Concealed Carry Laws and Fatal Police Encounters

Anna Kyriazis*

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Abstract

Violent encounters between police and civilians are an important policy issue, and policymakers are eager to find ways to reduce them–particularly the unnecessary use of police force. One reason that officers may be quick to use force is fear for their personal safety, which may increase in environments with more civilian gun carriers. In this paper, I consider the effect of concealed carry laws on violent police encounters. Studying the staggered rollout of lenient concealed carry laws in the United States, I find suggestive evidence that as gun laws become more lenient, officers assaults rise. Under the most lenient gun laws, fatal police shootings of civilian increase–disproportionately affecting minorities–coupled with an indication that fewer police are killed in action. These findings emphasize the role of gun laws in the risks that officers face on the job and, in turn, their use of force against civilians.

Keywords: police shootings, concealed carry laws, police behavior, police violence, right-to-carry, permitless carry.

JEL Codes: K14, K40, K42.

*Social Science Research Council & New York University, email: anna.kyriazis@nyu.edu, website: annakyriazis.com. Declarations of interest: none. This research received no external funding.

1 Introduction

Highly-publicized fatal police shootings, mostly of unarmed minorities, have sparked heated discussions over police behavior and a call for reforms (Ray and Neily, 2021; Subramanian and Arzy, 2021; Thompson, 2021). However, implementing meaningful reforms requires understanding the factors that trigger violent police behavior and how to address them. One potentially decisive factor is the level of danger officers believe they are in during an encounter (Nieuwenhuys et al., 2012a,b, 2015). That level of danger may be influenced by the officers' perceptions of the intentions of the suspects and whether they are armed. Indeed, in 57% of police shooting the victim had a firearm.[1] Concealed carry laws, which regulate who can carry concealed weapons, could affect both the likelihood of police encountering armed suspects, as well as their beliefs regarding their intentions. Therefore, these laws could affect the uncertainty and risk that police face, and ultimately the frequency of violent police interactions.

In this paper, I examine how concealed carry, and in particular Right-to-Carry (RTC) laws, influence police interactions.[2] I do this in three steps: First, I estimate the effect of these laws on the frequency of fatal police shootings and of police officers being killed or assaulted.[3,4] Second, I examine potential mechanisms through which these laws could impact police violence. Finally, I explore how the impact of RTC laws on fatal police shootings varies by the race of the suspect.

To estimate the effect of RTC laws, I leverage state-level variation of concealed carry laws. I assess both the overall impact of RTC laws and the effects of two specific types: Shall Issue

[1] According to the Washington Post police shootings database from 2015 to 2019.

[2] Right-to-Carry (RTC) laws allow citizens to carry concealed handguns when away from home without a permit, or with a permit if the applicant meets the state's requirements for one.

[3] Mustard (2001) studied whether RTC laws affect felonious deaths of police officers and found that the number of felonious deaths decreases. Crifasi et al. (2016) studied the effect of RTC laws on deaths and non-fatal assaults of officers and found no association with fatal or non-fatal assaults. Neither of those papers distinguish between the different types of RTC laws (Shall Issue and Permitless Carry) like this paper does and, due to the time frame that they study, their findings are mainly attributable to Shall Issue laws.

[4] Doucette et al. (2022) use a synthetic controls analysis to examine the impact of PC laws on police shootings from 2014 to 2020. They found that adopting PC laws resulted in an average increase of approximately 13% in officer-involved shootings.

(SI) and Permitless Carry (PC). SI allows any citizen who satisfies the state's requirements to obtain a concealed carry permit, while under PC, a permit to carry a concealed weapon is not needed. As of 2021, RTC laws are ubiquitous. All but eight states have enacted SI laws which are either still in effect today or have been succeeded by PC. Though little is known about the effects of PC laws, as they have been adopted by states in more recent years, there is a growing number of states implementing them. As of 2014 there were four states that had enacted PC laws and by 2021 seventeen more had done so.

The impact of RTC laws on police encounters is ambiguous as they have the potential to influence interactions in several ways. First, more lenient concealed carry laws could increase the likelihood of police interacting with armed citizens as more people are allowed to carry guns.[5] And second, they introduce two different types of uncertainty: as to who may be armed, since the weapon will be carried in a concealed manner; and regarding the composition of armed people that police might run into, particularly as to whether they are armed law-abiding citizens or criminals.[6,7,8] Therefore, concealed carry laws could increase officers' exposure to risk, resulting in a more aggressive police force and an increase in violent police incidents. On the other hand, knowing that more armed individuals could now be law-abiding citizens, officers may become more cautious and less hasty in their reactions to, and interactions with, armed individuals. In which case the incidence of police violence may either decrease or remain unchanged. Furthermore, besides the direct effect on officers' perception of risk, concealed carry laws could affect violent police incidents through some

[5]RTC laws allow individuals with existing firearms to carry them outside, mechanically increasing the chance of encountering an armed person. This remains true regardless of whether RTC laws impact gun sales or not, as that is not their primary objective.

[6]The uncertainty as to who is armed can be illustrated by an incident in Arizona where officers confronted an unarmed but intoxicated man they incorrectly believed had a gun. During the encounter, officers killed him with five bullets while he was on the floor, as he moved his hand to pull up his slipping pants.

[7]The composition of armed people depends on the context in which a person could carry a concealed weapon and so it differs from SI to PC.

[8]The confusion on the intentions of armed people can be illustrated by two examples. First, at an Alabama mall, police 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 is Philando Castile who was shot seven times by an officer, during a traffic stop. Castile had 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.

other intermediate outcomes, such as crime.

An important aspect of the effect of concealed carry laws is that it may differ by the race of the suspects. That could be the case if, for example, officers have different priors on how dangerous a suspect is based on their race, if the circumstances of police incidents vary by race systematically, or if people carry concealed guns at different rates by race. Overall, RTC laws can impact differentially white and black people in ways that could both mitigate or intensify existing racial disparities in police shootings.

To study the effects of RTC laws on fatal police shootings I use data for the 50 states and the District of Columbia, from two different sources: the Fatal Encounters database, that spans the years 2000 to 2022, and the Washington Post database that covers the years 2015 to 2022.[9] To explore the effects of RTC laws on killed and assaulted law enforcement officers I use data from the FBI Law Enforcement Officers Killed and Assaulted (LEOKA) Program that spans the years 2000 to 2019. As previously mentioned, this paper studies three transitions: the switch from Restricted and May Issue laws–where none or few citizens are allowed to carry concealed weapons–to SI and PC (overall RTC effect), the switch from Restricted and May Issue laws to SI, and the move from SI to PC.[10] To estimate the causal effects of the difference-in-differences setup with staggered treatment adoption, I use Callaway and SantAnna (2021)'s estimator (CS). Additionally, in the appendix I contrast the CS results with the ones from the classical two-way fixed effects (TWFE) model.

Since SI is the RTC law enacted by most states and has been in effect for a longer time, the overall RTC effect closely resembles the SI effect. Thus, it's essential to separately analyze the two types of RTC laws: SI and PC. I find that when a state moves from Restricted or May Issue to SI, there is an indication that assaults of officers rise but there is no detectable increase in fatal police shootings or officers killed. However, when a state switches from SI to PC, the environment becomes more uncertain and volatile. A possible increase in assaults

[9] The analysis will be from 2000 to 2019.

[10] As show in Figure 1, concealed carry laws have only ever loosened or stagnated; that is, there are no instances of transitioning from PC to SI or from SI to Restricted or May Issue.

against the police is now met with a significant (13%) increase in fatal police shootings, coupled with suggestive evidence of a decrease in police officer deaths. Overall, under both SI and PC, assaults of officers increase, but it's only under PC when officers are fearful about the weapons and weapon carriers, that this is resulting in additional violence.

To further disentangle the findings, I examine the composition of armed people, shaped by the different criteria for carrying a concealed gun under each RTC law, and four intermediate outcomes that may affect violent police incidents: crime rates; number of police officers; prevalence of guns, using the percentage of suicides committed by gun as a proxy; and the number of police interactions with the public, estimated by the rate of arrests.[11]

The results suggest that under PC, the increase in fatal police shootings can be attributed to the fact that citizens who under SI were unqualified to acquire a concealed carry permit, can now carry a concealed weapon, increasing the risk that police officers face. Based on the requirements to obtain a concealed carry permit under SI, unqualified citizens can be classified into two categories:[12] 1) those who are unfit to own a gun and 2) those who do not have the necessary training to carry a gun. The former category refers to people with a violent history or alcohol-related problems or are mentally unstable and could obtain guns by exploiting legal loopholes that exist in the majority of states. In principal, the concealed carry permit, imposed under SI, prevents these individuals 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 SI.[13] Therefore, when switching from SI to PC, the pool of law-abiding citizens who can carry a concealed gun increases but so does the potential risk that they pose.

[11]Regarding the four intermediate outcomes, I find that both SI and PC laws lead to an increase in violent crime rates. The prevalence of guns and the number of police officers rise only under SI, with no significant impact from PC. Additionally, arrest rates decrease under both laws, although not significantly.

[12]Under SI applicants applying for a concealed carry permit must meet certain state requirements, such as background checks, firearm safety class certifications, and demonstrations of handgun proficiency.

[13]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.

The existence of unqualified citizens and the uncertainty they create for officers raise more than just theoretical arguments. Police officers themselves have expressed their concerns 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).

Breaking down the RTC effects by race I find that under SI there is no indication of fatal police shootings varying by the race of the suspect. However, under PC the positive effect on fatal police shootings is driven by minorities.[14] Further, I find that under PC the circumstances of fatal police shootings vary by race as well. There is a larger increase in dangerous incidents from the officer's perspective, involving black suspects compared to white. Incidents where the suspect attacks the officer(s), is not fleeing the scene, and is armed increase more under PC for black suspects that white. However, the increase of armed black suspects that are fatally shot is driven by suspects not armed with a firearm.

The paper's findings have important policy implications. Discussing police shootings requires a comprehensive understanding of all perspectives, and this paper provides a well-rounded examination of the issue. In this case, the allowance of unqualified citizens to carry concealed guns through PC increases the risk and uncertainty faced by police officers. This can lead officers to defend themselves, potentially resulting in more shootings. Therefore, to address police shootings, it is vital to consider the conditions in which police officers function.[15]

Moreover, this paper contributes to three different literatures: First, it contributes to the concealed carry literature and the debate on how concealed carry laws affect social welfare.

[14] In Fatal Encounters data 22% of race is being imputed, and in 3% of the data the deceased's race is missing. As shown in Figure A8 in the Appendix, at the beginning of the sample period the percentage of unspecified race is almost 60%, dropping down to less than 20% in the last 9 years. States adopted SI mostly in the middle of the sample period in contrast to PC which was adopted by most of the states in the last 5 years. Therefore SI estimates by race should be interpreted with caution. The results are also consistent when using the sample with the not imputed race, as shown in Appendix H.

[15] This paper does not make any claims on whether police shootings are justified or unjustified. It simply states that concealed carry laws, specifically PC, can increase the risk that officers face and thus may affect the way they behave.

While many studies have explored the impact of concealed carry laws on crime, the effects on police officers have been overlooked.[16,17] To my knowledge, this paper is the first to study both SI and PC laws on violence against and by the police.[18,19] The parallel comparison of the effects of SI and PC coupled with the exploration of intermediate outcomes allows for a better understanding of the mechanisms at play, as well as the conditions that police officers face under each RTC law. Understanding the conditions that police officers face is particularly important for PC laws because their recent adoption means that the environment shaped under these laws is vastly unknown. Finally, the paper is also the first to study the heterogeneity of the effects of RTC laws on fatal police shootings based on the race of the suspect.

Second, this paper is related to the literature of police behavior, police violence, and

[16] Advocates of RTC laws, specifically of SI, argue that permitting 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). In contrast, 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). 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, 2018; 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). Although it remains unclear whether RTC causes more crime (National Research Council, 2005), modern findings present strong evidence that ten years after enacting an RTC law a state's rate of violent crime increases by up to 15% (Donohue et al., 2019). Furthermore, the most recent RAND reports (January, 2023), evaluating gun laws, conclude at the highest level of evidentiary support that SI laws increase violent crime, firearm-related homicides, and overall homicides (RAND, 2023a,b).

[17] When it comes to the effect of RTC laws on police officers' outcomes Donohue et al. (2022), without distinguishing between SI and PC, find that RTC laws decreased the clearance rates for many violent crimes.

[18] I study violence against the police by looking at the number of officers being assaulted or fatally shot, and violence by the police by looking at fatal police shootings.

[19] Doucette et al. (2022) study how PC laws affect police shootings. Mustard (2001) and Crifasi et al. (2016) study how RTC laws affect violence against police. Mustard (2001) focuses on police officer deaths, while Crifasi et al. (2016) extends this analysis by looking also at assaults of police officers. These studies do not differentiate between the distinct categories of RTC laws (SI and PC), which this paper does. Furthermore, their results are mostly attributed to SI because of the limited time period they study. This paper contributes to these studies by both extending the time frame, as well as by updating the estimation methodology.

racial bias in policing .[20,21] Specifically it explores the decision making of police officers under uncertainty and how laws can change the environment in which officers operate. Furthermore, even though the paper does not speak directly on racial disparities in fatal police shootings caused by concealed carry laws it contributes in detecting heterogeneous treatment effects and exploring how the circumstances in fatal police shootings differ by race.

Lastly, the paper utilizes the CS estimator, a new approach that has emerged from the growing literature on difference-in-differences for dealing with staggered treatment adoption. It compares the traditional TWFE approach with the CS and demonstrates the severity of TWFE's bias by finding results with opposite sign of the SI effect.[22]

The remainder of this paper proceeds as follows: Section 2 provides background information regarding concealed carry laws. Section 3 discusses the conceptual framework, and section 4 describes the data and presents the empirical strategy. In sections 5 and 6 I estimate the concealed carry effects of police violent incidents, and how they vary by race, respectively. Section 7 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 aspects. Nevertheless, concealed carry laws can be classified in four broad categories based on how easy the process to legally carry a concealed weapon in public is for a private citizen.

[20]The literature explores how various factors can affect police behavior and police violence, such as, but not limited to, the characteristics of the officer (Friedrich, 1980; Eugene A. Paoline and Terrill, 2007; Ridgeway, 2016; Rozema and Schanzenbach, 2019), the characteristics of the suspect and the encounter (Friedrich, 1980; Edwards et al., 2019), the militarization of the police force (Bove and Gavrilova, 2017; Harris et al., 2017) and the liability of officers, for example the use of body worn cameras (Ariel et al., 2016, 2017) and the existence of collective bargaining rights (Dharmapala et al., 2020; Cunningham et al., 2021).

[21]Recent research that has focused on racial bias of police officers are Donohue and Levitt (2001); Anwar and Fang (2006); Fryer (2019); Hoekstra and Sloan (2022).

[22]For the TWFE results of the effects of concealed carry laws on fatal police shootings as well as on law enforcement officers killed and assaulted see Appendix D and Appendix E, respectively.

The most regulated category is restricted or No Issue laws; states under this regime prohibit any concealed carry of guns in public. Next is May Issue laws, where a citizen may obtain a permit if she both meets the state requirements and demonstrates "good cause" and/or "good character". Therefore, under these laws local authorities have considerable discretion in granting or denying a concealed carry permit, and it is not guaranteed that the applicant will be issued one even if she meets the general requirements.

Then there are the Right-to-carry (RTC) laws, which broadly speaking, consist of Shall Issue (SI) and Permitless Carry (PC). Under SI, the applicant can get a concealed carry permit as long as she meets the state requirements, which many times include background checks, firearm safety class certifications, and demonstrations of handgun proficiency. Lastly, under PC people are not required to have a permit to carry a concealed gun in public; this is also known as unrestricted, Constitutional carry, and Vermont carry.

Figure 1 shows changes of concealed carry laws from 2000 to 2019 for the 50 states and the District of Columbia.[23] Up to the mid 1990s, the majority of states were either No Issue or May Issue states, and over time, they started to adopt SI 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 SI to PC. As shown in Figure 1, by 2014 only four states had PC. However, within the next five years, nine more switched for a total of 14 PC states by 2019.

So far, the literature investigating the effect of RTC laws on crime rates is focusing on the transition from No or May Issue to SI. This paper, along with the overall RTC effect, studies both the transition from more strict states (No and May Issue) to SI and the newer trend, the transition from SI to PC since data from more recent years has been made available.

[23] 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 PC is legal. (https://www.usacarry.com/arkansas-permitless-carry/)

3 Conceptual Framework

In this section I discuss two mechanical changes and four intermediate outcomes that can influence the effect of concealed carry laws on police violent incidents.

3.1 Mechanical changes

All else being held constant, the changes we would observe by relaxing the requirements for carrying a concealed gun would be: first, more people will be allowed to be armed in public, and second, there will be a change in the composition of those armed people.

Likelihood of Carrying a Gun.

In both transitions, from restricted laws to SI, and from SI to PC, the probability of running into an armed person increases.[24] This, in principle, should translate into an increase in the risk police face and in turn into more aggressive behavior and higher incidence of police violent encounters. However, in practice, this may not necessarily be the case. The way police react to the increase in the number of armed individuals will depend also on the characteristics of those recently armed as a result of the law change. For instance, the knowledge that any given individual 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 understand how this increase in the likelihood of running into an armed person will affect police behavior, we must determine the characteristics of those who will be newly armed in each case.

Composition of Armed Citizens.

Even though under SI laws applicants for a concealed carry permit do not have to demonstrate "good cause" and/or "good character", they still have to meet the state requirements. In addition to minimum age and residency, many times states with SI laws require background checks, firearm safety class certificates, and demonstration of handgun proficiency. In

[24] This is a mechanical change, which is the intended purpose of RTC laws. The mere fact that individuals with pre-existing firearms can legally carry them outside increases the likelihood of encountering an armed individual.

fact, it has been found that concealed carry permit holders are the most-trained gun owners, with 83% of having taken some formal training (Rowhani-Rahbar et al., 2018). Therefore, when a state adopts SI it, in principle, gives only to citizens who are law abiding, trained, and mentally sound the opportunity to carry a concealed weapon. In theory, these newly armed individuals should not cause any risk to police officers.

On the other hand, under PC, none of the requirements mentioned above are mandatory, and citizens who were once considered unqualified under SI can now carry concealed weapons. Based on the SI requirements that do not apply under PC we could classify unqualified citizens into two broad categories. First, are those who would have failed the background check for being deemed unfit to own a gun, and second are those who are untrained and lack the necessary knowledge to carry a gun. People in the former category would have been denied the concealed carry permit for reasons such as violent history, alcohol-related problems, and mental issues.

Concealed carry 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 unfit citizens, other laws (particularly, background checks) are in place to regulate that. However, even though background checks on all buyers that purchase a firearm from a licensed dealer are required by federal law, they are not required for private sales of firearms (for example, at gun shows). In these situations, enforcement of background checks is up to state laws or the discretion of the seller.[25] The 13 states that adopted PC have no laws addressing private sales' loopholes and do not require gun registration. Therefore, in these PC states, the concealed carry permit would have worked as a second screening for unqualified citizens, and in theory it should have prevented them from carrying a concealed gun in public.

The second category of unqualified citizens includes people who would have been denied the concealed carry permit under SI laws for not taking any firearm safety classes or any

[25] As of 2019, 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.

basic firearms proficiency exams. Since obtaining a concealed carry permit is not compulsory under PC laws, gun owners who would have chosen to take safety classes and training only if the law required it, now choose not to, and will carry a concealed gun without a permit.

Therefore, when switching from SI to PC, the increase in the probability of running into an armed person is accompanied by an increase in the threat that armed people pose because it is more likely they are unfit to handle the ownership of a gun. At the same time, unqualified armed civilians could create uncertainty in regards to the quality of the larger armed population. This creates general confusion for the police officers as to which armed law-abiding citizen may be a threat, which in turn, causes negative spillovers to police interactions with qualified armed citizens.

Finally, changes in the composition of armed individuals under PC, would only cause a change in the behavior of police officers if they themselves were concerned about the qualifications of the newly armed citizens. This is evident by the fact that various police chiefs and unions have vocalized their worries and opposition when it comes to PC and who can carry a concealed gun under these laws (Gorman, 2017; Shepperson, 2017; Goudeau, 2017; Robertson and Williams, 2016; Yablon, 2016). The following statement from the Charleston Police Chief Greg Mullen, when South Carolina was considering passing PC in 2017, summarizes the aforementioned arguments: "...this [PC] bill creates-the ability for anyone who can legally purchase a firearm, many who have not completed a background check or received any type of training, to walk our streets and neighborhoods with a handgun on their hip, in a bag or under their jacket without any review or training"(Gorman, 2017).

3.2 Intermediate outcomes

Crime Rate.

The most obvious factor that affects police behavior is crime. When crime increases, violent police encounters are also likely to increase as a reaction. The concealed carry literature on how RTC laws (specifically SI) affect crime, however, has been divided. Nevertheless, it appears to be a consensus among the most recent studies on the topic, with the latest findings by Donohue et al. (2019) showing that a state's rate of violent crime can increase by up to 15%, ten years after enacting RTC. Additionally, the latest RAND reports, evaluating gun laws, conclude that there is substantial evidence linking SI laws to increased rates of violent crime, firearm-related homicides, and overall homicides (RAND, 2023a,b).

Behavior of Criminals.

Among the factors contributing to increased crime under RTC laws is criminal behavior. This aspect is particularly relevant in the context of fatal police encounters as it directly influences the composition of the armed population and officers' risk perception. While RTC laws do not directly dictate criminal carrying behavior, criminals are indirectly impacted and adapt in response.

Under RTC laws, as more law-abiding citizens carry guns, criminals may be more inclined to carry firearms, anticipating a greater likelihood of meeting armed resistance. This rise in public firearm carrying also grants criminals easier access to weapons, leading to more thefts. This is evidenced by Donohue et al. (2022) findings, which indicate a roughly 50% increase in gun thefts under RTC, leading to a direct transfer of legal guns into the hands of criminals.[26]

Therefore, the increased desire and ability of criminals to carry guns could directly affect both the perception of law enforcement officers and the actual composition of the armed population. While this paper doesn't delve into the specifics of firearm theft or concealed carry by criminals, these aspects are encompassed within the crime mechanism.

Number of Law Enforcement Officers.

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

[26] Related to Donohue et al. (2022) findings, Billings (2023) shows that new concealed carry permit holders are 68% more likely to be victimized, primarily due to firearm theft.

decrease the number of violent incidents. Donohue et al. (2019) finds that states that adopt SI laws increase the size of their police force by about 7-8%.

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. This would eventually increase the likelihood of police officers running into an armed person and possibly escalate violence.[27]

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; Nagin, 2020; Fridel, 2021), and it is the one being used in this paper.

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.

RTC laws can affect the number of police interactions with the public in multiple ways. Donohue et al. (2019) argue that RTC laws impair police officers and discuss three possible channels. First, the allocation of police time among different tasks could change. Police officers, instead of going after violent criminals, may be dealing with additional bureaucratic tasks (such as issuing and checking SI permits), tracking stolen guns, and addressing gun accidents. Second, police officers may be discouraged by concealed weapons and prefer to initiate interactions with individuals who are most likely to be armed only if they believe that it is absolutely necessary. These two mechanisms may then 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 actual criminal or intentionally

[27] Nagin (2020), Sheppard et al. (2021), and Hemenway et al. (2019) find that prevalence of gun ownership is positively correlated to fatal police shootings while Swedler et al. (2015) find that gun ownership is positively related with law enforcement officers killed.

through vigilante efforts to catch criminals.[28] This may not directly affect the number of police interactions but can impact the number of arrests, which is the proxy for police interactions that I use in the paper. Donohue et al. (2022) support the above arguments and find, without distinguishing between SI and PC, that RTC laws indeed impair police effectiveness, decreasing clearance rates across many violent crimes by around 13%.

4 Data and Empirical Strategy

4.1 Data

Fatal police shootings.

Data on the number of fatal shootings by police officers is obtained at the state level from two different sources: the Fatal Encounters.org database, and the Washington Post database.[29,30]

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 incidents 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, 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.[31] Data collection starts from 2000 and goes up to date. Fatal Encounters provides information

[28] As illustrated in Donohue et al. (2019), in November 2017 in Denver law-abiding citizens had unintentionally hindered 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 concealed carry 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).

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

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

[31] 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.

on the race, age, and gender of the individual fatally shot by police officers, however, it does have two main limitations. First, in more than a third of the incidents, mostly prior to 2013, the race of the deceased is not specified.[32] 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) became involved, which therefore limits the possibility of more detailed analysis.

The Washington Post dataset improves on the limitations of the Fatal Encounters dataset by providing more detail on the incident level. In addition to the race, age, and gender of the individuals fatally shot by police officers, 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 to study the PC effects.

Summary statistics of the two data sources for fatal police shootings are shown in Table 1. When comparing columns (2) and (3), which report averages for the same time period, 2015 to 2019, we observe that Fatal Encounters and the Washington Post are consistent in both the characteristics of the victim and the average number of people shot and killed by police officers. For the years 2015 to 2019 the average age 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 million people ranges from 3.5 to 3.7. Appendix B provides a more detailed comparison of the two data sources.

Law Enforcement Officers Killed or Assaulted .

To estimate the effect of concealed carry laws on killed and assaulted officers I use data from the FBI Law Enforcement Officers Killed and Assaulted (LEOKA) Program that spans

[32]To address this, Fatal Encounters imputed the missing race using the Bayesian Improved Surname Geocoding (BISG)(Elliott et al., 2008). Figure A8 in the Appendix shows the percentage and number of victims with unspecified race by year before and after the imputation.

the years 2000 to 2019.

Data on police officers feloniously killed in the line of duty is at the state level and is obtained directly from the FBI website.[33] As shown in Panel A of Table 2 the average number of officers killed by firearm per state-year is 0.89 and the average rate per 100,000 police officers is 5.6. Fewer officers are being killed by other means with the average number per state-year being 0.15 and the average rate per 100,000 police officers 0.655.

Regarding the data on officers assaulted while performing their duties I utilize the concentrated files compiled by Jacob Kaplan using data from the FBI's LEOKA series (Kaplan, 2021). The data is at the agency level and for the main analysis I include agencies that have been reporting to the FBI for at least 15 years, out of the sample's 20.[34]

In Panel B of Table 2, the number of police officers assaulted by firearm is shown to be more than 23 times smaller than the number of officers assaulted by other means. The average number of officers assaulted per agency-year by firearm is 0.5, while by other means it is 11.65. The average rate per 10,000 police officers is 38 and 875, respectively.[35]

Among the three main outcomes explored in this paper, fatal shooting by police and officers being killed by firearm are straightforward measures with minimal reporting bias. However, assessing data on officers being assaulted presents certain challenges. The reporting of such incidents can be influenced by both objective and subjective factors, including the officers' experiences and incentives.

Identifying a true causal relationship between RTC laws and assaults on police faces two challenges. First, RTC laws could impact the reporting behavior of officers, thus affecting the reporting of assaults. For example, if RTC laws lead to more confrontational police-civilian interactions, reporting practices might be adjusted, or there may be increased leniency in assault reports, leading to a surge in documented assaults. Second, it is difficult to distinguish whether reports of assaults on officers follow police responses or are actually driven by civilian

[33] https://www.fbi.gov/services/cjis/ucr/leoka

[34] For more information about the cleaning data process see Appendix E.

[35] For the analysis I am using the winsorized rate of officers' assaults.

aggression. For instance, incidents involving the use of force might prompt officer assault reports.

Unfortunately, it's difficult to differentiate between these mechanisms or verify their validity. In either case, if officer assaults are influenced by reporting behavior or officers' enhanced response to increased violence in interactions, and RTC laws impact either of these aspects, reporting bias could result in an apparent increase in reported assaults. Hence, we need to be cautious when interpreting the impact of RTC laws on officer assaults.

4.2 Empirical Strategy

To identify the causal effect of RTC laws on violent police encounters I use a difference-in-differences quasi-experimental design with the identifying assumption of parallel trends.[36]

When it comes to estimating the causal effects in a difference-in-differences setup with staggered treatment adoption, recent developments have pointed out possible biases that can arise from the common TWFE approach, specifically in the presence of treatment effect heterogeneity and dynamic effects, and have proposed a number of solutions(de Chaisemartin and D'Haultfuille, 2020; Goodman-Bacon, 2021; Sun and Abraham, 2021).

In this paper, I estimate the effect of concealed carry laws of violent police encounters using both the traditional TWFE estimator, as well as the new estimator proposed by Callaway and SantAnna (2021). Even though I elaborate on both methods below, results from the TWFE analysis are reported in the appendix.[37]

[36]Appendix C presents event studies leading up to the passage of RTC laws, estimated using Callaway and SantAnna (2021)'s estimator. They show that crime rates, gun prevalence, number of police officers, unemployment, and population density do not follow different patterns for states in the control and the treatment group prior to the adoption of RTC laws.

[37]For the TWFE results of fatal police shootings and of law enforcement officers killed and assaulted see Appendices D and E, respectively.

4.2.1 Two-Way Fixed Effects

The TWFE linear regression models for estimating the SI and PC effects, respectively, are:

$$Log(Y_{s,t}) = \alpha + \beta_1 \mathbf{SI}_{s,t} + \gamma_s + \delta_t + \epsilon_{s,t} \tag{1}$$

$$Log(Y_{s,t}) = \alpha + \beta_2 \mathbf{PC}_{s,t} + \gamma_s + \delta_t + \epsilon_{s,t} \tag{2}$$

The variables $\mathbf{SI}_{s,t}$ and $\mathbf{PC}_{s,t}$ are dummy variables, indicating when a state has SI or PC, respectively. These dummy variables turn on the first year that the law has been in effect for at least half a year, and remain turned on for all future years following.[38] In equation 1 the control group (baseline) are the states under Restricted or May Issue, and the coefficient of interest is β_1 which estimates the SI effects. In equation 2, the omitted category is the SI states, and β_2 reflects the PC effects.[39] Figures A1 and A2 in the appendix present the states that belong to the control and treatment groups for the SI and the PC TWFE analysis, respectively. The outcome $Y_{s,t}$ for the main part of the analysis is defined as the number of individuals fatally shot by law enforcement per million people, in state (s) and year (t). The model includes also state (γ_s) and time (δ_t) fixed effects.[40]

4.2.2 Callaway & Sant'Anna estimator (CS)

This paper, to overcome the possible biases of the TWFE approach and to estimate easy to interpret casual parameters will use the new estimation method (CS) proposed by Callaway and SantAnna (2021).

CS is a two-step approach estimation strategy. In the first step CS estimates the causal

[38] Table A1 shows the dates that SI and PC laws took effect, along with the fraction of the year that the laws are in effect the first year.

[39] In equation 1 the SI dummy turns on under SI laws and then turns off when the state switches to PC; observations when PC is in effect are entirely excluded from the analysis. Likewise, in equation 2, years in which a state has Restricted or May Issue laws are excluded from the analysis, thus focusing solely on states with SI and PC laws.

[40] It is important to note that the a model does not include controls. The underline implication is that I am relying on an unconditional parallel trends assumption. This assumption appears to hold, supported by evidence from the event studies.

parameter *group-time average treatment effect*, which is the average treatment effect for group g in time t, where a group is defined by when states are first treated. The *group-time average treatment effect* allows for treatment effect heterogeneity across groups and time. In the second step, the *group-time average treatment effect* are combined to create aggregated causal parameters.

For this paper I use two summary measures of casual effects: the overall average effect of participating in the treatment, which aggregates *group-time average treatment effects* by group and then averages them all together. This overall ATT summary measure is interpreted similarly to the ATT in a difference-in-differences setup with two periods and two groups. Finally, I aggregate *group-time average treatment effects* by relative time to explore dynamic effects of concealed carry laws, similar to an event study approach.

Standard errors are calculated using a bootstrap procedure and are clustered at the state-level.[41] For the analysis I will use both unbalanced and balanced in calendar time panels. The states that are excluded from the balanced panel are the ones that at some point had a concealed carry law irrelevant for the analysis of the concealed carry law of interest. For example if I study the effect of SI I exclude from the analysis the state-year observations where the PC is in effect, as it is a more lenient law and not needed for estimating the SI effect; in that case the states that are not being observed through-out the 20 years of the analysis and therefore are not balanced are the ones that eventually adopt PC.[42]

A main feature of the CS which differs from TWFE, is that it does not use the already treated states in the control group, avoiding in this way the undesirable comparison of already treated with newly treated states. The parameters are easier to interpret and any biases that rise from the presence of dynamic effects are eliminated. Figures A3 and A4

[41] The available methods for estimating the CS estimator are doubly-robust, inverse probability weighting method, and outcome regression. Callaway and SantAnna (2021) show that in the absence of controls, as in this case, all three estimators collapse into the standard two-periods and two-groups case. For more information on doubly-robust, inverse probability weighting approach, and outcome regression see Callaway and SantAnna (2021).

[42] Similarly for the PC analysis the states that are not included in the balanced panel are the ones that at some point had Restricted or May Issue concealed carry laws.

in the appendix present the states that belong to the control and treatment groups for the RTC and PC analysis of the CS approach, respectively, for both unbalanced and balanced samples. Comparing the above figures with the analogous figures of TWFE (Figures A1 and A2) show that the sample panels used in CS and TWFE can be significantly different depending on the number of states in the already treated group. Specifically, when studying the SI effect the CS approach excludes 30 states that had already adopted SI before the beginning of the sample, while when studying the PC effect the only state that is excluded in the CS approach compare to TWFE is Vermont which had always PC.

5 Concealed carry and fatal police encounters.

5.1 Right-to-Carry Effect on Fatal Police Encounters

To be consistent with the existing literature on RTC laws, which typically estimates their impact without distinguishing between SI and PC laws, I initially present the overall effect of RTC laws on fatal police encounters and officers being killed or assaulted by firearms. It is important to note that the effect of RTC laws is anticipated to be mainly driven by SI laws, as they are adopted by the majority of states and has been in effect for a longer time. Analyzing the overall RTC effect alone does not provide sufficient insights into the underlying mechanisms, which is why I subsequently break down the analysis into SI and PC effects.

Fatal Police Shootings.

To estimate the effect of RTC laws on fatal police shootings I use the Fatal Encounters data set covering the years 2000 to 2019. Using the CS estimator, the results in Panel A of Table 3 show that when a state with Restricted or May Issue laws adopts RTC, the rate of people fatally shot by police officers increases by about 5%. This translates to approximately

0.78 more fatal shootings by police officers per year in a given state.[43,44] However, the effect is not statistically significant.

Law Enforcement Killed by firearm.

Panel B of Table 3 reports the impact of RTC on the number of law enforcement officers feloniously killed by firearms per 100,000 officers at the state-year level.[45] Although there is a substantial increase of approximately 20%, the findings show that the effect of RTC laws on police officer deaths is not statistically significant.[46,47] These results align with Crifasi et al. (2016), but differ from the findings of Mustard (2001), who concluded that RTC laws decrease the likelihood of a felonious death.

Law Enforcement Assaulted by firearm

Panel C of Table 3 presents the results from the CS estimator, examining the impact of RTC on the number of law enforcement officers assaulted by firearms per 10,000 officers.[48] This time the analysis is conducted at the agency-year level. [49] In columns (1) and (2), we observe an increase of approximately 16 assaults per 10,000 officers per agency-year. This effect is statistically significant only in the unbalanced sample.[50] These findings differ from those of Crifasi et al. (2016), who concluded that RTC laws are not associated with an increased risk of officer assaults.

In general, I find no evidence to suggest that RTC laws lead to an increase in fatal

[43]By multiplying the baseline mean rate of treated states, 2.6, with the percentage increase, 5%, I get the increase in number of people that are fatally shot by police officers per million persons every year in a given state under RTC. From Table 1 I can infer that the average population in each state is 6,000,000 people.

[44]When studying the RTC effect the sample is always balanced at the calendar time. There's no missing data at the state-year level for fatal police shootings and since I examine RTC laws as a whole when a state gets treated,it maintains that status until the end of the sample.

[45]The average number of police officers per state is 18,994. See Table 2.

[46]Likewise to the fatal police shootings analysis, when studying the RTC effect the sample is always balanced at the calendar time.

[47]The outcome is the rate of officers killed by firearm because around 55% of the observations (state-year) have zero police fatalities.

[48]The average number of police officers per agency in the sample is 88. See Table 2.

[49]While RTC states maintain their treatment status throughout the entire sample period, not all agencies consistently report assaults on officers. Therefore, for the unbalanced panel I use agencies that report for at least 15 years (out of 20), and for the balanced panel I include agencies that report for at least 17 years.

[50]Due to the large amount of zero assaults reported (above 85%), the outcome is the rate of officers assaulted by firearm.

encounters between officers and civilians. However, there is some indication of an increase in assaults on officers involving firearms.

5.2 Shall Issue Effect on Fatal Police Encounters

Next, I break down RTC laws into SI and PC, and estimate their separate effects. First, I study the transition of states from Restricted or May Issue laws to SI, where citizens can obtain a concealed carry permit and carry a concealed firearm after meeting the state's requirements.

Fatal Police Shootings.

To estimate the SI effect on fatal police shootings I use the Fatal Encounters data set which spans the years 2000 to 2019. Using the CS estimator, the results in Panel A of Table 4 show that when a state with Restricted or May Issue laws adopts SI, the rate of people fatally shot by police officers increases by about 4% and 7.5%, which translates to around 0.6 and 1.2 more people fatally shot by police officers every year in a given state, for the unbalanced and balanced sample, respectively.[51,52] However, both effects are statistically insignificant.[53]

Figure 2 shows the effect of SI laws on fatal police shootings using the event study approach.[54] Since different states enacted SI laws in different years the panel is not balanced in relative time, meaning I do not observe the same number of states in each relative-time period. Sub-figure 2.a shows the unbalanced event study from periods t-5 to t+6 and sub-figures 2.b, 2.c, and 2.d present balanced event studies that differ in the relative time periods covered and therefore the number of treated states included. The results of the event-studies

[51]For the unbalanced (balanced) sample, by multiplying the baseline mean rate of treated states, 2.6 (2.65), with the percentage increase, 4% (7.5%), I get the increase in number of people that are fatally shot by police officers per million persons every year in a given state under SI. From Table 1 I can infer that the average population in each state is 6,000,000 people.

[52]The two states that are being dropped from the unbalanced to the balanced sample are Kansas and Missouri. For a full list of the states included in each sample see figure A3 in the appendix.

[53]Appendix D shows the SI effect using the inverse hyperbolic sine transformation of the outcome, the rate of fatal police shootings, and the TWFE model. The results, as seen in Table A3, are robust across the various transformations of the depended variable. However, when using the TWFE model, as presented in Table A4, the effect becomes negative while remaining statistically insignificant. Section D.2 provides a discussion of the reasons for the variations between CS and TWFE.

[54]Event study is estimated by aggregating the CS group-time average treatment effects by relative time.

are consistent with the overall statistically insignificant effect of 4%.

Law Enforcement Killed by firearm.

Panel B of Table 4 reports the results of the CS estimator regarding the impact of SI on the number of officers feloniously killed by firearms. Around 0.4 to 0.5 more officers per 100,000 officers are being killed at the agency-year level, although the effect is not statistically significant.[55] However, the results appear to be sensitive to alternative transformations of the dependent variable; as shown in Table A6, Appendix E, the effect becomes negative, though the magnitude is small and remains statistically insignificant.[56] Overall, there is no evidence that SI laws lead to officers being killed in action.

Law Enforcement Assaulted by firearm

Panel C of Table 4 reports the CS estimator results on how SI affects the number of law enforcement officers assaulted by firearm per 10,000 officers. The analysis is at the agency-year level. Columns (1) and (2) show that when a state adopts SI laws the rate of assaults increases by almost 12 and 11 assaults by agency-year per 10,000 officers, and both effects are statistically significant.[57] When using logarithmic transformations of the depended variable, the SI effect on officers assaulted by firearm remains positive, but it is mostly statistically insignificant, as shown in Table A6, Appendix E.[58]

Overall under SI I find no indication of an increase in fatal shootings between officers and civilians. There is suggestive evidence of an increase in officers' assaults, which can be attributed to an increase in crime, as seen in the analysis that follows, but overall those interactions do not seem to escalate to the point in which an officer is fatally shooting the suspect. As previously mentioned, the SI effect closely resembles the RTC effect, which is not surprising, considering that SI is adopted by the majority of states and has been in effect

[55] The outcome is the *rate* of officers killed by firearm because around 55% of the observations (state-year) have zero police fatalities.

[56] See Appendix E, Table A7, for estimates using a TWFE model. The effects are positive and larger in magnitude compared to the CA estimates, but remain statistically insignificant.

[57] Due to a large amount of zero assaults reported (above 85%), the outcome is the rate of officers assaulted by firearm.

[58] For estimates using a TWFE model, see Appendix E, Table A8. The SI effect is robust– the TWFE estimates are larger in magnitude compared to the CA estimates, and remain statistically significant.

for a longer duration compared to PC.

5.3 Permitless Carry Effect on Fatal Police Encounters

Finally, I estimate the move from SI to PC, in which citizens who previously needed to acquire a permit to carry a concealed gun, no longer need to.

Fatal police shootings

To estimate the effects of PC on fatal police shootings I use both the Fatal Encounters and the Washington Post data. Panel A of table 5 presents the PC effects using the Fatal Encounters data for the years 2000 to 2019, and the analysis is at the yearly level. Using the CS estimator, the results show that when a state from SI laws adopts PC, the rate of people fatally shot by police officers increases by around 13% and 11%, for the unbalanced and balanced panel, respectively. That translates to around 1.8 and 1.7 more people fatally shot by police officers per year in a given state.[59,60,61]

Panel B of table 5 presents the PC effects using the Washington Post data. The analysis is at the quarterly level and covers the years 2015 to 2019. Consistent with the findings from the Fatal Encounters data, the CS estimator shows that when a state from SI laws adopts PC, the rate of people fatally shot by police officers increases by around 19%, for both the unbalanced and balanced panel. That translates to around 1.16 more people fatally shot by police officers per quarter in a given state.

Similar to Figure 2, Figure 3 shows the effect of PC laws on fatal police shootings using the event study approach and the Fatal encounters data. Sub-figure 3.a shows the unbalanced event study from periods t-5 to t+5 and sub-figures 3.b, 3.c, and 3.d present balanced event studies that differ in the relative time periods covered and therefore the number of treated

[59] For the unbalanced (balanced) sample, by multiplying the baseline mean rate of treated states, 2.4 (2.34), with the percentage increase, 12.7% (11.9%), I get the increase in number of people that are fatally shot by police officers per million persons every year in a given state under SI. From Table 1 I can infer that the average population in each state is 6,000,000 people.

[60] For a full list of the states included in the unbalanced and balanced sample see figure A4 in the appendix.

[61] Tables A3 and A4 in Appendix D display the PC effect using the inverse hyperbolic sine transformation of the outcome, the rate of fatal police shootings, and the TWFE model, using the Fatal Encounters data. The results are robust.

states included. The results of the event-studies are consistent with the overall statistically significant effect of 13%.

Law Enforcement Killed by firearm.

Panel C of Table 5 report the CS estimator results on how PC affects the number of law enforcement officers feloniously killed by firearm per 100,000 officers, at the state-year level. Columns (1) and (2) show that under permitless carry there is a large in magnitude decrease of officers killed by firearms.[62] The effect is statistically significant in the unbalanced panel. When considering different logarithmic transformations of the dependent variable, as shown in Table A6 of Appendix E, the effect remains negative and statistically significant at the 10% significance level.[63]

Law Enforcement Assaulted by firearm.

Panel D of Table 5 report the CS estimator results on how PC affects the number of law enforcement officers assaulted by firearm per 10,000 officers. The analysis of the officers assaulted is at the agency-year level. The findings show a statistically significant increase in the rate of officers assaulted.[64] When using logarithmic transformations of the depended variable, the PC effect on officers assaulted by firearm remains positive, but is not statistically significant, as shown in Table A6, Appendix E.[65]

Overall, under PC, the rate of fatal police shootings, where the potential suspect is killed, increases. The effect is robust across both data sets used. The exertion of additional force by police officers when encounter defendants is met with a likely reduction in their own killings and coupled with a possible increase in their assaults, as encounters become more volatile.

[62]The outcome is the *rate* since around 55% of the observations (state-year) have zero police fatalities.

[63]For estimates using a TWFE model, see Table A7 in Appendix E. The PC effect on officers killed by firearm is negative, but it is not statistically significant.

[64]Similar to the SI analysis, due to a large amount of zero assaults reported (above 85%) the outcome is the *rate* of officers being assaulted by firearm.

[65]For the estimates using a TWFE model, see Table A8 in Appendix E. The PC effect is robust, with TWFE estimates showing both a larger magnitude and higher statistical significance compared to the CA estimation.

5.4 Mechanisms

The main analysis shows that states who switch from Restricted or May Issue laws to SI experience, on average, an increase of about 4% in the rate of people fatally shot by law enforcement, though the effect is statistically insignificant. Whereas SI states that adopt PC, which is a more lenient law, experience a 13% increase in the rate of people fatally shot by law enforcement.

In this section I disentangle these results by investigating five possible mechanisms: the composition of armed people, crime rates, prevalence of guns, number of law enforcement officers, and number of police interactions with the public.[66]

The following analysis suggests that the increase of fatal police shootings under PC is due to the newly armed people that under SI would not have been qualified for a concealed carry permit, but now are able to carry a concealed weapon. This change in the composition of armed people increases the risk that police officers face.

5.4.1 Composition of Armed Citizens.

Concealed carry laws, as discussed in earlier sections, could change, first the likelihood of running into an armed person and second, the composition of armed people. The likelihood of carrying a gun alone cannot fully capture the effects of concealed carry laws. In both transitions, from restricted laws to SI and from SI to PC, the probability of running into an armed person increases, but the rate of people fatally shot by law enforcement doesn't change accordingly.

Regarding the composition of armed people, when a state adopts SI laws, it allows law-abiding citizens that can show proof of handgun proficiency and pass a background check to carry a concealed weapon. In contrast, under PC a permit is not needed and unfit and untrained people who would have been denied the concealed carry permit under SI could

[66] 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.

carry a concealed gun.[67]

To explore the composition of people fatally shot under PC I use the Washington Post data that provide information on the circumstances of the shooting. Table 6 explores the PC effect on various characteristics of the deceased and their actions.[68] First, Panel A shows that both unarmed and armed victims increase by 3.6% and 17%, respectively. Breaking down the types of weapons that the deceased were armed with reveals that the increase in armed victims is driven by ones armed with guns. This increase of armed victims can be attributed either to an increase in the likelihood of running into armed people or to a higher perceived risk by the officers, or both. The former argument is deduced from the idea that even if the number of armed people that police officers interact with doesn't increase, the fact that officers fatally shoot more armed people than before shows that they feel threatened by armed people more often. The increase of unarmed victims emphasizes the uncertainty that police officers face as to who is armed as well as the negative spillovers of unqualified armed people on all police interactions.

Second, Panel B explores the mental state of the suspects, providing some empirical evidence on the existence of unfit gun carriers. The findings show that when a state adopts PC the rate of individuals fatally shot by law enforcement officers that exhibit signs of mental illness increases by almost 9%. Furthermore, the rate of people fatally shot that were mentally ill and armed with a gun increases by 6%. Finally, regarding the circumstances of the incident, Panel C and D show that the suspects' behavior with respect to fleeing did not change. However there was an 18% increase to the fatal police incidents where the suspect attacked the officer.

Overall, based on the Washington Post data, when a state with SI laws adopts PC the incidents in which law enforcement officers fatally shoot potential suspects are more dangerous than before, as the suspect is either more likely to be armed with a gun, attack the officer or be mentally ill. Therefore, under PC, there is an increase in the number of

[67]For more details see section 3.1.

[68]For results using the rate of the outcome variable see Appendix F.

people fatally shot by police officers who would have been deemed unfit to carry a gun under SI laws.

As suggestive evidence for the existence of untrained people, column (1) of Table 7 using the National Instant Criminal Background Check System (NICS) data, shows that when a state adopts SI with mandatory concealed carry permits, experiences a 135% increase in NICS background checks conducted for issuing firearm-related permits.[69] In contrast, when a state adopts PC, where concealed carry permits are not obligatory, witness a 61% decline in NICS background checks for firearm-related permits. This supports the notion that under PC, fewer people receive firearm training due to the reduced issuance of concealed carry permits. As previously mentioned, concealed carry permit holders are typically the most well-trained gun owners (Rowhani-Rahbar et al., 2018).

For additional evidence of the increase in untrained people under PC and to confirm that the decrease in NICS background checks for permits under PC was not solely due to citizens choosing not to carry concealed guns, columns (2) of Table 7 show a 9.5% increase in accidental shootings.[70] However, as mentioned earlier, this is only suggestive evidence. This phenomenon could be attributed either to an increase in concealed gun carriers and/or to the lack of training among these newly armed citizens.

Furthermore, evidence that unqualified citizens affect police officers' work and behavior in practice is the fact that law enforcement chiefs and unions have raised their concerns about the qualifications of the newly armed people. For that reason have expressed their

[69]NICS background checks are initiated by officially-licensed Federal Firearms Licensees (FFLs) or law enforcement agencies before issuing firearm-related permits or allowing transfers. In this case, we are interested in the number of background checks conducted for obtaining a permit. However, there are two types of permits: concealed carry permits and permits for purchasing handguns. It's worth noting that only a few states require a permit to purchase a handgun. While it's not possible to distinguish the specific purpose of the permit for which the NICS background check was conducted, the background checks performed for permits to purchase are expected to bias the SI and PC effects in a similar way, potentially inflating the estimates. This is because it becomes more appealing to purchase a handgun in states where concealed carry is legal.

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

opposition of PC (Gorman, 2017; Shepperson, 2017; Goudeau, 2017; Robertson and Williams, 2016; Yablon, 2016).

To summarize, when switching from SI to PC, the increase in the likelihood of running into an armed person is accompanied with an increase in the threat that armed people can pose. That should, in theory lead to an increase in fatal police shootings, which is supported by the main findings.

5.4.2 Intermediate Outcomes

Table 8 shows the effect of SI (Panel A) and PC (Panel B) laws on crime rates, number of law enforcement officers, and the percentage of suicides committed with guns. The latter of which is used as a proxy for gun prevalence .

Crime Rate.

Columns (1) and (2) of Tables 8 show that violent crime increase under both SI and PC laws by 12% and 5%, respectively, with the effect being statistically significant at the 1% and 5% level. On the other hand, property crime decreases under SI by 3% and increases under PC laws by almost 1.5%, though both effects are statistically insignificant. The findings for the SI laws are consistent with Donohue et al. (2019), even though they cover a longer time period and use a TWFE analysis.

Prevalence of Guns.

Using the percentage of suicides committed with guns as a proxy for gun prevalence, column (3) of Table 8 shows that when a state adopts SI laws the percentage of suicides committed with guns increases by 1.6%, and though the effect is relatively small in magnitude it is statistically significant. Now, when a states adopts PC laws the percentage of suicides committed with guns does not seems to be affected in a ny meaningful way. Overall, from SI and PC, only the former seems to have small positive effects on gun prevalence.These results are somewhat consistent with Duggan (2001), who uses sales of the magazine *Guns & Ammo* as a proxy and finds no evidence that concealed carry laws increase the rate of gun ownership.

Number of Law Enforcement Officers.

Regarding the number of police officers employed, column (4) of Table 8 shows that when a state adopts SI laws the rate of police officers increases by 5.5% and it is statistically significant at the 10% level. However, when a state transitions from SI to PC laws, the rate of police officers does not appear to be affected. There is a small, non-statistically significant decrease of 1.6%. The findings are overall consistent with Donohue et al. (2019) that find that states that adopt RTC laws increase the size of their police force by about 7-8%.

Number of Police Interactions with the Public.

As mentioned in section 3.2, to estimate the number of police interactions, I use the rate of arrests. Specifically, I use the rate of arrests for both victimless crimes, such as drug offenses, gambling, and prostitution, where it is up to the police officers to intervene and enforce the law, as well as for index crimes, such as violent and property crimes. Moreover, to further understand whether the concealed carry effects on the rate of arrests are driven by a change in crime, I also estimate the concealed carry effects on arrests per crime. This outcome is only available for index crimes (violent and property crimes) as the actual number of crimes committed is unknown for the rest of the crime categories. The data are 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 2019.

Panel A of Table 9 shows that when a state adopts SI the rate of arrests for agencies serving at least 25,000 people decreases by 5%, though the effect is statistically insignificant. Breaking down the arrests by the types of crime, it appears that the negative effect is mainly driven by arrests for victimless crimes. The rate of arrest for victimless crimes decreases by 22% and it is statistically significant at the 10% level. That finding supports Donohue et al. (2019)'s argument, discussed in section 3.2, that officers have more limited time and therefore prioritize crimes reported by victims over offenses that need to be sought out by police. 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 effect of PC on arrest rates in Panel B of Table 9 follows a similar pattern to the SI effect. Under PC the total rate of arrests, for agencies serving at least 25,000 people, decreases by 0.3%, statistically insignificant, and it is mainly driven by a 8.5% decrease of victimless crimes, this time statistically significant at the 1% level.

Overview of Intermediate Outcomes.

In summary, under both SI and PC laws, violent crime rates increase, and arrest rates decrease, although the latter change is not statistically significant. The direction of the effects is the same for both SI and PC, but the magnitude of the effects is larger under SI. Additionally, the prevalence of guns and the number of police officers increase only under SI, while they remain unaffected by PC. Considering only the impact of concealed carry laws on intermediate outcomes, it might have been anticipated that fatal police shootings would increase to a greater extent under SI than under PC. Nevertheless, as previously discussed, under PC, the composition of armed individuals appears to increase the risk that officers face. Evidently, this factor is significant enough to observe a higher increase in fatal police shootings under PC.

6 Concealed carry and fatal police encounters by race

In this section I examine how the impact of SI and PC laws on fatal police shootings varies by the race of the suspect.

6.1 Shall Issue Effect on Fatal Police Encounters by race

Table 10 shows the SI effect for different race groups, using the CS estimator. Black people is the only racial group that experiences a decline in fatal police shootings while Hispanics face the biggest increase. The effects of all racial groups are statistically insignificant. However, the SI effect by race should be interpreted with caution because around 22% of race is being imputed and in 3% of the data the race of the deceased is missing.[71]

6.2 Permitless Carry Effect on Fatal Police Encounters by race

The PC effects by race group in Table 11 show that when using the unbalanced sample (column(1)), Hispanics and Black people experience the largest increase in fatal police shooting of 36% and 35% respectively, both estimates are statistically significant at the 1% level. At the same time, white people face a 10% increase, statistically significant at the 10% level. Yet, as mentioned earlier, around 22% of race is being imputed, and in 3% of the data race of the deceased is missing. This race uncertainty occurs, mostly, prior to 2013, and for the period of 2013 to 2019 the percentage of cases with imputed and missing race drops to 4% and 1%, respectively.

The PC effect on fatal police shootings by race follows a similar pattern, with the exception of Hispanic people, when using the Washington Post data for the years 2015 to 2019. Fatal police shootings increase for black people by 24% and for white people 13%, both effects statistically significant at the 1% level. Hispanic people experience a 14% increase though this time it is statistically insignificant.

6.3 Permitless Carry Effect on the Circumstances of Fatal Police Encounters by race

To explore why minorities, especially black people, experience the largest increase in fatal police shootings under PC, I use the Washington Post data to examine whether the circumstances of the shootings vary by race.

[71] For more information on the imputed and missing race in the Fatal Encounters data, and for the SI and PC effects using only the non-imputed race data, the inverse hyperbolic sine transformation and the rate of the outcome variable see Appendix H.

First, Table 12 reports the summary statistics of different circumstances of fatal police shootings by race. In almost 10% of the shootings involving black people the suspect was unarmed, with that percentage dropping to 6% and 7.6% for white and hispanic people respectively. Moreover, in almost 60% of shootings that involve black people the suspect was armed with a gun, that percentage is similar for white people (59%), while for hispanic people the likelihood of the suspect being armed with a gun is 51%.

The mental health of the suspect is the characteristic that varies the most between white people and minorities. Almost 31% of white suspects show signs of mental illness and more than half of those are armed with a gun. For black people the likelihood that the suspect is mentally ill is around 16%, almost half of the likelihood of white people, while less than half of those are armed with a gun.

Next, I see how the circumstances of fatal police shootings change under PC by race. Columns (1) to (4) of Table 13 show that unarmed and armed suspects increase for both white and black people. For white people the magnitude of the effect on armed suspects (11%) was around 3 times bigger than on the unarmed suspects (3.3%). While for black people the magnitude of the effect on armed suspects (31.6%) was almost 5 times bigger than on the unarmed suspects (6.4%). Though there was a larger increase of armed suspects, in both absolute and relative terms for black people compare to white people, that effect of PC on armed black people is mainly driven by an increase of armed suspects though not with a gun. That is in contrast to the white suspects.

Columns (5) to (8) of Table 13 show that fatal shootings where the suspect is not fleeing the scene and is attacking the officer(s) increase for both white and black people. However for white people the increase in the incidents where the suspect is attacking the officers (9.7%) is relatively similar to the increase of incidents where the suspect is not attacking the officers (8.2%). In contrast, for black people the increase in the incidents where the suspect attacks the officer(s) (28.9%) is more than 4 times larger than the increase of suspects that do not attack the officer (6.7%).

Regarding the mental health of the suspects, Table 14 shows that under PC there is a statistically significant increase for minorities in the incidents where the suspect shows signs of mental illness. For black people there is also a statistically significant increase in the cases where the suspect is mentally ill and both armed with a gun (6.4%), or unarmed (1.9%).

7 Conclusion

This paper estimates the effects of concealed carry laws on violent police interactions, and more specifically on fatal police shootings and law enforcement officers killed and assaulted. I leverage state-level staggered roll-out of concealed carry laws and use the estimation method proposed by Callaway and SantAnna (2021). I find that when states with stricter concealed carry laws adopt SI, and allow qualified citizens to carry concealed guns after acquiring a permit to do so, there is an indication that assaults of officers increase, though there is no detectable increase in fatal police shootings or officers killed. States that subsequently switch to PC, and a permit for carrying a concealed gun is not needed, experience an increase in the number of people fatally shot by police officers, driven by minorities. From the police side, there is suggestive evidence that under PC, assaults of officers by firearms increase, while there is a reduction of officers' killed in action. Furthermore, I find suggestive evidence that the increase of fatal police shooting under PC can be attributed to the change in composition of armed individuals. In particular, citizens who under SI would have been considered unqualified can carry a concealed weapon under PC, which increases the risk that police officers face.

The gravity and importance of the effects of concealed carry laws on fatal police shootings can be illustrated in two points. First, being killed by law enforcement is the most extreme outcome that can occur from a police interaction. Therefore, the effects detected in this study on such a rare event indicate that concealed carry laws could potentially have a much larger impact on more common violent incidents, such as non-lethal police shootings. Finally, even if fatal police shooting are relatively rare, when they do happen, their consequences can be devastating to communities.

Understanding how civil laws, in this case concealed carry laws, can influence law enforcement's jobs and consequently their actions, has direct implications for future policy considerations. The questions studied in this paper are directly related to two ongoing issues - the debate surrounding concealed carry laws and the discussion over police reform. Therefore, the findings of this study provide insights that are important to consider in determining the effects of more lenient concealed carry laws on social welfare, and in evaluating reforms to mitigate police violence.

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8 Tables and Figures

Table 1: Summary Statistics: Fatal shootings by police officers

	Fatal Encounters (1)	(2)	Washington Post (3)
Years covered	2000-2019	2015-2019	2015-2019
Average state population	6,016,665	6,369,024	
Per state-year			
Average number of deaths by gun	15.85	20.82	19.25
Average rate of deaths per million ppl by gun	2.7	3.7	3.5
Victims characteristics			
Average age	35.50	36.95	36.64
% Male	95.66	95.12	95.62
% Race[1]: White	47.09	50.18	48.22
Black	28.31	25.37	24.28
Hispanic	18.46	18.35	17.35
Race unspecified	2.53	1.70	5.94
Race unspecified before imputation	20.13	8.06	
Incident characteristics			
%Unarmed			6.90
% Armed			93.10
% Armed with gun			57.22
% Armed without gun			35.88
% sigh of mental illness			24.05
% mentally ill & armed with gun			12.00
% mentally ill & armed without gun			10.70
% mentally ill & unarmed			1.35
% Not fleeing			29.02
%Attack officers			64.58

[1] Race in the Fatal Encounter's data is after imputation. Fatal Encounters impute the missing race using the Bayesian Improved Surname Geocoding (BISG)(Elliott et al., 2008).

Table 2: Summary Statistics: Police officers killed and assaulted

Panel A: Officers killed, state-level		
Years covered	2000-2019	
Average state population	6,016,665	
Average number of police officers per state	18,994.91	
Law Enforcement officers feloniously killed per state-year:	by firearm	not by firearm
Average number	0.887	0.152
Average number per 100,000 police officers	5.60	0.66
Panel B: Officers assaulted, agency-level[1]		
Years covered	2000-2019	
Number of agencies	3609	
Average number of officers by agency	88.31	
Law Enforcement officers assaulted per agency-year:	by firearm	not by firearm
Average number	0.49	11.65
Average number per 10,000 police officers	37.90	874.76
Average number per 10,000 police officers, winsorized[2]	20.16	813.81

[1] Agencies that report for at least 15 years. See Appendix E for a description of the cleaning process.
[2] For the analysis I use the winsorized rate of officers' assaults.

Table 3: Effect of Right-to-Carry on violent police incidents, 2000-2019

	(1)	(2)
Panel A: Log rate of fatal shootings		
Right-to-Carry		0.049
		(0.060)
Baseline mean rate of treated		2.592
Number of states		20
Balanced panel		Yes
Panel B: Rate of officers killed by firearm		
Right-to-Carry		0.726
		(0.719)
Baseline mean rate of treated		3.473
Number of states		20
Balanced panel		Yes
Panel C: Rate of officers assaulted by firearm		
Right-to-Carry	16.160***	15.797
	(5.290)	(11.901)
Baseline mean rate of treated	5.970	6.423
Number of agencies	1339	933
Minimum years agency reports	15	17

Notes. The dependent variable in Panel A is the logarithm of the number of people fatally shot by law enforcement per million persons, and the data comes from the Fatal Encounters database. The dependent variable in Panel B is the number of police officers feloniously killed per 100,000 police officers, and in Panel C is the number of police officers non-fatally assaulted per 10,000 police officers. All results are estimated using Callaway and SantAnna (2021)'s estimator. In Panel A and B the analysis is at the state-year level and uses state population weights and weights based on the number of officers per state, respectively. In Panel C the analysis is at the agency-year level and uses weights based on the number of officers per agency. Standard errors are clustered at the state level, in parentheses. *10%, **5%, and ***1% significance level.

Table 4: Effect of Shall Issue on violent police incidents, 2000-2019

	(1)	(2)
Panel A: Log rate of fatal shootings		
Shall Issue	0.039	0.074
	(0.048)	(0.073)
Baseline mean rate of treated	2.592	2.653
Number of states	20	18
Balanced panel	No	Yes
Panel B: Rate of officers killed by firearm		
Shall Issue	0.489	0.386
	(0.693)	(1.519)
Baseline mean rate of treated	3.473	3.077
Number of states	20	18
Balanced panel	No	Yes
Panel C: Rate of officers assaulted by firearm		
Shall Issue	12.391***	11.271**
	(3.461)	(5.267)
Baseline mean rate of treated	5.886	5.174
Number of agencies	1320	920
Minimum years agency reports	15	17

Notes. The dependent variable in Panel A is the logarithm of the number of people fatally shot by law enforcement per million persons, and the data comes from the Fatal Encounters database. The dependent variable in Panel B is the number of police officers feloniously killed per 100,000 police officers, and in Panel C is the number of police officers non-fatally assaulted per 10,000 police officers. All results are estimated using Callaway and SantAnna (2021)'s estimator. In Panel A and B the analysis is at the state-year level and uses state population weights and weights based on the number of officers per state, respectively. In Panel C the analysis is at the agency-year level and uses weights based on the number of officers per agency. Standard errors are clustered at the state level, in parentheses. *10%, **5%, and ***1% significance level.

Table 5: Effect of Permitless Carry on violent police incidents, 2000-2019

	(1)	(2)
Panel A: Log rate of fatal shootings, Fatal Encounters		
Permitless Carry	0.127**	0.119**
	(0.052)	(0.058)
Baseline mean rate of treated	2.401	2.343
Number of states	42	30
Balanced panel	No	Yes
Panel B: Log rate of fatal shootings, Washington Post		
Permitless Carry	0.188**	0.189**
	(0.078)	(0.076)
Baseline mean rate of treated	1.029	1.029
Number of states	39	38
Balanced panel	No	Yes
Panel C: Rate of officers killed by firearm		
Permitless Carry	–4.869***	–10.079
	(1.800)	(9.054)
Baseline mean rate of treated	7.003	7.174
Number of states	42	28
Balanced panel	No	Yes
Panel D: Rate of officers assaulted by firearm		
Permitless Carry	12.101**	20.558***
	(5.030)	(5.370)
Baseline mean rate of treated	9.810	9.165
Number of agencies	2917	2128
Minimum years agency reports	15	17

Notes. The dependent variable in Panel A and B is the logarithm of the number of people fatally shot by law enforcement per million persons. In Panel A, the data is sourced from Fatal Encounters, covering the years 2000 to 2019, and in Panel B, it comes from the Washington Post database, covering the years 2015 to 2019. The dependent variable in Panel C is the number of police officers feloniously killed per 100,000 police officers, and in Panel D is the number of police officers non-fatally assaulted per 10,000 police officers. All results are estimated using Callaway and SantAnna (2021)'s estimator. In Panel A the analysis is at the state-year level and in Panel B at the state-quarterly level (covering only the years 2015 to 2019). Both Panels A and B use state population weights. I Panel C the analysis is at the state-year level and uses weights based on the number of officers per state, respectively. In Panel D the analysis is at the agency-year level and uses weights based on the number of officers per agency. Standard errors are clustered at the state level, in parentheses. *10%, **5%, and ***1% significance level.

Table 6: Effect of Permitless Carry on people fatally shot by police, by victim characteristics, 2015-2019

	Logarithm of Rate				
	(1)	(2)	(3)	(4)	(5)
Panel A:	unarmed	armed	armed with gun	armed w/o gun	vehicle
Permitless Carry	0.036***	0.169**	0.164***	0.042	0.040**
	(0.008)	(0.082)	(0.027)	(0.119)	(0.016)
Baseline mean rate of treated	0.069	0.959	0.617	0.342	0.029
			mentally ill		
Panel B:	not mentally ill	mentally ill	with gun	w/o a gun	unarmed
Permitless Carry	0.130	0.088***	0.060***	0.029***	0.008***
	(0.082)	(0.028)	(0.021)	(0.010)	(0.003)
Baseline mean rate of treated	0.817	0.212	0.143	0.065	0.004
Panel C:	fleeing	not fleeing			
Permitless Carry	-0.018	0.175			
	(0.039)	(0.116)			
Baseline mean rate of treated	0.285	0.676			
Panel D:	attack	not attack			
Permitless Carry	0.181***	0.056			
	(0.025)	(0.067)			
Baseline mean rate of treated	0.718	0.311			
Number of units	39	39	39	39	39

Notes. Washington Post data covering the years 2015 to 2019. All results are estimated using Callaway and SantAnna (2021)'s estimator. The dependent variable is the logarithm of people fatally shot by law enforcement per million persons. Data are at the state-quarterly level. The panel is unbalanced. All regressions use state population weights. Standard errors are clustered at the state level, in parentheses. *10%, **5%, and ***1% significance level.

Table 7: Effect of Right-to-Carry laws on NICS background checks and accidental shootings

Logarithm of Rate:	NICS permit related (1)	Accidental Shooting (2)
Panel A:		
Shall Issue	1.364**	
	(0.567)	
Baseline mean rate of treated	933.339	
Number of states	20	
Panel B:		
Permitless Carry	-0.609***	0.095***
	(0.151)	(0.027)
Baseline mean rate of treated	4013.756	0.790
Number of states	42	38

Notes. The dependent variable in columns (1) is the logarithm of the number of NICS background checks that were conducted for a fire-related permit per 100,000 persons. The NICS data is obtained from the FBI and cover the year 2000 to 2019. The dependent variable is the logarithm of the number of accidental shootings per 100,000 persons. Data for the accidental shootings is obtained from the Gun Violence Archive, from 2014-2017. All results are estimated using Callaway and SantAnna (2021)'s estimator. The panel is unbalanced. thought the unbalanced and balanced panel are the same for estimating the Permitless Carry effect for the years 2014 to 2017. All regressions use state population weights. Standard errors are clustered at the state level, in parentheses. *10%, **5%, and ***1% significance level.

Table 8: Intermediate outcomes: How Shall Issue and Permitless Carry affect crime rates, PSG*, and number of police officers, 2000-2019

Logarithm of Rate:	Violent crime (1)	Property crime (2)	PSG (3)	Number of Police (4)
Panel A:				
Shall Issue	0.124***	-0.033	0.016***	0.055*
	(0.029)	(0.040)	(0.004)	(0.032)
Baseline mean rate of treated	552.697	3677.227	0.494	414.391
Number of states	20	20	19	20
Panel B:				
Permitless Carry	0.048**	0.013	0.001	-0.016
	(0.019)	(0.012)	(0.003)	(0.011)
Baseline mean rate of treated	262.324	2762.496	0.597	279.500
Number of states	42	42	42	42

Notes. All results are estimated using Callaway and SantAnna (2021)'s estimator. The dependent variable for columns (1), (2), (3), and (4) is the logarithm of violent crime rate, property crime rate, percentage of suicides committed by gun, and number of police officers per 100,000 people. The panel is unbalanced. All regressions use state population weights. Standard errors are clustered at the state level, in parentheses.
*10%, **5%, and ***1% significance level.
*PSG: Percentage of suicides committed by gun.

Table 9: Intermediate outcomes: How Shall Issue and Permitless Carry affect arrest rates, agency-level, 2000-2019

	Logarithm of Rate of Arrests							Log of Arrests per Crime	
	Total Arrests	Victimless Crimes	Vandalism	Weapon Violation	Drugs	Violent	Property	Violent	Property
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A:									
Shall Issue	-0.050	-0.220*	0.047	-0.042	0.067	0.052	0.084*	-0.069	0.016
	(0.090)	(0.126)	(0.131)	(0.106)	(0.097)	(0.061)	(0.048)	(0.093)	(0.010)
Baseline mean rate of treated	268.178	118.735	11.417	3.649	35.346	45.662	53.369	3.497	0.192
Number of agencies	2215	2215	2215	2215	2215	2215	2215	2215	2215
Panel B:									
Permitless Carry	-0.003	-0.085***	0.050*	-0.044*	0.034	0.028	0.026	-0.010	-0.008*
	(0.018)	(0.022)	(0.026)	(0.024)	(0.047)	(0.022)	(0.034)	(0.018)	(0.004)
Baseline mean rate of treated	258.718	95.699	7.988	3.376	45.062	54.944	51.649	3.133	0.187
Number of agencies	3492	3492	3492	3492	3492	3492	3492	3492	3492

Notes. All results are estimated using Callaway and SantAnna (2021)'s estimator. The dependent variable in columns (1) to (7) is the logarithm of the number of arrests per million people for the type of crime mentioned above each column, and for columns (8) and (9) it is the logarithm of the number of arrests per crime. 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. Data are at the agency-year level, where agencies serves at least 25,000 people. All regressions include year, state, and agency fixed effects, estimated using agency population weights. Standard errors are clustered at the state level, in parentheses. *10%, **5%, and ***1% significance level.

Table 10: Effect of Shall Issue on fatal police shootings by race, 2000-2019

	Log rate of fatal shootings	
	(1)	(2)
Panel A: White people		
Shall Issue	0.039	0.086
	(0.369)	(0.361)
Baseline mean rate of treated	1.173	1.107
Panel B: Black people		
Shall Issue	–0.038	–0.067
	(0.951)	(1.134)
Baseline mean rate of treated	7.346	7.403
Panel C: Hispanics		
Shall Issue	0.165	0.287
	(0.151)	(0.306)
Baseline mean rate of treated	2.856	2.747
Number of states	20	18
Balanced panel	No	Yes

Notes. Fatal Encounters data covering years 2000 to 2019. All results are estimated using Callaway and SantAnna (2021)'s estimator. The dependent variable is the logarithm of people fatally shot by law enforcement per million persons. The regressions are weighted using population weights of the race of interest. Standard errors are clustered at the state level, in parentheses. 22% of race is imputed, and 3% of race is missing. Shall Issue effects by race should be interpreted with caution. *10%, **5%, and ***1% significance level.

Table 11: Effect of Permitless Carry of fatal police shootings by race

	Fatal Encounters yearly 2000-2019		Washington Post quarterly 2015-2019	
Logarithm of Rate:	(1)	(2)	(3)	(4)
Panel A: White people				
Permitless Carry	0.101*	0.079	0.131***	0.131***
	(0.056)	(0.079)	(0.028)	(0.028)
Baseline mean rate of treated	2.023	2.016	0.905	0.905
Panel B: Black people				
Permitless Carry	0.353***	0.493***	0.236***	0.238***
	(0.090)	(0.119)	(0.073)	(0.077)
Baseline mean rate of treated	4.530	3.672	1.724	1.724
Panel C: Hispanics				
Permitless Carry	0.364***	0.349**	0.138	0.142
	(0.108)	(0.136)	(0.105)	(0.111)
Baseline mean rate of treated	1.254	1.240	0.478	0.478
Number of states	42	30	39	38
Balanced panel	No	Yes	No	Yes

Notes. All results are estimated using Callaway and SantAnna (2021)'s estimator. The dependent variable is the logarithm of people fatally shot by law enforcement per million persons. The regressions are weighted using population weights of the race of interest. Standard errors are clustered at the state level, in parentheses. In Fatal Encounters data 22% of race is imputed, and 3% of race is missing. *10%, **5%, and ***1% significance level.

Table 12: Summary Statistics: Washington Post data

Years covered	2015-2019		
Average state population	6,016,665		
Incident characteristics	White	Black	Hispanics
% Unarmed	6.10	9.58	7.63
% Armed	93.90	90.42	92.37
% Armed with gun	58.69	59.70	51.29
% Armed without gun	35.21	30.72	41.08
% sigh of mental illness	30.67	15.57	18.66
% mental illness & armed with gun	17.00	6.00	7.51
% mental illness & armed without gun	12.33	7.66	10.21
% mental illness & unarmed	1.34	1.91	0.94
% not fleeing	68.25	57.29	60.21
% attack officers	66.48	67.36	57.39

Table 13: Effect of Permitless Carry on people fatally shot by police, by victim characteristics and race, 2015-2019

		Armed			Fleeing		Attack	
	unarmed	total	with gun	w/o gun	true	false	true	false
Logarithm of Rate:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: White people								
Permitless Carry	0.033***	0.110***	0.103***	0.016	-0.026	0.102**	0.097***	0.082***
	(0.008)	(0.028)	(0.037)	(0.021)	(0.052)	(0.041)	(0.033)	(0.027)
Baseline mean rate of treated	0.066	0.839	0.571	0.269	0.239	0.627	0.638	0.267
Panel B: Black people								
Permitless Carry	0.064***	0.316***	0.122*	0.307***	0.010	0.354***	0.289***	0.067*
	(0.023)	(0.071)	(0.062)	(0.060)	(0.051)	(0.049)	(0.080)	(0.040)
Baseline mean rate of treated	0.120	1.604	1.181	0.423	0.812	0.756	1.249	0.474
Panel C: Hispanics								
Permitless Carry	0.005	0.203	0.362	-0.168***	-0.175***	0.368	0.357	-0.149
	(0.011)	(0.334)	(0.338)	(0.022)	(0.060)	(0.446)	(0.438)	(0.124)
Baseline mean rate of treated	0.046	0.432	0.293	0.139	0.138	0.264	0.328	0.149
Number of states	39	39	39	39	39	39	39	39

Notes. Washington Post data covering the years 2015 to 2019. All results are estimated using Callaway and SantAnna (2021)'s estimator. The dependent variable is the logarithm of people fatally shot by law enforcement per million persons. Data are at the state-quarterly level. The regressions are weighted using population weights of the race of interest. Standard errors are clustered at the state level, in parentheses. *10%, **5%, and ***1% significance level.

Table 14: Effect of Permitless Carry on people fatally shot by police, by victim characteristics and race, 2015-2019

	Mentally ill		Mentally ill		
Logarithm of rate	false (1)	true (2)	with gun (3)	w/o gun (4)	unarmed (5)
Panel A: White people					
Permitless carry	0.091***	0.049	0.031	0.018	0.006*
	(0.019)	(0.030)	(0.024)	(0.015)	(0.003)
Baseline mean rate of treated	0.676	0.229	0.165	0.063	0.000
Panel B: Black people					
Permitless carry	0.289***	0.117***	0.064***	0.035	0.019**
	(0.070)	(0.033)	(0.024)	(0.025)	(0.009)
Baseline mean rate of treated	1.522	0.202	0.130	0.071	0.000
Panel C: Hispanics					
Permitless carry	0.135	0.066***	0.036	0.030*	0.001
	(0.311)	(0.013)	(0.024)	(0.016)	(0.001)
Baseline mean rate of treated	0.457	0.021	0.021	0.000	0.000
Number of states	39	39	39	39	39

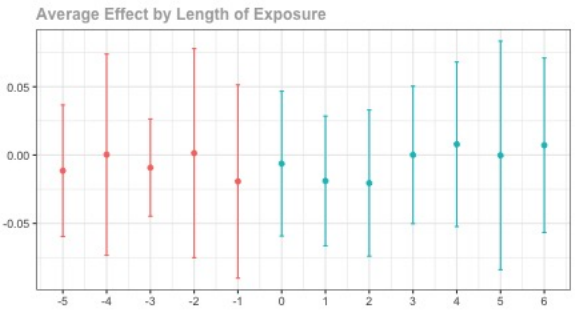
Notes. Washington Post data covering the years 2015 to 2019. All results are estimated using Callaway and SantAnna (2021)'s estimator. The dependent variable is the logarithm of people fatally shot by law enforcement per million persons. Data are at the state-quarterly level. The regressions are weighted using population weights of the race of interest. Standard errors are clustered at the state level, in parentheses. *10%, **5%, and ***1% significance level.

Changes of concealed-carry laws by state and year, 2000-2019

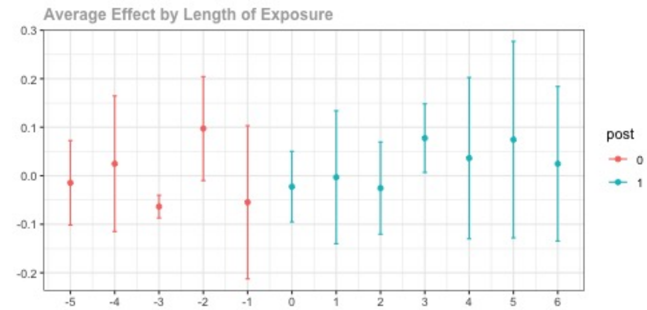
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Massachusetts	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM
Rhode Island	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM
Maryland	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM
New Jersey	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM
California	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM
Hawaii	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM
Delaware	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM
New York	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM
District of Columbia	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	SI	SI
Illinois	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	SI	SI	SI	SI	SI	SI
Wisconsin	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI
Iowa	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI
Kansas	RM	RM	RM	RM	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC	PC
Nebraska	RM	RM	RM	RM	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Missouri	RM	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC
Ohio	RM	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
New Mexico	RM	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Colorado	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Minnesota	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Michigan	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Alaska	SI	SI	SI	SI	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
Arizona	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC	PC	PC	PC	PC	PC
Wyoming	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC	PC	PC	PC	PC	PC
Mississippi	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC
Idaho	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC
Maine	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC
West Virginia	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC
New Hampshire	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC
North Dakota	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC
Arkansas	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC
South Dakota	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC
Kentucky	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC
Montana	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Georgia	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Tennessee	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Washington	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Texas	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Alabama	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Indiana	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Oregon	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Nevada	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
North Carolina	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Virginia	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Florida	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
South Carolina	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Connecticut	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Louisiana	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Pennsylvania	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Utah	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Oklahoma	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Vermont	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC

RM Restricted or May Issue; SI Shall Issue; PC Permitless Carry

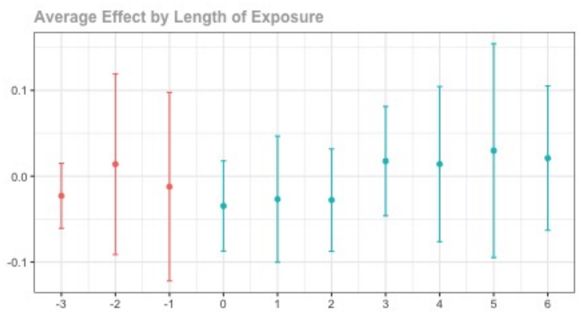
Figure 1: Changes of concealed carry laws



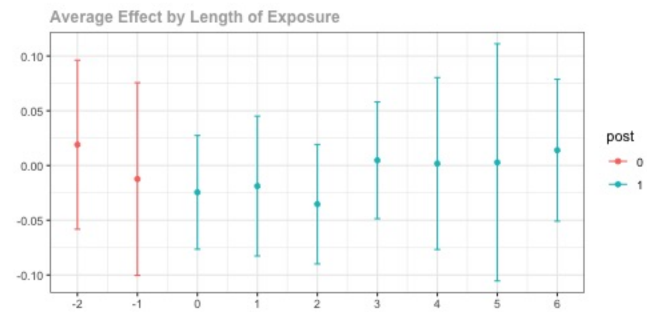
(a) unbalanced (-5,6), $n_{treated} = 12$



(b) balanced (-5,6), $n_{treated} = 4$



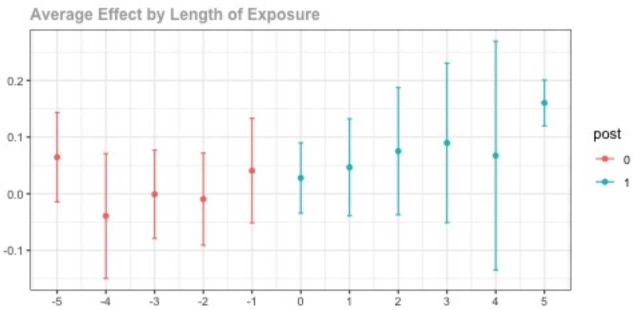
(c) balanced (-3,6), $n_{treated} = 7$



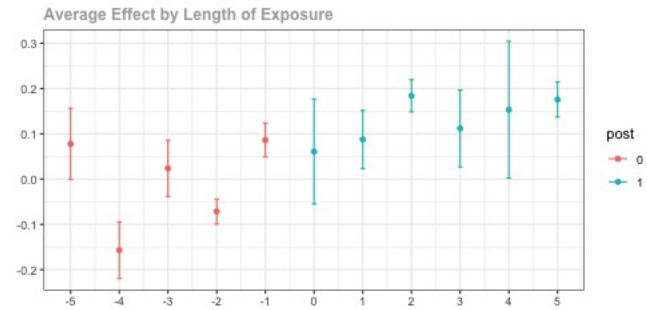
(d) balanced (-2,6), $n_{treated} = 9$

Figure 2: Effect of Shall Issue on fatal police shootings, using Fatal Encounters data, 2000-2019

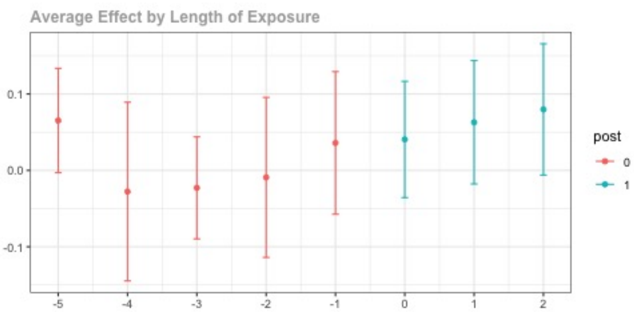
The figure plots coefficients and 95% confidence intervals of yearly indicators leading up to and following the passage of a Shall Issue law, estimated using Callaway and SantAnna (2021)'s estimator. The dependent variable is the logarithm of the rate of people fatally shot by police officers.



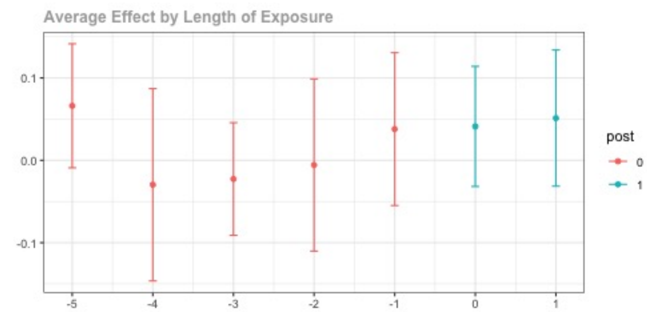
(a) unbalanced (-5,5), $n_{treated} = 14$



(b) balanced (-5,5), $n_{treated} = 2$



(c) balanced (-5,2), $n_{treated} = 9$



(d) balanced (-5,1), $n_{treated} = 10$

Figure 3: Effect of Permitless Carry on fatal police shootings, using Fatal Encounters data, 2000-2019

The figure plots coefficients and 95% confidence intervals of yearly indicators leading up to and following the passage of a Permitless Carry law, estimated using Callaway and SantAnna (2021)'s estimator. The dependent variable is the logarithm of the rate of people fatally shot by police officers.

Appendices

A Appendix

Table A1: Adoption dates of concealed carry laws, 2000-2019

State	**Concealed carry law**	**Effective date**	**Fraction of year in effect**
Alaska	Permitless Carry	9/9/2003	0.31
Arizona	Permitless Carry	7/29/2010	0.43
Arkansas	Permitless Carry	10/17/2018	0.21
Colorado	Shall Issue	5/17/2003	0.63
District of Columbia	Shall Issue	10/6/2017	0.24
Idaho	Permitless Carry	7/1/2016	0.5
Illinois	Shall Issue	1/5/2014	0.99
Iowa	Shall Issue	1/1/2011	1
Kansas	Shall Issue Permitless Carry	1/1/2007 7/1/2015	1 0.5
Kentucky	Permitless Carry	6/27/2019	0.52
Main	Permitless Carry	10/15/2015	0.21
Michigan	Shall Issue	7/1/2001	.5
Minnesota	Shall Issue	5/28/2003	0.6
Mississippi	Permitless Carry	4/15/2016	0.72
Missouri	Shall Issue Permitless Carry	2/26/2004 1/1/2017	0.85 1
Nebraska	Shall Issue	1/1/2007	1
New Hampshire	Permitless Carry	2/22/2017	0.86
New Mexico	Shall Issue	1/1/2004	1
North Dakota	Permitless Carry	8/1/2017	0.42
Ohio	Shall Issue	4/8/2004	0.73
Oklahoma	Permitless Carry	11/01/2019	0.17
South Dakota	Permitless Carry	7/01/2019	0.5
West Virginia	Permitless Carry	5/24/2016	.61
Wisconsin	Shall Issue	11/1/2011	0.17
Wyoming	Permitless Carry	7/1/2011	.5

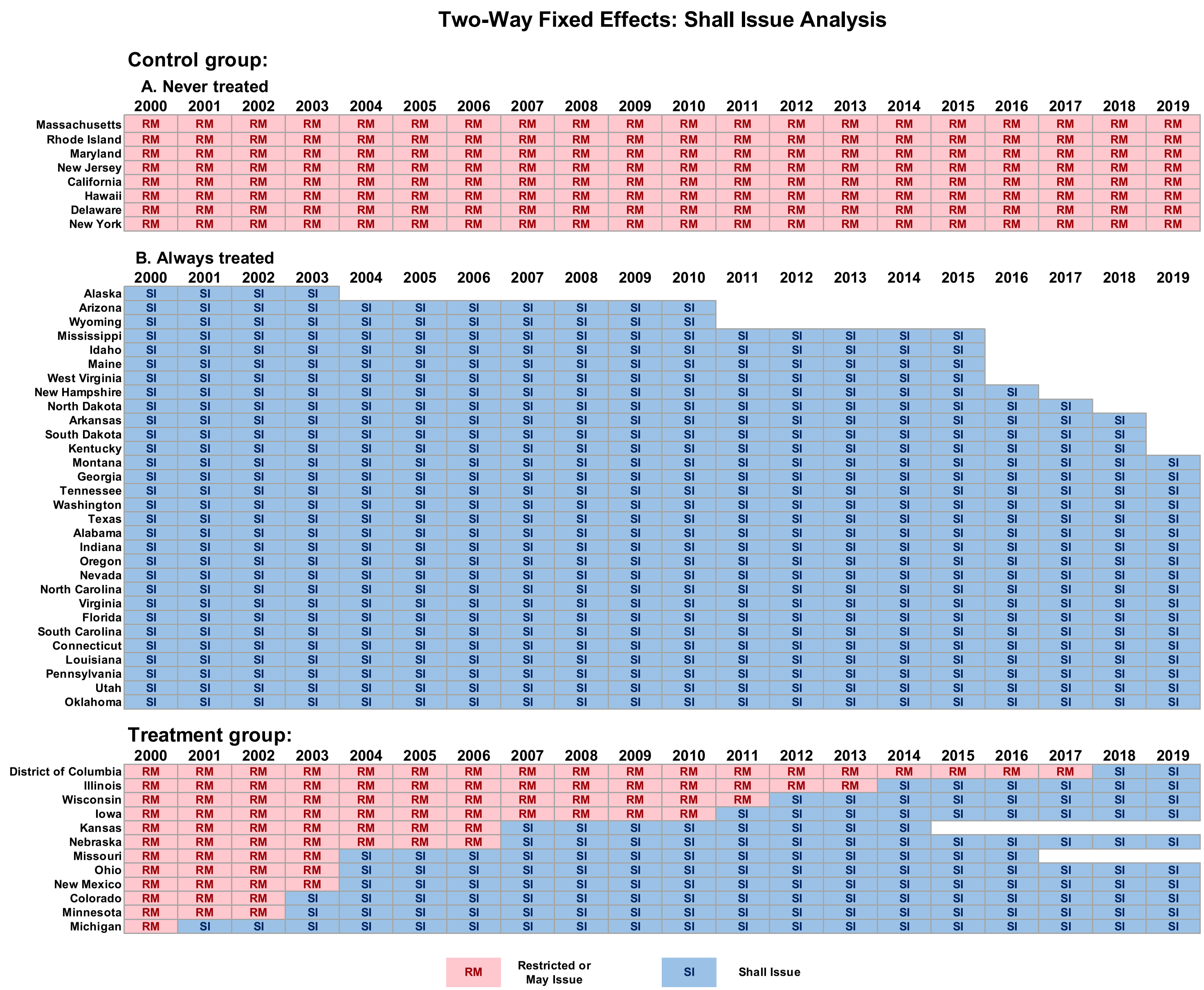


Figure A1: RTC: Control and treatment groups of TWFE

Two-Way Fixed Effects: Permitless Carry Analysis

Control group:

A. Never treated

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
District of Columbia																			SI	SI
Illinois															SI	SI	SI	SI	SI	SI
Wisconsin													SI	SI	SI	SI	SI	SI	SI	SI
Iowa												SI	SI	SI	SI	SI	SI	SI	SI	SI
Nebraska								SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Ohio					SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
New Mexico					SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Colorado				SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Minnesota				SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Michigan		SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Montana	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Georgia	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Tennessee	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Washington	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Texas	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Alabama	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Indiana	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Oregon	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Nevada	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
North Carolina	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Virginia	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Florida	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
South Carolina	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Connecticut	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Louisiana	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Pennsylvania	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Utah	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Oklahoma	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI

B. Always treated

Vermont	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC

Treatment group:

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Alaska	SI	SI	SI	SI	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
Arizona	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC	PC	PC	PC	PC	PC
Wyoming	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC	PC	PC	PC	PC	PC
Mississippi	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC
Idaho	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC
Maine	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC
West Virginia	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC
New Hampshire	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC
North Dakota	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC
Arkansas	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC
South Dakota	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC
Kentucky	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC
Missouri					SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC
Kansas								SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC	PC

SI Shall Issue — PC Permitless Carry

Figure A2: PC: Control and treatment groups of TWFE

Callaway & Sant'Anna: Shall Issue Analysis, Unbalanced sample

Control group:

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Massachusetts	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM
Rhode Island	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM
Maryland	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM
New Jersey	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM
California	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM
Hawaii	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM
Delaware	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM
New York	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM

Treatment group:

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
District of Columbia	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	SI	SI
Illinois	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	SI	SI	SI	SI	SI	SI
Wisconsin	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI
Iowa	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI
Kansas	RM	RM	RM	RM	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI					
Nebraska	RM	RM	RM	RM	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Missouri	RM	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI			
Ohio	RM	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
New Mexico	RM	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Colorado	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Minnesota	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Michigan	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI

Callaway & Sant'Anna: Shall Issue Analysis, Balanced sample

Control group:

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Massachusetts	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM
Rhode Island	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM
Maryland	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM
New Jersey	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM
California	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM
Hawaii	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM
Delaware	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM
New York	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM

Treatment group:

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
District of Columbia	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	SI	SI
Illinois	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	SI	SI	SI	SI	SI	SI
Wisconsin	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI
Iowa	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI
Nebraska	RM	RM	RM	RM	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Ohio	RM	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
New Mexico	RM	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Colorado	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Minnesota	RM	RM	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Michigan	RM	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI

RM: Restricted or May Issue; SI: Shall Issue

Figure A3: RTC: Control and treatment groups of Callaway and SantAnna (2021)'s method

Callaway & Sant'Anna: Permitless Carry Analysis, Unbalanced sample

Control group:

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
District of Columbia																			SI	SI
Illinois															SI	SI	SI	SI	SI	SI
Wisconsin													SI	SI	SI	SI	SI	SI	SI	SI
Iowa												SI	SI	SI	SI	SI	SI	SI	SI	SI
Nebraska								SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Ohio					SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
New Mexico					SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Colorado				SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Minnesota				SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Michigan		SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Montana	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Georgia	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Tennessee	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Washington	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Texas	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Alabama	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Indiana	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Oregon	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Nevada	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
North Carolina	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Virginia	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Florida	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
South Carolina	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Connecticut	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Louisiana	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Pennsylvania	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Utah	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Oklahoma	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI

Treatment group:

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Alaska	SI	SI	SI	SI	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
Arizona	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC	PC	PC	PC	PC	PC
Wyoming	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC	PC	PC	PC	PC	PC
Mississippi	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC
Idaho	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC
Maine	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC
West Virginia	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC
New Hampshire	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC
North Dakota	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC
Arkansas	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC
South Dakota	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC
Kentucky	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC
Missouri					SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC
Kansas								SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC	PC

Callaway & Sant'Anna: Permitless Carry Analysis, Balanced sample

Control group:

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Montana	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Georgia	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Tennessee	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Washington	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Texas	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Alabama	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Indiana	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Oregon	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Nevada	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
North Carolina	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Virginia	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Florida	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
South Carolina	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Connecticut	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Louisiana	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Pennsylvania	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Utah	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
Oklahoma	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI

Treatment group:

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Alaska	SI	SI	SI	SI	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC	PC
Arizona	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC	PC	PC	PC	PC	PC
Wyoming	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC	PC	PC	PC	PC	PC
Mississippi	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC
Idaho	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC
Maine	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC
West Virginia	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC	PC
New Hampshire	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC	PC
North Dakota	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC	PC
Arkansas	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC
South Dakota	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC
Kentucky	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	PC

SI: Shall Issue PC: Permitless Carry

Figure A4: PC: Control and treatment groups of Callaway and SantAnna (2021)'s method

B Appendix: Fatal Encounters and Washington Post data

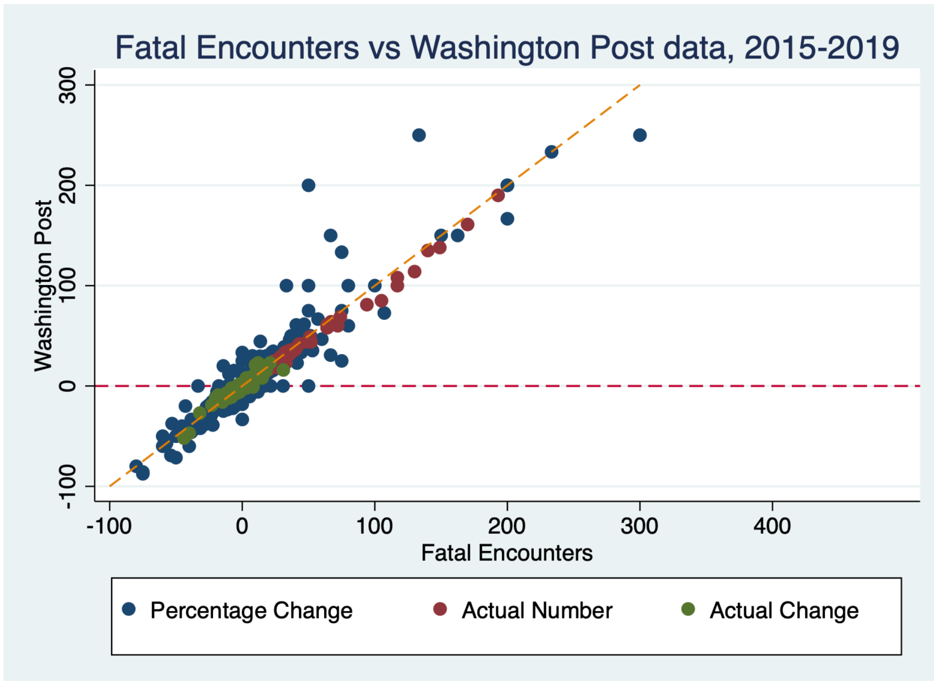


Figure A5: Compare Fatal Encounters and Washington Post data, 2015-2019
This figure presents the correlation of Fatal Encounters and Washington Post data by state and year, using 3 measures: the number of people fatally shot by law enforcement (actual number), the change in the number people fatally shot , and the percentage change.

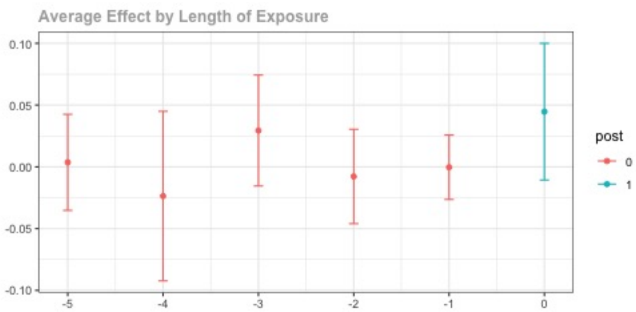
Table A2: Data sources comparison: Fatal Encounters vs Washington Post, 2015-2019

(Correlation of state-year observations)

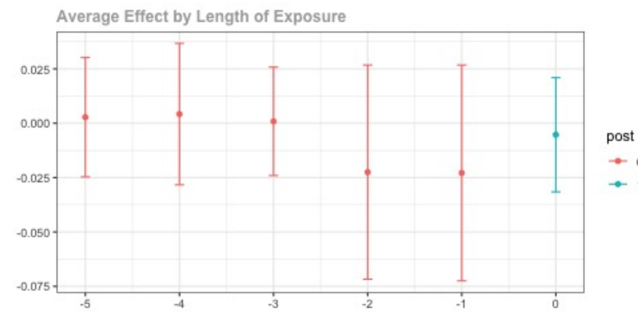
	Coefficient of Correlation	Formula	N[1]
Actual number	0.9969		255
Percentage change[2]	0.9269	$\frac{FatalyShot_t - FatalyShot_{t-1}}{FatalyShot_{t-1}} * 100$	204
Actual change	0.9427	$FatalyShot_t - FatalyShot_{t-1}$	204

[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.

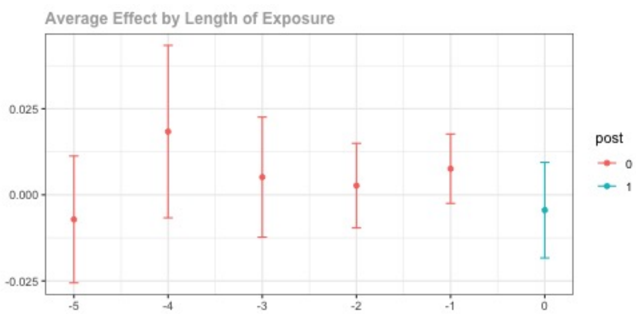
C Appendix: Pre-Trends



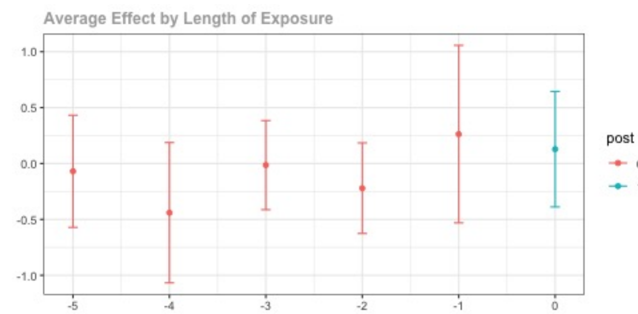
(a) Log rate of violent crime



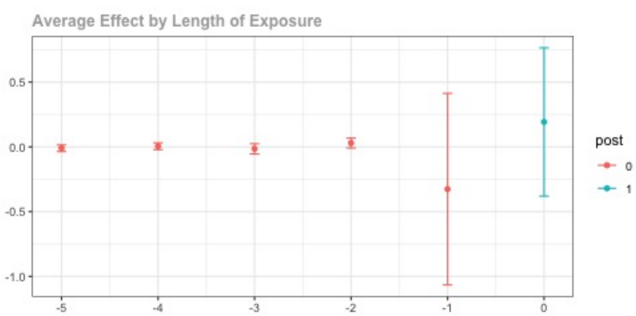
(b) Log rate of property crime



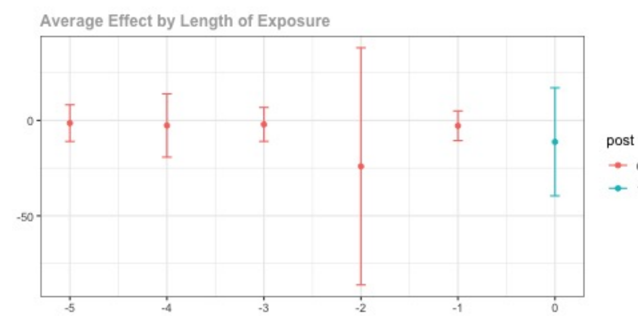
(c) Prevalence of guns (log of % of suicides by gun)



(d) Unemployment rate

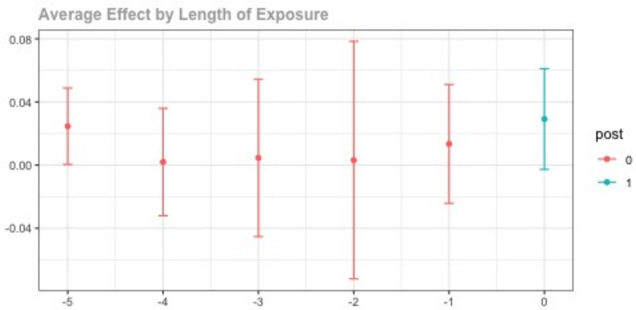


(e) Log rate of # of police officers

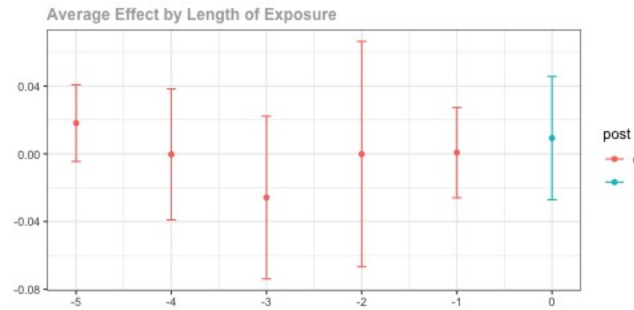


(f) Population density

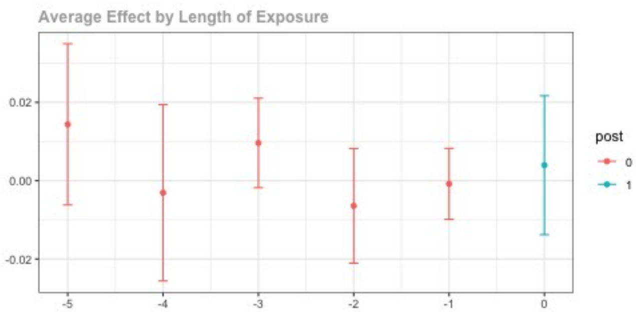
Figure A6: Shall Issue: Pre-trends of intermediate outcomes
The figure plots coefficients and 95% confidence intervals of yearly indicators leading up to the passage of a Shall Issue law, estimated using Callaway and SantAnna (2021)'s estimator. The dependent variables are intermediate outcomes studied in the paper, including unemployment rate and population density, and are indicated under each sub-figure. The flat trends of the pre-passage years show that states of the control and treatment groups followed similar patterns prior to adoption.



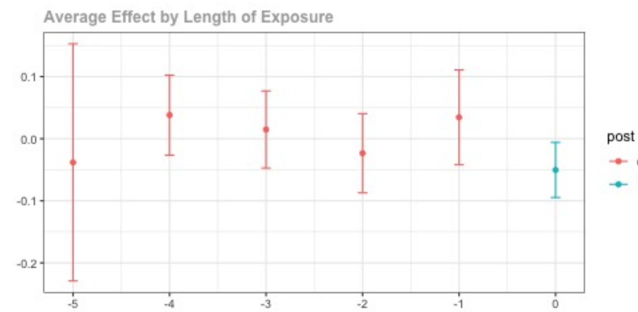
(a) Log rate of violent crime



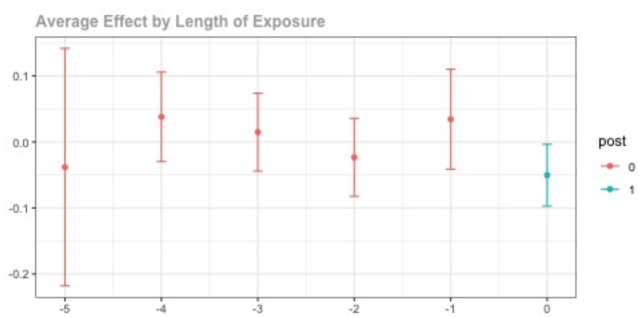
(b) Log rate of property crime



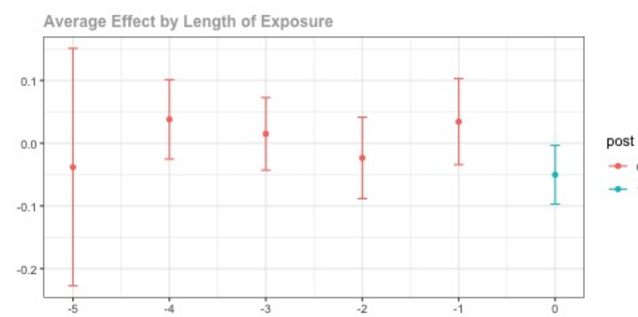
(c) Prevalence of guns (log of % of suicides by gun)



(d) Unemployment rate



(e) Log rate of # of police officers



(f) Population density

Figure A7: Permitless Carry: Pre-trends of intermediate outcomes
The figure plots coefficients and 95% confidence intervals of yearly indicators leading up to the passage of a Permitless Carry law, estimated using Callaway and SantAnna (2021)'s estimator. The dependent variables are intermediate outcomes studied in the paper, including unemployment rate and population density, and are indicated under each sub-figure. The flat trends of the pre-passage years show that states of the control and treatment groups followed similar patterns prior to adoption.

D Appendix: Fatal police shootings

D.1 Fatal police shootings: Outcome Transformation

Table A3: Effects of Shall Issue and Permitless Carry on fatal police shootings, 2000-2019, Outcome Transformation

	Logarithm of Rate		IHS of Rate		Rate	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A:						
Shall Issue	0.039	0.074	0.049	0.096	0.205	0.311**
	(0.048)	(0.073)	(0.074)	(0.094)	(0.142)	(0.159)
Baseline mean rate of treated	2.592	2.653	2.592	2.653	2.592	2.653
Number of states	20	18	20	18	20	18
Panel B:						
Permitless Carry	0.127**	0.119**	0.151**	0.139*	0.792***	0.815***
	(0.052)	(0.058)	(0.062)	(0.077)	(0.208)	(0.241)
Baseline mean rate of treated	2.401	2.343	2.401	2.343	2.401	2.343
Number of states	42	30	42	30	42	30
Balanced panel	No	Yes	Yes	No	No	Yes

Notes. Fatal Encounters data covering years 2000 to 2019. All results are estimated using Callaway and SantAnna (2021)'s estimator. The dependent variable is the number of people fatally shot by law enforcement per million persons. The regressions use state population weights. Standard errors are clustered at the state level, in parentheses. *10%, **5%, and ***1% significance level.

D.2 Fatal police shootings: Two-Way Fixed Effects

In this section I estimate the effects of RTC laws on fatal police shootings using the Two-Way Fixed Effects (TWFE) model.

Shall Issue effect:

Panel A of table A4 presents the Shall Issue (SI) effect. Column (1), using the full sample of TWFE, i.e. including the 30 always-treated SI states that are excluded in the CS analysis, shows that the rate of people fatally shot by police officers when a state with No or May Issue laws adopts SI decreases by about 10% - which is statistically insignificant at the 10% level. This finding is not consistent with the CS analysis that suggests a positive but mostly statistically insignificant SI effect.

To further explore the possible sources of disagreement between the TWFE and CS results, I estimate the SI effect of the TWFE model using the unbalanced and balanced samples of CS analysis. Columns (2) and (3) of panel A show that when the 30 always-treated SI states are excluded from the sample, the magnitude of the SI effect decreases to around 1%, and becomes statistically insignificant. That suggests that a nontrivial amount of TWFE's bias comes from the comparison of newly treated states to always-treated states. Differences still exist between TWFE and CS as the comparison of newly-treated states to early-treated states in the TWFE cannot be avoided.

Permitless Carry effect:

Panel B of table A4 presents the Permitless Carry (PC) effect using the Fatal Encounters data. The PC effect of the TWFE, in contrast to the SI effect of TWFE, follows the same direction with the CS results, though it is significantly larger in magnitude. Using the whole sample, column (1) shows that when a SI state adopts PC, the rate of people fatally shot by police officers increases by about 21% and it is statistically significant at the 1% level. The results remain consistent when constraining the analysis to the unbalanced CS and balanced CS samples in columns (2) and (3), respectively.

Overall, the PC effects of CS and TWFE are coherent both in the direction of the effect and the statistical significance. That may be contributed to the similar control groups of their samples, which in contrast to the SI analysis, they had only one always-PC state, Vermont, that was excluded from the CS analysis. However, the comparison of newly-treated states and early-treated states still biases the TWFE estimates.

Table A4: Two-way fixed effects (TWFE): Effects of Shall Issue and Permitless Carry on fatal police shootings, 2000-2019

	Log rate of fatal shootings		
	(1)	(2)	(3)
Panel A:			
Shall Issue	-0.103*	-0.0115	-0.00814
	(0.0599)	(0.0587)	(0.0637)
Observations	934	392	360
R-squared	0.709	0.796	0.800
Baseline mean rate of treated	2.592	2.592	2.653
Panel B:			
Permitless Carry	0.209***	0.210***	0.223***
	(0.0510)	(0.0512)	(0.0671)
Observations	772	752	600
R-squared	0.664	0.666	0.649
Baseline mean rate of treated	2.401	2.401	2.343
TWFE sample	Yes	No	No
CS unbalanced sample	No	Yes	No
CS balanced sample	No	No	Yes

Notes. Fatal Encounters data covering years 2000 to 2019. Results are estimated using the TWFE model. The dependent variable is the logarithm of people fatally shot by law enforcement per million persons. All regressions use state population weights and include state and year fixed effects. Standard errors are clustered at the state level, in parentheses. *10%, **5%, and ***1% significance level.

E Appendix: Police Officers Killed or Assaulted

E.1 Police Officers Assaulted: Data Cleaning

The data on officers assaulted come from the concentrated files compiled by Jacob Kaplan using data from the FBIs LEOKA series (Kaplan, 2021) which are at the agency-yearly level. Below I go over the cleaning process that was followed:

First, I consider an agency-year observation complete if the agency: 1) reports the number of officers that serve, 2) reports the number of assaults of officers (different than missing),

3) indicates that it reported assaults for all 12 month of a year, and 4) is not covered by another agency. I drop the agency-year observations that are not complete.

Second, to account for possible misreporting and the large number of zeros, I take the following two steps: First, I address the misreporting of large agencies and specifically the reporting of zero assaults that should have been recorded as missing. I do that by dropping the top 5% of the largest agencies (based on the number of officers serving) from the ones that never report a single assault throughout the 20 year period of the study. Second, to reduce the amount of zeros I drop a quarter of the smaller agencies, which is very likely that they do not report consistently and at the same time due to their size it is also impossible to distinguish between true zeros and inaccurate reporting.[72]

Next, to address the consistency of reporting and the highly unbalanced sample I first drop agencies that have been covered by another at any point in time. And second, I keep two samples of agencies, the ones that report at least 15 and 17 years (out of the 20 years of study) based on the concealed carry law of interest. Finally, the data are winsorized at 10% in each tail (10% and 90%).

Table A5 shows the robustness of the SI and PC effects on officers assaulted in regards to the percentage of small agencies dropped from the sample and the minimum number of years that an agency should report. The effects appear to be sensitive only to the latter and specifically to the inclusion of agencies that do not report consistently, hence making the sample highly unbalanced. When the minimum number of years that agencies need to report gets smaller both the SI and PC effects lose statistical significance and the magnitude of the effect of PC decreases.

[72]The effects are robust to dropping 10% as well as 50% of the smaller agencies. See table A5.

Table A5: Effects of Shall Issue and Permitless Carry on assaults on officers assaulted by firearm using different samples, 2000-2019

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A:						
Shall Issue	8.933**	11.189	12.386***	12.898***	11.268**	11.936***
	(4.342)	(32.905)	(3.701)	(3.473)	(5.641)	(4.583)
Baseline mean rate of treated	6.901	6.060	5.701	9.866	5.574	9.491
Number of agencies	1934	1547	1409	864	980	603
Panel B:						
Permitless Carry	1.197	3.655	12.019**	12.818**	20.450***	21.467***
	(4.009)	(4.989)	(4.985)	(5.750)	(5.610)	(5.206)
Baseline mean rate of treated	11.481	10.188	8.641	15.360	8.172	13.694
Number of agencies	4616	4104	3236	2057	2359	1526
% of small agencies dropped	25	25	10	50	10	50
Minimum years agency reports	10	12	15	15	17	17

Notes. The dependent variable is the number of police officers non-fatally assaulted by firearm per 10,000 police officers. All results are estimated using Callaway and SantAnna (2021)'s estimator. The analysis is at the agency-year level and uses weights based on the number of officers per agency. Standard errors are clustered at the state level, in parentheses. *10%, **5%, and ***1% significance level.

E.2 Police Officers Killed or Assaulted: Outcome Transformation

Table A6: Effects of Shall Issue and Permitless Carry on police officers killed and assaulted by firearm, 2000-2019

	ln(rate+1)	ln(rate+p5)	ln(rate+p10)
	(1)	(2)	(3)
Panel A: Officers killed by firearm			
Shall Issue	-0.050	-0.025	-0.019
	(0.176)	(0.127)	(0.108)
Number of states	20	20	20
Panel B: Officers assaulted by firearm			
Shall Issue	0.243	0.119	0.101*
	(0.373)	(0.076)	(0.053)
Number of agencies	1320	1320	1320
Panel C: Officers killed by firearm			
Permitless Carry	-0.450	-0.325*	-0.303*
	(0.288)	(0.181)	(0.157)
Number of states	42	42	42
Panel D: Officers assaulted by firearm			
Permitless Carry	0.134	0.058	0.051
	(0.147)	(0.064)	(0.051)
Number of agencies	2916	2916	2916

Notes. The outcome of interest in Panels A and C is the number of police officers feloniously killed per 100,000 police officers, and in Panels B and D is the number of police officers non-fatally assaulted per 10,000 police officers. The dependent variable in columns (1) is the logarithm of the rate of the outcome of interest plus 1 (ln(rate+1)). The dependent variable in columns (2) and (3) is the logarithm of the rate of the outcome of interest plus the Xth percentile of nonzero values in the data (ln(rate+pX)). All results are estimated using Callaway and SantAnna (2021)'s estimator. In Panel A and C the analysis is at the state-year level, uses weights based on the number of officers per state, and the panel is unbalanced. In Panel B and D the analysis is at the agency-year level, uses weights based on the number of officers per agency, and includes agencies that have been reporting for at least 15 years. Standard errors are clustered at the state level, in parentheses. *10%, **5%, and ***1% significance level.

E.3 Police Officers Killed or Assaulted: Two-Way Fixed Effects

Table A7: Two-way fixed effects (TWFE): Effects of Shall Issue and Permitless Carry on officers killed by firearm, 2000-2019

	Rate of officers killed by firearm		
	(1)	(2)	(3)
Panel A:			
Shall Issue	1.207	1.145	1.407
	(0.724)	(0.721)	(0.809)
Observations	932	392	360 0
R-squared	0.163	0.147	0.153
Panel B:			
Permitless Carry	-0.0444	-0.0442	-0.452
	(1.442)	(1.443)	(1.844)
Observations	769	749	597
R-squared	0.126	0.125	0.131
TWFE sample	Yes	No	No
CS unbalanced sample	No	Yes	No
CS balanced sample	No	No	Yes

Notes. Results are estimated using the TWFE model. The dependent variable is the number of police officers feloniously killed by firearm per 100,000 police officers (rate). All regressions are at the state-year level, use weights based on the number of officers per state, and include state and year fixed effects. Standard errors are clustered at the state level, in parentheses. *10%, **5%, and ***1% significance level.

Table A8: Two-way fixed effects (TWFE): Effects of Shall Issue and Permitless Carry on officers assaulted by firearm, 2000-2019

	Rate of officers assaulted by firearm			
	(1)	(2)	(3)	(4)
Panel A:				
Shall Issue	14.78***	20.74**	15.05**	20.26**
	(5.206)	(7.918)	(5.363)	(8.443)
Observations	61,683	43,635	23,631	17,399
R-squared	0.400	0.406	0.488	0.502
Panel B:				
Permitless Carry	21.18***	21.36***	21.19***	21.37***
	(6.720)	(7.550)	(6.743)	(7.576)
Observations	52,319	39,835	51,615	39,427
R-squared	0.427	0.386	0.426	0.385
TWFE sample	Yes	Yes	No	No
CS sample	No	No	Yes	Yes
Min. years agency reports	15	17	15	17

Notes. Results are estimated using the TWFE model. The dependent variable is the number of police officers non-fatally assaulted by firearm per 10,000 police officers (rate). All regressions are at the agency-year level, use weights based on the number of officers per agency, and include agency and year fixed effects. Standard errors are clustered at the state level, in parentheses. *10%, **5%, and ***1% significance level.

F Appendix: Mechanisms

Table A9: Effect of Permitless Carry on people fatally shot by police, by victim characteristics, 2015-2019

	(1)	(2)	(3)	(4)	(5)
Panel A:	unarmed	armed	armed with gun	armed w/o gun	vehicle
Permitless carry	0.043***	0.432**	0.368***	0.064	0.052***
	(0.012)	(0.177)	(0.037)	(0.165)	(0.018)
Baseline mean rate of treated	0.071	0.959	0.617	0.342	0.029
			mentally ill		
Panel B:	not mentally ill	mentally ill	with gun	w/o a gun	and unarmed
Permitless carry	0.357**	0.118***	0.073***	0.035***	0.010***
	(0.164)	(0.034)	(0.022)	(0.012)	(0.003)
Baseline mean rate of treated	0.817	0.212	0.143	0.065	0.004
Panel C:	fleeing	not fleeing			
Permitless carry	-0.002	0.286*			
	(0.055)	(0.174)			
Baseline mean rate of treated	0.285	0.676			
Panel D:	attack	not attack			
Permitless carry	0.395***	0.081			
	(0.065)	(0.110)			
Baseline mean rate of treated	0.718	0.311			
Number of states	39	39	39	39	39

Notes. Washington Post data covering the years 2015-2019. All results are estimated using Callaway and SantAnna (2021)'s estimator. The dependent variable is the number of people fatally shot by law enforcement per million persons (rate). Data are at the quarterly-level. The panel is unbalanced. All regressions use state population weights. Standard errors are clustered at the state level, in parentheses. *10%, **5%, and ***1% significance level.

G Appendix: Arrests rates

Table A10: Intermediate outcomes: How Shall Issue and Permitless Carry affect arrest rates, agency-level, 2000-2019

	Rate of Arrests							Arrests per Crime	
	Total Arrests	Victimless Crimes	Vandalism	Weapon Violation	Drugs	Violent	Property	Violent	Property
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A:									
Shall Issue	–11.656	–18.009***	–1.001	–0.685	4.073	0.567	3.398	–0.291	0.023***
	(10.660)	(2.669)	(1.615)	(0.667)	(4.028)	(7.050)	(2.932)	(0.262)	(0.009)
Baseline mean rate of treated	268.178	118.735	11.417	3.649	35.346	45.662	53.369	3.497	0.192
Number of agencies	2215	2215	2215	2215	2215	2215	2215	2215	2215
Panel B:									
Permitless Carry	–5.887*	–6.843***	–0.051	–0.178	–1.151	2.237*	0.098	–0.014	–0.012**
	(3.154)	(1.616)	(0.180)	(0.142)	(1.238)	(1.201)	(1.068)	(0.095)	(0.005)
Baseline mean rate of treated	258.718	95.699	7.988	3.376	45.062	54.944	51.649	3.133	0.187
Number of agencies	3492	3492	3492	3492	3492	3492	3492	3492	3492

Notes. All results are estimated using Callaway and SantAnna (2021)'s estimator. The dependent variable in columns (1) to (7) is the number of arrests per million people for the type of crime mentioned above each column, and for columns (8) and (9) it is the number of arrests per crime. 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. Data are at the agency-year level, where agencies serves at least 25,000 people. All regressions include year, state, and agency fixed effects, estimated using agency population weights. Standard errors are clustered at the state level, in parentheses. *10%, **5%, and ***1% significance level.

H Appendix: Reported and Imputed Race in Fatal Encounters

Table A11: Summary Statistics of Actual and Imputed Race*

		Fatal Encounters data	
Years covered	2000-2019	2000-2012	2013-2019
% Race: White	36.52	29.02	45.59
Black	24.24	23.58	25.02
Hispanic	15.72	14.50	17.19
Race Unspecified	20.13	29.92	8.27
White after Imputation	47.09	44.63	50.08
Black after Imputation	28.31	30.23	25.98
Hispanic after Imputation	18.46	18.65	18.23
Race Unspecified after Imputation	2.53	3.25	1.65

*Fatal Encounters imputed the missing race using the Bayesian Improved Surname Geocoding (BISG)(Elliott et al., 2008)

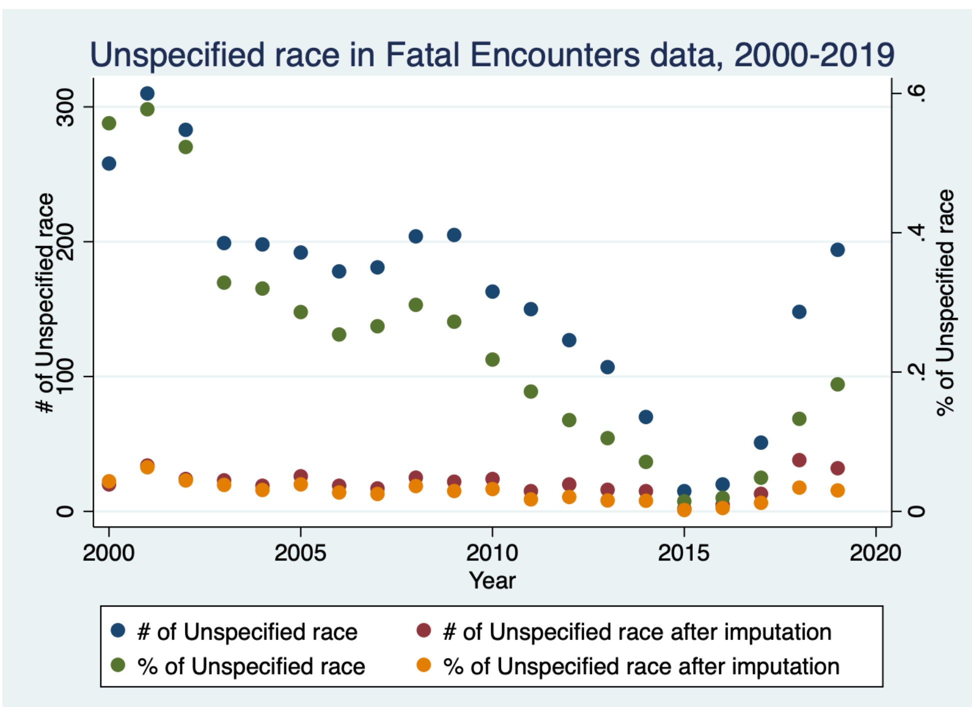


Figure A8: Unspecified Race in Fatal Encounters data, 2000-2019
This figure presents the number and percentage of incidents by year where the race of the individual fatally shot by police is unspecified, both before and after the imputation of race.

Table A12: Effect of Shall Issue on fatal police shootings by race, 2000-2019, Outcome Transformation

	Logarithm of Rate		IHS of Rate		Rate	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: White people						
Shall Issue	0.039	0.086	0.060	0.124	0.069	0.213
	(0.369)	(0.361)	(0.475)	(0.475)	(0.879)	(0.805)
Baseline mean rate of treated	1.173	1.107	1.173	1.107	1.173	1.107
Panel B: Black people						
Shall Issue	-0.038	-0.067	-0.046	-0.082	-0.137	-0.326
	(0.951)	(1.134)	(1.168)	(1.393)	(5.085)	(5.804)
Baseline mean rate of treated	7.346	7.403	7.346	7.403	7.346	7.403
Panel C: Hispanics						
Shall Issue	0.165	0.287	0.193	0.344	1.107	1.675
	(0.151)	(0.306)	(0.187)	(0.372)	(0.849)	(1.799)
Baseline mean rate of treated	2.856	2.747	2.856	2.747	2.856	2.747
Number of states	20	18	20	18	20	18
Balanced panel	No	Yes	No	Yes	No	Yes

Notes. Fatal Encounters data covering years 2000 to 2019. All results are estimated using Callaway and SantAnna (2021)'s estimator. The dependent variable is the number of people fatally shot by law enforcement per million persons. The regressions are weighted using population weights of the race of interest. Standard errors are clustered at the state level, in parentheses. 22% of race is imputed, and 3% of race is missing. *10%, **5%, and ***1% significance level.

Table A13: Effect of Permitless Carry on fatal police shootings by race, 2000-2019, Outcome Transformation

	Logarithm of Rate		IHS of Rate		Rate	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: White people						
Permitless Carry	0.101*	0.079	0.124*	0.094	0.511**	0.475*
	(0.056)	(0.079)	(0.075)	(0.102)	(0.214)	(0.285)
Baseline mean rate of treated	2.023	2.016	2.023	2.016	2.023	2.016
Panel B: Black people						
Permitless Carry	0.353***	0.493***	0.429***	0.606***	2.152**	2.712**
	(0.090)	(0.119)	(0.106)	(0.148)	(0.840)	(1.231)
Baseline mean rate of treated	4.530	3.672	4.530	3.672	4.530	3.672
Panel C: Hispanics						
Permitless Carry	0.364***	0.349**	0.416***	0.386**	2.711***	2.978***
	(0.108)	(0.136)	(0.137)	(0.173)	(0.397)	(0.477)
Baseline mean rate of treated	1.254	1.240	1.254	1.240	1.254	1.240
Number of states	42	30	42	30	42	30
Balanced panel	No	Yes	No	Yes	No	Yes

Notes. Fatal Encounters data covering years 2000 to 2019. All results are estimated using Callaway and SantAnna (2021)'s estimator. The dependent variable is the number of people fatally shot by law enforcement per million persons. The regressions are weighted using population weights of the race of interest. Standard errors are clustered at the state level, in parentheses. 22% of race is imputed, and 3% of race is missing. *10%, **5%, and ***1% significance level.

Table A14: Effect of Shall Issue on fatal police shootings by race, **not imputed**, 2000-2019

	Logarithm of Rate		IHS of Rate		Rate	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: White people						
Shall Issue	0.065	0.109	0.100	0.161	0.146	0.231
	(0.261)	(0.244)	(0.333)	(0.313)	(0.656)	(0.591)
Baseline mean rate of treated	0.628	0.620	0.628	0.620	0.628	0.620
Panel B: Black people						
Shall Issue	-0.067	-0.072	-0.100	-0.104	0.104	-0.029
	(0.769)	(0.916)	(0.941)	(1.137)	(3.948)	(4.693)
Baseline mean rate of treated	5.781	5.923	5.781	5.923	5.781	5.923
Panel C: Hispanics						
Shall Issue	0.351**	0.423	0.448**	0.535	1.082	1.512
	(0.151)	(0.306)	(0.179)	(0.373)	(0.844)	(1.692)
Baseline mean rate of treated	1.991	1.981	1.991	1.981	1.991	1.981
Number of states	20	18	20	18	20	18
Balanced panel	No	Yes	No	Yes	No	Yes

Notes. Fatal Encounters data covering years 2000 to 2019. All results are estimated using Callaway and SantAnna (2021)'s estimator. The dependent variable is the number of people fatally shot by law enforcement per million persons. The regressions are weighted using population weights of the race of interest. Standard errors are clustered at the state level, in parentheses. *10%, **5%, and ***1% significance level.

Table A15: Effect of Permitless Carry on fatal police shootings by race, **not imputed**, 2000-2019

	Logarithm of Rate		IHS of Rate		Rate	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: White people						
Permitless Carry	0.092**	0.099*	0.113*	0.121	0.424***	0.503**
	(0.046)	(0.059)	(0.062)	(0.082)	(0.144)	(0.212)
Baseline mean rate of treated	1.369	1.357	1.369	1.357	1.369	1.357
Panel B: Black people						
Permitless Carry	0.379***	0.513***	0.457***	0.627***	2.382***	2.924**
	(0.093)	(0.124)	(0.100)	(0.141)	(0.900)	(1.163)
Baseline mean rate of treated	3.828	3.096	3.828	3.096	3.828	3.096
Panel C: Hispanics						
Permitless Carry	0.475***	0.513***	0.572***	0.609***	2.777***	3.240***
	(0.114)	(0.134)	(0.152)	(0.172)	(0.423)	(0.495)
Baseline mean rate of treated	1.084	1.067	1.084	1.067	1.084	1.067
Number of states	42	30	42	30	42	30
Balanced panel	No	Yes	No	Yes	No	Yes

Notes. Fatal Encounters data covering years 2000 to 2019. All results are estimated using Callaway and SantAnna (2021)'s estimator. The dependent variable is the number of people fatally shot by law enforcement per million persons. The regressions are weighted using population weights of the race of interest. Standard errors are clustered at the state level, in parentheses. *10%, **5%, and ***1% significance level.