The Effects of Universal Background Check Laws on Firearm Sales

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Abstract
Requiring background checks for gun purchases from both retail dealers and private parties is a popular and frequently discussed policy proposal. I evaluate the effects of such "universal background check" (UBC) policies on private and dealer gun sales using more than 10 years of data from online gun classified ads. Using a stacked difference-in-differences estimator, I find that the six states that implemented UBC laws covering all firearm sales from 2014 to 2023 saw a 56% reduction in classified ads for private gun sales and a 23% increase in classified ads for dealer sales. The results suggest that private and retail firearm markets are imperfect substitutes. The large reduction in private sales activity also challenges the hypothesis that compliance with UBC laws is low—faced with an increase in the costs of conducting private sales, sellers may simply withdraw from firearm markets rather than conduct dealer-facilitated or illegal private sales. While UBC laws effectively curtail private transactions, they may do so at significant cost to the gun sellers who withdraw from the market.

Keywords: firearm, gun sales, background check

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1 Introduction

Gun violence is a significant public health issue in the United States; about 45,000 Americans die annually from gun-related injuries, making guns one of the leading causes of death. Universal background check laws, which require gun buyers in both private and retail sales to undergo a background check to purchase a firearm, are among the most debated solutions for mitigating gun violence. In the past decade, there has been a notable increase in the adoption of such regulations. Currently, 22 states have laws mandating background checks for private firearm sales, with 18 of these requiring background checks for both private handgun and long gun (rifle and shotgun) sales.

I examine the impact of universal background check (UBC) policies on private firearm sales using novel longitudinal data on classified ads from one of the largest online firearm marketplaces. I find that UBC laws lead to a 56-percent decrease in the number of classified ads for private firearm sales, indicating that these regulations reduce the volume of firearms traded outside of formal retail channels. In contrast to this large reduction in ads for privately-sold firearms, I observe a more modest 23-percent increase in advertising activity by federally licensed firearm dealers. This increase is insufficient to offset the substantial decrease in private sales, suggesting that private and retail firearm markets are imperfect substitutes.

This paper contributes to research on the effects of gun policy by estimating how UBC laws affect sales in private markets. While prior studies have examined how UBC laws affect gun violence or the number of background checks conducted (Castillo-Carniglia et al., 2018), a lack of data on private firearm transactions has limited researchers' ability to observe the laws' effects on the private gun markets specifically targeted by UBC laws. I overcome this challenge by using more than 10 years of longitudinal data on classified ads posted to the internet's largest firearms marketplace, which previous studies have

shown are a reliable indicator of sales (Kim & Wilbur, 2022). In doing so, I capture market responses that are not readily observable using traditional data.

The findings offer insights for policymakers in the ongoing debate over gun control legislation. Studies on the effects of UBC laws on suicide and homicide report mixed results (Gius, 2015; Kagawa et al., 2018; McCourt et al., 2020), and several studies propose that non-compliance greatly limits the effectiveness of UBC policies (Castillo-Carniglia et al., 2018; Merrill-Francis et al., 2021). Predictions that background check activity should increase following UBC adoption implicitly assume that participants in private markets will switch to conducting transactions via licensed dealers. My results suggest this is often not the case. Rather than reflect non-compliance, however, my findings suggest that many sellers in private markets likely cease selling entirely rather than incur the costs of finding a licensed dealer to facilitate the purchase. Overall, the results indicate that UBC laws effectively curtail private transactions and limit the availability of guns outside of retail markets but may do so at significant cost to gun sellers who withdraw from the market.

2 Universal Background Check Laws

Federal background checks for firearm purchases in the United States date to the Brady Handgun Violence Prevention Act of 1993, which required federally licensed firearm dealers (FFLs) to conduct a background check on buyers and established the National Instant Criminal Background Check System (NICS) that FFLs now use to conduct instant background checks on prospective gun buyers. Since the implementation of NICS, the FBI has denied more 2.4 million firearm purchases with about 50% of denials being due to the prospective buyer having a disqualifying criminal conviction.[1] Federal law,

[1] Data on denials as of April 30, 2025. See https://www.fbi.gov/file-repository/cjis/federal_denials.pdf for the FBI's regularly updated count of denials by category of prohibited purchaser.

however, does not require background checks for private gun sales—sales by sellers who are not licensed dealers—if the buyer and seller are residents of the same state. Some states, however, have closed this "gap" by implementing universal background check (UBC) laws requiring background checks for private transactions.

In states with UBC laws, prospective gun buyers must complete private firearm sales at a federally licensed dealer, who facilitates the sale by conducting a background check on the buyer and only transferring the weapon if the buyer is not prohibited from owning a firearm. Survey evidence suggests that about 64% of firearm acquisitions are purchases from gun stores with the remaining 36% being private sales, gifts, inheritances, or other transfers (Miller et al., 2017). About 22% of all firearm transfers and 50% of private firearm sales occur without a background check (Miller et al., 2017).

Table 1 shows the evolution of firearm background check policies across the fifty states from July 2014 through December 2023. During this period, six states (NM, NV, OR, VA, VT, WA) went from having no law regarding background checks on private firearm sales to requiring checks on all sales. One state (MN) adopted a law requiring background checks for private handgun sales after having no policy, one state (MD) expanded a law requiring checks for handgun purchases to cover rifles and shotguns, and two states (IA, NC) repealed laws requiring background checks on private handgun sales. The other 40 states either had laws requiring a background check for all private firearm sales (CA, CO, CT, DE, HI, IL, MA, NJ, NY, RI) or handgun sales (MI, NE, PA), or did not require checks on any private sales (AK, AL, AR, AZ, FL, GA, ID, IN, KS, KY, LA, ME, MO, MS, MT, ND, NH, OH, OK, SC, SD, TN, TX, UT, WI, WV, WY) for the entire period between July 2014 and December 2023. As shown in Table 1 and Figure 1, policy changes are staggered with few states changing their policies in the same year.

3 Methodology

I estimate the causal effect of UBC laws on private gun sales in adopting states using a staggered, difference-in-differences design that compares changes in sales activity in states that implemented new UBC laws between July 2014 and December 2023 to changes in states that never had such laws during the same period:

$$E[Y_{itc}|UBC_{itc}] = \exp(\beta \times UBC_{itc} + \alpha_{ic} + \lambda_{tc}) \quad (1)$$

where Y_{ict} is private sales activity in state i and week t for UBC-adoption cohort c (see below). The variable UBC_{itc} is an indicator that equals 1 if state i has a universal background check law in-effect in week t. The terms α_{ic} and λ_{tc} denote state-cohort and week-cohort fixed effects, respectively.

This difference-in-differences study design accounts for the staggered adoption of UBC laws using the "stacked DID" approach (Cengiz et al., 2019). This estimation strategy first forms "cohorts" of states that adopted UBC laws at the same time and then constructs a balanced panel of control states that did not adopt UBC laws any time during the study period for each cohort.

I use the exponential functional form because the outcomes are non-negative and can include zero. Recent work demonstrates that log-linear models that adjust for zero-valued outcomes by adding one to the dependent variable do not estimate treatment effects for variables that affect both the intensive and extensive margins (Chen & Roth, 2024). The exponential specification, however, provides reliable estimates in such settings.

4 Data

4.1 Measuring private firearm sales

I measure gun sales activity in the private market with data on classified ads posted to Armslist.com, the internet's largest online marketplace for private firearm sales. To gather these data, I scraped all new ads posted to Armslist.com every day for over ten years beginning in July 2014, collecting information about the type of gun offered, the listing location, and whether the seller was a licensed dealer among other attributes.

Although online classified ads for firearms are not equivalent to completed sales, prior research suggests such advertisements are a useful proxy for sales (Kim & Wilbur, 2022). The difficulty of obtaining data on gun sales, especially sales conducted privately, is a major obstacle to studying markets for firearms and their effects on public health. As a result, researchers frequently rely on creative proxies for sales and gun ownership, such as Google search traffic (Briggs & Tabarrok, 2014), subscriptions to gun magazines (Duggan, 2001), the share of suicides with a gun (Cerqueira et al., 2019; Cook & Ludwig, 2006), and the count of background checks completed by the National Instant Criminal Background Check System (Castillo-Carniglia et al., 2018). Although researchers have devised several effective proxies for firearm ownership or sales (Haviland et al., 2021; Kim & Wilbur, 2022), previously used measures do not distinguish between private and dealer sales and are therefore inadequate for studying the effects of background check laws on *private* transactions. UBC laws' emphasis on private gun sales compounds the usual difficulty of finding reliable data because analyses must distinguish between newly regulated private sales—which should decrease following the adoption of UBC laws—and dealer-facilitated transactions, which have long required a background check and theoretically might increase following the implementation of greater restrictions on private sales.

Figure 2 shows the geographic distribution of online classified ads for private firearm sales posted between July 2014 and December 2023 at the county level. To match classified ads to counties, I geocode the location name posted by the seller in the advertisement. Private firearm sales are advertised in nearly all counties of the United States, including in states like California that have long regulated private transactions. The primary areas with few classified ads are a swath of small, mostly low-population counties in the middle of the United States.

Figure 3 reports the total number of gun classified ads posted each week between July 2014 and December 2023. The red line shows the number of ads for transactions by private sellers—i.e., sellers who are not licensed firearm dealers. The sharp drop in private sale ads in late 2020 corresponds with when the online marketplace instituted a membership fee. The lower blue line shows the number of ads by licensed firearm dealers who have been required to conduct background checks by federal law since 1994.

4.2 Universal background check laws

I assemble a list of states requiring universal background checks using information on gun policies from the Giffords Law Center to Prevent Gun Violence and by manually reviewing state statutes and public laws to determine the effective date of changes and whether each law applies to all private firearm sales or only handgun sales. Table 1 and Figure 1 show the status of state UBC laws from July 2014 through December 2023. Information about state law changes begins in July 2014 because this is when I started collecting data on private sale classified ads.

5 Results

Figure 4 shows the "event study" estimates for the multiplicative treatment effect of implementing a universal background law for all firearm purchases on classified ads for private firearm sales. Classified ads for private firearm sales immediately and

dramatically decrease the week the UBC law takes effect. Classified ads slightly recover over the following eight weeks, then begin a gradual and permanent decline relative to the pre-UBC period. Coefficient estimates for the pre-period indicate anticipation effects consistent with forward-looking behavior by private sellers of firearms. Between two and five weeks before the UBC laws take effect, sellers increase their posting of classified ads, perhaps hoping to complete sales before the background check requirements take effect. Then, in the week immediately prior to the law taking effect, classified ads decrease by a statistically insignificant 14% relative to six weeks before the effective date (the omitted period in Figure 4). This decrease may be the result of sellers anticipating that a sale cannot be completed within the week before the UBC effective date; online classified ads for private firearm sales are active for an average of six weeks.

Aside from the obvious anticipation effects in the five weeks before UBC implementation in Figure 4, trends in classified ads pre-UBC are roughly parallel, with point estimates close to zero and only small deviations relative to the post-treatment effect estimates.

Figure 5 shows estimates for the effect of universal background check laws on ads for *dealer* rather than private sales. Background check laws increase the cost of conducting private gun sales by requiring private parties to conduct sales through a dealer. The estimates for dealer classified ads in Figure 5 are less precise than the estimates for private sale ads in Figure 4, but show a slight increase in dealer ads following UBC adoption.

Table 2 shows difference-in-difference estimates of the treatment effect of UBC laws on adopting states over the entire post-period. The estimates in Columns 1–2, which are population weighted, indicate that universal background checks decrease private sale ads by 56% and increase ads by licensed firearm dealers by 23%. Estimates in Columns 3–4, which are not weighted, lead to similar conclusions but with much larger standard

errors for the effects of UBC laws on dealer ads (Column 4). Overall, the estimates in Table 2 indicate that private and dealer firearm sales are imperfect substitutes and that the sharp decrease in ads by private sellers is not offset by an increase in ads by dealers, who generally post much fewer ads in the online marketplace (see Figure 3).

6 Conclusion

This study uses more than 10 years of data from an online firearms marketplace to estimate the effect of universal background check (UBC) policies on classified ads, a proxy for gun sales. The analysis distinguishes between ads by private sellers and ads posted by licensed firearm dealers to examine the effects of UBC laws on each market. I find that UBC adoption decreases private sale ads by 56% and increases ads by licensed firearm dealers by 23%. The increase in ads by licensed dealers is not sufficient to offset the reduction in private sale ads, suggesting that private and retail markets are imperfect substitutes. UBC laws effectively limit the availability of guns in private markets.

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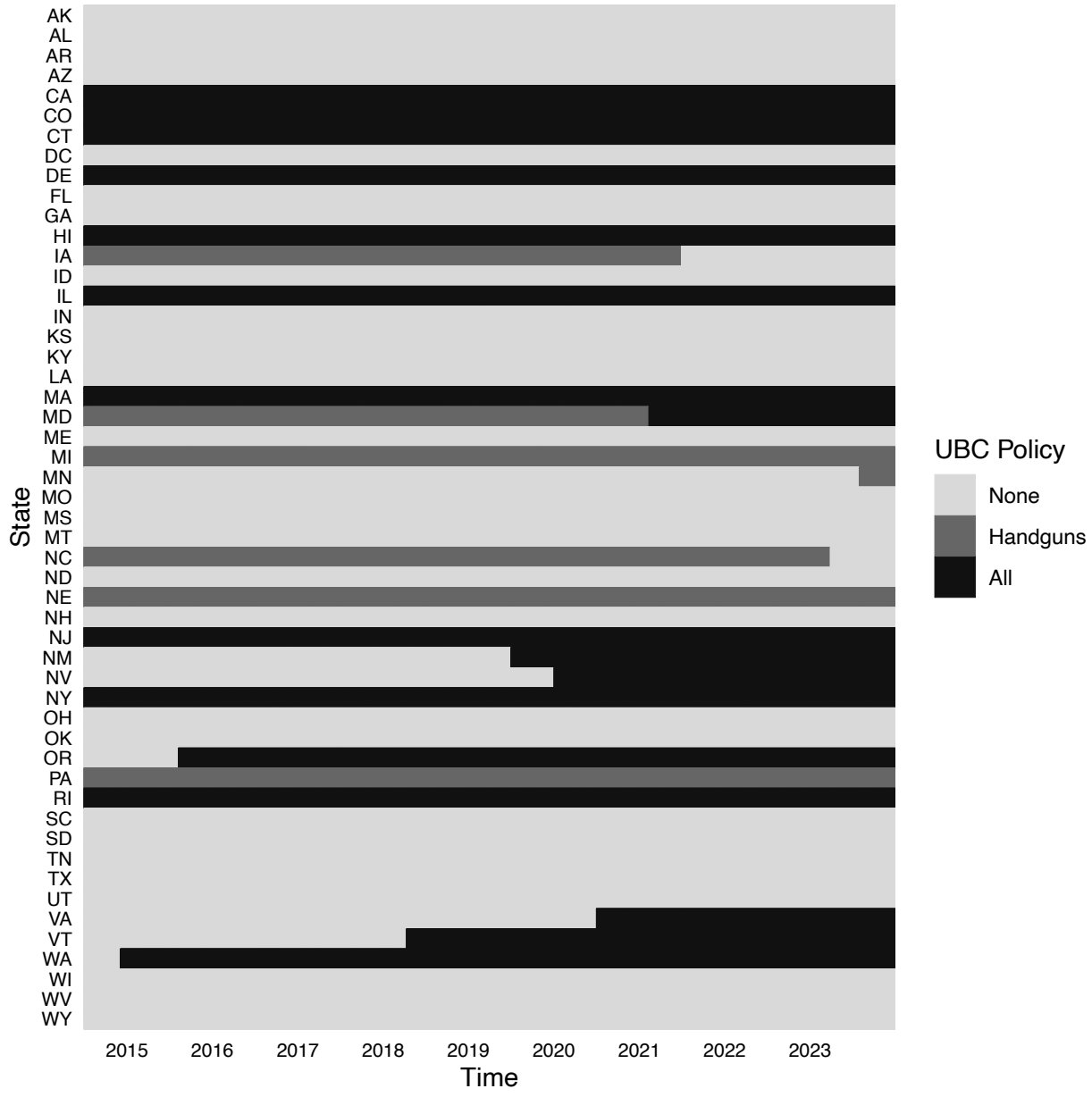
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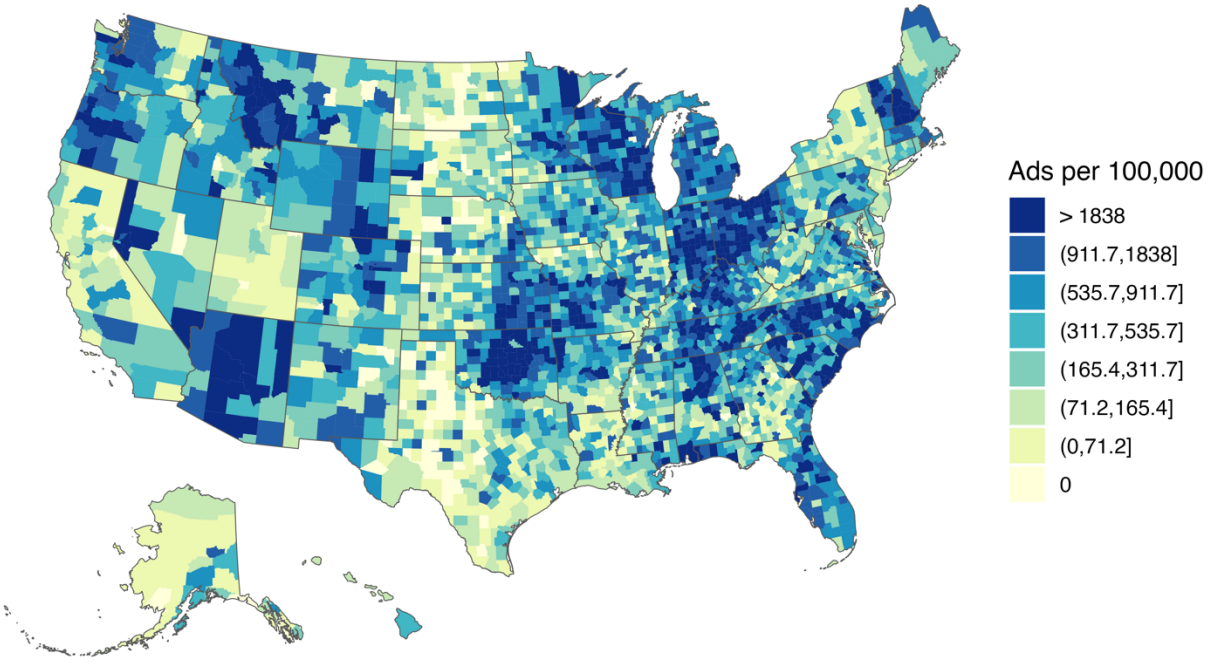
Figures

Figure 1. Universal background check laws, July 2014 – December 2023



Notes. Adoption of universal background check (UBC) policies for private handgun or all firearm sales. Time is measured in days.

Figure 2. Ads for private firearm sales by county, July 2014 – December 2023



Notes. Ads per 100,000 is the total number of classified ads posted between July 2014 and December 2023 divided by the mean county population over the same period, divided by 100,000.

Figure 3. Total ads for firearm sales, July 2014 – December 2023

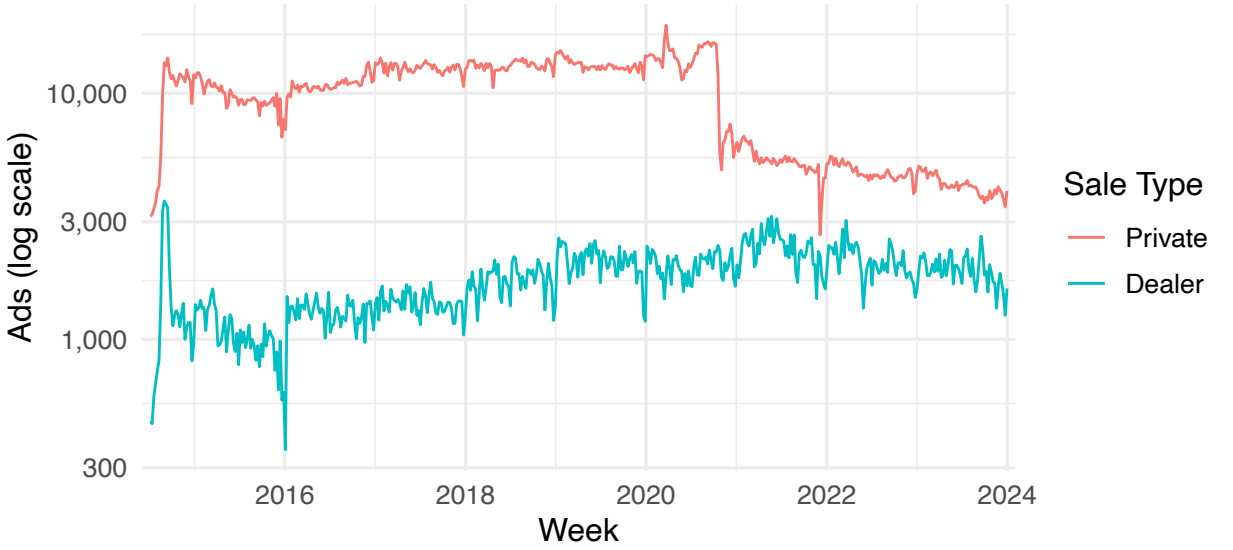
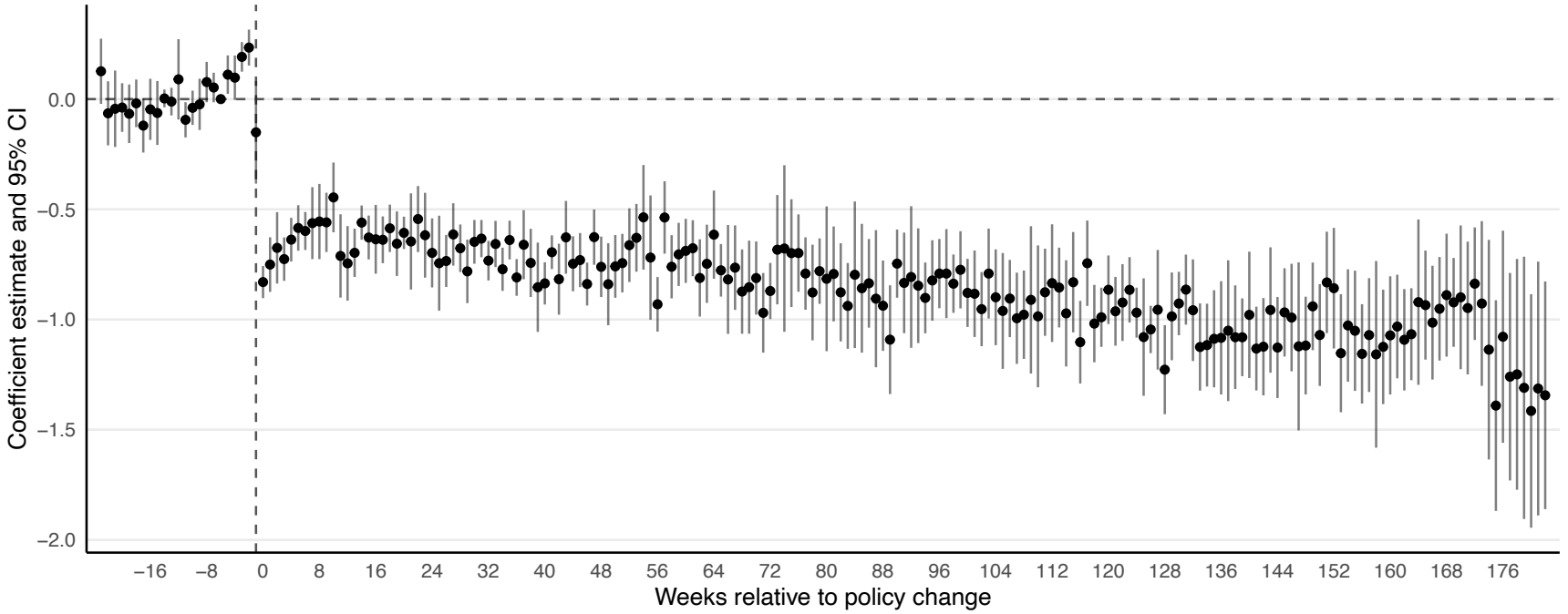
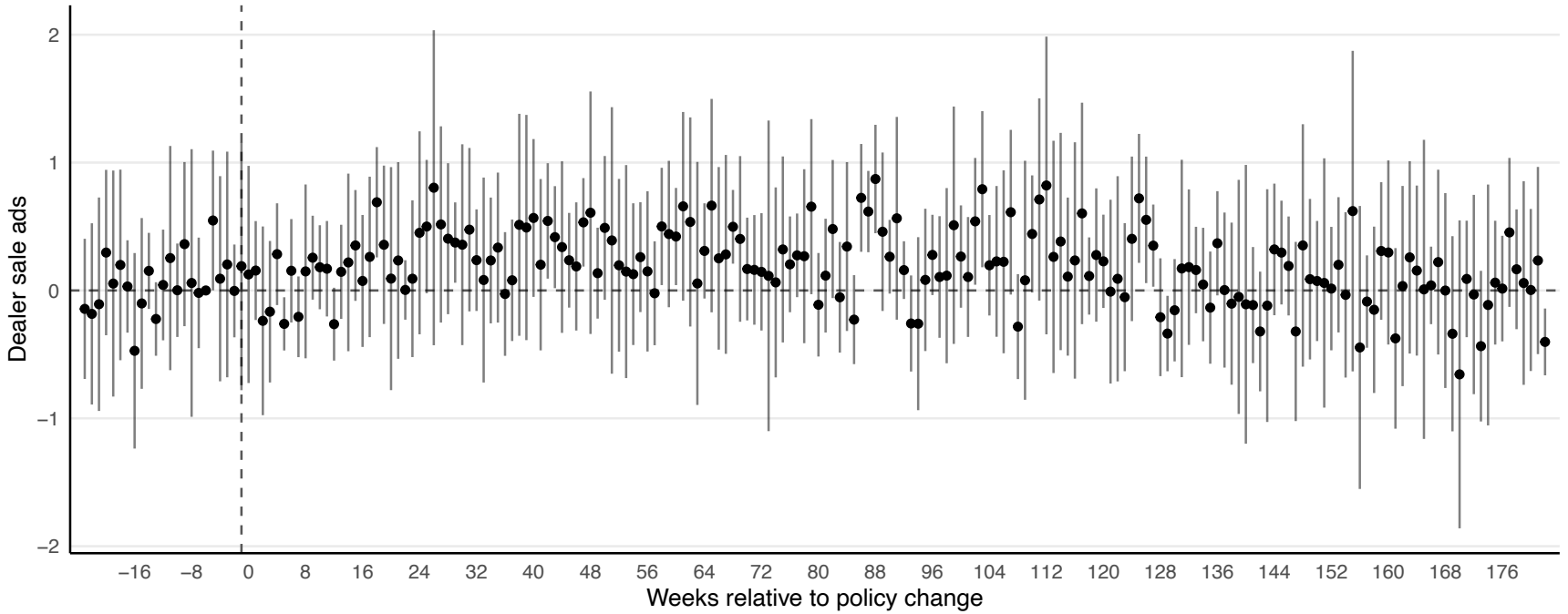


Figure 4. Effects of universal background check law adoption on ads for private firearm sales



Notes. Point estimates reflect the multiplicative effect of adopting a universal background check for all firearm sales on classified ads for private firearm sales. Vertical lines represent 95% confidence intervals (CI) using standard errors clustered by state. The omitted period is six weeks prior to UBC implementation.

Figure 5. Effects of universal background check law adoption on ads for dealer firearm sales



Notes. Point estimates reflect the multiplicative effect of adopting a universal background check for all firearm sales on classified ads for dealer firearm sales. Vertical lines represent 95% confidence intervals (CI) using standard errors clustered by state. The omitted period is six weeks prior to UBC implementation.

Tables

Table 1. Universal background check laws, July 2014 – December 2023.

Policy change/date	States	Prior Policy
Universal background check for all firearm sales		
(Always treated)	CA, CO, CT, DE, HI, IL, MA, NJ, NY, RI	
2014-12-04	WA	None
2015-08-09	OR	None
2018-04-11	VT	None
2019-07-01	NM	None
2020-01-02	NV	None
2020-07-01	VA	None
2021-02-11	MD	Handgun sales
Universal background check for handgun sales		
(Always treated)	MD, MI, NE, PA	
2023-08-01	MN†	None
No universal background check policy		
(Never treated)	AK, AL, AR, AZ, FL, GA, ID, IN, KS, KY, LA, ME*, MO, MS, MT, ND, NH, OH, OK, SC, SD, TN, TX, UT, WI, WV, WY	
2021-07-01	IA	Handgun sales
2023-03-29	NC	Handgun sales

† Minnesota's law also applies to certain assault weapons but does not apply to all long guns.

* Maine implemented universal background checks in 2024.

Notes. Dates refer to the effective date of the policy change. For states with changes, prior policy refers to pre-existing background check laws at the time of the policy change.

Table 2. Effects of universal background check law adoption

	Population Weighted		Unweighted	
Dependent variable:	Private ads	Dealer ads	Private ads	Dealer ads
	(1)	(2)	(3)	(4)
UBC Law × Post	-0.816***	0.207*	-0.844***	0.194
	(0.084)	(0.088)	(0.076)	(0.156)
Observations	2,186,076	734,454	2,186,076	734,454

Notes. All models include county and week fixed effects. Models 1–2 are weighted by county population. Models 3–4 are unweighted. Standard errors in parentheses are clustered by state.
* $p < 0.05$, *** $p < 0.001$