Do Concealed Carry Laws Affect Police Shootings?

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Abstract

This paper sheds light on the consequences of concealed carry laws on police shootings. Using data on fatal police shootings from two different sources and a difference-in-differences approach, this paper finds that: when a state adopts Right-to-Carry (RTC) laws, which allow citizens who meet state requirements to carry concealed weapons, the rate of people fatally shot by police officers decreases by 3.6%, which is attributed to a decrease in police interactions with the public, measured by the rate of arrests. Switching from RTC to Permitless Carry (PC), which does not require a permit to carry a concealed gun, increases the rate of people fatally shot by police by 5.2%. This effect is due to the fact that citizens considered unqualified under RTC can carry concealed weapons under PC, increasing the risk that police officers face when interacting with the public.

Keywords: Concealed Carry, Gun control, Law Enforcement, Police Shootings

JEL Codes: K0, K14, K40, K42

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1 Introduction

Laws regulating the conditions under which citizens can carry concealed weapons have attracted much attention in the media, within policy debates, and among researchers. Advocates of concealed carry (CC) laws, and in particular, Right-To-Carry (RTC) laws, which allows for concealed carry after meeting the state requirements, argue that making it feasible for citizens to carry concealed weapons can discourage criminals from committing violent crimes (Lott, 2010; Lott and Mustard, 1997; Moody and Marvell, 2008; Moody et al., 2014). On the other hand, those opposed to RTC laws argue that more guns in the streets will promote a culture of violence, hence increasing violent crimes (Mcdowall et al., 1996; Zimmerman, 2014; Siegel et al., 2017). Despite extensive research, there is no consensus on either the magnitude or the direction of these effects (National Research Council, 2005).[1] Most recently, though, using the latest and most extensive data, Donohue et al. (2019), provides strong evidence that violent crime rates increase by up to 15%, 10 years after the enactment of RTC laws.

This paper examines how CC laws alter the behavior of a largely ignored and incredibly relevant actor: police officers, in particular how they affect fatal police shootings.[2] More specifically, this paper evaluates the effects of two different types of CC laws: RTC and Permitless Carry (PC). RTC, as mentioned earlier, allows any citizen who satisfies the state's requirements to obtain a concealed carry permit and therefore carry a concealed weapon. Under PC a permit to carry a concealed weapon is not needed.

Considering the fact that law enforcement officers interact with the public on an everyday basis, dealing with an armed versus unarmed person could very likely have an effect on the approach an officer takes during the interaction. More lenient CC laws will alter a police officer's environment in three ways.[3] First, it will increase the likelihood of having to face

[1]Some consider different effects in terms of types of crime, degree of gun prevalence, region, level of urbanization, and the time period (Manski and Pepper, 2015; Durlauf et al., 2016); while others, reanalyzing and testing the Lott and Mustard (1997) results showed that their estimates are highly "fragile" and "sensitive"(Duggan, 2001; Black and Nagin, 1998; Donohue and Ayres, 2003; Aneja et al., 2011; Durlauf et al., 2016).

[2]Mustard (2001) studied whether RTC laws affect felonious deaths of police officers.

[3]Police officers tend to alter their behavior and adjust to the characteristics of their environment accordingly. Their environment is defined by the features of the location-neighborhood where the incidents take place (Smith, 1986; Kane, 2002; Terrill and Reisig, 2003) and by the nature (race, sex, age) of the

armed citizens, as more people will be carrying guns. Second, since the weapons carried will be concealed, it introduces the element of uncertainty as to who poses a threat, and as far as law enforcement officers are concerned, anyone might be carrying a gun.[4] Finally, making it feasible for the vast majority of citizens to carry a concealed weapon changes the composition of armed people that police may run into. This composition will depend on the conditions under which a person could carry a concealed weapon, i.e it will differ from RTC to PC. Overall, since those who carry a gun under CC laws are not, by definition, breaking the law, knowing that, police officers might be more cautious and less hasty in their reactions to and interactions with would-be criminals. However, under PC, where citizens do not need a permit to carry a concealed weapon, it is possible that more unfit people than before could be armed. This combination of different armed people creates another source of uncertainty and armed law-abiding citizens may be mistaken for criminals and vice-versa, since the gun carrier's motives are initially unknown.[5]

These changes could either increase officers' exposure to risk, and result in a more aggressive police force, under which their use of deadly force is legally justifiable, or, as mentioned above, they could become more cautious. Therefore, neither the direction nor the magnitude of the effect of CC laws on fatal police shootings is clear. In addition to all these moving parts, the effect of CC laws is even more nuanced, as they may affect intermediate outcomes which in turn are likely to affect police shootings. Such outcomes are crime rate, gun prevalence, number of law enforcement officers, intensity of crime, and number of police interactions.

To study the effect of CC laws on police shootings, I use data on fatal police shootings for

participants (Black and Reiss, 1970; Black, 1971; Smith and Visher, 1981).

[4] "A vivid illustration of how even the erroneous perception that someone accosted by the police is armed can lead to deadly consequences is revealed in the chilling video of five Arizona police officers confronting an unarmed man they incorrectly believed had a gun. During the prolonged encounter, the officers shouted commands at an intoxicated 26-year-old father of two, who begged with his hands in the air not to be shot. The man was killed by five bullets when, following orders to crawl on the floor toward police, he paused to pull up his slipping pants."Donohue et al. (2019)

[5] This confusion can be illustrated by two highly publicized police shootings. In November 2018 at an Alabama mall, police officers responding to the scene shot and killed Emantic Fitzgerald Bradford Jr.. Police had mistook him for the shooter as he was assisting civilians while holding his legal gun (McLaughlin and Holcombe, 2018). Another example, in Minnesota, on July of 2016, Philando Castile was shot seven times by a police officer, during a traffic stop. Castile had earlier informed the officers that he had a concealed carry permit, and when he tried to reach for his license and registration the officer believed that he was reaching for the gun.

the 50 states and the District of Columbia, from two different sources: the Fatal Encounters database that spans the years 2000 to 2017, and the Washington Post database which covers the years 2015 to 2017. Regarding the CC laws, as mentioned earlier, the paper studies both the transition from Restricted and May-issue laws, where none to few citizens are allowed to carry concealed weapons, to RTC, and the transition from RTC to Permitless Carry (PC).

Using both a difference-in-differences and an event study analysis this paper finds that if a state adopts RTC laws the rate of fatal shootings by police officers decreases by around 3.6%, and if it switches from RTC to PC, becoming even more lenient, the rate of fatal shootings by police officers increases by 5.2%. The results are robust to considering open carry laws, possible neighboring spillover effects and linear and quadratic state-specific trends.

Moreover I find suggestive evidence of important heterogeneity by race.[6] Under RTC, white people experience a decrease of 3.6% in fatal police shootings of, while for African Americans this decrease was only 2.8% and statistically insignificant. Moreover, under PC, there was an increase of fatal police shootings of 5% for whites, while for African Americans it was 22%. However, these findings are only suggestive and should be interpreted with caution, because for 27% of the data the race of the deceased is not reported.[7]

To further understand these results I examine the composition of armed people, which is shaped by the different criteria of each CC law, and the five intermediate outcomes that could affect police shootings, mentioned above: crime rates; number of law enforcement officers; prevalence of guns, using as a proxy the percentage of suicides committed by gun; intensity of crime, measured by the number of law enforcement officers killed; and the number of police interactions with the public, estimated by the rate of arrests.

The analysis suggests that under RTC, fatal police shootings decrease due to a drop in police interactions. This decrease under RTC, measured by the rate of arrests, may be happening due to three reasons as discussed in Donohue et al. (2019): First, valuable police time may be used for bureaucratic tasks (such as issuing and checking RTC permits

[6] Other recent research that has focused on the racial bias of police officers are Roland G. Fryer (2016); Anwar and Fang (2006); Donohue and Levitt (2001).

[7] As shown in Figure A1 in the Appendix at the beginning of the sample period the percentage of unspecified race is almost 60%, dropping down to less than 10% in the last 4 years. States adopted RTC mostly at the middle of our sample period in contrast with PC which was adopted by most of the states in the last 3 years. Therefore RTC estimates by race should be taken with more caution.

in every interaction that involves a gun), for tracking stolen guns, and for dealing with gun accidents; all this at the expense of actively pursuing violent criminals. Second, it is possible that concealed weapons discourage police officers from interacting with people that are more likely to be armed, and they may choose to intervene only when they believe it is absolutely necessary. Lastly, the decrease in arrests could be due to armed law-abiding citizens hindering police work either unintentionally, by making it harder to identify the bad-guy with the gun, or intentionally through their efforts to catch the criminal and help police officers out.[8]

As for the increase of fatal police shooting under PC, it is attributed to the fact that citizens who were once unqualified under RTC can now carry a concealed weapon, and that increases the risk that police officers face. Unqualified citizens can be classified into two categories, first are the ones that should not own a gun in the first place, and second are the citizens who do not have the necessary knowledge to carry a gun. The former category refers to people with violent history, alcohol-related problems, and mentally unstable citizens who could have obtain guns from the black market, online or through the private sales loopholes that exist in the majority of states (where a background check on the buyer is not required by law). For those individuals the RTC permit would work as a second screening and would have prevent them from carrying a concealed gun in public. The second category includes people who carry concealed guns but have not taken any firearm safety classes, or any basic firearms proficiency exams, actions and certificates that would have been required under RTC.[9] These unqualified citizens could potentially put everyone around them in danger including police officers and themselves. Besides causing firearm accidents, by treating the gun recklessly, failing to comply with the officers instructions, or even moving in a threatening way, police officers could be forced to react in a defensive - and possibly violent - manner.

The existence of unqualified citizens and the worries they create for officers is more than just theoretical arguments. Police officers themselves have expressed their concern regarding arming unqualified citizens, and various police chiefs and unions have opposed PC for those reasons. (Gorman, 2017; Shepperson, 2017; Goudeau, 2017; Robertson and Williams, 2016;

[8]I can also rule out that the effect is due to a decrease in crime since arrests per crime decrease as well.

[9]Rowhani-Rahbar et al. (2018) conduct a nationally representative survey in 2015 and find that concealed carry permit holders are the most-trained gun owners, 83% of them having taken some formal training.

Yablon, 2016).

Therefore, when switching from RTC to PC, the pool of law-abiding citizens that are able to carry a concealed gun increases, but so does the potential risk that those civilians pose. Not only could they be unfit to handle the ownership of a gun, but they also might be in a questionable state of mind. At the same time unqualified armed civilians could create a general confusion for the police officers as to which armed law-abiding citizen may be posing a threat, hence making police interactions even with qualified armed citizens dubious.

The remainder of this paper proceeds as follows: Section 2 provides background information regarding the CC laws. Section 3 introduces a theoretical framework, and section 4 describes the data and presents the empirical strategy. Sections 5 estimates the CC effects of police shootings, while section 6 checks the robustness of the findings. Section 7 presents possible mechanisms, and section 8 concludes.

2 Concealed Carry Laws Background

Concealed carry laws vary by state in many ways. They differ in terms of the types of background checks required, length of waiting periods, and minimum requirements, among many other things. However, states can be classified in four broad categories based on how easy, or even feasible, the process is for a private citizen to be able to carry a concealed weapon in public.

The most regulated category is Restricted or No-issue; states in this category prohibit any concealed carry of guns in public. Next is May-issue, where a citizen may obtain a permit if he/she both meets the state requirements and demonstrates "good cause", the latter is crucial as local authorities can deny granting a permit based on those grounds, for no substantive reason. Then there is the Shall-issue category, also known as Right-To-Carry (RTC); in states falling under this category, the applicant can get a CC permit as long as he/she meets the state requirements, which many times include background checks, firearm safety class certifications, and demonstrations of handgun proficiency. Lastly are the Unrestricted states, where people do not require a license to carry a concealed weapon in public; this is also known as Permitless Carry (PC), Constitutional Carry, and Vermont

Carry. Figure 1 shows the changes of the CC laws from 1990 to 2017 for the 50 states and the District of Columbia.[10]

Up to the mid 1990s, the majority of states were either No-issue or May-issue states, and over time, they started to adopt RTC policies. In 2014 Illinois was the last state under Restricted laws. Over the last few years there has been a growing trend of states switching from RTC to PC. As shown in Figure1, in 2014 only 5 states had PC, and within the next three years, eight more switched, for a total of 13 PC states in 2017.

So far, the literature investigating the effect of the these laws on crime is focusing on the transition from No-issue or May-issue to RTC. This paper is able to study both the transition from more strict states (No- and May- issue) to RTC and the newer trend, the transition from RTC to PC, as data from more recent years has been made available.

3 Framework

CC laws can affect many factors which in turn could impact police shootings, and that makes it hard to predict the overall effect. Nevertheless keeping these uncertain mechanisms constant it is feasible to theoretically describe the effect of CC laws on police shootings.

CC laws will undoubtedly change the probability or running into an armed person and the composition of the gun owning population. Under both RTC and PC law-abiding citizens are able to carry concealed guns, the difference between them being that under RTC those citizens meet some requirement to ensure that they are qualified to be armed in public, while under PC that process is not mandatory. That results in a combination of qualified and unqualified law-abiding armed citizens under PC with each category imposing its own risk to police officers.

Below I present a simple probability model that incorporates all the moving parts mentioned above, and makes a theoretical prediction on the effect that RTC and PC will have on fatal police shootings.

[10] In the state of Arkansas, even though the PC law passed on August 16, 2013, there was a general confusion among civilians and officials regarding the interpretation of the law. The confusion was cleared in October 17, 2018 after the Arkansas Court of Appeals issued a ruling confirming that permitless carry is legal. (https://www.usacarry.com/arkansas-permitless-carry/)

The people that police come in contact with can be described by two features: their intentions, criminals (C) or law-abiding citizens (L), and whether they are armed (A) or unarmed (U). Moreover, among armed law-abiding citizens I also distinguish between qualified (L_Q) and unqualified (L_{UQ}).

Every encounter police officers have with a possible perpetrator, carries with it a certain danger. I refer to this as *Threat level* expressed by $T(x, y)$, where x denotes the criminality of the agent, and y refers to whether they're armed or not. Law enforcement, upon encountering a potential criminal, chooses to react according to the *Expected Threat level* $E(T)$ of each situation, which depends on the characteristics of the potential criminal and is defined as follows:

$$E(T(x,y)) = P_{(C,U)}T(C,U) + P_{(L,U)}T(L,U) + P_{(C,A)}T(C,A) + P_{(L_Q,A)}T(L_Q,A) + P_{(L_{UQ},A)}T(L_{UQ},A) \quad (1)$$

where $P_{(x,y)}$ is the probability of running into a person of type x and ability y, and

$$P_{(L,U)} + P_{(C,U)} + P_{(C,A)} + (P_{(L_Q,A)} + P_{(L_{UQ},A)}) = 1 \quad (2)$$

For simplicity I assume that the threat level of an unarmed law-abiding citizen and an armed qualified law-abiding citizen are equal and normalized to zero, $T(L, U) = T(L_Q, A) = 0$. Therefore, equation (4) can be written as:

$$E(T(x,y)) = P_{(C,U)}T(C,U) + P_{(C,A)}T(C,A) + P_{(L_{UQ},A)}T(L_{UQ},A) \quad (3)$$

The probability of a citizen being armed is defined solely by the CC law of the state. Under Restricted laws, citizens are forbidden to carry concealed weapons, and in May-issue states the probability of that happening is very small. Therefor for simplicity I assume that in Restricted and May-issue (RM) states the probability of a law-abiding citizen carrying a gun is equal to zero, $P^{RM}_{(L_Q,A)} = P^{RM}_{(L_{UQ},A)} = 0$, and the expected threat level is:

$$RM : E(T)^{RM} = P_{(C,U)}T(C,U) + P_{(C,A)}T(C,A) \quad (4)$$

Under RTC citizens that qualify for a concealed carry permit can now carry guns and therefore the probability of running into an armed qualified law-abiding citizen is positive ($P_{L_Q,A} > 0$). At the same time, because some citizens are armed, the probability of running into an unarmed citizen decreases ($P^{RTC}_{(L,U)} < P^{RM}_{(L,U)}$) . However, since the threat level of unarmed citizens and armed qualified citizens is the same and equal to zero ($T(L_Q, A) = T(L, U) = 0$) the *Expected Threat level* under RTC remains the same as in RM:

$$RTC : E(T)^{RTC} = P_{(C,U)}T(C, U) + P_{(C,A)}T(C, A) \tag{5}$$

Under PC all citizens can carry a concealed gun, including many that under RTC would have been considered unqualified. Therefore, the probability of running into an armed unqualified law-abiding citizen is now positive ($P_{L_{UQ},A} > 0$) and the probability of a law-abiding citizen being unarmed decreases even more ($P^{PC}_{(L,U)} < P^{RTC}_{(L,U)} < P^{RM}_{(L,U)}$).[11] Under PC:

$$PC : E(T)^{PC} = P_{(C,U)}T(C, U) + P_{(C,A)}T(C, A) + P_{(L_{UQ},A)}T(L_{UQ}, A) \tag{6}$$

If the concealed carry laws affect nothing but the probability of law-abiding citizens carrying concealed guns, then according to the basic framework, the expected threat level would be the same under Restricted or May-issue and RTC states, while it would increase under PC as law-abiding unqualified citizens would be able to carry concealed guns:

$$\Rightarrow E(T)^{PC} > E(T)^{RTC} = E(T)^{RM} \tag{7}$$

The expected number of police shootings is defined as $\#shootings = E(T) * N$ where N is the $\#ofInteractions$.

In addition to the probability of running into, and the composition of, armed people, which are both affected mechanically by the CC laws, there are other factors that can be affected. As mentioned above, these other factors can in return affect the threat level of an

[11] I can also argue that under PC the probability of armed qualified law-abiding citizens $P_{(L_Q,A)}$ increases as well, since now the cost of carrying a concealed gun legally is zero (previously, you would have needed to obtain a permit), however as mentioned above since $T(L_Q, A) = T(L, U) = 0$ an increase of $P_{(L_Q,A)}$ will not change the threat level.

encounter. Donohue et al. (2019) argues that when a state switches from Restricted/May-issue laws to RTC the $\#ofInteractions$ with police, as measured by the rate of arrests decreases. The analysis in section 7.2.1 below verifies this. Additionally, I find that when a state switches from RTC to PC the $\#ofInteractions$ with the police remain overall the same.

Therefore, compared to more restricted laws the number of interactions under RTC decreases, $N^{RTC} < N^{RM}$, and since $E(T)^{RM} = E(T)^{RTC}$ the number of shootings under RTC decreases.

$$\Rightarrow \#shootings^{RM} = E(T) * N^{RM} > E(T) * N^{RTC} = \#shootings^{RTC} \tag{8}$$

In the transition from RTC to PC since the number of interactions remains overall the same, $N^{RTC} = N^{PC}$, and because the expected threat level that police officers face was already higher that in the RTC due to the unqualified armed law-abiding citizens ($E(T)^{PC} > E(T)^{RTC}$), the number of shooting under PC remains higher that in RTC.

$$\Rightarrow \#shootings^{RTC} = E(T) * N^{RTC} < E(T) * N^{PC} = \#shootings^{PC} \tag{9}$$

4 Data and Empirical Strategy

4.1 Data Sources

Data on the number of fatal shootings by law enforcement officers is obtained at the state level from two different sources: the Fatal Encounters.org database, and the Washington Post database.[12] [13]

The Fatal Encounters project is run by journalist D. Brian Burghart, and is a first step in creating a "*national database of people killed during interactions with law enforcement*". The data set includes all types of situations where a person died in front of a police officer, either on- or off-duty. In order to eliminate noise from self-inflicted gunshot wounds, suicides,

[12] http://www.fatalencounters.org

[13] https://github.com/washingtonpost/data-police-shootings

accidents, and criminal activity, I define fatal police shootings as an event where a person that is neither a relative nor an acquaintance of the officer is fatally shot by a firearm fired by a police officer, either on-duty or operating under the capacity of law enforcement.[14] Data collection starts from 2000 and goes up to 2017. Fatal Encounters has two limitations. First, in more than a third of the incidents, mostly prior to 2013, the race of the deceased is unspecified.[15] Second, Fatal Encounters data do not consistently provide enough information about the incidents, such as if the deceased was armed/unarmed, their mental state, or why the officer(s) initially got involved, which therefore limits more detailed further analysis.

On the other hand, the Washington Post database does provide some level of detail on the information necessary to improve on the Fatal Encounters data. In addition to the race, age, and gender of people fatally shot by police officers, all of which were also available on Fatal Encounters, it provides information on whether the victim was armed, what they were armed with, whether he/she was fleeing the scene, and if he/she had signs of mental illness. The main drawback of the Washington Post data is that it is only available for the years 2015 onward. For this reason it is used only for studying the PC effect.

4.2 Summary Statistics

The summary statistics of the two data sources for fatal police shootings are shown in Table 1. When comparing the column (2) and (3), which report averages for the same time period, 2015 to 2017, we observe that Fatal Encounters and Washington Post are consistent in both the characteristics of the victim and average number of people shot dead by police officers. For the years 2015 to 2017 the average number of the deceased is 36 to 37 years old, more than 95% are male, half are white, and around a quarter are black. Moreover, the average number of deaths by gun per state-year is between 19 and 20 and the average rate per 100,000 people ranges from 0.35 to 0.37.

For a more thorough examination Table 2 and Figure 2 present correlations of the differences from year to year in number of people fatally shot by police, within state, between

[14] Excluding cases where the police officer is in civilian clothing, on- or off-duty, being the victim of casual criminal activity, and uses the gun in self-defense.

[15] Figure A1 in the Appendix shows the percentage and number of victims with unspecified race by year.

the data sources for the years 2015 to 2017. The first measure is the correlation between the number of deaths reported for every state-year. The next two measures try to capture the correlation between changes of number of deaths within a state across years. The first one calculates the percentage change from one year to another by state, and the second measures the actual change in number of deaths by state.[16] Throughout the table, there is a strong correlation between the data sources. The Fatal Encounters and Washington Post data show similar numbers and patterns, as evidenced by both the summary statistics Table 1 and Table 2. It is clear that the overall trend in the number of people fatally shot by police is consistent; Fatal Encounters and Washington Post maintain a harmonious fluctuation.

4.3 Empirical Strategy

To estimate the effect of the different concealed carry laws, I use a *Difference-in-differences* model and an *event-study* analysis.

4.3.1 DiD model

For estimating the RTC effect, the DiD model is:

$$Log(Y_{s,t}) = \alpha + \beta_1 \mathbf{RTC}_{s,t} + \beta_3 \mathbf{X}_{s,t} + \sum_s \text{Sate fixed effect}_s + \sum_t \text{Time fixed effect}_t + \epsilon_{s,t} \quad (10)$$

While for estimating the PC effect:

$$Log(Y_{s,t}) = \alpha + \beta_2 \mathbf{PC}_{s,t} + \beta_3 \mathbf{X}_{s,t} + \sum_s \text{Sate fixed effect}_s + \sum_t \text{Time fixed effect}_t + \epsilon_{s,t} \quad (11)$$

The variables $RTC_{s,t}$ and $PC_{s,t}$ are dummies, indicating when the state is RTC or has PC, respectively. Following Aneja et al. (2011), the dummies are set equal to the proportion of the first year under the law, and equal to one for all future full years following.[17] In

[16] The first measure is calculated as $\frac{FatalyShot_t - FatalyShot_{t-1}}{FatalyShot_{t-1}} * 100$, and the second measure as $FatalyShot_t - FatalyShot_{t-1}$. When calculating the first measure, I add one to all elements in the fraction to deal with the zeros in the denominator.

[17] Table A1 and table A2 in Appendix show the dates that RTC and PC laws took effect, along with the fraction of the year that the laws are in effect the first year. The tables are similar to the one in Donohue et al. (2019).

equation 10 the control group (baseline) are the states under No or May-issue, and the coefficient of interest is β_1 which estimates the RTC effect. In equation 11, the omitted category is the RTC states, and β_2 reflects the PC effect. The outcome $Y_{s,t}$ for the main part of the analysis is defined as the number of people fatally shot by law enforcement per 100,000 people, in state (s) and year (t). As for $X_{s,t}$, it include common demographic and economic indicators.[18]

4.3.2 Event-study analysis

The *event-study* model allows for time-varied responses (year-by-year effects) and estimates the short-run and long-run effects of RTC and PC:

$$\begin{aligned} Log(Y_{s,t}) = \alpha + \sum_{k\geq 1} \beta_{1_k}\ k\text{YRAFT}_{s,t} + \sum_{k\geq 1} \beta_{2_k}\ k\text{YRBEF}_{s,t} + \beta_3 X_{s,t} \\ + \sum_{s} \text{Sate fixed effect}_s + \sum_{t} \text{Time fixed effect}_t + \epsilon_{s,t} \end{aligned} \tag{12}$$

The variables kYRAFT and kYRBEF are a series of dummy variables, that take the value 1 if the RTC/PC law has been in effect for k periods or it is k periods before RTC/PC is enacted, respectively, and 0 otherwise. Similar to the DiD model, the dummy for the first year the law was enacted is equal the fraction of the year that the law is in effect. Control variables $X_{s,t}$, state and time fixed effects are also included. For the RTC event study, the control group is states that never adopted RTC laws (No or May-issue) and the treatment group is states that adopted RTC laws regardless of whether that happened earlier than the time period of the study (before 2000).[19] For the PC event study, the control group is the RCT states that never adopted PC laws and the treatment group is states that adopted PC laws regardless of whether that happened earlier than the time period of the study.

[18] Table A3 in the Appendix lists all the control variables used.

[19] Even thought we do not observe the year that the change happened in the data, the dates of early adopters are known. For example Texas, which adopted RTC in 1995, will take the value 1 from Lead 5 onward and zero otherwise.

5 Results

5.1 Right-To-Carry Effect on Fatal Police Shootings

To estimate the RTC effect on fatal police shootings I use the Fatal Encounters data that span the years 2000 to 2017. Table 3 presents results of the *DiD* model (equation 10). When a state with Restricted or May-issue laws adopts RTC, the rate of people fatally shot by police officers decreases by about 3.7%, or in other words 0.45 fewer people are fatally shot by police officers per 1,000,000 persons every year in a given state. The results are statistically significant at the 1% level.

Looking the RTC effect for different race groups, it is evident that the overall negative RTC effect is driven primarily by the white population. Not only do white people experience the biggest decline of police shooting by about 3.6%, but they are also the only racial group for which the decrease in police shootings is statistically significant. However, as stated earlier the RTC effect by race should be interpreted with caution as 27% of the data does not report the race of the deceased.

Figure 4 shows the results of the event study analysis, using equation 12. After the enactment of RTC laws the logarithm of the rate of people fatally shot by law enforcement drops to, and stays at, a relatively lower average compared to the pre-treatment period. However, since different states enacted the laws in different years, the event study in figure 4 is not balanced. Figure 3 presents four different balanced event studies, where each figure groups the analysis for states that appear in consistent event windows (for example, t-7 to t+6). Each different event windows includes a different number of states. Throughout the event studies the pre-treatment period reveals parallel trends between the treatment and control group, and as we add more states to the analysis, the estimates become more precise. These results are consistent with the DiD model's 3.6% decrease.

5.2 Permitless Carry Effect on Fatal Police Shootings

To estimate the PC effect on fatal police shootings I use both the Fatal Encounters and the Washington Post data.

5.2.1 Permitless Carry Effect Using Fatal Encounters data

As seen in Panel A of Table 4, using the Fatal Encounters data for the years 2000 to 2017 yields a positive effect of PC laws of 5.2%, and statistically significant at the 5% level. That means that when a RTC state adopts PC, the rate of people fatally shot by police officers increase by about 5.2% or based on column (6) 0.8 more people are fatally shot by police per 10,000,000 persons every year in a state.

In the data used to estimate the PC effect, 25% of race is missing; however that phenomenon appears, mostly, prior to 2013, and for the period 2013 to 2017 the percentage of cases with unreported race drops to 5%. Since most of the transitions from RTC to PC happens in the more recent years, I restrict the sample to the years 2013 to 2017 to get accurate estimates of the PC effect by race. Panel A2 of Table 4 shows the overall PC effect for the restricted sample. The PC effect is larger in magnitude, causing a 7.3% increase in fatal police shootings and is statistically significant at the 1% level.

When breaking down the analysis by race, in contrast to the RTC effect, the PC effect is now driven by the black population. Black people under PC face a statistically significant 22% increase in fatal police shootings. On the other hand the rate of white people fatally shot by police increases by 5%, and is statistically significant albeit less precise than for the black population.

Figure 6 shows the results from the event study analysis, using equation 12 for the years 2000 to 2017. In the post-treatment period there is an immediate positive reaction, which despite getting smaller in magnitude, remains positive and statistically significant for the rest of the years. As in the RTC analysis, since different states have different years of enactment the event study in figure 6 is not balanced. Figure 5 presents six different balanced event studies. The pre-treatment period shows parallel trends throughout the figures. These results are consistent with the dummy model's 5.2% increase.

5.2.2 Permitless Carry Effect Using Washington Post data

The Washington Post data is collapsed at the monthly level and cover the years 2015 to 2017. In this analysis I am running a Poisson regression.[20]

Table 5 shows that the difference in the logarithm of expected number of people fatally shot by police officers is 0.35 deaths higher under PC compared to RTC, and it is statistically significant at the 1% level. Moreover, similar to the findings using the Fatal Encounters data, black people face the larger increase in fatal police shootings.

5.2.3 Comparing Fatal Encounters and Washington Post data

Table 6 presents the PC effect using both the Fatal Encounters in Panel A and the Washington Post data in Panel B, for the years 2015-2017. For this analysis the Washington Post data were collapsed to the yearly level.

Knowing, from the summary statistics, that the data from those two sources are comparable, it is not a surprise that their PC effects are similar. When a RTC state adopts PC, based on the Fatal Encounters data the rate of people fatally shot by law enforcement officers will experience an increase of around 10%, while the Washington Post data show an increase of about 12%. The results are statistically significant, both, at the 1% level.

6 Robustness checks of Main Results

In order to test the robustness of the results, the RTC and PC effects were estimated dropping the State of Arkansas and with various alternative specifications: controlling for open carry laws of firearms, including possible neighboring spillover effects, and with linear and quadratic state-specific trends.

6.1 Open carry

Open carry, where the firearm must remain visible to a casual observer, is the other way in which civilians can carry a firearm in a public place. Similar to the CC laws, states can be

[20] The regression does not include population weights, but population is incorporated as a control variable.

classified in 3 broad categories based on whether it is legal to open carry and whether a permit is med in order to do so. In the Non-permissive open carry states, open carry is forbidden, with the exception of specific situations such as when one is hunting or traveling. Licensed open carry states allow open carry, but a permit is required. Finally, Permissive open carry states are states where open carry is legal and a permit to carry is not required, although in some states there are local restrictions for non-license holders. The above categories apply separately for long gun and handguns.

Along with the PC, open carry of firearms has also been opposed by law enforcement (Holloway, 2016; Harte, 2016). They argue that first, when a citizen is carrying a gun openly, it is a stressful situation, where the gun carrier's motives are unknown until he/she acts, which may lead police officers to overreact, unnecessarily escalating some incidents. Second, police officers tend to pay attention to openly armed people, even if they do not do anything illegal, diverting attention away from other responsibilities, wasting valuable police time. Third, in an urgent situation, if an uninvolved third party is openly carrying a gun, law enforcement may not discern the perpetrator from this civilian.

It is clear that open carry hinders police work in a different way than concealed carry, and that open carry can also affect police shootings. Although, the direction in which to expect the effect to go is not entirely clear, and this discussion is beyond scope of my analysis. In this robustness check, I am primarily concerned with isolating any possible effects coming from CC laws; to that end, I control for both the handgun and long gun open carry laws. Columns 3 and 4 of Table 7 show that open carry laws do not affect neither the RTC nor the PC effect.

6.2 Spillover effects from neighboring states

Spillover effects are another important aspect to consider. Bronars and Lott (1998), who are in favor of more lenient CC laws, argue that when a state adopts those kind of laws, criminals tend to emigrate from that state since victims are more likely to be armed, and so the benefits are generally stronger than those found in previous work.

Following that theory, more lenient CC laws can bias the results in two ways. First, if neighboring states have more lenient CC laws than the state of interest, criminals from the surrounding area will migrate and increase the crime rate. This will alter the control group if this state is never treated (since the state of interest will absorb effects from surrounding states). Whereas, if the state will be treated in a later year, this migration will affect the pre-treatment period and can inflate the estimates. Second, if any given state adopts more lenient CC laws then, based on Bronars and Lott (1998) argument, its crime rate will decrease due to geographic spillovers. Therefore, in both cases, even if police shootings increase, we may not observe any effect because the spillovers will bias the findings.

To control for the geographic spillovers and to incorporate the impact of neighbor states I constructed the following two indices:

$$NSrtc_{it} = \frac{\#ofNeigboringStatesunderRTC_{it}}{\#ofNeigboringStates_{it}}$$

$$NSpc_{it} = \frac{\#ofNeigboringStatesunderPermitlesscarry_{it}}{\#ofNeigboringStates_{it}}$$

Therefore $NSrtc_{it}$ and $NSpc_{it} \in [0, 1]$. $NSrtc_{it}$ is the ratio of the neighboring states under RTC laws, and $NSpc_{it}$ is the ratio of the neighboring states under PC laws.

Columns (1) and (2) of Table 7 repeat the DiD model analysis of the RTC and PC effect, but this time controlling for possible spillovers. The findings indicate that spillover effects do not bias neither the RTC nor the PC effect.

6.3 Take out Arkansas

In the state of Arkansas, even though the PC law passed on August 16, 2013, there was a general confusion among civilians and officials regarding the interpretation of the law. The issue was resolved in October 17, 2018 after the Arkansas Court of Appeals issued a ruling confirming that permitless carry is legal.[21]

Therefore during the years 2013 to 2018, because of the unclear situation that prevailed, how the law was followed is ambiguous. In order to deal with this uncertainty, I remove the state of Arkansas. As Columns (5) and (6) of Table 7 show the RTC an PC effect are robust

[21] https://www.usacarry.com/arkansas-permitless-carry/

to the exclusion of the state of Arkansas.

6.4 State specific trends

One of the most debatable specifications in the RTC literature is whether or not to include state-specific trends. The NRC Report does not take a stance on that matter, and an influential paper, Lott and Mustard (1997), does not include them, as they could absorb the effect of the shock under study (Wolfers, 2006). Nevertheless, their inclusion can be useful (Durlauf et al., 2008) as they control for pre-existing local time trends or potential omitted variables (Aneja et al., 2011; Black and Nagin, 1998). With that in mind, papers have used a couple of location-specific trends such as linear state-specific time trends (Aneja et al., 2011; Donohue and Ayres, 2003, 2009; Moody and Marvell, 2008), quadratic state-specific time- trends (Black and Nagin, 1998) and region-time-trends (Durlauf et al., 2016). Columns (7) to (10) of Table 7 present the RTC and the PC effects when I account for linear and quadratic state-specific trends respectively. The results are robust to these changes.

7 Mechanisms

The main analysis above shows that the relationship between the leniency of CC laws and fatal police shootings is not linear. States that switch from Restricted or May-issue laws to RTC experience, on average, a decrease of about 3.6% in the rate of people fatally shot by law enforcement. Whereas, RTC states that adopt PC, which is more lenient, will face, on average, an increase in the rate of people fatally shot by law enforcement of 5.2%.

In this section I disentangle the above results by investigating seven possible mechanisms. Of those mechanisms, two are reactions that happen mechanically due to the CC laws: the likelihood of running into an armed person, and the composition of armed people; and the rest are five intermediate outcomes: crime rates, prevalence of guns, number of law enforcement agents, number of police interactions with the public, and intensity of crime.[22]

[22] Data for crime rates, number of full-time law enforcement employees, and percentage of suicides committed by gun was obtained from the FBI's uniform crime reports, the FBI's police employee data, and NCHS, respectively. Data is at the state-year level unless stated otherwise.

The following analysis suggests that fatal police shootings under RTC are lower because of a decrease in police interactions with the public. While the increase of fatal police shootings under PC is due to the fact that previously unqualified citizens under RTC are now able carry concealed weapons, increasing the risk that police officers face.

7.1 Two mechanical changes

If everything else remained constant, the only changes we would observe by loosening the requirements for carrying a concealed gun would be: first, more people carrying guns in the streets, and second, a change in the composition of those armed people.

7.1.1 Likelihood of carrying a gun

The likelihood of carrying a gun by itself cannot explain much of the effect of CC laws on police shootings. In both transitions, from restricted laws to RTC, and from RTC to PC, the probability of running into an armed person increases by definition, and that should translate into an increase in the risk police face and therefore into more aggressive behavior and more police shootings. However, this is not necessarily the case, as the way police will react to that change will depend also on the characteristics of those recently armed people. For instance, knowing that any given person carrying a gun is not necessarily breaking the law may lead police officers to be less impulsive in their interactions with armed citizens. Therefore, in order to speculate on how the increase in the likelihood of running into an armed person will affect police shootings, we must first understand who will be newly armed in each case.

7.1.2 Composition of armed people

Even though under RTC laws, applicants for a concealed carry permit do not have to demonstrate "good cause" as under May-issue, they still have to meet the state requirements which, in addition to minimum age and residency, many times require background checks, firearm safety class certificates, and demonstration of handgun proficiency. In addition, Rowhani-Rahbar et al. (2018) conduct a nationally representative survey in 2015 and find that concealed carry permit holders are the most-trained gun owners, 83% of them having taken some formal training. Hence, when a state adopts RTC it, ideally, gives the opportunity to carry a concealed weapon only to citizens who are law abiding, trained, and mentally sound. In theory, these newly armed people should not cause any risk to police officers.

On the other hand, under PC, none of the above requirements are mandatory, and citizens who are considered unqualified under RTC can now carry concealed weapons. Unqualified citizens can be classified into two categories, first are the ones that should not own a gun in the first place, and second are the citizens who do not have the necessary knowledge to carry a gun. The former category includes people with violent history, alcohol-related problems, and mentally unstable citizens. Clearly, CC laws are not the only laws that regulate access and use of guns, and PC itself does not solely explain the acquisition of guns by unqualified citizens, other laws (background checks) are in place to regulate that. However, even though background checks on all buyers that purchase a firearm from a licensed dealer is required by federal law, they are not required for private sales of firearms (gun shows). In those situations, enforcement of background check is up to state laws or the discretion of the seller.[23] All 13 states that adopted PC do not have laws that address the private sales loopholes and do not require gun registration. Therefore in those PC states, the RTC permit would have worked as a second screening for unqualified citizens and would have prevented them from carrying a concealed gun in public. To provide some empirical evidence for this, using the Washington Post data, Table 8 Panel A and B show that the rate of mentally ill people fatally shot by law enforcement officers increased, along with those people fatally shot that were mentally ill and armed.

In the second category of unqualified citizens are the people who carry concealed guns but have not taken any firearm safety class, basic firearms proficiency exam, or any actions and certificates that would have been required under RTC. Since obtaining a CC permit is not compulsory under PC, gun owners who would have chosen to take safety classes and training only if the law required it now choose not to, and so they would carry a concealed

[23]Currently, there are 18 states that expanded background check to all firearm purchases, while in 33 states the private sales loopholes through which unfit people can buy a gun legally without being detected by the system remains open. In addition, all but 6 states and the District of Columbia do not require any type of gun registration.

gun without a permit. Table 9 Columns (1) and (2), using the National Instant Criminal Background Check System (NICS) data, corroborate that when a state that requires a federal background check in order to obtain a CC permit adopts PC, there are significantly fewer background checks being conducted for the purpose of obtaining a permit.[24] To argue that NICS background checks did not just decrease because citizens simply choose not to carry concealed guns, Table 9 Columns (3) and (4) show that the rate of accidental shootings increased by about 12%.[25] This phenomenon could be attributed both to an increase of concealed gun carriers and to the lack of training of these newly armed citizen. Moreover, these unqualified citizens could potentially put everyone around them in danger including police officers and themselves. Besides causing firearm accidents, by treating the gun recklessly, failing to comply with the officers instructions, or even moving in a threatening way, police officers could be forced to react in a defensive - and possibly violent - manner.

Therefore, when switching from RTC to PC, the increase in the probability of running into an armed person is accompanied with an increase in the threat that armed people can pose, as they might be unfit to handle the ownership of a gun.

At the same time unqualified armed civilians could raise uncertainty in regards to the quality of this larger armed population, which creates general confusion for the police officers as to which armed law-abiding citizen may be a threat. This causes negative spillovers to police interactions with qualified armed citizens.

Table 8, using data from the Washington Post, presents estimates that support the aforementioned argument, that PC leads to a higher number of armed citizens and that unqualified ones cause negative spillovers to the qualified citizens. Under PC the rate of people armed with firearms who were fatally shot by law enforcement increased, while people armed with other types of weapons did not experience such a significant and large increase.

[24] The data report background checks that were conducted with the purpose of obtaining a permit. However, there are two possible types of permits, a CC permit and a permit that allows the individual to buy a gun. To isolate the CC permits I control for the states that require a universal background check when they need a permit to buy a gun. Also many states might have their own Background check system so they do not require an NICS approval. Therefore the coefficient of interest is the $backgroudNICS\#PC$ which is the effect on NICS background checks when a state adopts PC and a CC permit requires a NCIS.

[25] Data for the accidental shootings where obtained from the Gun Violence Archive, from 2014-2017. Due to the period that the data cover is not possible to study the RTC effect. Accidental shootings exclude cases where the ID of a person was mistaken i.e.thought is was an intruder/threat but it turned out to be a friend/family, and cases of stray bullets.

Moreover, the increase in the number of unarmed victims shows the general confusion from the police officer's perspective as to who might be armed and pose a threat.

The existence of unqualified citizens and the worries they create for officers is more than just theoretical arguments. Police officers themselves have expressed their concern regarding arming unqualified citizens, and various police chiefs and unions have opposed PC for those reasons. (Gorman, 2017; Shepperson, 2017; Goudeau, 2017; Robertson and Williams, 2016; Yablon, 2016).

7.2 Five Intermediate Outcomes

7.2.1 Number of police interactions with the public

More/fewer interactions between police and the public might lead to more/less violent encounters, and in turn can affect the number of police shootings.

Donohue et al. (2019) argues that RTC impairs police officers and discusses three possible causes. First, valuable police time may be used for bureaucratic tasks (such as issuing and checking RTC permits in every interaction that involves a gun), for tracking stolen guns, and for dealing with gun accidents; all this at the expense of actively pursuing violent criminals. Second, it is possible that concealed weapons discourage police officers from interacting with people that are more likely to be armed, and they may choose to intervene only when they believe it is absolutely necessary. These reasons could decrease the number of police interactions under RTC. Lastly, armed law-abiding citizens may hinder police work either unintentionally, by making it harder to identify the bad-guy with the gun, or intentionally through their efforts to catch the criminal and help police officers out.[26] This last point does not directly decrease police interactions but can decrease arrests.

Taking into consideration Donohue et al. (2019)'s arguments, the effect of PC on police interactions is uncertain. Under PC law enforcement might not have to issue so many CC

[26] As illustrated in Donohue et al. (2019), in Denver on November 2017 law-abiding citizens had unintentionally hinder police work, and "delayed the investigation" when they pulled out their handguns during a shooting at a Walmart (Simpson, 2017). An example of an intentional intervention on police work by a good guy with a gun is the incident that took place in Illinois on 2014. While a police officer was chasing an armed robber, a CC permit holder fired towards the criminal."Since the officer did not know where the shots were fired from, he was forced to terminate his foot pursuit and take cover for his own safety" (Glanton and Sadovi, 2014).

permits and deal with the bureaucratic aspect of the law. On the other hand more non-violent incidents involving guns might occur, demanding even more time, or as the risks they face increase, officers may shy away even more.

In estimating the number of interactions, I use the rate of arrests for both the victimless crimes, where it is up to the police officers to intervene and enforce the law, such as drug offenses, gambling, and prostitution, as well as for the reported crimes, such as violent and property crimes.

I find RTC effects on the number of police interactions that support Donohue et al. (2019)'s arguments. The results in Table 10 show a 20% decrease in the total rate of arrests for agencies serving at least 100,000 people, and a 9% decrease for all the agencies combined, when a state adopts RTC. Both effects were statistically significant at the 10% level. When results are broken down by types of crimes, the negative effect is significant only for drug offenses and weapon violations for agencies serving at least 100,000 people, and for victimless crimes and weapon violations for all agencies combined. The drop in arrests for weapon violations could be a mechanical reaction to the decrease of illegal gun possessions or due to officers shying away from armed people. The findings support the claim that officers have more limited time and therefore prioritize crimes reported by victims over offenses that need to be sought out by polices. The results also support the argument that police may shy away from dangerous situations, intervening only when it is truly necessary, something that is less likely with victimless crimes.

The findings for the PC effect should be interpreted with caution at this point as 2017, the year where 3 states adopted PC, is not yet available and therefore not included in the analysis. The results in Table 11 show a 12% increase in the total rate of arrests for agencies serving at least 100,000 people, and a 4% increase for all the agencies combined, when a states adopts PC. However, the effects are significant only for agencies serving at least 100,000 people. Breaking down the results by types of crimes, regardless of the size of the population that the agency serves there is an increase in the arrests for vandalism, yet I only find an increase in arrests for reported crimes in the larger agencies.

To further understand the effect on rate of arrests, I explore three different performance measures for police officers: arrest/crime, clearances/crime, and clearances/arrests. I follow the specification of Adda et al. (2014). The error follows AR(1) structure, and the outcome variables will be define as:

$$ARR_{a,t} = \frac{ARR_{a,t}}{Crime_{a,t} + Crime_{a,t-1}}$$

$$CL_{a,t} = \frac{CL_{a,t}}{Crime_{a,t} + Crime_{a,t-1}}$$

$$CL/ARR_{a,t} = \frac{CL_{a,t}}{ARR_{a,t}}$$

I restrict the analysis of police performance to reported crimes, because the actual number of crimes committed is unknown for the rest of the crime categories.[27] To also deal with the problem of zero crimes committed, the sample is restricted to agencies who serve more than 100,000 people and are extremely unlikely to face that problem. The data used were obtained from the FBI's Uniform crime reports *Offenses Known and Clearances by Arrest* and *Arrests by Age, Sex, and Race* series. These data are at the agency level, and span the years 2000 to 2016.

The results for change in police performance as a response to RTC are shown in Table 12. Arrests per crime decrease, reinforcing previous findings that the rate of arrests did not drop because fewer crimes are committed. Clearances per crime falls only for violent crimes, while arrests per clearance decrease which mean that police become more efficient. In response to PC, however, Table 12 shows that there is a significant effect only in property crimes, with an increase in both the arrests per crime and clearances per crime, and a less efficient outcome as more arrests per clearance were made.

7.2.2 Crime

The most obvious factor that affects police behavior is crime. When crime increases, violent outcomes from police encounters might also increase as a reaction.

The RTC literature on how CC laws affect crime, as mentioned earlier, is divided. Following the most recent findings by Donohue et al. (2019), "10 years after the enactment of RTC laws, violent crime is estimated to be 13-15% higher than it would have been without

[27] Reported crimes: murder, manslaughter, rape, robbery, assault, burglary, larceny, and motor theft.

the RTC laws."

The results in columns (1) to (8) of Table 13 cannot be compared to Donohue et al. (2019)'s findings as they cover only the years 2000 to 2017, and are missing crucial controls like incarceration rate and the number of police officers. After controlling for demographics and economic controls, violent crime seems to increase under RTC by about 6.7% and decrease under PC laws by about 5.8%. On the other hand, property crime decreases under both RTC and PC laws, by about 3% and 11.6%, respectively. However, all of the effects are statistically insignificant, with the exception of the 11.6% drop of property crime under PC which was statistically significant at the 5% level. Even though property crime reacts differently under RTC and PC, the significant decrease under PC states is not consistent with the increase of people shot by police and cannot explain the contrasting RTC and PC effect. On the contrary, a decrease of property crime should be accompanied by, at least, a steady or reduced number of fatal shootings by the police. Alternatively, it could be the result of an increase in violent crime since there are more guns and an initially harmless property crime ends up becoming violent.

7.2.3 Intensity of Crime: Do More Police Die?

It is also possible that while crime rates do not change significantly, the crimes committed are becoming more violent. I explore this by testing whether lenient CC laws have an impact on police deaths.

Table 13 reports the result of a Poisson regression where the dependent variable is the number of law enforcement officers feloniously killed. The data cover the years 2000 to 2017 and were obtained from the FBI's LEOKA series. For these regressions, in addition to the control variables used in the analyses above, crime rates (violent and property crime rates) and number of full-time Law Enforcement Employees are also included.

The finding show no significant effect of the RTC on police officer deaths. The results are not consistent with those found by Mustard (2001), who concluded that RTC laws decrease the likelihood of a felonious death. In the PC case, the effect becomes negative, but remains statistically insignificant.

7.2.4 Number of law enforcement

Another factor that can affect the number of violent police outcomesis the number of law enforcement officers. A higher number of police officers may lead to a boost in violence, as the frequency of encounters between police officers and civilians increases. However, at the same time, a bigger police force might decrease crime which in return would decrease the number of violent incidents.

Donohue et al. (2019) found that states that adopt RTC laws increase the size of their police force by about 7-8%. The results in columns (13) to (16) of Table 13, that span the years 2000 to 2017, indicate a negative change on the number of police officers for RTC, and an increase for PC, both effects being statistically insignificant. The difference between these results to those of Donohue et al. (2019) may be due to the time periods considered, as they studied the years 1977 to 2014.

7.2.5 Prevalence of Guns

More lenient gun laws can make the idea of owning a gun more appealing and, consequently, increase the number of gun owners and guns carried in public, eventually increasing the likelihood of police officers running into an armed person.

The nonexistence of administrative data on firearm ownership (Cook and Ludwig, 2006) has forced researchers to look for substitutes. The most widely used proxy for gun prevalence is the percentage of suicides committed with guns (PSG) (Kleck, 2004; Azrael et al., 2004; Moody and Marvell, 2005; Cook and Ludwig, 2006; Siegel et al., 2013).

Using PSG, columns (9) to (12) of Table 13 show whether RTC and PC had an effect on gun prevalence. The magnitudes of both effects are small and statistically insignificant indicating that CC laws have no effect on PSG.

Overall, it can be concluded that RTC and PC do not have a particular effect on gun prevalence. These results are consistent with Duggan (2001), who uses sales of the magazine *Guns & Ammo* as a proxy and found no evidence that CC laws increase the rate of gun ownership.

8 Conclusion

This paper estimates the effects of CC laws on police behavior, and more specifically on fatal police shootings. Using both a difference-in-differences and an event study strategy I find that states that adopt RTC laws experience, on average, a decrease in the rate of killings by police officers by around 3.6%. States that then switch to PC, and become even more lenient, experience an increase in the rate of killings by police officers by 5.2%, on average.

Furthermore, looking into possible mechanisms I conclude that under RTC, fatal police shootings decrease due to a decrease in police interactions, while the increase of fatal police shooting under PC is attributable to the fact that the citizens who were unqualified under RTC can now carry a concealed weapon, and that increases the risk that police officers face.

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9 Tables and Figures

Table 1: Summary Statistics

	Fatal Encounters		Washington Post
Years covered	2000-2017	2015-2017	2015-2017
Victims characteristics			
Average Age	35.18	36.53	36.6
% Male	95.78	95.36	95.68
% Race: White	32.94	50	51
Black	22.69	25.41	25.81
Hispanic	14.61	17.49	18.44
Race Unspecified	26.66	2.8	0.33
Per state-year			
Average number of deaths by Gun	15.54	20.29	19.25
Average rate of deaths per 100,000 ppl by Gun	0.26	0.37	0.35
Incident's characteristics			
% Armed			89
% Armed with gun			56.5
% Not fleeing			67.8
% Body camera			10.83
% Mental illness			24.92

Table 2: Data sources comparison: Fatal Encounters vs Washington Post, 2015-2017
(Correlation of state-year observations)

	Coefficient of Correlation	Formula	N[1]
Actual number	0.9974		153
Percentage change[2]	0.9571	$\frac{FatalyShot_t - FatalyShot_{t-1}}{FatalyShot_{t-1}} * 100$	102
Actual change	0.9609	$FatalyShot_t - FatalyShot_{t-1}$	102

[1] when constructing the *percentage* and *actual change* the initial year gets lost, therefore losing 51 observations.
[2] I add one to all elements in the fraction to deal with the zeros in the denominator.

Table 3: Fatal Encounters data: DiD Model, RTC effect, 2000-2017

Dependent variable: Logarithm of people fatally shot by law enforcement per 100,000 persons

	Logarithm of the Ratio				Ratio	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: All races						
RTC	-0.0286**	-0.0330***	-0.0352***	-0.0365***	-0.0358**	-0.0451***
	(0.0129)	(0.0105)	(0.0106)	(0.00900)	(0.0167)	(0.0115)
Observations	855	855	855	855	855	855
R-squared	0.710	0.717	0.727	0.735	0.694	0.721
Panel B: White						
RTC	-0.0294*	-0.0334**	-0.0351**	-0.0361***	-0.0382*	-0.0457***
	(0.0161)	(0.0149)	(0.0137)	(0.0128)	(0.0202)	(0.0158)
Observations	855	855	855	855	855	855
R-squared	0.696	0.703	0.716	0.724	0.672	0.706
Panel C: Black						
RTC	-0.0337	-0.0390	-0.0228	-0.0281	-0.0234	-0.0143
	(0.0438)	(0.0465)	(0.0427)	(0.0468)	(0.0711)	(0.0697)
Observations	855	855	855	855	855	855
R-squared	0.609	0.611	0.623	0.632	0.566	0.593
Panel D: Hispanics						
RTC	0.0250	0.0225	0.00594	0.00594	0.0355	0.0103
	(0.0474)	(0.0462)	(0.0282)	(0.0282)	(0.0683)	(0.0370)
Observations	855	855	855	855	855	855
R-squared	0.549	0.550	0.587	0.587	0.498	0.544
Economic Controls	No	Yes	No	Yes	No	Yes
Demographic Controls	No	No	Yes	Yes	No	Yes

Estimated using state population weights. All regressions include state and year fixed effects.
Standard errors clustered at the state level in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
27% of the data did not report the race of the deceased.
RTC effects by race should be taken with caution.

Table 4: Fatal Encounters data: DiD Model, PC effect, 2000-2017
Dependent variable: Logarithm of people fatally shot by law enforcement per 100,000 persons

	Logarithm of the Ratio				Ratio	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: All races						
PC	0.0911***	0.0898***	0.0612***	0.0522**	0.140***	0.0762**
	(0.0123)	(0.0129)	(0.0208)	(0.0227)	(0.0194)	(0.0306)
R-squared	0.660	0.661	0.687	0.692	0.654	0.695
Observations	681	681	681	681	681	681
Panel A2: All races, 2013-2017						
PC	0.0728***	0.0830***	0.0571**	0.0729***	0.103***	0.105***
	(0.0221)	(0.0239)	(0.0250)	(0.0225)	(0.0314)	(0.0316)
R-squared	0.775	0.778	0.793	0.801	0.781	0.808
Panel B: White, 2013-2017						
PC	0.0498*	0.0597**	0.0300	0.0505*	0.0695*	0.0699*
	(0.0293)	(0.0295)	(0.0333)	(0.0299)	(0.0393)	(0.0408)
R-squared	0.706	0.714	0.721	0.730	0.695	0.718
Panel C: Black, 2013-2017						
PC	0.187***	0.218***	0.199***	0.219***	0.322**	0.408***
	(0.0583)	(0.0537)	(0.0429)	(0.0461)	(0.158)	(0.141)
R-squared	0.558	0.564	0.598	0.605	0.533	0.573
Panel D: Hispanics, 2013-2017						
PC	0.222***	0.241***	0.164**	0.184*	0.291***	0.244
	(0.0673)	(0.0776)	(0.0781)	(0.0979)	(0.103)	(0.148)
R-squared	0.650	0.660	0.676	0.698	0.619	0.668
Observations	208	208	208	208	208	208
Economic Controls	No	Yes	No	Yes	No	Yes
Demographic Controls	No	No	Yes	Yes	No	Yes

Estimated using state population weights. All regressions include state and year fixed effects.
Standard errors clustered at the state level in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
From 2013 to 2017, 8% of the data did not report the race of the deceased.

Table 5: Washington Post data: DiD Model, PC effect, 2015-2017
Dependent variable: Number of people fatally shot by law enforcement

	(1)	(2)	(3)	(4)
Panel A: All races				
PC	0.250***	0.266***	0.347***	0.345***
	(0.0946)	(0.0974)	(0.0889)	(0.0996)
Panel B: White				
PC	0.233	0.210	0.280*	0.276*
	(0.163)	(0.150)	(0.166)	(0.152)
Panel C: Black				
PC	0.796**	0.808***	0.995***	0.952***
	(0.312)	(0.305)	(0.286)	(0.280)
Panel D: Other races				
PC	-0.179	-0.157	-0.434	-0.476
	(0.508)	(0.526)	(0.624)	(0.640)
Economic Controls	No	Yes	No	Yes
Demographic Controls	No	No	Yes	Yes
Observations	1,515	1,515	1,515	1,515

Poisson regression.
Population is included as control variable.
Standard errors clustered at the state level in parentheses.
All regressions include state and year fixed effects.
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Washington Post vs Fatal Encounters data: DiD Model, PC effect, 2015-2017
Dependent variable: Logarithm of people fatally shot by law enforcement per 100,000 persons

	All Deaths (1)-(2)		White (3)-(4)		Black (5)-(6)		Hispanics (7)-(8)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Fatal Encounters								
PC	0.107***	0.103***	0.0718*	0.0864***	0.307***	0.330***	0.0258	-0.149
	(0.0354)	(0.0356)	(0.0387)	(0.0311)	(0.0649)	(0.121)	(0.163)	(0.205)
R-squared	0.841	0.841	0.759	0.827	0.668	0.737	0.722	0.785
Panel B: Washington Post								
PC	0.108***	0.122***	0.0622	0.0720*	0.405***	0.438***	0.0706	-0.0835
	(0.0325)	(0.0375)	(0.0378)	(0.0358)	(0.0627)	(0.107)	(0.119)	(0.156)
R-squared	0.847	0.895	0.755	0.809	0.668	0.746	0.766	0.834
Economic Controls	No	Yes	No	Yes	No	Yes	No	Yes
Demographic Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	126	126	126	126	126	126	126	126

Data are collapsed to a yearly-level.
Estimated using state population weights.
Standard errors clustered at the state level in parentheses.
All regressions include state and year fixed effects.
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Robustness Checks

Dependent variable: For Panels A & B is the logarithm of people fatally shot by law enforcement per 100,000 persons; for Panel C is the number of people fatally shot by law enforcement.

	Neighbor Spillovers		Open Carry laws		w/o Arkansas		Linear State trends		Quadratic State trends	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: Fatal Encounters, RTC effect, 2000-17										
RTC	-0.0278**	-0.0346***	-0.0283**	-0.0368***	-0.0286**	-0.0365***	-0.0508***	-0.0422***	-0.0508***	-0.0422***
	(0.0129)	(0.00889)	(0.0129)	(0.00946)	(0.0129)	(0.00900)	(0.00887)	(0.0121)	(0.00887)	(0.0120)
Observations	837	837	855	855	855	855	855	855	855	855
R-squared	0.717	0.742	0.710	0.735	0.710	0.735	0.763	0.772	0.763	0.772
Panel B: Fatal Encounters, PC effect, 2000-17										
PC	0.0886***	0.0510**	0.0911***	0.0483**	0.0911***	0.0522**	0.0833***	0.0824***	0.0832***	0.0824***
	(0.0129)	(0.0224)	(0.0137)	(0.0204)	(0.0123)	(0.0227)	(0.0288)	(0.0296)	(0.0288)	(0.0296)
Observations	668	668	681	681	681	681	681	681	681	681
R-squared	0.667	0.700	0.660	0.693	0.660	0.692	0.710	0.728	0.710	0.728
Panel C: Washington Post data, PC effect, 2015-17										
PC	0.282***	0.387***	0.245**	0.343***	0.258***	0.359***				
	(0.102)	(0.104)	(0.0971)	(0.100)	(0.0946)	(0.102)				
Observations	1,515	1,515	1,515	1,515	1,479	1,479				
Neighboring State Indices	Yes	Yes	No	No	No	No	No	No	No	No
Open carry laws	No	No	Yes	Yes	No	No	No	No	No	No
Linear State trends	No	No	No	No	No	No	Yes	Yes	No	No
Quadratic State trends	No	No	No	No	No	No	No	No	Yes	Yes
Economic Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Demographic Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes

Panel A&B: OLS regression. Estimated using state population weights.

Panel C: Poisson regression. Population is included as control variable. Monthly-level.

Standard errors clustered at the state level in parentheses. All regressions include state and year fixed effects. *** p<0.01, ** p<0.05, * p<0.1

Table 8: Mechanisms: Unqualified Citizens
Washington Post data, DiD Model, PC effect, 2015-2017
Dependent variable: Number of people fatally shot by law enforcement

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A:	**Mentally ill: FALSE**		**Mentally ill: TRUE**			
PC	0.122	0.217	0.766*	0.861**		
	(0.140)	(0.152)	(0.407)	(0.349)		
Panel B:	**Mentally ill & Armed with a gun**		**Mentally ill & Armed w/o a gun**			
PC	1.038*	1.008*	0.222	0.668		
	(0.603)	(0.574)	(0.425)	(0.444)		
Panel C:	**Unarmed**		**Armed (w/o Vehicle)**		**Vehicle**	
PC	0.962***	0.935**	0.235**	0.339***	-0.596	-0.337
	(0.349)	(0.421)	(0.111)	(0.123)	(0.597)	(0.744)
Panel D:	**Armed with Gun**		**Armed w/o Gun**		**ArmedToyWeapon**	
PC	0.233*	0.308**	0.0162	0.226	0.500	0.0473
	(0.129)	(0.120)	(0.251)	(0.265)	(0.611)	(0.901)
Economic Controls	No	Yes	No	Yes	No	Yes
Demographic Controls	No	Yes	No	Yes	No	Yes
Observations	1,515	1,515	1,515	1,515	1,515	1,515

Poisson regression.
Population is included as control variable.
Standard errors clustered at the state level in parentheses.
All regressions include state and year fixed effects.
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Mechanisms: Unqualified Citizens
Dependent variable: logarithm of the rate of NICS background checks and of Accidental Shootings per 100,000 people.

	NICS 2000-2017		Accidental Shootings 2014-2017	
	(1)	(2)	(3)	(4)
PC	-0.640	-0.399	0.132**	0.116*
	(0.880)	(0.740)	(0.0643)	(0.0681)
backgroundNICS	1.104	1.756*		
	(1.111)	(0.957)		
backgroundNICS # PC	-2.641**	-3.682***		
	(1.284)	(1.264)		
Observations	681	681	167	167
R-squared	0.744	0.795	0.785	0.822
Economic Controls	No	Yes	No	Yes
Demographic Controls	No	Yes	No	Yes

Standard errors clustered at the state level in parentheses.
Estimated using state population weights.
All regressions include state and year fixed effects.
*** p<0.01, ** p<0.05, * p<0.1

Note: NICS data report background checks that were conducted with the purpose of obtaining a permit. However, there are two possible types of permits, a CC permit and a permit that allows the individual to buy a gun. To isolate the CC permits I control for the states that require a universal background check when they need a permit to buy a gun. Also many states might have their own Background check system so they do not require an NICS approval. Therefore the coefficient of interest is the $backgroudNICS\#PC$ which is the effect on NICS background checks when a state adopts PC and a CC permit requires a NCIS.

Table 10: Mechanisms: How RTC affects Arrest rates, 2000-2016
Dependent variable: logarithm of the rate of Arrests per 100,000 people.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Total Arrests		Victimless Crimes	Vandalism	Weapon Violation	Drugs	Drugs w/o Mrj	Marijuana	Reported Crimes	Violent	Property
Panel A: Agencies serving at least 100,000 people											
RTC	-0.166	-0.195*	-0.256	0.148	-0.186*	-0.255**	-0.203	-0.00596	-0.154	-0.180	-0.120
	(0.110)	(0.103)	(0.196)	(0.274)	(0.0950)	(0.125)	(0.146)	(0.228)	(0.104)	(0.113)	(0.0981)
Observations	5,769	5,597	5,597	5,597	5,597	5,597	5,597	5,597	5,597	5,597	5,597
R-squared	0.806	0.842	0.770	0.760	0.837	0.686	0.773	0.630	0.842	0.828	0.851
Panel B: All Agencies											
RTC	-0.0723	-0.0882*	-0.171**	0.0812	-0.120**	-0.0666	-0.0563	0.157	-0.0230	-0.0147	-0.0363
	(0.0514)	(0.0473)	(0.0850)	(0.118)	(0.0472)	(0.0683)	(0.0785)	(0.107)	(0.0495)	(0.0544)	(0.0469)
Observations	31,247	30,585	30,585	30,585	30,585	30,585	30,585	30,585	30,585	30,585	30,585
R-squared	0.828	0.846	0.784	0.723	0.790	0.715	0.773	0.631	0.836	0.823	0.836
Economic Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Demographic Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Ye	Yes	Yes

Reported Crimes: Violent+Property. **Violent crimes:** murders, manslaughter, forcible rape, robberies, and assaults.
Property crimes: burglaries, larceny, and motor theft
Victimless crimes: prostitution and commercialized vice, gambling, DUI, liquor laws, drunkenness, vagrancy, suspicion, curfew, and loitering violations.
Agency-year level. Estimated using agency population weights.
All regressions include population groups, year, state, and agency fixed effects.
Standard errors clustered at the agency level in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 11: Mechanisms: How PC affects Arrest rates, 2000-2016
Dependent variable: logarithm of the rate of Arrests per 100,000 people.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Total Arrests		Victimless Crimes	Vandalism	Weapon Violation	Drugs	Drugs w/o Mrj	Marijuana	Reported Crimes	Violent	Property
Panel A: Agencies serving at least 100,000 people											
PC	0.0229	0.115**	0.175	0.302***	0.00271	0.258	0.303	0.171	0.133***	0.118*	0.171**
	(0.0672)	(0.0568)	(0.110)	(0.0949)	(0.112)	(0.195)	(0.215)	(0.186)	(0.0500)	(0.0626)	(0.0735)
Observations	3,571	3,399	3,399	3,399	3,399	3,399	3,399	3,399	3,399	3,399	3,399
R-squared	0.813	0.860	0.785	0.792	0.837	0.638	0.695	0.577	0.842	0.814	0.850
Panel B: All Agencies											
PC	-0.00309	0.0359	0.0696	0.226***	-0.137	0.0981	0.0549	0.141	0.0369	0.0301	0.0463
	(0.0463)	(0.0427)	(0.0713)	(0.0801)	(0.0924)	(0.110)	(0.134)	(0.104)	(0.0380)	(0.0525)	(0.0496)
Observations	20,293	19,633	19,633	19,633	19,633	19,633	19,633	19,633	19,633	19,633	19,633
R-squared	0.821	0.844	0.784	0.740	0.766	0.666	0.695	0.607	0.824	0.803	0.833
Economic Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Demographic Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Ye	Yes	Yes

Reported Crimes: Violent+Property. **Violent crimes:** murders, manslaughter, forcible rape, robberies, and assaults.
Property crimes: burglaries, larceny, and motor theft
Victimless crimes: prostitution and commercialized vice, gambling, DUI, liquor laws, drunkenness, vagrancy, suspicion, curfew, and loitering violations.
Agency-year level. Estimated using agency population weights.
All regressions include population groups, year, state, and agency fixed effects.
Standard errors clustered at the agency level in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 12: Mechanisms: How CC affects Police Performance, 2000-2016

	(1) Reported Crime	(2) Violent	(3) Property
Panel A: DV logarithm of $\#ARR_{a,t}/(\#Crime_{a,yeart} + \#Crime_{a,yeart-1})$			
RTC	-0.0103***	-0.0356***	-0.00422**
	(0.00205)	(0.00340)	(0.00192)
R-squared	0.877	0.844	0.817
Observations	5,565	5,565	5,565
PC	0.00275	0.00752	0.0203***
	(0.0347)	(0.00611)	(0.00699)
R-squared	0.847	0.820	0.770
Observations	3,310	3,310	3,310
Panel B: DV logarithm of $\#CLEAR_{a,t}/(\#Crime_{a,yeart} + \#Crime_{a,yeart-1})$			
RTC	3.13e-05	-0.00989**	0.00134
	(0.00271)	(0.00413)	(0.00199)
R-squared	0.820	0.628	0.757
Observations	5,565	5,565	5,565
PC	0.0223***	0.00750	0.0228***
	(0.00536)	(0.00483)	(0.00563)
R-squared	0.833	0.756	0.765
Observations	3,310	3,310	3,310
Panel C: DV logarithm of $\#ARR_{a,t}/\#CLEAR_{a,yeart}$			
RTC	0.0944***	0.108***	0.0600***
	(0.0108)	(0.0108)	(0.00875)
R-squared	0.764	0.794	0.632
Observations	5,565	5,565	5,565
PC	0.0231	-0.000997	0.0428**
	(0.0184)	(0.0255)	(0.0182)
R-squared	0.751	0.792	0.619
Observations	3,310	3,310	3,310
Economic Controls	Yes	Yes	Yes
Demographic Controls	Yes	Yes	Yes

Reported Crimes: Violent+Property. **Violent crimes:** murders, manslaughter, forcible rape, robberies, and assaults.
Property crimes: burglaries, larceny, and motor theft.
Agency-year level. An Agency serves at least 100,000 people.
Estimated using agency population weights. All regressions include population groups, year, state, and agency fixed effects.
Standard errors in parentheses follow AR(1)
*** p<0.01, ** p<0.05, * p<0.1

Table 13: Mechanisms: How RTC and PC affect Crime, PSG*, Number of Police, and LEOK** 2000-2017
Dependent variable: Log of Crime rate/PSG/rate of Police per 100,000 persons and Number of Law Enforcement Officers Killed

	Violent crime		Property crime		PSG		# Police officers		LEOK			
									All		with Firearm	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: RTC Effect												
RTC	0.102*	0.0669	-0.0326	-0.0328	0.0430**	0.00970	-0.0885	-0.0756	0.467	0.213	0.0602	0.0217
	(0.0578)	(0.0500)	(0.0277)	(0.0273)	(0.0188)	(0.0110)	(0.0690)	(0.0605)	(0.367)	(0.230)	(0.257)	(0.239)
Observations[1,2]	855	855	855	855	848	848	853	853	855	853	855	853
R-squared	0.931	0.943	0.954	0.959	0.963	0.970	0.752	0.770				
Panel B: PC Effect												
PC	0.0964*	-0.0584	-0.0550	-0.116**	0.0106	0.0191	0.0469	0.0607	-0.0941	-0.365	0.0699	-0.203
	(0.0501)	(0.0437)	(0.0606)	(0.0536)	(0.0129)	(0.0149)	(0.0557)	(0.0677)	(0.204)	(0.263)	(0.162)	(0.260)
Observations[3]	681	681	681	681	681	681	678	678	681	678	681	678
R-squared	0.935	0.963	0.946	0.957	0.930	0.935	0.743	0.759				
Economic Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Demogr. Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes

Standard errors clustered at the state level in parentheses. All regressions include state and year fixed effects.
*** p<0.01, ** p<0.05, * p<0.1
* PSG: Percentage of Suicides committed by Gun.
** LEOK: Law Enforcement Officers Killed.
[1] PSG is missing for some states.
[2] Police rate is missing from West Virginia for two years.
[3] Police rate is missing from Alaska for one year, and from West Virginia for two years.
Columns (1)-(8): OLS. Estimated using state population weights.
Columns (9)-(12): Poisson Regression. Population is included as control variable.

Figure 2: Compare Fatal Encounters and Washington Post data, 2015-2017

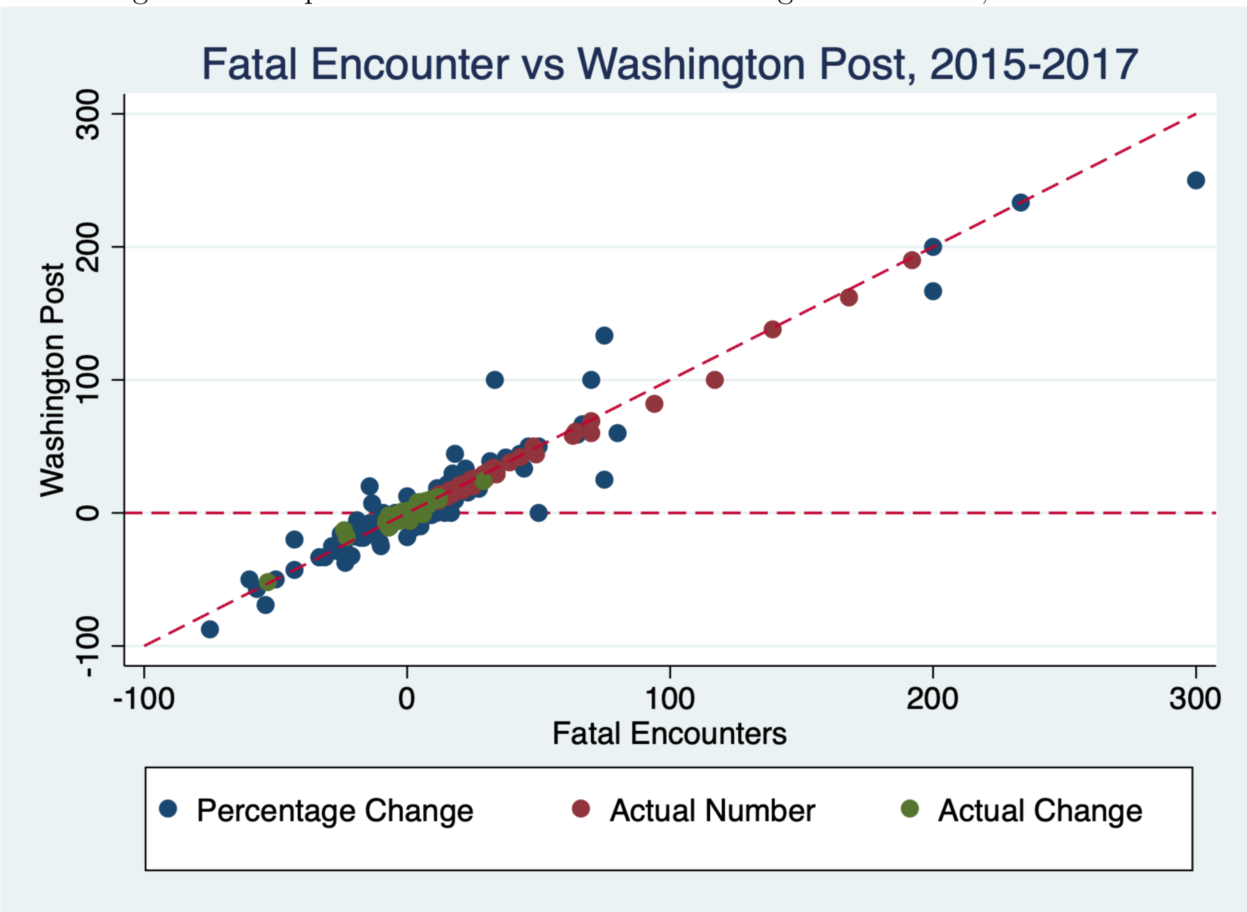


Figure 1: Changes of CC laws

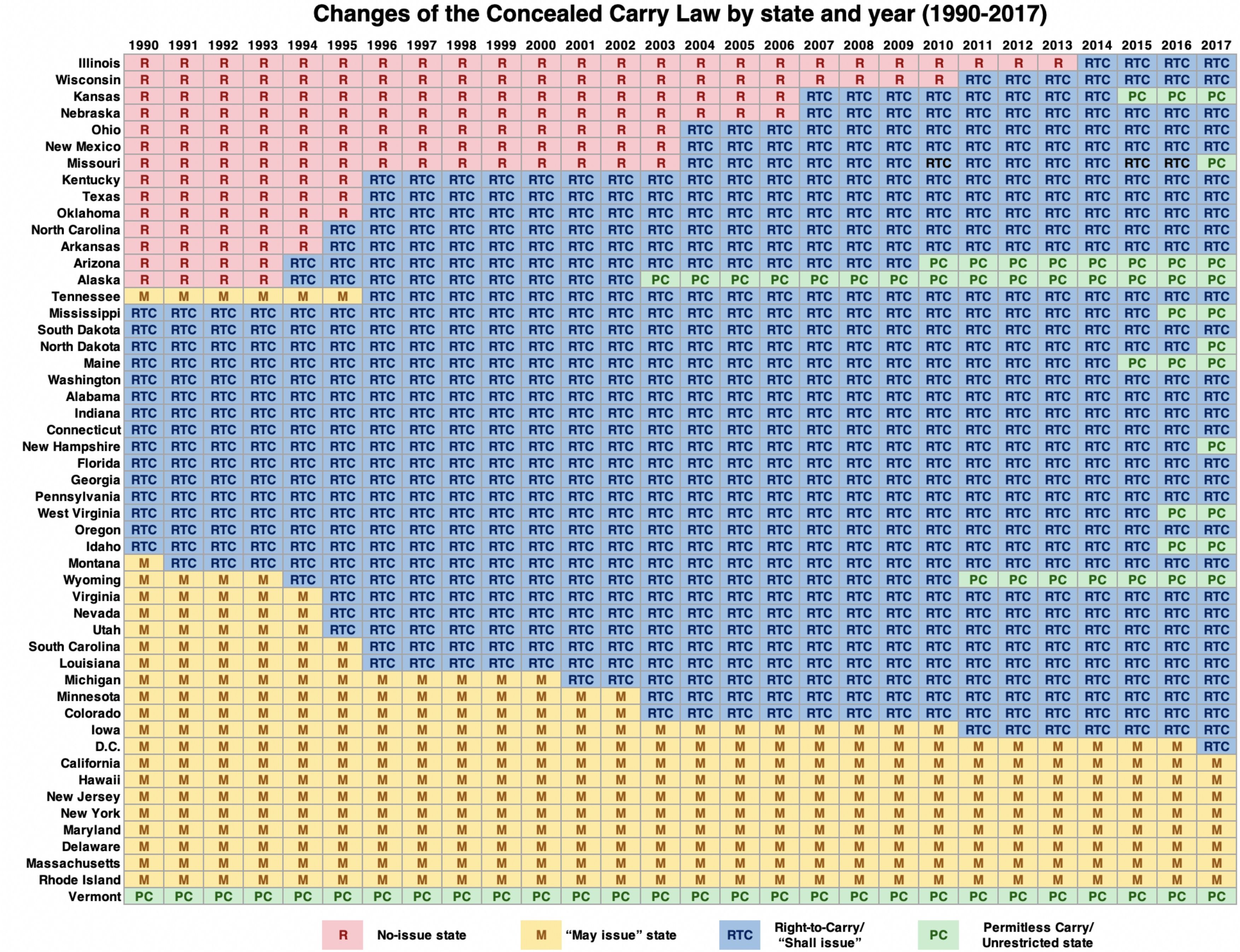


Figure 3: Switch to RTC: Fatal Encounters, Balanced, 2000-2017

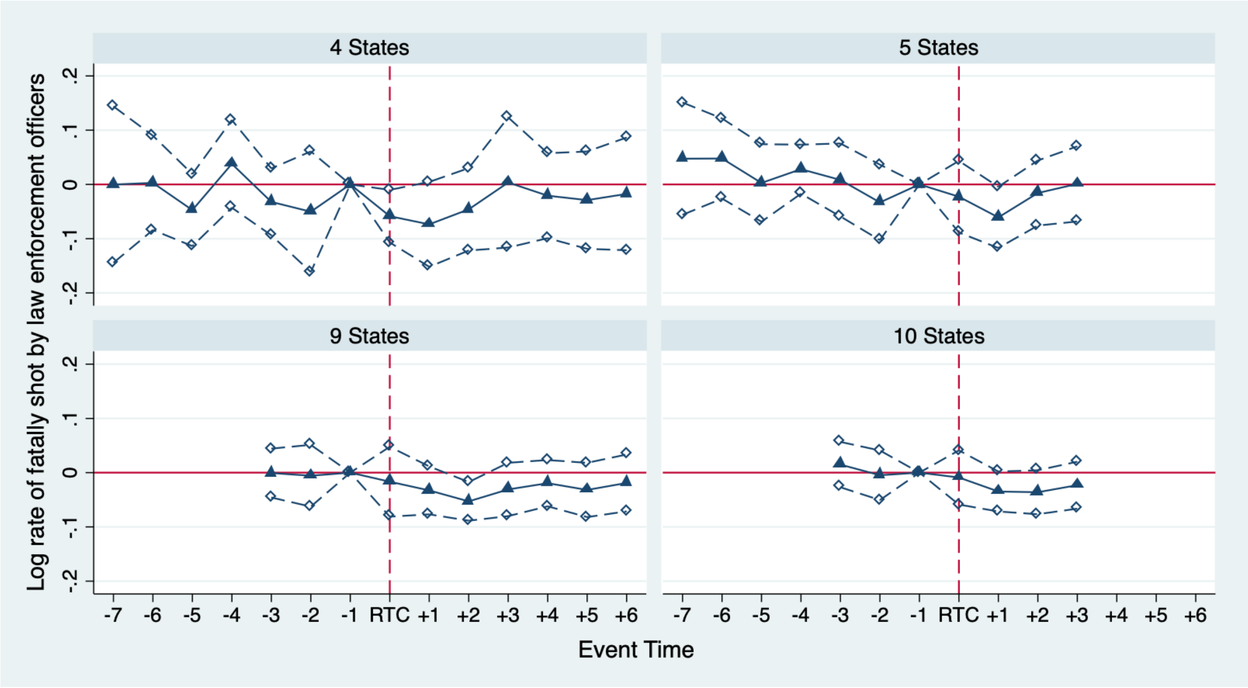


Figure 4: Switch to RTC: Fatal Encounters, 2000-2017

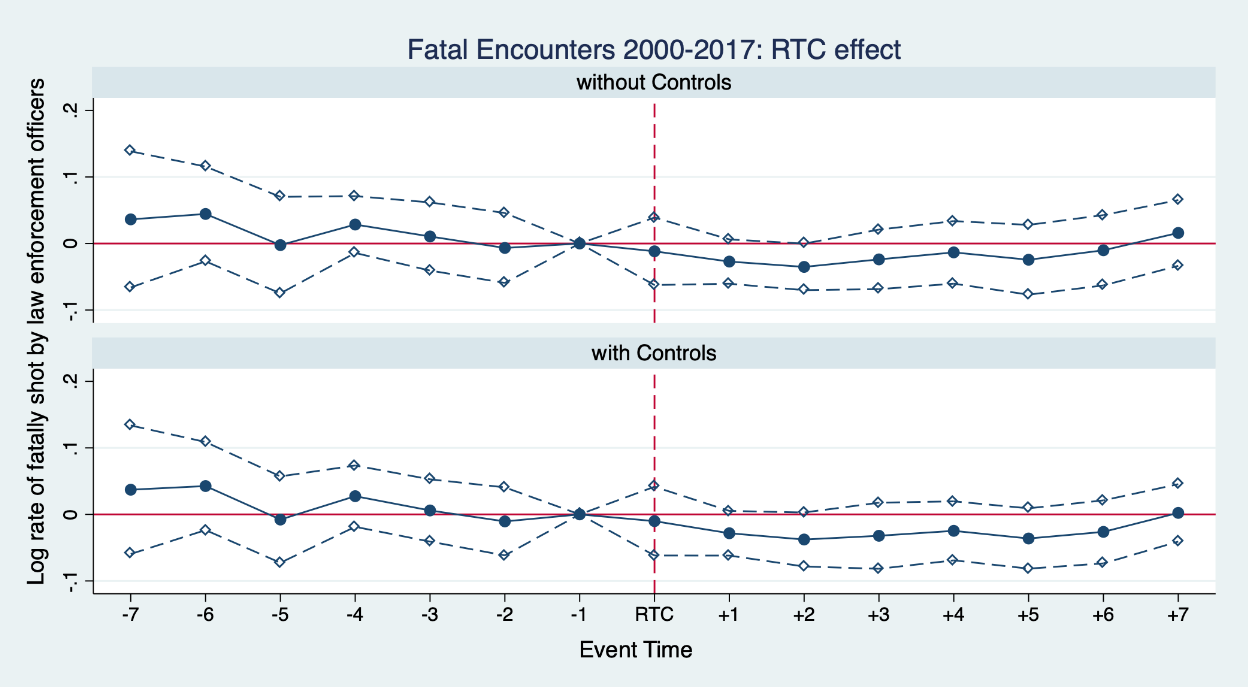


Figure 5: Switch to PC: Fatal Encounters, Balanced, 2000-2017

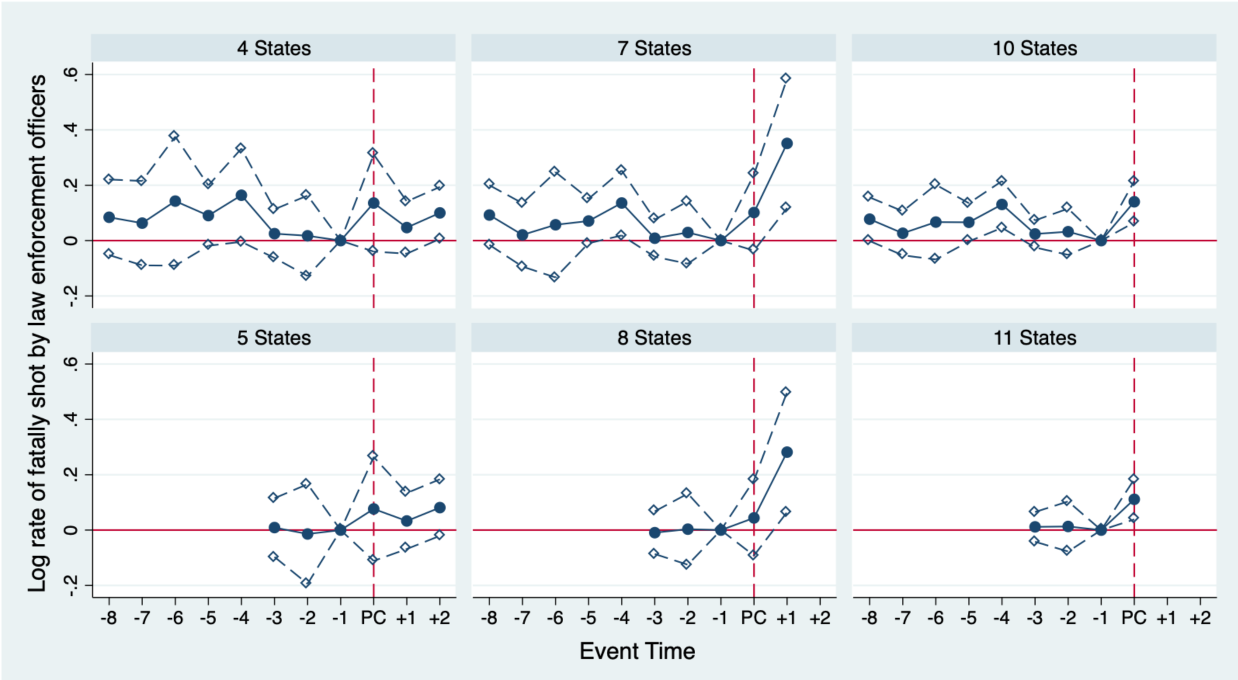
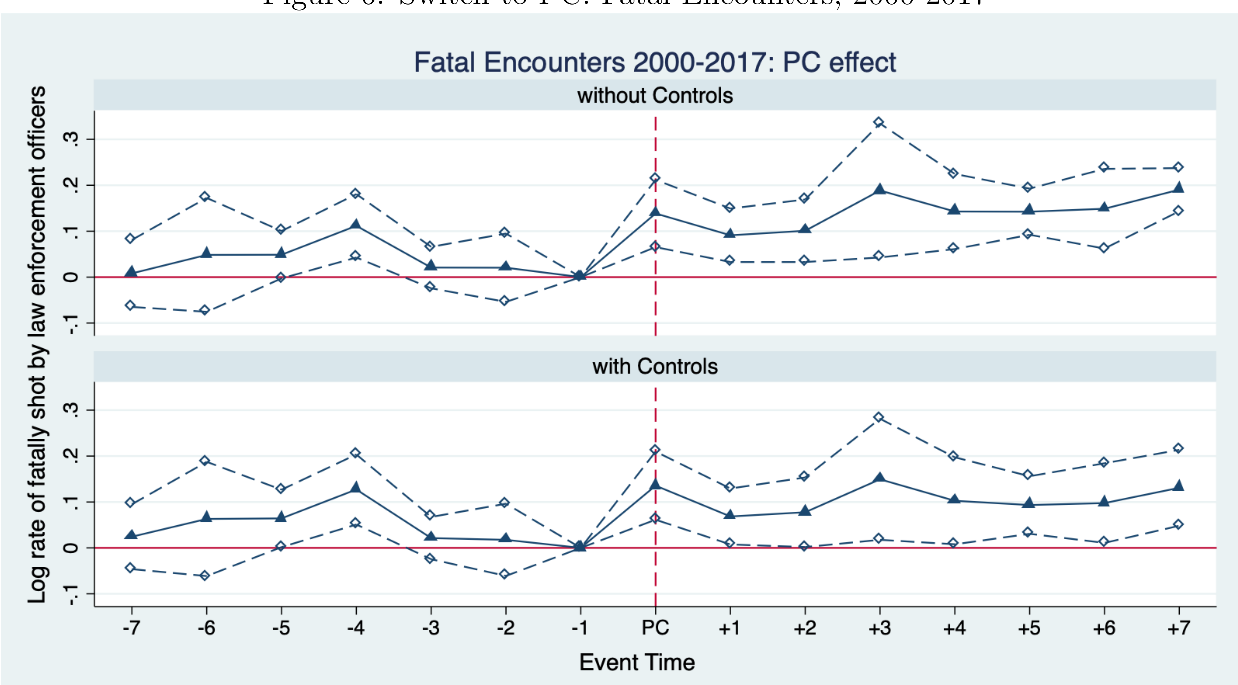


Figure 6: Switch to PC: Fatal Encounters, 2000-2017



A Appendix

Table A1: Annual analysis- Adoption Dates of CC laws since 2000

State	**CCW Law**	**Effective Date**	**Fraction of Year In Effect**
Alaska	PC	9/9/2003	0.311
Arizona	PC	7/29/2010	0.422
Colorado	RTC	5/17/2003	0.627
District of Columbia	RTC	10/6/2017	0.236
Idaho	PC	7/1/2016	0.5
Illinois	RTC	1/5/2014	0.988
Iowa	RTC	1/1/2011	1
Kansas	RTC	1/1/2007	1
	PC	7/1/2015	0.5
Main	PC	10/15/2015	0.211
Michigan	RTC	7/1/2001	.5
Minnesota	RTC	5/28/2003	0.592
Mississippi	PC	4/15/2016	0.711
Missouri	RTC	2/26/2004	0.847
	PC	1/1/2017	1
Nebraska	RTC	1/1/2007	1
New Hampshire	PC	2/22/2017	0.86
New Mexico	RTC	1/1/2004	1
North Dakota	PC	8/1/2017	0.42
Ohio	RTC	4/8/2004	0.732
West Virginia	PC	5/24/2016	.6
Wisconsin	RTC	11/1/2011	0.167
Wyoming	PC	7/1/2011	.5

Table A2: Monthly analysis- Adoption Dates of CC laws from 2015 to 2017

State	**CC Law**	**Effective Date**	**Fraction of Month In Effect**
District of Columbia	RTC	10/6/2017	0.838
Idaho	PC	7/1/2016	1
Kansas	PC	7/1/2015	1
Main	PC	10/15/2015	0.548
Mississippi	PC	4/15/2016	0.533
Missouri	PC	1/1/2017	1
New Hampshire	PC	2/22/2017	0.25
North Dakota	PC	8/1/2017	1
West Virginia	PC	5/24/2016	0.258

Table A3: Control Variables

Demographic composition:	
	Region
	Population density
	White males ages ten to thirty years
	Black males ages ten to thirty years
Economic indicators:	
	Unemployment rate
	Poverty rate
	rpcpi: Real per capita personal income

Figure A1: Unspecified Race 2000-2017