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Anti-Crime Laws and Retail Prices

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Abstract

The fear of becoming a victim of crime acts like barriers to retail trade for consumers, where retailers attempt to reduce such barriers by enduring additional costs such as insurance or security/surveillance costs; as a result, retail prices are affected by the possibility of crime. This paper attempts to measure such effects by considering the recent experience of the County of Sacramento, where an anti-panhandling ordinance has been issued to protect the retailers. As an application, a difference-in-difference approach is employed to identify the effects of the ordinance on Sacramento gasoline prices at the retail level, by considering the gasoline prices in neighbor counties as the control group of a natural experiment. The results show that the anti-panhandling ordinance has resulted in lower gasoline prices in the County of Sacramento.

JEL Classification: H73, K42

Key Words: Anti-Crime Laws; Gasoline Retail Prices; Gas-Station Level Analysis; County of Sacramento

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1. Introduction

The fear of victimization imposes indirect costs to society through its negative impact on local business establishments, especially retailers that make a neighborhood a convenient and stable place to live and shop; e.g. see Gallagher (1989), Greenbaum and Tita (2004) and Rosenthal and Ross (2010). It has been shown that individuals perceive crime as highly visible signs of disorderly and disreputable behavior in the community, which affect a community's social and economic vitality. Therefore, crime is perceived as one of the most serious urban problems where high-crime neighborhoods discourage individuals from living, shopping, conducting business or seeking entertainment; e.g., see Fisher (1991). Although the fear of victimization has shown to contribute to neighborhood decline and deterioration, policy makers have given more importance to residential crime, fear of crime, and various disorders such as homelessness, prostitution, and abandoned buildings. However, the same attention has not been provided for the neighborhood businesses until recently; e.g., see Gallagher (1989) and Fisher (1991). Realizing this lack of attention, given the social and economic effects of crime on the local business establishments, many jurisdictions have started special programs to prevent crime in the last two decades, including a recent case by The County of Sacramento in 2015 to prohibit aggressive panhandling.

In the U.S., the Supreme Court has held that panhandling/begging is a form of speech that is protected by the Constitution[1], but political divisions have successfully outlawed "aggressive" forms of panhandling.[2] Therefore, aggressive panhandling has been started being defined as a crime in certain neighborhoods. The County of Sacramento is one of these divisions that has recently passed an ordinance prohibiting panhandling that has become effective on January 14th, 2015 as announced by the Sacramento County Sheriff's Department. In particular, the ordinance prohibits soliciting for cash in "an aggressive or intrusive manner in any public place," including within 35 feet from an automated teller machine (ATM), within 200 feet of a vehicle at an intersection, within any vehicle stopped at a gas station, on any traffic median strip and on buses and city trains.

This paper investigates the short-run effects of this ordinance on the equilibrium gasoline retail price in Sacramento County by using data at the station level. Since the equilibrium price depends on both demand and supply conditions, the effects of the ordinance may be through (i) the consumer side where customers may stop shying away from gas stations due to the fear of meeting aggressive pan-

[1] For example, see https://supreme.justia.com/cases/federal/us/497/720/case.html.

[2] Also see Smith (2005) who investigates the reasons behind the regulation of panhandling across 71 U.S. cities and shows that cities with higher welfare benefits are less likely to regulate begging, while cities with higher crime rates, higher proportions of disabled citizens, and higher proportions of collegeeducated citizens, and cities that are more densely populated are more likely to regulate begging.

handlers (as in Alrich and Reiss, 1976 or McPherson, 1978),[3] or (ii) the producer side where gas stations may stop facing additional costs (because of aggressive panhandlers) such as insurance premiums to cover losses, security/surveillance costs, lower profits due to shorter operating hours, replacing and repairing property, or higher labor costs in order to compensate employees for higher risks of working; e.g., see Steward (1986) and Fisher (1991). Within this context, the ordinance would result in a higher demand when customers stop shying away from gas stations, and it would result in a higher supply when gas stations face fewer costs. Moreover, gas stations may also get involved in marketing efforts at the time of (or right after) the ordinance (advertising a safer shopping environment) to further shift the individual demand toward shopping in Sacramento County, at the cost of their advertisement. Accordingly, the effects of the ordinance on the equilibrium gasoline price depends on the relative magnitude of such changes/shifts in demand and supply conditions as well as their corresponding initial positions (i.e., the price elasticities of demand and supply). In other words, without any further evidence, the theory is silent, and we need an empirical investigation in order to figure out such effects.

It is important to emphasize that such changes in retail prices may be observed even in the absence of the ordinance being fully effective; the announcement itself

[3] Also see http://www.yelp.com/topic/sacramento-can-you-spare-any-change-for-gas-wink-wink for the actual experience of customers in Sacramento, CA.

(on January 14th, 2015) may be enough for customers to stop shying away from gas stations or for gas stations to cut additional costs mentioned above, both due to the changes in expectations. In particular, Sacramento Sheriff's Department has made an announcement on its web page as well as the social media on January 14th, 2015, and this announcement has been widely covered by the local media, even starting from a week before the actual announcement date.[4] On top of this coverage on the internet, starting from January 14th, Sacramento Sheriff's Department has also offered panhandlers fliers and warnings about the ordinance, where they have been informed that they could be fined or face jail time.[5] Therefore, one would expect to observe the effects of the ordinance starting from its effective day of January 14th, 2015. Nevertheless, the observation of such effects also depends on timing or portion of gas stations taking the announcement into account; i.e., if all gas stations consider the announcement immediately for setting gasoline prices, one would expect to see the complete effects of the ordinance immediately, whereas if only some gas stations consider the announcement or if gas stations consider it later, one would expect to see the complete effects of the ordinance in a longer period of time.

In terms of the methodology, we achieve our investigation by using a difference-

[4] Among many others, see http://www.sacbee.com/news/local/article5638734.html

[5] See http://www.indystar.com/story/news/local/arden-lariviera/2015/01/16/new-sacramento-county-ordinance-bans-panhandling-in-certain-areas/21848319/

in-difference approach where the gas stations located in the County of Sacramento experiencing the policy change on January 14th, 2015 are analyzed as the treatment group of a natural policy experiment, and the control group consists of gas stations in the neighbor counties with no policy changes. Since the ordinance restricting panhandling near gas stations is due to the Sacramento County law (rather than market conditions), using a difference-in-difference approach is a compelling way to study the effects of the ordinance on retail prices, and it is robust to any identification/endogeneity problem. Since different gas stations may take into account the announcement of the ordinance in different time periods, we also consider alternative time intervals in our difference-in-difference investigation.

The benchmark results show that the gasoline prices have decreased in Sacramento County right after panhandling is prohibited compared to the neighbor counties. These short-run results are robust to the consideration of time fixed effects across stations. Since the equilibrium retail prices may also depend on retail characteristics such as the brand of the gas station, having a car wash or a convenience store, or the exact location of the gas station within the neighborhood, the benchmark investigation also considers brand fixed effects or station fixed effects. Therefore, there is strong evidence for lower gasoline prices right after the ordinance. It is implied that the changes in supply conditions (as discussed above) have been more effective than the changes in demand conditions in the determination of equilibrium gasoline prices. These benchmark results are

further supported by longer-term before-and-after analyses, and robustness tests considering outliers or gas stations that are closer to the county border, which all suggest lower gasoline prices in Sacramento County after the ordinance.

In the related literature, the effects of crime on sales and profits of the business have been well established by many earlier studies such as by McPherson (1978) or Alrich and Reiss (1976). The connection between panhandling and local economic activity has also been achieved in the existing literature. In one strand of the literature, studies such as by Foscarinis (1996) and Iwamoto (2007) show that the panhandling deters customers from patronizing local businesses, which results in fewer demand. However, such studies have not discussed/measured the quantitative effects of panhandling on the local economic activity; one of the contributions of this paper is to bridge this gap.

Greenbaum and Tita (2004), who investigate business establishments in five large U.S. cities between 1987 and 1994, have shown that establishments relying on face-to-face interaction such as retailers are more sensitive to changes in crime in terms of lost sales due to fearful customers. Similarly, studies such as by Wilcox et al. (2003), Warr (1990, 2000), Liska et al. (1988), and Skogan and Maxfield (1981) have shown how fear of violence would change the behavior of consumers, employees and entrepreneurs.[6] Accordingly, the costs of local businesses highly

[6]Studies such as by Bingham and Zhang (2001) or Rosenthal and Ross (2010) show how entrepreneurs take crime into account while deciding on their locations.

depend on the existence of crime (due to the costs discussed above). The degree of pass-through of these costs (to consumers) determine the pricing behavior of local businesses through competition within and across the neighborhoods. In addition to the existing literature, the main objective of this study is to measure the change in such local business prices due to an anti-crime law (i.e., the ordinance prohibiting panhandling in The County of Sacramento) by focusing on the gasoline retail prices.

The rest of the paper is organized as follows. The next section describes the panhandling ordinance in the Sacramento County. Section 3 achieves the empirical investigation by introducing the empirical strategy and the data used. Section 4 concludes.

2. Sacramento County Panhandling Ordinance

On May 13, 2014, the Board of Supervisors of the County of Sacramento has adopted an ordinance to ban aggressive panhandling in response to complaints from suburban business leaders and residents. According to the ordinance, "aggressive" is defined as conduct intended or likely to cause a reasonable person to fear bodily harm to oneself or to another, to fear damage to or loss of property, or otherwise to be intimidated into giving money or other thing of value; intentionally touching or causing physical contact with another person or an occupied

vehicle without that person's consent; persisting in closely following or approaching a person, after the person has informed a solicitor that such person does not want to be solicited or does not want to give money or any other thing of value to the solicitor; or using violent gestures toward a person.

In particular, the Board of Supervisors have declared:

> "The Board of Supervisors finds that an increase in aggressive solicitation throughout the County has become disturbing and disruptive to residents and businesses and has contributed not only to the loss of access to and enjoyment of places open to the public, but has also created an enhanced sense of fear, intimidation and disorder."

where solicitation has been defined as asking, begging, requesting, and/or panhandling using the spoken, written, or printed word, or bodily gestures, signs or other means with the purpose of obtaining an immediate donation of money or other thing of value or soliciting the direct and immediate sale of goods or services.

The ordinance, which has been adopted to protect the safety and welfare of the general public and improve the quality of life and economic vitality (according to the official ordinance), prohibits panhandling near financial institutions and ATMs; motor vehicles; median strips; driveways accessing shopping centers, retail, and business establishments; public transportation vehicles and stops; and gasoline stations and fuel pumps. Regarding the latter, the ordinance has declared

"No person shall solicit from an operator or occupant of a motor vehicle while such vehicle is stopped in a gasoline station or at a gasoline pump." As a penalty, the ordinance has declared that any person who violates the ordinance shall be guilty of an infraction, and any person who violates it more than two times within a six month period shall be guilty of a misdemeanor.

However, The American Civil Liberties Union of Northern California has sued to stop enforcement of this new law due the violation of the First Amendment to the United States Constitution in terms of broadly and over-inclusively prohibiting free speech. On January 7th, 2015, the county settled the federal lawsuit brought against the ordinance by changing it to include fund raising like the Sacramento Metro Fire Department's "Fill the Boot" for burn victims campaign. Accordingly, on January 14th, 2015, Sacramento Sheriff's Department has made the following announcement:[7]

> "As a result of a December 2014 court settlement by the County of Sacramento, the Sacramento Sheriff's Department will be embarking on the thirty day period of educating both our employees and the public in regards to the enforcement of the Sacramento County Panhandling Ordinance (sections 9.81.010-070). Effective today, patrol officers who encounter persons that may be unaware they are committing a violation of this ordinance will

[7]The announcment can be found at the following link: http://www.sacsheriff.com/media/Release.aspx?id=1277

be handed an educational notice. While the Sheriff's Department aims to retain discretion during each violation encounter, our goal is to gain voluntary compliance rather than issue a citation in every situation."

when the panhandling ordinance has officially become effective. Therefore, we accept January 14th, 2015 as the time of a policy change affecting gas stations. Since this announcement has been widely covered by the local media, even starting from a week before the actual announcement date, and since Sacramento Sheriff's Department has also offered panhandlers fliers and warnings about the ordinance starting from January 14th, 2015, where they have been informed that they could be fined or face jail time, we expect to observe the effects of the ordinance starting from its effective day of January 14th, 2015.

3. Empirical Investigation

3.1. Estimation Methodology and Data

The gas stations located in the County of Sacramento experiencing the policy change on January 14th, 2015 are analyzed as the treatment group of a natural policy experiment, where the control group consists of gas stations in the neighbor counties (depicted in Figure 1) with no policy changes. Since the ordinance restricting panhandling near gas stations is due to the Sacramento County law (rather than market conditions), using a difference-in-difference approach is a

compelling way to study the effects of the ordinance on retail prices, and it is robust to any identification/endogeneity problem.

We start with investigating the short-run trends in gasoline prices before and after January 14th in Figure 2, where the average gasoline prices of the treatment group (i.e., the County of Sacramento) have been shifted such that the average gasoline prices during the pre-treatment period are equalized across Sacramento and neighboring counties in order to focus on trends over time (rather than scales). As is evident, the gasoline price trends of the County of Sacramento and neighbor counties are very similar before the policy change. This common trend during the pre-treatment period is also supported by a formal test, where the hypothesis of having an uncommon trend between Sacramento and neighboring counties is rejected.[8] However, the average prices across Sacramento and neighboring counties deviate from each other after the ordinance becomes effective, when gasoline

[8] In technical terms, the pooled version of gasoline prices (at the station level) in Sacramento and neighboring counties during the pre-treatment period are regressed on a time trend and its interaction with a dummy representing the gas stations in the County of Sacramento. We test the significance of the interaction term in this regression; if it is significant, there is evidence for an uncommon trend across Sacramento and neighboring counties, otherwise, there is evidence for a common trend. The regression results show that the time trend is negative and significant at the 5 percent level, whereas the interaction term is insignificant, suggesting that there is in fact a common trend of gasoline prices across Sacramento and neighboring counties during the pre-treatment period.

prices in the County of Sacramento become lower, on average across stations.

Nevertheless, for robustness, we need a formal investigation in order to control for all other factors that are specific to the gas stations, brands or time periods. Accordingly, in terms of the econometric model, we consider the following expression for the retail price of gasoline in station s selling brand b at time t:

$$\begin{aligned} \ln\left(\text{RetailPrice}_{sbt}\right) &= \beta_0 + \beta_1 1\left(\text{Sacramento}_s\right) * \text{PostReform}_t \\ &\quad + 1\left(\text{Sacramento}_s\right) + \delta_s + \delta_b + \delta_t + \varepsilon_{sbt} \end{aligned} \tag{3.1}$$

where $1\left(\text{Sacramento}_s\right)$ is an indicator that the retailer is located in Sacramento County, PostReform_t is an indicator that the gas price is observed after the anti-panhandling ordinance of Sacramento County, δ_s represents station fixed effects capturing the characteristics of station s that are constant over time (e.g., any demand shifter across stations such as being in the treatment or the control group, the geographical characteristics, having a car wash or a convenience store, etc.), δ_b represents brand-specific effects (that are effective in the absence of station fixed effects), and δ_t represents time fixed effects (based on the time of data collection) capturing aggregate factors that would cause changes in the retail price even in the absence of a policy change.

In this econometric model, it is important to emphasize that the identification (of the effects of the ordinance) is achieved through the time dimension (i.e., before and after the implementation of the law) rather than the cross-sectional dimension

of gas stations. Accordingly, station fixed effects would capture the characteristics of gas stations that are common before and after the change in the law, whereas the gas stations in Sacramento may experience a change in their prices only after the change in the law (i.e., identification through the time dimension). In other words, station fixed effects are essential in our investigation, consistent with the regression specifications in influential studies such as by Bertrand et al. (2004).

The gasoline price data has been downloaded at midnight of each day from MapQuest.[9] MapQuest receives gasoline prices from Oil Price Information Service (OPIS), a leading provider of petroleum data collecting gas price data based on fleet transaction data.[10] MapQuest gas prices are updated as qualifying transactions are processed by OPIS. The exact location of the gas station, together with its brand and the approximate time of the gasoline-price update, is also provided by MapQuest. We analyze the days of January 13th and 15th in the formal benchmark analysis, where we focus on the very same gas stations in the County of Sacramento and neighbor counties. This corresponds to a one-day before and after analysis. While the number of gas stations in the County of Sacramento is 68, it is 248 in neighbor counties.

For robustness, by taking into account the very same gas stations, we also

[9] The link is http://gasprices.mapquest.com/.

[10] Focusing on other topics and time periods, earlier studies such as by Abrantes-Metz et al. (2006), Doyle and Samphantharak (2008), and Chandra and Tappata (2011) have also used this data set.

consider alternative before and after analyses. In particular, we achieve a five-day and a two-week before and after analyses on top of the benchmark analysis.

Moreover, we also consider alternative specifications in order to test the robustness of the results regarding the definition of the dependent variable (i.e., logs versus levels), outliers, or the proximity of the gas stations to the county border.

3.2. Estimation Results

The estimation results for the one-day before and after analysis are given in Table 1, where the change in gasoline prices in the County of Sacramento (after the policy change) is negative and significant in all cases, with or without control variables. Since the dependent variable is the log gasoline prices, the estimated coefficients suggest that the gasoline prices in the County of Sacramento have been about 1.5 percent lower compared to the neighbor counties after the policy change. This result is robust to the consideration of all control variables, including station fixed effects, brand fixed effects or time fixed effects. Therefore, on top of the graphical evidence in Figure 2, there is also econometric evidence for lower retail prices due to the anti-panhandling ordinance in the County of Sacramento. This result is further supported by high explanatory powers, especially when all control variables are included in regression case (5) in Table 1.[11]

[11] It is important to emphasize that the results in Table 1 are robust to the clustering critique of diff-in-diff by Bertrand et al. (2004). In particular, these results already correspond to the

Although the effects of an anti-crime law on retail prices have been shown to be negative in Table 1, there is more that we can learn from the columns of it. As is evident, each control variable (i.e., each set of fixed effects) is important in explaining the data better (by improving the explanatory power across columns). For example, when we compare columns 1 and 3, we observe the contribution of having time fixed effects which corresponds to an increase in the adjusted R-squared about 0.28. Similarly, when columns 3 and 4 are compared, the contribution of brand fixed effects corresponds to an increase in the adjusted R-squared about another 0.08. However, the biggest contribution is achieved by retail characteristics (captured by gas-station fixed effects) where the R-squared value increases by about 0.45 between columns 4 and 5. Therefore, retail characteristics explain the lion's share of price changes, followed by time fixed effects and brand fixed effects (that become ineffective when station fixed effects are considered in column 5). Although the explanatory power across columns change significantly (due to alternative control variables), it is encouraging for the results of this paper to see that the negative effects of the Sacramento County panhandling ordinance on retail prices are very similar across columns of Table 1.

empirical solution to the problem of underestimated standard errors in Bertrand et al. (2004) under their section titled "ignoring time series information."

3.3. Robustness Checks

We consider the possibility that on the specific days of January 13th and 15th in the benchmark investigation, the results may be affected by some other events that cannot be captured in this study. Accordingly, we consider alternative robustness checks in this subsection.

The first robustness check is achieved by considering a five-day before and after analysis by using the price data from the specific days of January 9th and 19th. The results are given in Table 2. As is evident, the change in gasoline prices in the County of Sacramento (after the policy change) is negative and significant in all cases, although the standard errors differ across columns 1 and 5. The estimated coefficient representing the policy change corresponds to a price reduction in the County of Sacramento of about 4 percent compared to the neighbor counties. Although the explanatory power of the regressions are still high, they are lower compared to the corresponding values in Table 1, mostly due to the possibility that many other factors effecting the prices have changed over the considered period.

The second robustness check is achieved by considering a two-week before and after analysis where the price data obtained from the specific days of January 1st and 27th are used. The corresponding results are given in Table 3 where, again, the change in gasoline prices in the County of Sacramento (after the policy change)

is negative and significant in all cases. The magnitude of the coefficient, however, is much higher compared to the earlier tables, where the prices in the County of Sacramento have declined about 6 percent after the policy change, compared to the neighbor counties.

Another robustness check is achieved by considering all the days in Tables 1-3 (i.e., January 1st, 9th, 13th, 15th, 19th, and 27th). The corresponding results are given in Table 4 where the retail price reduction in the County of Sacramento is negative and significant in all regressions, with or without any control variables. When we replace the log of gasoline retail prices on the left hand side of Equation **??** with the level of gasoline retail prices by using the same data as in Table 4, the corresponding results are given in Table 5. As is evident, the retail price reduction in the County of Sacramento is again negative and significant in all regressions, with or without any control variables.

In order to test the robustness of the results regarding outliers, we consider another alternative specification by ignoring the observations below 5th percentile and above 95th percentile (of percentage changes in gasoline prices) by using the same data as in Table 4. As is evident in Table 6, the results (of lower retail prices in the County of Sacramento) are robust to the consideration of such outliers as well.

Finally, in order to investigate whether the gasoline retail prices in gas stations closer to the county border have been affected in a different way, we split the set of

gas stations in Sacramento into two subsets based on their minimum distance to the closest station in neighbor counties. Accordingly, one set covers the stations that are relatively closer to their closest stations in the neighbor county (i.e., its minimum distance is below the median minimum distance across Sacramento stations), while the other set covers the stations that are relatively remote from their closest stations in neighbor counties. The corresponding results in Table 7 show that when all control variables are considered, the retail price reduction in Sacramento stations that are closer to the county border is relatively higher (in absolute terms) than in ones that are remote from the county border. It is implied for Sacramento stations near the county border that for instance a marketing effort is more likely to pay off in that it attracts patrons from other counties. Therefore, competition between the stations in the County of Sacramento that are closer to the county border and the neighbor counties might also have played an important role in the determination of the effects of the ordinance on retail prices.

4. Concluding Remarks

Crime is costly for retail establishments. Since there are no pure data available for such costs, the measurement of these costs requires an empirical strategy that is robust to any identification/endogeneity problem. By considering the recent case of Sacramento County panhandling ordinance, this study has achieved

such a robust investigation by using a difference-in-difference approach where the gas stations located in the County of Sacramento experiencing the policy change on January 14th, 2015 are analyzed as the treatment group of a natural policy experiment, and the control group consists of gas stations in the neighbor counties with no policy changes.

The results have shown that during a period with a decreasing general trend in gasoline prices, the retail prices in Sacramento County (measured by gas-station level gasoline prices) have decreased further compared to the neighbor counties after the ordinance has been announced. These results are robust to the consideration of time fixed effects, brand fixed effects or other retailer characteristics (measured by gas-station fixed effects), as well as any potential outliers in the sample. According to the results of a further analysis, competition between the stations in the County of Sacramento that are closer to the county border and the neighbor counties might also have played an important role in the determination of the effects of the ordinance on retail prices.

It has also been shown that retail prices are explained most by retailer characteristics, followed by time and brand fixed effects. Accordingly, for future research, one path may be to investigate how retailer characteristics (such as having a car wash or a convenience store) interact with the effects of anti-crime laws on retail prices, although it was not the focus of this paper due to the lack of available data.

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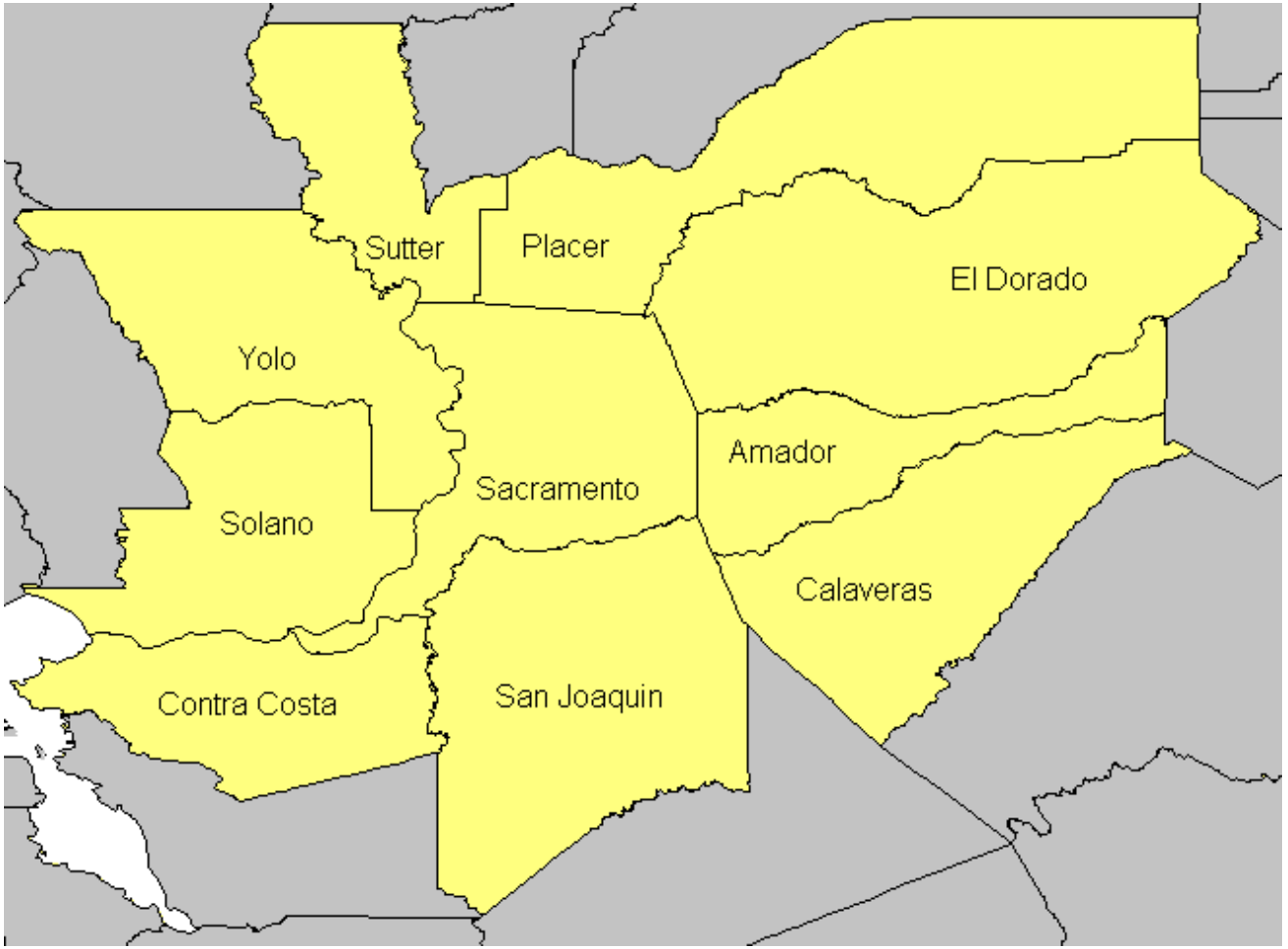
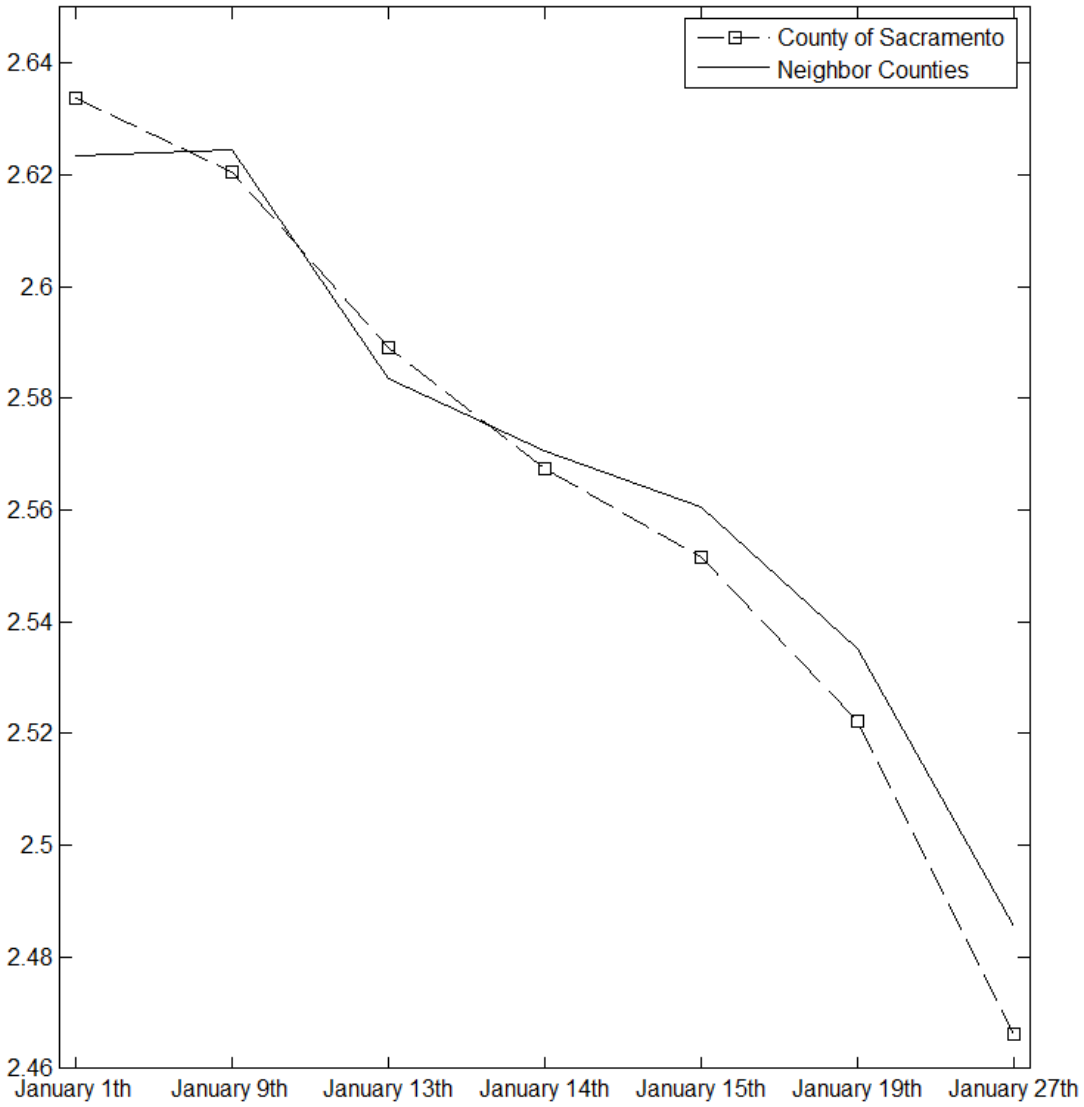
Figure 1 – County of Sacramento and Neighbor Counties



Notes: The shape files that have been used to create this map have been obtained from the U.S. Census Bureau.

Figure 2 – Average Gasoline Prices in Sacramento County versus Neighbor Counties



Notes: In order to focus on trends over time (rather than scales), average gasoline prices of the treatment group (i.e., the County of Sacramento) have been shifted such that the average value of pre-treatment gasoline prices are equalized across Sacramento and neighboring counties.

Table 1 – Benchmark Estimation Results: One-Day Before and After Analysis

	Dependent Variable: Log Gasoline Prices				
	(1)	(2)	(3)	(4)	(5)
$(Sacramento_s)^*PostReform_t$	-0.0151+	-0.0151+	-0.0151+	-0.0151+	-0.0151*
	(0.00823)	(0.00833)	(0.00777)	(0.00778)	(0.00615)
Brand Fixed Effects	NO	YES	NO	YES	YES
Time Fixed Effects	NO	NO	YES	YES	YES
Station Fixed Effects	NO	NO	NO	NO	YES
Sacramento Fixed Effects	YES	YES	YES	YES	YES
# of Stations in Sacramento County	68	68	68	68	68
# of Stations in Neighbor Counties	248	248	248	248	248
Total # of Stations	316	316	316	316	316
Sample Size	632	632	632	632	632
Overall Adjusted R-Squared	0.003	0.207	0.287	0.368	0.815

Notes: ***, **, *, and + represent significance at the 0.1%, 1%, 5% and 10% levels. Standard errors in parenthesis represent cluster-robust measures at the county level.

Table 2 – Alternative Estimation Results: Five-Day Before and After Analysis

	Dependent Variable: Log Gasoline Prices				
	(1)	(2)	(3)	(4)	(5)
$(Sacramento_s)^* PostReform_t$	-0.0383***	-0.0383***	-0.0383***	-0.0383***	-0.0383***
	(0.00720)	(0.00734)	(0.00656)	(0.00654)	(0.00414)
Brand Fixed Effects	NO	YES	NO	YES	YES
Time Fixed Effects	NO	NO	YES	YES	YES
Station Fixed Effects	NO	NO	NO	NO	YES
Sacramento Fixed Effects	YES	YES	YES	YES	YES
# of Stations in Sacramento County	68	68	68	68	68
# of Stations in Neighbor Counties	248	248	248	248	248
Total # of Stations	316	316	316	316	316
Sample Size	632	632	632	632	632
Overall Adjusted R-Squared	0.023	0.205	0.283	0.353	0.659

Notes: ***, **, *, and + represent significance at the 0.1%, 1%, 5% and 10% levels. Standard errors in parenthesis represent cluster-robust measures at the county level.

Table 3 – Alternative Estimation Results: Two-Week Before and After Analysis

	Dependent Variable: Log Gasoline Prices				
	(1)	(2)	(3)	(4)	(5)
$(Sacramento_s)^* PostReform_t$	-0.0631***	-0.0631***	-0.0631***	-0.0631***	-0.0631***
	(0.00693)	(0.00693)	(0.00673)	(0.00669)	(0.00448)
Brand Fixed Effects	NO	YES	NO	YES	YES
Time Fixed Effects	NO	NO	YES	YES	YES
Station Fixed Effects	NO	NO	NO	NO	YES
Sacramento Fixed Effects	YES	YES	YES	YES	YES
# of Stations in Sacramento County	68	68	68	68	68
# of Stations in Neighbor Counties	248	248	248	248	248
Total # of Stations	316	316	316	316	316
Sample Size	632	632	632	632	632
Overall Adjusted R-Squared	0.057	0.194	0.22	0.279	0.432

Notes: ***, **, *, and + represent significance at the 0.1%, 1%, 5% and 10% levels. Standard errors in parenthesis represent cluster-robust measures at the county level.

Table 4 – Alternative Estimation Results: Full-Sample Before and After Analysis

	Dependent Variable: Log Gasoline Prices				
	(1)	(2)	(3)	(4)	(5)
$(Sacramento_s)^*PostReform_t$	-0.0388***	-0.0388***	-0.0388***	-0.0388***	-0.0388***
	(0.00443)	(0.00448)	(0.00415)	(0.00413)	(0.00294)
Brand Fixed Effects	NO	YES	NO	YES	YES
Time Fixed Effects	NO	NO	YES	YES	YES
Station Fixed Effects	NO	NO	NO	NO	YES
Sacramento Fixed Effects	YES	YES	YES	YES	YES
# of Stations in Sacramento County	68	68	68	68	68
# of Stations in Neighbor Counties	248	248	248	248	248
Total # of Stations	316	316	316	316	316
Sample Size	1896	1896	1896	1896	1896
Overall Adjusted R-Squared	0.025	0.199	0.295	0.361	0.700

Notes: ***, **, *, and + represent significance at the 0.1%, 1%, 5% and 10% levels. Standard errors in parenthesis represent cluster-robust measures at the county level.

Table 5 – Alternative Estimation Results: Full-Sample Before and After Analysis, Level of Prices

	Dependent Variable: Gasoline Prices				
	(1)	(2)	(3)	(4)	(5)
$(Sacramento_s)^* PostReform_t$	-0.0992***	-0.0992***	-0.0992***	-0.0992***	-0.0992***
	(0.0114)	(0.0115)	(0.0107)	(0.0106)	(0.00757)
Brand Fixed Effects	NO	YES	NO	YES	YES
Time Fixed Effects	NO	NO	YES	YES	YES
Station Fixed Effects	NO	NO	NO	NO	YES
Sacramento Fixed Effects	YES	YES	YES	YES	YES
# of Stations in Sacramento County	68	68	68	68	68
# of Stations in Neighbor Counties	248	248	248	248	248
Total # of Stations	316	316	316	316	316
Sample Size	1896	1896	1896	1896	1896
Overall Adjusted R-Squared	0.026	0.189	0.288	0.352	0.699

Notes: ***, **, *, and + represent significance at the 0.1%, 1%, 5% and 10% levels. Standard errors in parenthesis represent cluster-robust measures at the county level.

Table 6 – Alternative Estimation Results: Full-Sample Before and After Analysis, Controlling for Outliers

	Dependent Variable: Log Gasoline Prices				
	(1)	(2)	(3)	(4)	(5)
$(Sacramento_s)^* PostReform_t$	-0.0287***	-0.0293***	-0.0290***	-0.0289***	-0.0338***
	(0.00288)	(0.00277)	(0.00259)	(0.00257)	(0.00230)
Brand Fixed Effects	NO	YES	NO	YES	YES
Time Fixed Effects	NO	NO	YES	YES	YES
Station Fixed Effects	NO	NO	NO	NO	YES
Sacramento Fixed Effects	YES	YES	YES	YES	YES
# of Stations in Sacramento County	68	68	68	68	68
# of Stations in Neighbor Counties	248	248	248	248	248
Total # of Stations	316	316	316	316	316
Sample Size	1744	1744	1744	1744	1744
Overall Adjusted R-Squared	0.042	0.353	0.502	0.534	0.581

Notes: ***, **, *, and + represent significance at the 0.1%, 1%, 5% and 10% levels. Standard errors in parenthesis represent cluster-robust measures at the county level.

Table 7 – Alternative Estimation Results: Full-Sample Before and After Analysis, Stations at the Country Border

	Dependent Variable: Log Gasoline Prices				
	(1)	(2)	(3)	(4)	(5)
$(Sacramento_s)^* PostReform_t$	-0.0457***	-0.0422***	-0.0387***	-0.0368***	-0.0424***
(Closer to County Border)	(0.00595)	(0.00578)	(0.00553)	(0.00552)	(0.00498)
$(Sacramento_s)^* PostReform_t$	-0.0320***	-0.0354***	-0.0390***	-0.0408***	-0.0353***
(Remote from County Border)	(0.00469)	(0.00495)	(0.00501)	(0.00498)	(0.00311)
Brand Fixed Effects	NO	YES	NO	YES	YES
Time Fixed Effects	NO	NO	YES	YES	YES
Station Fixed Effects	NO	NO	NO	NO	YES
Sacramento Fixed Effects	YES	YES	YES	YES	YES
# of Stations in Sacramento County	68	68	68	68	68
# of Stations in Neighbor Counties	248	248	248	248	248
Total # of Stations	316	316	316	316	316
Sample Size	1896	1896	1896	1896	1896
Overall Adjusted R-Squared	0.026	0.199	0.294	0.361	0.701

Notes: ***, **, *, and + represent significance at the 0.1%, 1%, 5% and 10% levels. Standard errors in parenthesis represent cluster-robust measures at the county level.