

Illegal Gun Bounties and Gun Violence

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Abstract

Gun Bounty programs provide a cash reward to people who tip off the police about someone in possession of an illegal firearm provided that that tip leads to an arrest. The first Gun Bounty Program in Florida began in Duval County (Jacksonville), Florida in 2006 and has since spread to many other counties across the state. Counties with these types of programs sometimes boast in the large number of arrests they have led to. In this paper, I estimate the effect of these programs on various types of gun-related crime. Results indicate that they lead to reductions in robberies involving a firearm, while having little to no effect on other types of gun-related crime.

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1 Introduction

In 2019, there were 10,258 murders by firearm and 82,285 robberies with a firearm in the United States (FBI UCR). Robberies alone caused 482 million in property losses. There is much discussion both publicly and in academic research on effective ways to reduce gun violence as well as understanding the relationship between the supply of guns and gun violence.

Lang (2016), using background checks as a proxy for firearm sales, finds a small and statistically non-significant relationship between background checks and violent crime. Duggan (2001), however, finds that a 1% percent increase in gun magazine sales leads to a 0.2% increase in homicides the subsequent year.

There has also been research on the effect of various gun regulations on violent crime such as shall issue carry permit laws, CAP laws, background check laws, and gun show regulations. Some regulations have been demonstrated to be effective while others have not. The literature on shall issue carry permit laws has been heavily debated. Lott and Mustard (1997) initially found that shall issue laws lead to a decrease in murders, rapes, and aggravated assaults, however, subsequent work found that their results were not robust to differing specifications (Ayres and Donohue 2003) and that those results violated the parallel trends assumption (Donohue et al 2019). More recent literature has found mixed results between no effect and slight increases in violent crime¹. Acquisti and Tucker (2022) find that following the publication of a Memphis database of carry permit holders and their zip codes, burglaries dropped in zip codes in the top tertile of carry permit holders, but increased in zip codes in the bottom tertile of carry permit holders. Research on CAP laws, laws that make it illegal for adults to allow easy access of firearms to children, is much more consistent at showing reductions in suicides, gun injuries, and gun carrying among children. Sen and Panjamapirom (2012) show that stricter background checks are associated with a 7% reduction in homicides and a 2% reduction in suicides. Duggan, Hjalmarsson and Jacob (2011) find no evidence of an increase in homicides within 25 miles of a gun show in the four weeks following a show regardless of the stringency of regulations on gun show firearm sales.

There have also been local measures aimed at reducing gun violence. This paper is focused on one of those measures called Gun Bounty programs which offers a cash reward for anonymous tips that lead to the confiscation of an illegal firearm and an arrest. The most common offenses that fall under this category are: a felon in possession of a firearm, possession of a stolen firearm, and carrying without a permit. Duval County was the first county to offer this program in Florida, boasting 373 arrests from 2006 to 2020. Miami-Dade County followed in 2007. Within 4 years they had 2400 tips, 535 guns confiscated, and made 329 arrests. Between 2006 and 2019, 18 counties in Florida adopted a Gun

¹Durlauf et al. (2016), Donohue et al. (2019), Aneja et al. (2011)

Bounty Program. This creates a environment to use variation in treatment timing to estimate the effect of these programs on gun violence.

While it is not the focus of this paper, a similar local initiative is the Gun Buyback Program which offers money to people who turn in their firearms to police, no questions asked. A key difference between buyback and bounty programs is that buyback programs operate through volunteer surrender of firearms while bounty programs operate through arrests and confiscations. Bounty programs reduce the presence of guns among people who are already violating gun laws and, therefore, are arguably more likely to use them in violent crime. Critics of Buyback programs argue that firearms voluntarily given up are not likely to be used in violent crime. Local authorities often present bounty programs as a more effective alternative to Buyback programs (Tampa Bay Times 2013) (Orlando Sentinel 2007) (The Palm Beach Post 2013) Indeed, Gun Buybacks have been show to be ineffective at reducing gun-related crime (Ferrazares, Sabia, and Anderson 2021).

Gun Bounty Programs are almost always run as a subprogram of Crime Stoppers. Crime Stoppers is a nonprofit that offers cash rewards to people who provide tips that help solve crimes. The benefit of gun bounty programs is that they provide a cash incentive and they are accompanied by a PR campaign which helps orient the public focus to the issue of illegal firearms. Some Crime-Stoppers already provide cash for tips that lead to arrests, but the bounty program serves to increase the cash reward if the person being arrested also has an illegal firearm. There are approximately 300 Crime-Stoppers programs in the United States, each covering at least one county. In Florida, Crime-Stoppers is present in 93% of counties which covers over 99% of the population. Gun Bounty Programs are initiated by the police chief, but then the tips are taken by Crime-Stoppers who then pass on the tip to the police. Crime-Stoppers in Florida is funded through private donation and through grant money acquired from a \$20 fine for all criminal offenses assessed in county and circuit courts. Once a program is initiated, there is a push to bring public awareness to the program through local news stories and advertising. An example of this advertising can be seen in figure 1 which shows an ad for the program placed on a bench near a bus stop in Tallahassee. During 2022 there were at least three of these types of advertisements in Tallahassee.



Figure 1: An advertisement for Leon County's Gun Bounty Program

There are several ways that Gun Bounty Programs theoretically reduce gun violence. First, there is a detection effect, in which citizens are incentivized to report gun law violators and have their firearms removed. Second is through the incarceration effect. The average sentence in my data set for violating one of the gun laws mentioned above is five years. During those years of incarceration, the person is removed from the public and unable to commit violent crime. The final avenue is through a deterrence effect. The presence of a Bounty Program increases the probability of getting caught for violating gun laws. This increase in cost may reduce the level of offending. This paper focuses on the overall treatment effect and does not estimate the effect from any specific avenue.

2 Data

My data source for crime is the FBI Uniform Crime Report (UCR) from the Florida Department of Law Enforcement from 2000 to 2019. These data contain counts of violent crime reported by county including the total count and the count of those involving a firearm. The outcome variable, crime rates per 100,000 people, is constructed by dividing the crime count by population from the Census and ACS population estimates².

²ACS population and racial statistics are not available from 2001 to 2004. The population values for those years were linearly interpolated. Population statistics for 2005 to 2009 are a five year average

Data on the active years of Gun Bounty programs came from reading newspaper articles, some of which are in the references, and by contacting police departments and Crime-Stoppers programs. I have little data on the utilization of these programs in terms of the number of arrests they have lead to, however, the Offender Based Information System (OBIS) from the Florida Department of Corrections contains data on every state prison conviction and the corresponding sentence during this time period, so I am able to look at convictions related to gun law violations. Data for time varying controls include percent of the population that is hispanic, percent of the population that is black, median income per capita and population from the American Community Survey and the Decennial Census, the Unemployment Rate from the Bureau of Labor Statistics, and the number of police officers and civilian police employees from UCR.

Table 1 provides information on the years each county offered the gun bounty. Duval County began in 2006, followed by 13 counties by 2009, and then 4 other counties joining some time after. Figure 2 shows the number of people convicted of firearm violations in ever treated and control counties over time. It can be seen that there is a large increase in convictions in years 2006-2008 relative to the control counties.

Table 1: Participating Counties

County	Years Active
Duval	2006-Present
Miami-Dade, Monroe, Orange, Brevard, Lake, Osceola, Seminole, Sumter	2007-Present
Palm Beach	2009-2020
Lee	2009
Pinellas	2009-2016
Alachua, Broward	2009-Present
Polk	2010-2011
Hillsborough, Pasco	2016-Present
Leon	2019-Present

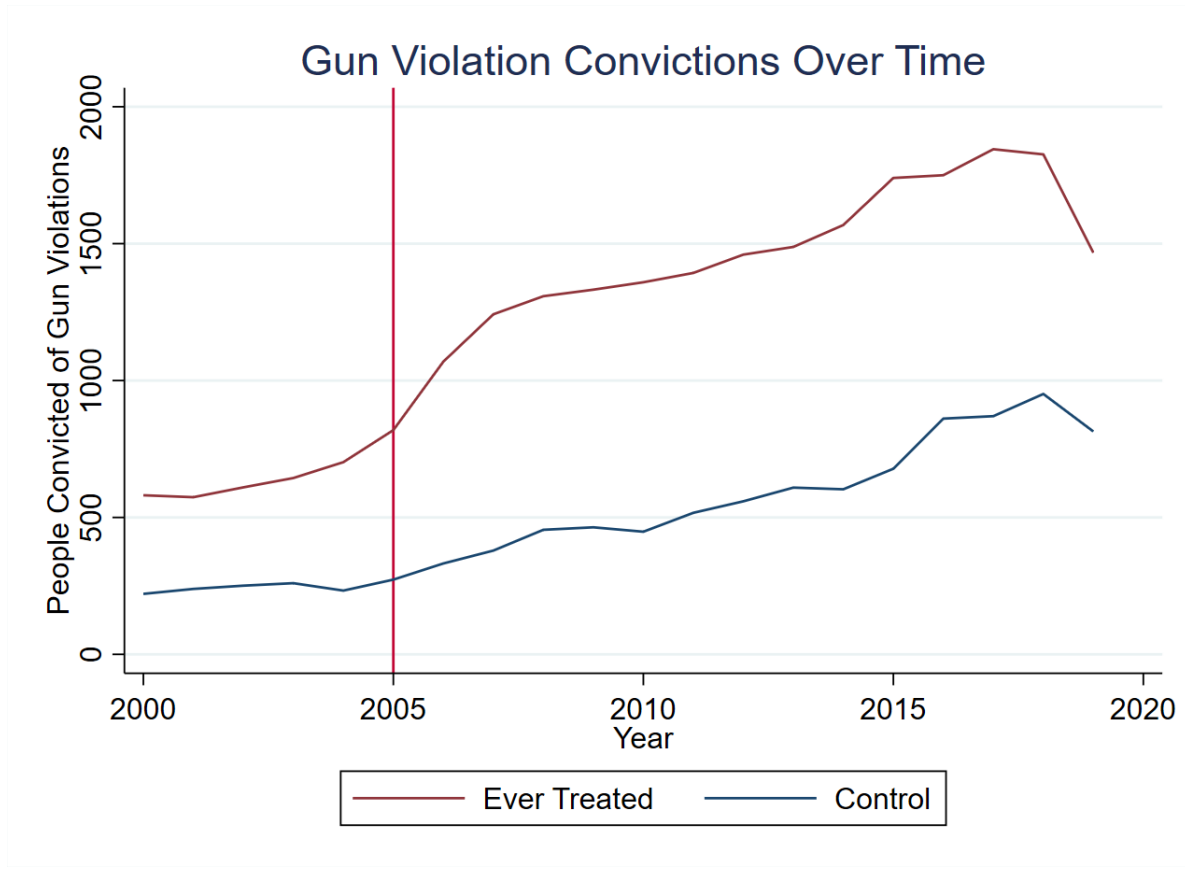


Figure 2: Shows the total number of people convicted of gun law violations each year for the treatment and control groups. The vertical line in 2005 indicates the final year before treatments begin in 2006.

Table 2 shows summary statistics for outcome and control variables for control counties and ever treated counties. Treated counties tend to be about 7.2 times larger in population and have 71% higher rates of gun violence, however, it can be demonstrated that conditional on control variables, treatment and control counties have parallel trends prior to treatment.

Table 2: Summary Statistics

Variables	Control				Ever Treated			
	N	Mean	Min	Max	N	Mean	Min	Max
Population	980	104,888	7,021	553,284	360	760,931	53,345	2,761,581
PercentBlack	980	13.6	2.3	56.9	360	14.4	2.0	31.5
Percent Hispanic	980	9.6	1.3	55.0	360	18.8	3.5	69.4
Income Per Capita	980	23,587	14,439	44,113	360	28,687	4,538	47,929
Unemployment Rate	980	5.8	2.6	13.8	360	5.4	1.9	12.9
Police Officer Rate	980	219.7	61.8	957.6	360	222.6	106.5	609.6
Police Employee Rate	980	143.7	11.3	876.2	360	149.9	38.3	447.2
Gun Convictions	980	10.2	0	126	360	68.8	0	305

Violent Crime Rate Involving a Firearm

All Violent	980	79.8	0	264.2	360	136	22.38	511.4
Murder	980	2.51	0	40.8	360	3.21	0	11.4
Robbery	980	20.0	0	115.4	360	55.7	1.2	244.8
Aggravated Assault	980	56.7	0	247.0	360	76.3	17.5	253.2
Sexual Offenses	980	0.591	0	15.0	360	0.964	0	5.9

3 Empirical Strategy

To estimate the effect of Gun Bounty Programs on crime, I use two way fixed effects difference-in-difference model exploiting variation in the timing of implementation.

$$CrimeRate_{c,t} = \beta_0 + \beta_1 GunBounty_{c,t} + \pi X_{c,t} + \gamma_c + \theta_t + \epsilon_{c,t}(1)$$

In equation 1, $CrimeRate_{c,t}$ refers to the crime rate per 100,000 people in county c and year t . $GunBounty_{c,t}$ is a binary variable indicating if a Gun Bounty Program was active during any part of the year or any years prior. In other words, this model assumes irreversible treatment which is the case of 15 out of 18 counties in the sample. This is not a bad assumption given that treatment for any duration of time likely has lingering incarceration effects for many years assuming that treatment lead to convictions. $X_{c,t}$ refers to a vector of controls that includes percent of the population that is black, percent of the population that is hispanic, the unemployment rate, the rate of police officers per 100,000 people and the rate of civilian police employees per 100,000 people. These last two

variables help control for changes in policing not related to the Gun Bounty Program³. γ_c and θ_t are county and year fixed effects.

There are two key assumptions for identification. The first is that in the absence of treatment, the treatment group would have experienced similar changes in crime rates as those of the control group. This assumption cannot be proven, but I provide contextual support comparing trends in crime rates prior to treatment. Of particular concern in this context is that counties initiated bounty programs in response to increases in gun violence (reverse causality). Such a response would bias estimates upwards, however, the lack of statistically significant differences in pre-treatment crime rate trends reinforces the claim that the control counties are valid controls and allay concerns of reverse causality.

The second assumption is that the estimated average treatment effect is not biased due to heterogeneous treatment effects over time. Heterogeneous treatment effects over time combined with a staggered roll out causes bias due to weights in the estimate that compare newly treated groups to already treated groups. This second assumption may not be met considering the Gun Bounty Programs have a staggered rollout and the treatment effect may have a strengthening effect over time as more and more people are arrested. Therefore, treatment effect estimates are also calculated using the Callaway and Sant’Anna (2021) approach which estimates the average treatment effect by cohort (based on the initial year treated) and by year relative to the never treated and not yet treated control group. It then takes those estimates and creates an overall average treatment effect. This method removes comparisons between treated and already treated groups.

There is some variability in treatment depending on how much a program is advertised through local news and paid advertisements, and there are potentially differences in strength of public response according to size of reward that is offered. It is common to see an initial strong utilization at program launch then decreasing utilization over time until the program is “relaunched” to increase public awareness of the program. So, it is possible for a county to be treated, but the program not lead to any arrests. This was the case for Pinellas County which had 21 arrests in the first year in 2009, but then zero arrests in 2012 before the program was relaunched in 2013. Because of this the estimation should be interpreted as an intention to treat.

4 Results & Analysis

Figure 3 shows the effect of a bounty program on the number of people convicted of gun violations. The estimates are imprecise, but there is a clear increase in the point estimates following implementation of bounty programs. There are two things that may

³Police per capita has been used as a covariate in crime equations in other papers such as Donohue & Levitt (2001), Cheng & Hoekstra (2013), Doleac (2017), Donohue & Levitt(2020)

explain the large standard errors. First, is the variation in tips within a county depending on how recent the program launched. Second, there is some degree of ambiguity to the theoretical effect given that locking up gun law violators in one year will lead to less gun violations in subsequent years.

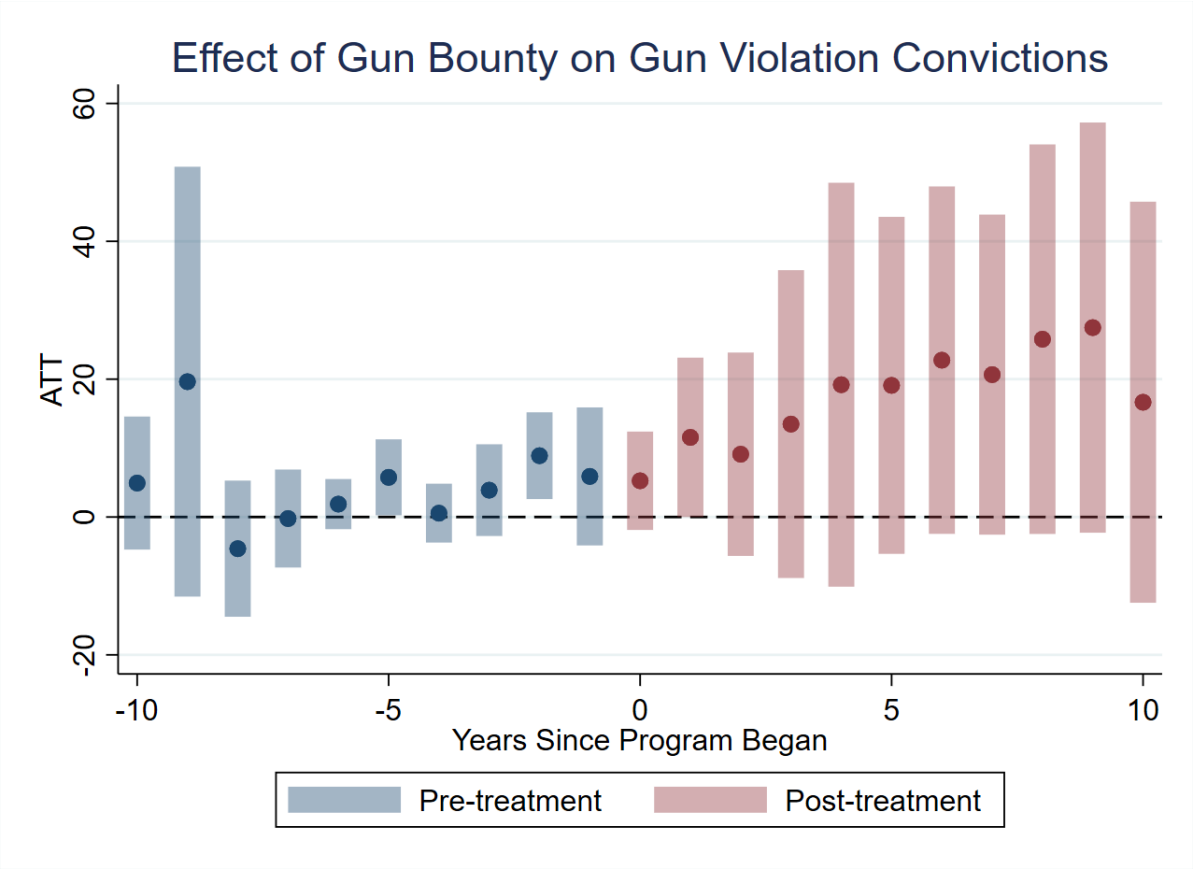


Figure 3

Table 3 shows the estimates of the average treatment on crimes rates for crimes that involve a firearm. The results suggests that for most types of violent crime there was not statistically significant effect. The one exception to this is robbery involving a firearm which estimates an approximate 11% reduction according to specifications 2 through 4. The results may be biased due to the problem of staggered rollout of treatment.

Table 3

Estimates of Effect of Gun Bounty Program on Crime Rates					Pre-Treatment Mean
	(1)	(2)	(3)	(4)	
Violent Crime Rate w/ Firearm	-12.4** (6.19)	-5.65 (6.11)	-6.10 (6.20)	-6.83 (6.43)	144
Murder w/ Firearm	-0.088 (0.285)	0.270 (0.338)	0.226 (0.346)	0.693* (0.378)	2.97
Robbery w/ Firearm	-12.7*** (2.99)	-7.19*** (2.60)	-7.38*** (2.65)	-8.59*** (2.70)	65.2
Aggravated Assault w/ Firearm	0.615 (4.35)	1.57 (4.29)	1.33 (4.35)	1.29 (4.91)	75
Sex Offense w/ Firearm	-0.261 (0.165)	-0.225 (0.238)	-0.275 (0.199)	-0.225 (0.238)	1.07
Observations	1,340	1,340	1,340	1,340	
County FE	YES	YES	YES	YES	
Year FE	YES	YES	YES	YES	
Racial and Economic Controls	NO	YES	YES	YES	
Police Controls	NO	NO	YES	YES	
Region by Year FE	NO	NO	NO	YES	

Notes: Each coefficient is from a separate regression using TWFE. County clustered standard errors are in parentheses. Column 4 includes region by year fixed effects where region indicates one of five regions in the state: South, West, East Northeast, and Northwest. ***p<0.01, **p<0.05, *p<0.1

Tables 4 shows results using the Callaway and Sant'Anna estimator. One drawback to this approach is that it does not easily allow for the inclusion of covariates. In this data set, it would only allow for the use of one or two covariates at a time before weight estimates began dropping out.

Overall the estimates in table 4 are much stronger in magnitude and statistical significance than the estimates in table 3. This is true for all crime types except sexual offenses which had little change in estimates. The estimates for robbery with a firearm are consistent in point estimate and in statistical significance across all specifications. These results imply that Gun Bounty Programs reduced the overall rate of robberies involving firearms by approximately 30%.

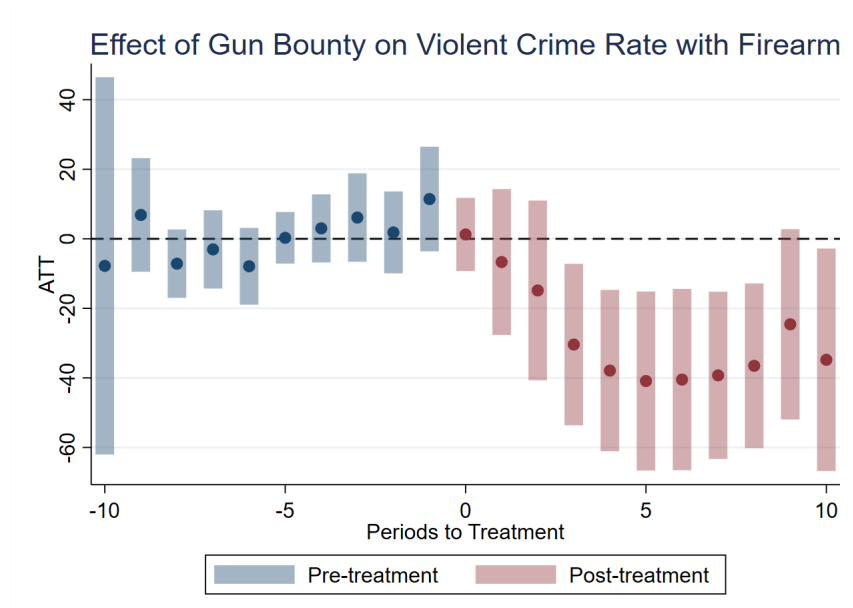
Table 4

Estimate of Effect of Gun Bounty Program on Crime Rates					Pre-Treatment Mean
	(1)	(2)	(3)	(4)	
Violent Crime w/ Firearm	-28.4** (11.6)	-27.7** (11.5)	-23.1* (12.0)	-28.4** (11.5)	144
Murder w/ Firearm	-0.829* (0.502)	-0.821* (0.495)	-0.293 (0.681)	-0.910* (0.491)	2.97
Robbery w/ Firearm	-21.8*** (7.65)	-21.3*** (7.66)	-20.3** (8.18)	-21.2*** (7.67)	65.2
Aggravated Assault w/ Firearm	-5.53 (4.63)	-5.34 (4.58)	-1.98 (4.71)	-6.03 (4.69)	75.0
Sex Offense w/ Firearm	-0.237 (0.169)	-0.247 (0.166)	-0.587* (0.330)	-0.250 (0.168)	1.07
Control: Never Treated	YES	YES	YES	YES	
Control: Not Yet Treated	NO	YES	YES	YES	
Racial Controls	NO	NO	YES	NO	
Police Officer Rate	NO	NO	NO	YES	

Notes: Tables shows estimates using the OR method proposed by Callaway and Sant’Anna(2021). Each coefficient is from a separate regression. Column 1 shows the results using never treated counties as the control. Column 2 shows the results using never treated and not yet treated counties as the control. Column 3 includes racial controls and column 4 includes police office rate as a control. County clustered standard errors are in parentheses. ***p<0.01, **p<0.5, *p<0.1

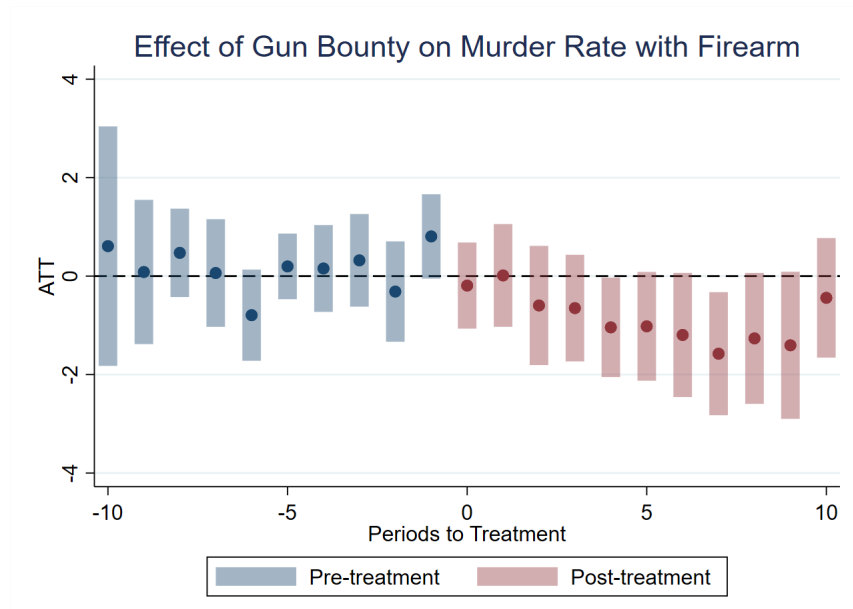
Figures 4 – 8 show the event study estimates from the Callaway and Sant’Anna (2021) method. These figures show little evidence of a pretrend prior to implementation of the bounty program and then a negative effect, which is most pronounced in robberies, following implementation. For robbery with a firearm (figure 6), the effect appears to gradually strengthen over time until it levels out around year five.

Figure 4



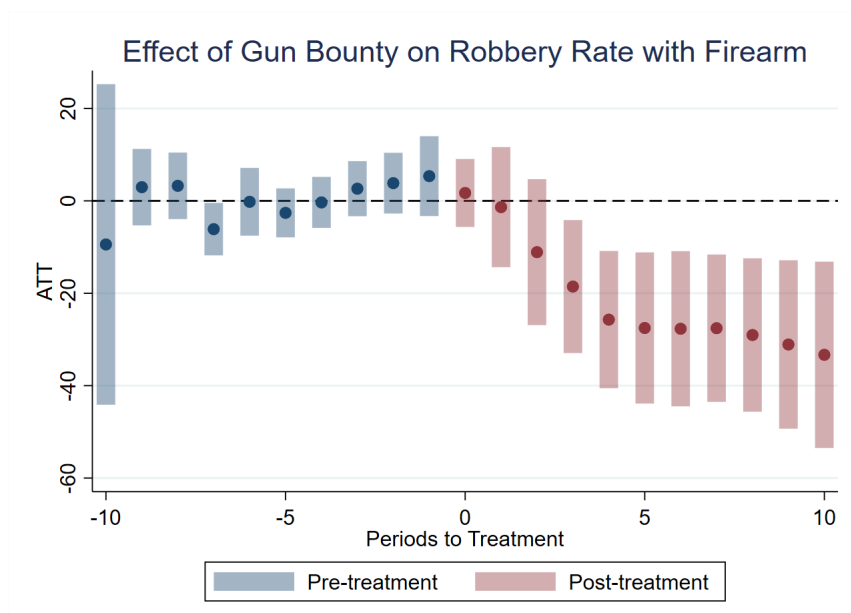
Notes: Figures depict estimated ATT effects before and after treatment using the OR method proposed by Callaway and sant'Anna (2021) The shaded areas represent 95% confidence intervals based on county-clustered standard errors

Figure 5



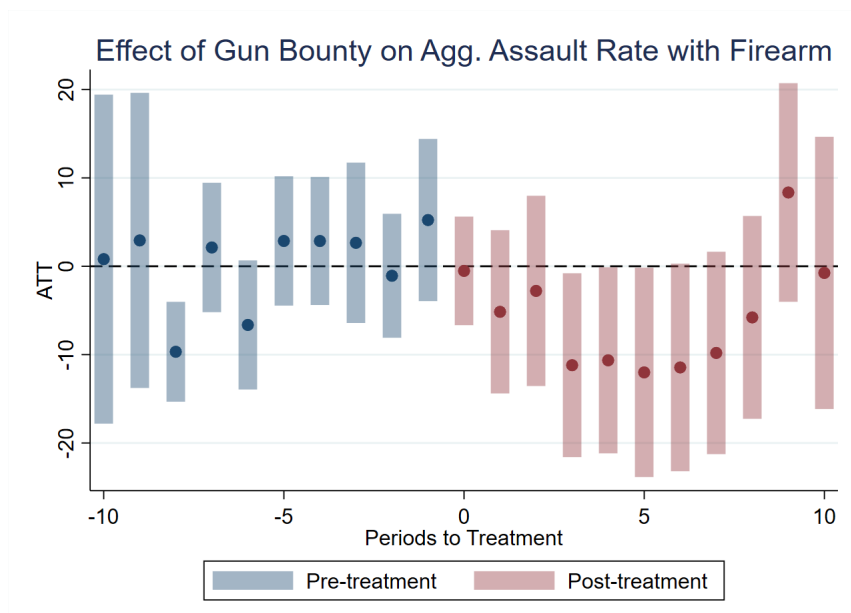
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Figure 6



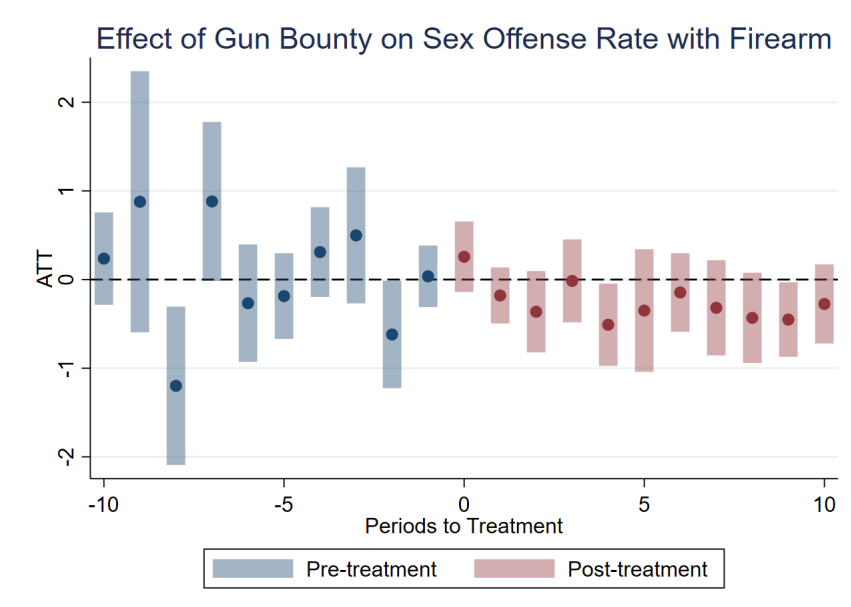
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Figure 7



Notes: Figures depict estimated ATT effects before and after treatment using the OR method proposed by Callaway and sant'Anna (2021) The shaded areas represent 95% confidence intervals based on county-clustered standard errors

Figure 8



Notes: Figures depict estimated ATT effects before and after treatment using the OR method proposed by Callaway and sant'Anna (2021) The shaded areas represent 95% confidence intervals based on county-clustered standard errors

5 Conclusion

This paper leverages variation in the timing of illegal Gun Bounty Programs in the state of Florida to estimate their effect on gun violence. Results using the Callaway Sant'Anna (2021) estimator indicate that these programs lead to a 16% reduction in gun violence primarily driven by reductions in robbery with a firearm which decreased 30%. Considering that this program is seldom utilized outside of Florida, these results could have large implications for the future of gun violence prevention tactics.

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