Multiple Victim Public Shootings

John R. Lott Jr.
School of Law
Yale University

William M. Landes
University of Chicago Law School

November 1, 1996

Latest Revision
October 19, 2000

* Lott is a Senior Research Scholar and Landes is Clifton R. Musser Professor of Law & Economics at the University of Chicago Law School. We would like to thank Mitch Polinsky for comments as well as participants in seminars at the Arizona State University, Auburn University, University of Chicago, Claremont Graduate School, George Mason University Law School, University of Houston, Hoover Institution, University of Illinois, University of Kansas, University of Miami, New York University, University of Oklahoma, University of Southern California, Rice University, University of Texas at Austin, University of Texas at Dallas, William and Mary University, Yale University (Business and Law Schools), and Yeshiva University School of Law as well as participants at the Economics of Law Enforcement Conference at Harvard Law School, Association of American Law Schools Meetings, American Economic Association Meetings, American Society of Criminology Meetings, Midwestern Economic Association Meetings, Southern Economic Association Meetings, and Western Economic Association Meetings.

Multiple Victim Public Shootings

Abstract

Few events obtain the same instant worldwide news coverage as multiple victim public shootings. These crimes allow us to study the alternative methods used to kill a large number of people (e.g., shootings versus bombings), marginal deterrence and the severity of the crime, substitutability of penalties, private versus public methods of deterrence and incapacitation, and whether attacks produce "copycats." The criminals who commit these crimes are also fairly unusual, recent evidence suggests that about half of these criminals have received a "formal diagnosis of mental illness, often schizophrenia." Yet, economists have not studied multiple victim shootings. Using data that extends until 1999 and includes the recent public school shootings, our results are surprising and dramatic. While arrest or conviction rates and the death penalty reduce "normal" murder rates and these attacks lead to new calls from more gun control, our results find that the only policy factor to have a consistently significant influence on multiple victim public shootings is the passage of concealed handgun laws. We explain why public shootings are more sensitive than other violent crimes to concealed handguns, why the laws reduce the number of shootings and have an even greater effect on their severity.

I. Introduction

Few events generate as much national and worldwide news coverage as when several people are shot and killed in a public place. Some highly publicized examples come readily to mind. Colin Ferguson killed 6 people in a shooting rampage on the Long Island (NY) Railroad in 1993. A single gunman indiscriminately killed 22 lunchtime patrons at a Luby's Cafeteria in Texas in 1991. An out-of-work security guard killed 21 persons at a California McDonald's in 1984. More recently two students shot and killed 13 people at Columbine High School in Littleton, Colorado in 1999. In another vein, shootings by disgruntled post office employees have made the phrase "going postal" part of our language. And with the recent shootings at public schools, a great sense of urgency entered the debate.

It is widely thought that the way to prevent multiple public shootings (the term we use to denote shootings in public places where two or more individuals are killed or injured) is to enact new and tougher laws that make it more difficult for individuals to obtain guns. To take an extreme example, recent public shootings in Australia and Scotland were followed by strict gun prohibitions in those countries. In the United States, public shootings have led to demands for national licensing of guns, laws requiring that guns be kept locked, and minimum waiting or cooling-off periods before a purchaser actually takes possession of a gun. By making it more difficult or costly for individuals to gain access to guns, these laws aim to reduce the likelihood that individuals will be able to carry out shooting sprees. The legislative response to public shootings, however, has not been uniform. In Texas and several other states, multiple shootings have been followed by the passage of concealed handgun laws that permit law-abiding citizens to carry concealed handguns (hereafter, concealed handgun or right-to-carry laws). Likewise, terrorist shootings in Israel have lead to wider licensing of citizens to carry concealed handguns.

Those opposed to right-to-carry laws reason that these laws will make it easier for criminals to gain access to guns and that "if you introduce a gun into a violent encounter, it increases the chance that someone will die."[1] Consider the school shootings that took place from 1997 to 1999. The perpetrators obtained their guns from a vartiety of choices: relatives, neighbors, people at work, or other acquaintances. Had guns been less accessible or not purchased in the first place, these acts may not have been committed. This argument is reinforced by the belief that shootings in public places often arise from temporary fits of rage that are later regretted. Accordingly, enacting laws that make handguns less, not more accessible (even temporarily), should prevent many deaths.[2]

---

[1] Philip Cook quoted in Editorial, Cincinnati Enquirer, Jan. 23, 1996, A8. Others share this belief. "It's common sense," says Doug Weil, research director at the Center to Prevent Handgun Violence and Handgun Control, Inc.. "The more guns people are carrying, the more likely it is that ordinary confrontations will escalate into violent confrontations" (William Tucker, "Maybe You Should Carry A Handgun," The Weekly Standard, Dec. 16, 1996, p. 30).

[2] See P. J. Cook, "The Role of Firearms in Violent Crime," in M.E. Wolfgang and N.A. Werner, eds., Criminal Violence, Sage Publishers: Newbury, N.J.(1982) and Franklin Zimring, "The Medium is the Message: Firearm Caliber as a Determinant of Death from Assault," Journal of Legal Studies, 1 (1972) for these arguments.

In contrast, those favoring concealed handgun laws point to the potential benefits of employing guns for defensive purposes. They argue that the prospect of a criminal encountering a victim who may be armed will deter some attacks in the first place. National polls showing that people use guns defensively against criminal attacks in the range of 1.5 to 3.5 million times per year provide some support for this argument.[3] Data from the Department of Justice's National Crime Victimization Survey from 1979 to 1987 also indicate that the risk of serious injury from a criminal attack is 2.5 times greater for women offering no resistance than for women resisting with a gun (Southwick, 1996).[4] The most comprehensive empirical study of concealed handgun laws finds that they reduce murder rates by about 1.5 percent for each additional year a law has been in effect, with similar declines in other violent crimes.[5] And contrary to a popular misconception, permit holders are virtually never involved in the commission of crime, let alone murder (Lott, 2000).[6]

Just as one can find examples of public shootings that support the desirability of more gun control, one can find other examples that support the opposite position. Consider the Luby's Cafeteria shooting in 1991. One of the surviving lunch patrons, an expert marksman, had left her handgun in her car to comply with the then existing Texas law. Had the gun remained in her possession, she might have been able to stop the attacker or, at least, limit the amount of damage he did. Law-abiding citizens have also used guns to stop gun-toting attackers at schools, restaurants, offices, and stores.[7] (See Lott (2000) for a list of such cases.). Similar examples can be found

---

[3]Kleck, Gary, and Marc Gertz, "Armed Resistance to Crime: The Prevalence and Nature of Self-Defense with a Gun," 86 Journal of Criminal Law and Criminology 86 (Fall 1995). For an extensive survey on this literature see Kleck (1997, chapter 5) and Cook and Ludwig (1996).

[4]There are problems with the National Crime Victimization Survey both in terms of its nonrepresentative sample (for example, it weights too heavily urban and minority populations) and its failure to adjust for many people not admitting to a law enforcement agency that they used a gun, even defensively. Unfortunately, this survey provides the only available evidence how the probability of significant injury varies with level and type of resistance.

[5]Lott (1998b) finds these effects, but see related discussions by Bartley et. al., 1998; Black and Nagin, 1998; Bronars and Lott, 1998; Plassman and Tideman, 1998; Lott and Mustard, 1997; and Lott, 1998a. Ayres and Levitt (1998) discuss related empirical evidence of spillovers for the issue of lojack automobile alarms.

[6]Unfortunately, no data are available on whether handguns lawfully bought by permit holders are used in crimes by another party at a later date.

[7]One puzzle is why the media rarely reports the role of guns in ending attacks. C0nsider the shooting spree at a high school in Pearl, Miss. in 1997 that left two students dead. An assistant principal stopped the attack by retrieving his handgun from his car and physically immobilized the shooter for over five minutes before police arrived. A Lexis-Nexis search indicates that 687 articles appeared the first month after the attack but only 19 stories mentioned the assistant principal and only 10 mentioned that he used a gun to stop the attack. Some stories simply stated that the assistant principal was "credited by police with helping capture the boy" or that he had disarmed the shooter. No story that mentioned the assistant principal's role was aired on the national evening news. A story on CBS with Dan Rather, which ran more than a month later, noted that the assistant principal "eventually subdued the young gunman." But these stories provided no explanation how of he had accomplished this feat.

In another, school-related shooting in Edinboro, Pa., which left one teacher dead, the owner of a nearby restaurant, pointed a shotgun at the shooter as he was reloading his gun. The police did not arrive until 11 minutes later. Nearly 600 news stories discussed this crime during the next month, yet only 35 mentioned the restaurant owner's role. Moreover, these stories did not mention that a shotgun was used to stop the crime. The New York Daily News, for example, explained that the restaurant owner "persuaded [the killer] to surrender," while The Atlanta Journal wrote how he "chased [the killer] down and held him until police came."

internationally. On March 13, 1997, a Jordanian soldier shot seven young Israeli girls to death while they were visiting Jordan's "Island of Peace." According to newspaper reports, the Israelis had "complied with Jordanian requests to leave their weapons behind when they entered the border enclave. Otherwise, they might have been able to stop the shooting."[8]

Referring to the 1984 massacre at a McDonald's restaurant in California, Israeli criminologist Abraham Tennenbaum wrote that:

> what occurred at a [crowded venue in] Jerusalem some weeks before the California McDonald's massacre: three terrorists who attempted to machine-gun the throng managed to kill only one victim before being shot down by handgun carrying Israelis. Presented to the press the next day, the surviving terrorist complained that his group had not realized that Israeli civilians were armed. The terrorists had planned to machine-gun a succession of crowded spots, thinking that they would be able to escape before the police or army could arrive to deal with them.[9]

Obviously allowing Israeli citizens to carry concealed handguns has not eliminated terrorist attacks. Indeed, terrorists may well have reacted to this change by substituting bombs for guns, which allow potential victims little chance to respond.

Anecdotal evidence cannot resolve the question whether laws allowing law-abiding persons to carry concealed handguns will save or cost lives. This study attempts to answer this question with respect to multiple victim public shootings. Our empirical analysis focuses primarily on right-to-carry (or "shall issue") laws, which allow law-abiding citizens to carry concealed handguns. We also examine the effects on public shootings of (1) laws that restrict access to handguns including mandatory waiting periods, one-gun-a-month purchase limitations, and safe storage gun laws; and (2) statutes that impose additional penalties on individuals who use guns in the commission of a crime [10]

At the outset we offer a few remarks explaining why we study shootings in public places. There is of course the widespread interest or curiosity that people have in these kind of shootings. The more important reason, however, is that these shootings allow us to test the economic model in an area far outside the usual domain of economics. Perpetrators of multiple victim shootings are often thought to be psychotic, deranged, or irrational, and hence not responsive to costs and benefits. Indeed, a series in the New York Times concluded that "About half [the 100 multiple victim public killers that they studied] had received formal diagnosis of mental illness, often schizophrenia" and

---

In this paper we do not try to explain why the news media appear to ignore the role that guns have played in stopping shooting sprees.

[8]Rebecca Trounson, "Anxiety, Anger Surround Return of Young Survivors," Los Angeles Times, March 14, 1997, p. A1

[9]Baltimore Sun, Oct. 26, 1991. As referenced in an article by Don Kates and Dan Polsby. "Of Genocide and Disarmament," Journal of Criminal Law and Criminology, 86 (Fall 1995): 252.

[10]We note that many national publications have called for these types of laws in the advent of public shootings. For example, the New York Times advocated "background checks, trigger locks and gun-show sales" restrictions as well as more comprehensive background checks as solutions to these attacks (New York Times Editorial, April 13, 2000, p. A30).

the killings were described as "impulsive acts"[11]. Thus, legal sanctions or, as in this case, the prospect of encountering an armed individual during a shooting spree would have no deterrent effect on such individuals. Indeed, the act itself is cited as powerful evidence of irrational or psychotic behavior since a sane person would never kill helpless victims in a public place. From this, the claim is made that a law permitting individuals to carry concealed weapons would not deter shooting sprees in public places (though it might reduce the number of people killed or wounded). Moreover, since concealed handgun laws might well increase the availability of guns to potential perpetrators, the combination of criminal irrationality and greater availability of guns should increase the number of multiple shooting incidents.

In contrast, the economic model of crime predicts that a right-to-carry law both will raise the potential perpetrator's cost (e.g., he is more likely to be wounded or killed or apprehended if he acts) and lower his expected benefit (e.g., he will do less damage if he encounters armed resistance). Although not all offenders will alter their behavior in response to the law, some individuals will refrain from a shooting spree because their net gain is now negative. The size of this deterrent effect, in turn, will depend on how many potential offenders are close enough to the margin so that the passage of a right-to-carry law changes their net benefit from positive to negative. Economics predicts, therefore, that right-to-carry laws will reduce the number of mass shootings though the magnitude of this effect is uncertain. One important qualification should be noted. If a right to carry law also lowers the potential perpetrator's cost of obtaining or gaining access to a gun—say because there are more guns on the secondary market or it is easiers to steal a gun—the net effect of the law may be weaker or may even increase the number of public shootings.

Our study also allows us to compare whether a right-to-carry law will produce a greater deterrent effect on multiple shootings than on ordinary murders and other crimes. This may appear surprising in light of the claimed irrationality of individuals who go on shooting sprees. But another consideration points in the opposite direction. Suppose that a right-to-carry law deters crime primarily by raising the probability that a perpetrator will encounter a potential victim who is armed. In a single victim crime, this probability is likely to be very low. Hence the deterrent effect of the law—though negative—might be relatively small. Now consider a shooting spree in a public place. The likelihood that one or more potential victims or bystanders are armed would be very large even though the probability that any particular individual is armed is very low.[12] Tthis suggests a testable hypothesis: a right-to-carry law will have a bigger deterrent effect on shooting sprees in public

---

[11] See New York Times Editorial, 2000, p. A30

[12] To illustrate, let the probability (p) that a single individual carries a concealed handgun be .05. Assume further that there are 10 individuals in a public place. Then the probability that at least one of them is armed is about .40 ($= 1 - (.95)^{10}$). Even if (p) is only .025, the probability that at least one of ten people will be armed is .22 ($= 1 - (.975)^{10}$). This calculation assumes that the individual's probability of carrying a gun is independent of how many people there are in a public place. One might argue that this probability would be negatively related to the expected number of individuals because each individual expects (with a positive probability) that another law-abiding citizen carrying a gun will protect him. Still, the main argument would still hold provided "free riding" doesn't wipe out the incentive for any party to carry a gun.

places than on more conventional crimes. Finally, economists have long recognized that deterrence can impact not only whether a crime occurs but also its severity (George Stigler (1970)). However, we are not aware of any studies on severity. Here the data allow us to examine both how many attacks are deterred as well as reductions in the severity of each attack.

II. Multiple Victim Public Shootings: A First Look

We analyze multiple public shootings in the United States in the time period 1977 to 1997 (and, in some cases, through 1999).[13] As noted earlier, we define a multiple public shooting as one in which two or more people are killed or wounded in a church, business, bar, street, government buildings, schools, public transit, place of employment, park, health care facility, mall or restaurant. The main advantage of restricting the analysis to the United States is that we can compare states with and without right-to-carry laws at different points in time (holding other factors constant), and therefore estimate the effects of a state changing its law during the sample period. In contrast, time series data for a single country faces the problem that many different events may occur at approximately the same time, which can make it difficult to disentangle the impact of a change in the law from other factors. Similarly, the alternative of conducting an international cross-country study was ruled out because of difficulty finding comparable data on gun laws, crime rates, and gun ownership.

We collected data on multiple shootings from articles in the Lexis/Nexis computerized database from 1977 to 1997. We did not include all multiple shootings in the Lexis/Nexis database. We excluded multiple shootings that were byproducts of other crimes (e.g., a robbery or drug deal) or that involved gang activity (e.g., drive by shootings), professional hits or organized crime. We also did not count as a multiple shooting serial killings or killings that took place over the span of more than one day.[14] There are two reasons for excluding these types of multiple shootings..

First, since shall issue laws permit law-abiding citizens to carry guns, they should have little impact on killings related to gang activity, drug deals and organized crime. Putting to one side, injuries to bystanders, individuals involved in gangs, drugs and organized crime are already engaged in unlawful activities that often require them to carry guns. Their behavior will be largely

---

[13]While the recent rash of public school shootings during the 1997-99 school largely took place after the period of our study, these incidents raise questions about the unintentional consequences of laws. All the public school shootings took place after a 1995 federal law banned guns (including permitted concealed handguns) within a thousand feet of a school. The possibility exists that attempts to outlaw guns from schools, no matter how well meaning, may have produced perverse effects. It is interesting to note that during the 1977 to 1995 period, 15 shootings took place in schools in states without right-to-carry laws and only one took place in a state with this type of law. There were 19 deaths and 97 injuries in states without the law, while there was one death and two injuries in states with the law.

[14]In a recent paper (see T. Petee, K. Padgett and T. York, Debunking the Stereotype: An Examination of Mass Murder in Public Places, 1 Homicide Studies 317 (1997)) the authors find felony related mass murders account for 36 percent and gang motivated mass murder incidents for 5.8 percent over the 1965 to 1995 period. That study defines mass murders as the killing of three or more persons (so it has much fewer incidents than our sample).

independent of whether a law on the books permits or prohibits citizens from carrying concealed handguns. Hence a "right-to-carry" law should not impact whether gang members or drug dealers are armed or kill each other.

Second, economic theory suggests a reason why a right-to-carry law will have a greater effect on multiple shootings in public places than on other types of shootings.[15] Assume that concealed handguns increase the number of individuals carrying handguns. Further assume that a right-to-carry law will have a greater deterrent effect the greater the likelihood that a potential victim (or bystander) is armed. Conversely, the law would have little deterrent effect if the offender knows in advance that the victim (or a relevant bystander) is armed. The latter circumstance is unlikely for public places unless there are separate prohibitions on carrying guns in certain places (e.g., near schools). In short, a right-to-carry law should increase the likelihood that an offender will encounter a potential victim or bystander in a public place who is armed.[16]

The way we define multiple shootings—requiring two or more killings or injuries, rather than three or more or four or more and so on—is somewhat arbitrary. To deal with this objection, we also tested the effects of concealed handgun laws on alternative definitions of multiple shootings that require a greater number of deaths and injuries. In addition, we tested the effect of concealed handgun laws on multiple shooting data that others compiled after we started this project.

Since there are well documented problems with the FBI's Supplemental Homicide Report (SHR), we and other researchers have used news reports to document multiple victim killings (see for example, Petee et al., 1997 and for a more popular discussion of using news reports to identify attacks see Fessenden, 2000). In the SHR, some events are double counted and others are left out. The SHR does not provide information on where or how the attacks took place or the parties involved—for example, it does not report whether the shootings occurred during a gang fight or the commission of a robbery or other crime.[17] Another problem in that the shootings we want to study make up only a small fraction of the number contained in the SHR. Another point is worth mentioning. We cannot rule out that local or national news coverage reported in the Lexis/Nexis database may miss some local public shootings involving two or victims. On the other hand, it seems highly doubtful that news coverage will miss public shootings involving at least two or, say,

---

[15]Alschuler (1997, p. 369) claims that concealed handguns should only deter crimes involving strangers. Our response is that concealed handguns can deter crimes involving acquaintances as well as strangers, though deterrence involving acquaintances might be more easily thought of as similar to open carrying of guns. The big effect of concealed handguns is that they may allow people to be able to now defend themselves outside of their home or business. The passage of the concealed handgun laws may deter crimes against acquaintances simply to the extent to which it increases gun ownership.

[16]Most states allow private businesses to decide whether permit holders are allowed to carry concealed handguns on their premises. State rules may also vary with regard to other places such as government buildings, churches, and bars.

[17]Our study has little to say about why gang fights over things like drug turf will be changing over time. Even if these cases were identified by the SHR data (and they are not) simply including a dummy variable for shootings due to gang fights would not properly account for all the impact that these changes might have. Indeed we would probably have to interact the dummy variable with all the variables used in the regressions that we will be reporting and thus it would be essentially the same as running a separate regression on these cases.

four people killed. To deal with the possibility of missing data, we re-estimated some equations using these alternative definitions of public shootings. As it turns out, our results are not sensitive to these different definitions.[18]

Tables 1 and 2 present data on multiple shootings for the United States as a whole, and for states with and without right-to-carry laws. Overall, we find that states without right-to-carry laws had more deaths and injuries from multiple shootings per year (both in absolute numbers and on a per capita basis) during the 1977 to 1997 period. Note also that the number of states with right-to-carry laws increased from 8 to 31 and the percentage of the U.S. population in these states rose from 8.5 to 50 percent in this period. Yet, states without right-to-carry laws still account for the large majority (often around 90 percent) of deaths and injuries. Turning to Table 2, we find that the per capita rates of shootings and injuries are greater in states without right-to-carry laws in 34 of the 42 comparisons. (See the last two columns in Table 2.) The annual differences are significantly different at least at the 4 percent level..

One noticeable feature of the data is the sharp increase in multiple shootings in the year 1996, and while the numbers decline for 1997, they are still high relative to other years. For example, the number of murders in 1996 are 47 percent higher than the previous high in 1993. While the share of multiple victim killings in right-to-carry states rose in 1996 and 1997 (compare columns (8)-(10) to columns (15)-(17) in Table 1), the number of states and the population covered with right-to-carry laws rose so much faster, the per capita rates are still lower in right-to-carry states (Table 2).[19] Section VI also shows that the increased share during 1996 and 1997 shown in Table 1 arose because the nine states whose first full year with right-to-carry laws had much more restrictive rules on where guns were allowed and who could have them than earlier adopters.

Tables 3 and 4 present data for the 23 states that adopted right-to-carry laws between 1977 and 1997.[20] (No state has ever repealed this law.) Although there is upward national trend in multiple

---

[18] However, as a comparison, we did use the SHR data. While the results consistently indicated that concealed handguns laws reduced the level and severity of attacks, the results were rarely statistically significant.

[19] The year 1996 has an unusually high number of murders, injuries, and attacks. Prior to the 128 people who were killed in 1996, the largest number of deaths had been 87 in 1993. Injuries and the number of attacks showed the biggest increases in 1996. Prior to the 291 injuries recorded in 1996, the highest number was 92 in 1982. The year 1997 was also unusually dangerous, and includes some of the public school shootings.

[20] The twenty-three states that enacted "shall issue" or "right-to-carry" laws in the 1977 to 1997 period (dates in parentheses) are as follows: Alaska (1994), Arizona (1994), Arkansas (1995), Florida (1987), Georgia (1989), Idaho (1990), Kentucky (1996), Louisiana (1996), Maine (1985), Mississippi (1990), Montana (1991), Nevada (1995), North Carolina (1995), Oklahoma (1995), Oregon (1990), Pennsylvania (1989), South Carolina (1996), Tennessee (1994), Texas (1995), Virginia (1988), Utah (1995), West Virginia (1989), and Wyoming (1994). Some states like Texas passed the law in 1995, but they did not go into effect until January of 1996. The following eight states had "shall issue" laws over the entire period: Alabama, Connecticut, Indiana, New Hampshire, North Dakota, South Dakota, Vermont and Washington. Data on states having laws prior to 1993 are from Clayton E. Cramer and David B. Kopel, Shall Issue: The New Wave of Concealed Handgun Permit Laws, 62 Tennessee Law Review, 679 (1995). We used a Nexis search to determine the state and date for states passing laws between 1993 and 1995. These two sources were also used in Lott and Mustard (1997). Because of objections raised to the dates for "shall issue" laws in Maine and Virginia (see the discussion in Lott and Mustard), the regression analysis presented in part III examines the sensitivity of our findings to alternative dates for Maine and Virginia.

victim shooting murders and injuries from 1977 to 1997 (see columns (1)-(3) in Table 1), Table 3 shows large declines in crime over time in the states that passed right-to-carry laws. Murders fell by about 43 percent and injuries by 30 percent.[21] Table 4 indicates that the biggest drop occurred largely during the first full year after a state enacted its law (year "1" in the first column). Overall, the decline is so large that we observe zero multiple victim killings in two of the six years for all states with right-to-carry laws, an event that did not occur during any year before passage of the law.[22]

Another point worth noting is that the decline in shootings between the pre-law and post-law periods in Table 4 is not the result of a few shootings incidents in the former period. The last two columns in Table 4 show that the two worst attacks accounted for 55 percent of the average annual deaths in the years before the right-to-carry laws were adopted compared to 64 percent after (excluding years in which there were no multiple victim murders).

Finally, consider the possibility noted earlier in connection with terrorist attacks in Israel; namely, the possibility that right-to-carry laws lead criminals to substitute bombings for shootings. Data on bombings (see Table 3) show that after the passage of right-to-carry laws, actual and attempted bombings increased slightly, while incendiary bombings and other bomb-related incidents (involving stolen explosives, threats to treasury facilities, and hoax devices) declined.[23]

III. Accounting for Other Factors

Although the above tables suggest that right-to-carry laws reduce mass shootings, other factors may explain these changes. To take account of this possibility and to deal with the count nature of the data, we estimated Poisson regressions with the following state specific variables: the arrest rate for murder; the probability of execution (equal to the number of executions per murder in a given year); real per capita personal income; real per capita government payments for income maintenance; unemployment insurance and retirement payments; the unemployment rate; the poverty rate; state population and population squared; and a set of demographic variables that subdivide a state's population into 36 different race, sex, and age groups (see data appendix).[24] Besides year and state fixed effects, we also include variables for other gun control laws in states such as whether a state has a waiting period before one can take delivery of a gun; the length of waiting period in days and days squared; whether a state limits an individual's gun purchases to

---

[21] The reverse—a particularly large upward trend—occurred in states that did not change their law (see Table 13).
[22] Of course, there were zero multiple shootings in individual states in particular years before the passage of concealed handgun laws.
[23] Bombing data are available in the Bureau of Alcohol, Tobacco and Firearms annual publication entitled "Arson and Explosives: Incidents Report."
[24] See the Tracy L. Snell, Prisoners executed under civil authority in the United States, by year, region, and jurisdiction, 1977-1995, Bureau of Justice Statistics, May 14, 1997.

one per month; whether a state requires that a gun be safely stored; and whether a state impose enhanced penalties for using guns in the commission of crime.[25]

Table 5 lists the variables included in the regression analysis. Since the regression analysis also includes year and state specific dummy variables, our results hold constant both the effects of any national trends and state-specific effects on multiple shootings. This implies, for example, that if the multiple shooting rate declines nationally between two years, the regression coefficient on the law variable tests if the decline is significantly larger in states that adopted laws during the two year period. (This approach may actually understate the impact of right-to-carry laws since the year dummy variables may also pick up some of the changes attributed to the increasing number of states that passed these laws.)

Table 6 presents regressions for eight different dependent variables (four for multiple shootings and four for bombings) using a very simple specification of the right-to-carry law variable—a dummy law variable which equals one if a state has a concealed handgun or "right-to-carry ' law and zero otherwise. The regression analysis contains 1045 observations (50 states and the District of Columbia for 21 years minus 26 observations for various states and years in which we lacked data on the arrest rate).[26] To simplify the table, we only present the incidence rate ratios (and z-statistics) for the dummy law variable.

Table 6 indicates that concealed handguns laws significantly reduce multiple shootings in public places (but have no systematic effects on bombings). For example, right-to-carry laws appear to lower the combined number of killings and injuries (equation (3)) in a state by 78 percent and the number of shootings (equation (4)) by 67 percent. The estimates imply that the average state passing these laws reduces the total number of murders and injuries per year from 1.91 to .42 and the number of shootings from .42 to .14. Although we might expect large deterrent effects from these laws because of the high probability that one or more potential victim or bystander will be armed, the drop in murders and injuries is surprisingly large. And as we shall see, alternative measures of shootings and adding other control variables do not seem to reduce the magnitude of the law's effect.

Appendix 2 shows the incidence rate ratios and z-statistics for all variables using specifications (3) and (4). We find that while arrest rates for murder lower the number of people harmed and the number of attacks in a state, income maintenance payments and unemployment have the opposite effects. A recent compilation of cases by the New York Times also found that so-called "rampage

---

[25] See Lott (2000) for a discussion of these variables. For the source of penalties imposed for when a gun is used in a commission of a crime see Thomas B. Marvell and Carl E. Moody, The Impact of Enhanced Prison Terms for Felonies Committed with Guns," Criminology 33 (May 1995): 247, 258-61.

[26] The states and years of the missing observations are as follows: Florida (1988); Illinois (1993-95); Iowa (1991); Kansas (1993-95); Kentucky (1988); Montana (1994-95); New Hampshire (1984 and 1995); Pennsylvania (1995) and Vermont (1978-79). As a further check on our results, we reestimated the regressions in Tables 6 and 7 deleting the arrest variable and adding the 16 missing observations. The coefficients and levels of significance on the right to carry law dummy variable were virtually unchanged.

killers" were much more likely than other murderers to be unemployed (Fessenden, April 9, 2000, p. 28). Higher execution rates reduce the number of attacks and the number of people killed or injured, but these effects are not statistically significant.[27] Finally, none of the other gun laws produce significant changes in either multiple shooting regression. (We find similar results for equations (1) and (2). The full Poisson regressions are available from the authors on request.)

Turning to the bombing regressions in Table 6, we observe that bombings are not systematically related to right-to-carry laws. After the passage of a law, some types of bombings appear to rise, others fall, and the signs often depend on whether bombings are expressed as a rate or an absolute number. Most coefficients are not statistically significant. In short, there appears to be no significant substitution between shootings and bombings in states enacting right-to-carry laws.

Table 7 replaces the dummy law variable with two time trend law variables for those states that passed laws between 1985 and 1996 (no state passed a right to carry law during the years 1977 to 1984). The first variable is a time trend before passage of the law that takes the value 0 in the year the law is passed (and 0 in all years following passage), -1 in the year before passage, -2 in the second year before passage and so forth. The second variable takes the value 0 in the year the law is passed (and 0 in all years before passage), 1 in the first year after passage and so on. This specification enables us to test whether the impact of a right-to-carry law increases over time as more people obtain permits. It may take many years after enacting a handgun law for states to reach their long run level of handgun permits. For states in which data on handgun permits are available, the share of the population with permits is still increasing a decade after the passage of the law (Lott, 1998b, p. 75).[28]

In Table 7, we find that deaths or injuries from mass shootings remain fairly constant over time before the right-to-carry law is passed and falling afterwards (though the before law trend is only significant for the number of shootings). The F-test for the differences in these time trends is always significant at least at the .002 level. As expected, therefore, the longer a right-to-carry law

---

[27] We note that the arrest rate variable understates the actual (or expected) arrest rate of individuals who go on shooting sprees. More than 90 percent of these offenders are either arrested or killed, which is slightly greater than the overall arrest rate for murder. The 90 percent figure (which comes from a Nexis search) represents perpetrators who were immediately captured or killed. We do not know whether those who escaped were apprehended later.

[28] We note three other points related to Table 7.

(1) Eight states in our sample had shall issue laws during the entire period. All eight passed their laws before 1960 and so should have reached their equilibrium level of permits before 1977 (the first year in our sample). The value assigned to two time trend variables for these states and states that never enacted laws is zero.

(2) A second reason for the split time trend specification is that if (relative to other states) shootings in states that pass right to carru laws are rising before the law goes into effect and falling thereafter, a dummy law variable would underestimate the law's impact (even though the regression contains year dummy variables). For example, imagine that the increase in shootings before the law is symmetrical with the decline after the law. A simple dummy variable for the presence or absence of the law could indicate that the law had no effect yet the law might well have caused a change in the trend from positive to negative.

(3) We also estimated regressions adding two time-squared variables for the law variables. Here we find the same pattern of declining murders and injuries after passage of the law with the decline flattening out by the sixth year after enactment of the law.

has been in effect in any of the 23 states that passed such laws in 1985 of later, the greater the decline in murders and injuries from mass public shootings. The incidence rate ratio implies about a 15 to 22 percent annual decline in these different measures of crime after concealed handguns are adopted.

The other gun related law variables generally produce no consistent significant impact on mass shootings. One exception is the impact of laws limiting a purchaser to no more than one-gun-a-month. All the estimates imply that limitations on purchases increase multiple shootings, though the statistical significance of this variable is driven solely by its impact on the number of injuries. The point estimates on the waiting period variables are not consistent. In some equations, a longer waiting period increases the risk of mass public shootings, in others it decreases the risk, and in only one equation is the variable statistically significant. A safe storage law has no significant effect in any equation. The imposition of additional penalties for using a gun in a crime significantly reduces the number of murders, but the impact on injuries and the number of attacks is statistically insignificant. Nor were any of the joint F-tests on the gun control variables statistically significant. In sum, there is no evidence that these laws systematically reduce multiple shootings.[29]

Although higher execution rates imply both fewer attacks and fewer people harmed, any statistical significance on the number harmed is through its impact on the number injured not killed. Also note that the execution variable is probably only weakly related to the probability that a mass murderer will be executed, given the long delays before execution, its over-inclusiveness (i.e., the variable measures the execution rate for all murders not mass murders) and the fact that many of these offenders are killed during their attack.[30]

The impact of the death penalty on public shootings is slightly larger in magnitude, but it is not as consistently significant as evidence on the deterrent effect of the death penalty on "normal" murders. Using state and county level data, we found that a one percentage point increase in the execution rate is associated with a four to seven percent decline in the overall murder rate and the effect is statistically significant at better than .01 percent level.[31] For multiple victim shootings, a one percentage point increase in the execution rate is associated with about a 10 percent reduction in the number of murders from multiple victim shootings, but it is never statistically significant for either the number of murders or shootings.

---

[29] We also tried adding in a variable for the Brady Act, but it was essentially zero and had no effect on any of the other estimates.

[30] We also tried including a simple dummy variable for whether the death penalty was in effect. The coefficient on this variable was never statistically significant, and it did not alter any other results.

[31] The county level estimates with the execution rate correspond to the estimates in Table 4.13 (Lott, 1998b), and the coefficient on the execution rate is -7.21, with a t-statistic of -3.218. The smaller four percent effect is associated with the state level data. For similarly deterrence effects from capital punishment see Isaac Ehrlich, "The Deterrent effect of Capital Punishment: A Question of Life and Death," American Economic Review 65 (1975): 397-417; Isaac Ehrlich, "Capital Punishment and Deterrence: Some Further Thoughts and Additional Evidence." Journal of Political Economy 85 (August 1977): 741-88; and Isaac Ehrlich and Zhiqiang Liu, "Sensitivity Analyses of the Deterrence Hypothesis: Let's Keep the Econ in Econometrics," Journal of Law and Economics (forthcoming).

Specifications (5) through (8) in Table (7) indicate that the passage of concealed handgun laws have no significant effects on the number of bombings. There is no significant trend in any type bombing category, either before or after the passage of the law. Indeed, none of the gun control laws have any statistically significant effect on bombings.

Because of the relatively large number of shootings that occur in the years that the right-to-carry laws are enacted and in the years immediately prior to adoption, one might suspect that our results simply reflect a regression to the mean. To deal with this possibility, Table 8 reestimates the regressions in Tables 6 and 7 removing observations for the year of passage and the two years passage. These new regressions confirmed our previous results. The coefficients for right-to-carry laws in the shooting regressions are statistically significant, with one exception—the change in before-and-after trends for injury rates remained slightly negative, but was no longer statistically significant.

In another set of regressions, we added murder and total bombing rates as explanatory variables. The rationale is that factors not accounted for by the independent variables in previous regressions may explain overall murders and bombings as well as public shootings. Adding the murder and bombing variables to the regressions in Tables 6, 7, and 8, however, yield similar results to the regressions without these variables. In 13 of the 16 regressions, the right-to-carry variable still has a statistically significant negative effect on multiple shootings.[32]

To further check whether the estimated impact of the right-to-carry laws is sensitive to the particular specification, we included different combinations of the various control variables. Some readers may believe that certain control variables are more likely to affect multiple victim attacks than other ones. But just as there are potential problems with excluding variables that should be included, problems can arise by including variables that should be excluded. Since readers may differ in their beliefs about which variables should be included, we tested the sensitivity of our results by breaking the control variables into six categories. They are all other gun laws, the execution rate, populate measures, the five measures of income and transfer payments, state unemployment and poverty rates, and 36 different demographic variables. We then ran 2^K combinations of these six categories. This involved 64 different regressions for each of the specifications reported in Table 7.

The range of estimates are reported in Figure 1, which shows both the maximum and minimum change in incidence rate ratios as well as the median change. For all the multiple victim public shooting regressions, passage of concealed handgun laws causes the percent annual change in crime rates to decline. For murders, the estimates range from 9 to 25 percent, for injuries from 1.2 to 22 percent, and for the number of shootings from 12 to 25 percent. The median incident rate ratio always implies an annual decline of at least 12 percent. By contrast, the bombing regressions

[32] Even in the three cases where the coefficient is no longer statistically significant it is still negative. The three cases correspond to specifications 5, 6, and 8 in Table 8, where the f-statistics for the difference in trends are 2.61, 0.09 and 1.59 respectively. The other 13 estimates are very similar to those already reported.

bounce all over the place, with positive and negative values for both the extreme values and even the signs of median estimates vary by type of bombing. The estimated median annual percent change is never greater than 1.3 percent.

In Tables 6, 7 and 8, we assumed that the passage of a right-to-carry law was an exogenous event. Following Lott and Mustard (1997, pp. 39-48), we now assume that the likelihood that a state will enact a law depends on several political influence variables. These variables include: the National Rifle Association membership (as a percentage of the population), the percentage of votes received by the Republican presidential candidate in the state, fixed regional effects, and lagged violent and property crime rates plus changes in those rates between the two most recent periods.[33]

The first stage (see the bottom half of Table 9) implies that states adopting these laws tend to be Republican, with low but rising violent crime rates. Higher NRA membership rates increase the likelihood of a law being adopted, but it is only significant at the twenty percent level. The second stage regressions support our earlier results. Adopting a right-to-carry law is associated with a significant decline in the combined number of multiple killings and injuries (both absolutely and per 100,000 persons). In the separate murder and injury regressions, the coefficients are always negative and either significant or marginally significant (a t-statistic greater that 1.65).[34]

IV. The Number of People Killed or Injured Per Shooting

The preceding evidence indicates that right-to-carry laws reduce both the number of public shootings and the total number of people killed or injured. As mentioned in the introduction, we also expect the amount of harm per incident to decline. The follow examples illustrate this point. During a shooting spree at a public school in Pearl, Mississippi, an assistant principal retrieved his gun and physically immobilized the shooter before he caused further harm (CNN, October 2, 1997, 2:40 PM EST). And in the public school related shooting in Edinboro, Pennsylvania, which left one teacher dead, a shot gun pointed at the offender while he was reloading prevented additional harm (Reuters Newswire, April 26, 1998). The police did not arrive for another ten minutes. In the introduction we gave other examples where shooters have been stopped by citizens and thus presumably prevented from doing more harm. One can also imagine circumstances where right-to-carry laws increase the availability of guns to potential offenders, or where guns used in self-defense lead to more, not fewer, killings. However, our results strongly indicate that these effects, if they exist, are not sufficient to offset the overall negative impact of right-to-carry laws on multiple shootings.

---

[33] Since presidential elections occur every four years, we interacted the percentage voting Republican with dummy variables for the years adjacent to the relevant elections. Thus, the percentage of the vote obtained in 1980 is multiplied by a year dummy for the years 1979-82, and so on, through the 1996 election.

[34] As a test of whether the shall issue laws were passed because of a shooting, we reestimated just first stage regression by itself after including the lagged murder or injury rate from the shootings to see if the law was adopted because of the shooting. While the coefficients on these lagged values were positive, neither variable was ever statistically significant.

In Table 10, we examine whether the number of people killed or injured in multiple shootings declines, holding constant the number of shootings. Table 10 includes the number of shootings as an independent variable in the regressions in Tables 6 and 7. If right-to-carry laws allow citizens to limit the amount of harm caused by these attacks, the number of persons harmed could fall relative to the number of shootings (as the two school shooting examples suggest). Using either the dummy law variable or the before-and-after time trends, the coefficients in Table 10 indicate that right-to-carry laws reduce the number of people harmed more than it reduces the number of shootings.[35,36] As expected, the coefficients on the right-to-carry variable are smaller than those reported earlier, but they are still relatively large with the average number of people dying or being injured from these attacks declining by around 50 percent and the average annual decline being around 11 to 13 percent.

V. Alternative Measures of Multiple Shootings

Recently the New York Times ran a major series on so-called "rampage killings." The Times collected data on 100 killings that had taken place from 1949 to 1999 (Fessenden, 2000). Their definition of "rampage killing" had many similarities to our own definition of multiple shootings. The Times identified cases where at least two people had been killed in a public place and excluded attacks that arose out of another crime, such as a robbery or gang activity. The two main differences between the two definitions is that the Times included non-gun killings and excluded politically motivated attacks. There is, however, a major problem with the Times data. They included all cases for the years 1995 to 1999, but included only "easily obtainable" cases for years prior to 1995.[37]

While the five-year period of 1995 to 1999 is relatively short, it still includes the public school shootings and many other notorious public shootings. We note, however, that public school shootings in right-to-carry states have occurred in areas where concealed handguns have been prohibited. Of course, excluding such cases would dramatically strengthens our results (not shown), but the estimates we report below (as well as our previously reported estimates) include public school shootings.

Table 11(A) uses the New York Times data in two ways. The first four regressions in Table 11(A) cover the 1995 to 1999 period only and, as a result, data on most of the control variables are unavailable. These regressions include state population, population squared, and state and year fixed

---

[35] Note that there are 234 observations in the deaths or injuries per shooting regressions although Table 1 indicates that there were 396 shootings in the sample period. The dependent variable in equations (1) – (3) in Table 10 equals the average number of deaths or injuries per shooting in a state in a year. Hence if there were two or more multiple shootings in a state in a year, this counted as one observation in the regression.

[36] While individuals with permits produce a large social benefit, they risk being shot by the attacker. We have no instances where people with permits have indeed been shot, but this risk surely raises the prospects of whether citizens with permits should be compensated or at least not have to pay large fees for obtaining a permit.

[37] For a discussion of the New York Times series see John R. Lott, Jr., "Rampage killing facts and fantasies," Washington Times, Wednesday, April 26, 2000, p. A15.

effects. The second set of regressions cover the Times data from 1977 to 1998. Here we can include all the control variables used in our previous regressions. The Times also lists eight "rampage killings" for the 1949 to 1976 period. All these killing occurred in states without right to carry laws.

For both the 1995-1999 and 1977-1998 period, we find that "rampage killings" declined by at least 47 percent after concealed handguns laws are passed. These results are statistically significant at the 5 percent (or lower) level for a two-tailed z-test (except for the first specification where the significance level is 12 percent level). The decline in the number of attacks in states enacting right to carry laws, range from 61 to 71 percent, but the effects are not statistically significant-(significance levels at around 20 percent).[38]

In Table 11 (B) we have constructed the dependent variable from the number of multiple shootings reported in the first section of the New York Times in the period 1977 to 1998. We use this measure as an estimate of the more serious or, at least, more news worthy multiple victimpublic shootings. Because the Poisson regressions with state specific effects did not converge, we substituted in regional dummy variables.[39] The second column also presents OLS estimates that include state fixed effects variables. Regional and state fixed effects may be important if the New York Times has a regional or state bias in its coverage of shooting events. Both set of estimates have problems. State fixed effects are more desirable than regional fixed effects but OLS estimates are significantly biased towards zero because of many observations with zero values. The results here are more mixed. The Poisson estimates show a significant decline in the number of Time reported multiple shootings after states pass right-to-carry laws, but the OLS estimates show no change.

We are aware of one other study that collects data on multiple victim murders. This study defines multiple victim murders as shootings in which four or more people are killed (Petee et. al., 1997). This way of defining the dependent variable greatly reduces the number of public shootings to 36 incidents over the entire 1977 to 1995 period. We attempted to explain both the per capita and absolute number of people killed in these shootings using the same specifications as in Tables 6 and 7.[40] The results are similar to our earlier ones. We find that right-to-carry laws reduce the

---

[38] The simple means also showed that the states that adopted right-to-carry laws during the 1995 to 1999 period experienced similar reductions in rampage killings. The average number of murders and injuries per state fell from 3.17 to 1.36 and the average number of attacks per state fell from .42 to .20.

[39] The Northeast includes Connecticut, Delaware, DC, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont; South includes Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia; Midwest includes Illinois, Indiania, Iowa, Kansas, Kentucky, Michigan, Minnesota, Nebraska, North Dakota, Ohio, South Dakota, West Virginia, and Wisconsin; Rocky Mountains includes Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming; and Pacific states includes Alaska, California, Hawaii, Oregon, Washington.

[40] Again, the Poisson estimates do not converge when state fixed effects are used for there is not enough variation in the data to distinguish the law's impact on these shootings with state fixed effects. Consequently, the state fixed effects are replaced with regional dummies (Northeast, Midwest, South, and West (the left out region)).

number of deaths, and that these deaths were increasing before passage of the law and falling thereafter.[41]

VI. Explaining Permit Rates Using Differences in State Laws

There is one extremely notable trend in the nature of concealed handgun laws over time. The states that adopted right-to-carry laws early on tend to have much lower fees and training requirements and fewer restrictions on where concealed handguns can be taken. For example, eight of the fourteen least restrictive states on where one is allowed to carry a concealed handgun adopted their laws before 1961. By contrast, the first full year that five most restrictive states had their laws was 1996 or 1997. The exact same breakdown is true for the length of training requirements. To put it differently, the nine states whose first full year with the law was 1996 or 1997 required twice as much training as the 22 earlier states, had 1.9 times higher fees, and had 2.6 times more restrictions on where one could carry the gun. The question this section examines is what impact that these changes in rules have had how these rules have reduced the crime rate.

A. Examining the Differences in Training, Fee, and the Number of Years that the Permit Rules Have Been in Effect

Central to much of the debate over right-to-carry is the relationship between the percent of the population with permits and the changes in crime rates. In the preceding sections, we used as a proxy the number of years that the law has been in effect. While the data on permits is limited --10 states provided data over at least a few years (permit data since enactment is available for Florida, Oregon, and Pennsylvania; more recent data for a few years is available for Alaska, Arizona, Oklahoma, South Carolina, Texas, Utah, and Wyoming), this data can used to predict how the percent of a state's adult population with permits has varied in other states. Four factors seem to have played important roles in explaining the percent of the state's population with permits: the length of time that right-to-carry laws have been in effect, the training period required, permit fees, and the crime rate.

It takes at least a decade for a state to reach its long-run stationary percentage of the population with permits. Shorter training periods, lower fees, and higher crime rates are associated with a greater percentage of the population getting permits.[42] However, while everything else equal we

---

[41] In explaining the per capita number of people killed, the shall issue concealed handgun dummy incidence rate ratio was .325 (z-statistic = 3.1) and the difference in the before and after trends equalled .18 (z-statistic = 4.55).

[42] A Tobit regression explaining the percent of the adult population with permits as a result of the number of hours of training required, the real permit fee, the number of years that the right-to-carry law has been in effect and the number of years squared, as well as the murder rate yields the following relationship:

Percent of the adult population with permits = -.00134 Hours of Training - .0507 Real Permit Fee
(4.278) (11.417)

+ .00313 Number of Years -.000198 Number of Years Squared + .00095 Murder Rate + .0278
(3.360) (1.546) (2.503) (9.926)

expect more permits to create a greater level of deterrence, changing the level of training or fees could affect the type of person who gets permits. It is quite possible that shortening training increases the number of permit holders but on net decreases the amount of deterrence simply because permit holders will not be as able to deal with situations that might arise. The converse is also true. Training may make each permit holder better able to deal with an attack but at the same time so greatly reduce the number of permit holders that the net effect is to reduce deterrence.

There are two different ways of dealing with the differences in state laws and the rates at which permits are issued. We can estimate the relationship between the percent of the adult population with permits and changes in training, fees, the murder rate, and the length of time that the law has been in effect over the small sample of states with permit data and then use the much more readily available data on how these rules vary across states to estimate the predicted permit rate across states. Alternatively, we could simply include the different state laws directly in the earlier regressions. We examined both approaches, and both support the hypothesis that more permits reduce the number of attacks. (To save space, we report only the reduced form estimates, but the other results indicate a strong significant relationship between the percent of the population with permits and drops in multiple victim public shootings.)

What exact permitting rules are in place in each state largely depends upon when the laws were first enacted. Once in place, the rules seldom change very much. States that adopted right-to-carry laws only recently tend to have more restrictive licensing requirements. For example, the three states requiring at least 10 hours of training (Alaska, Arizona, and Texas) adopted their rules during the last few years of the sample period, with Arizona being the only right-to-carry state that requires additional training when permits are renewed. Six of the eight states with permitting fees of at least $100 have also enacted the law during the last few years. Overall, permit fees range widely, from $6 in South Dakota to $140 in Texas. About half the 31 right-to-carry states require no training, a quarter at 3 to 5 hours, and the remaining quarter between 6 to 10 hours.

The results in Table 12 generally confirm that longer training periods, lower fees, and the number of years since adoption reduce the number of people harmed from multiple victim shootings, though neither the effects from training periods nor fees is not statistically significant for murders. The increased deterrence from having right-to-carry law in effect for additional years rapidly diminishes with virtually all (99%) the impact on murders occurring within the first 8 years.

B. Examining the Impact of "Gun Free Zones"

One of the more controversial and important regulations of concealed handguns regards where permit holders can carry their weapons. Even if a concealed handgun law is in place, banning guns

---

Chi-Square = 63.47 Log Likelihood = -198.2 N=36

from particular locations will defeat the laws ability to prevent an attack, though is some cases like the Pearl, Mississippi public school shooting it will still be possible for people to stop attacks with guns that are located nearby. A recent study of state laws lists 50 different possible places where permitted concealed handguns are prohibited (Jeffrey 2000, pp.33-39). A partial list of prohibited places in right-to-carry states includes bars, professional athletic events, school/college athletic events, casinos/gambling establishments, churches, banks and financial institutions, amusement parks, day care centers, school buildings, school parking lots, school buses, and hospitals and emergency rooms. Nine states allow private businesses to post whether permit holders are allowed to carry their weapons on the premises. Eleven states allow businesses to deny their employees to carry permitted handguns on the job. Unfortunately, there is no list of which business in a state exclude permitted concealed handguns. States also differ in what penalty is imposed for a violation. For some it is a felony and results in the immediate loss of the permit. For others, three violations are necessary before a permit is suspended for three years.

Based upon these fifty possible places where permits are prohibited and whether the penalty is a misdemeanor or a felony, Jeffrey creates an index that ranks states on a 0 to 74 scale, where 74 is the most restrictive rules: two points are given for each place that there is a statutory prohibition without discretion; one point if there is discretion; and an additional point is added if the prohibition violation is a felony. Indiana is assigned a value of zero, because their are no restrictions. Pennsylvania is the next lowest, with a score of 2, because concealed handguns are banned in court houses, though there is no criminal penalty for a violation. At the other extreme, six states have scores over 60 (from highest to lowest they are: Arkansas, Oklahoma, North Carolina, Texas, South Carolina, and Mississippi).

We did not include this scale in the first section of Table 12, since the weightings are somewhat arbitrary. For example, it is not obvious that all places where concealed handguns are restricted are equally important. Nor is it clear that a felony is worth one point and that misdemeanors or no penalty should be treated equally. Yet, despite these concerns, the index is probably roughly correlated with how restrictive different states are. To account for these restrictions, we reran the regressions reported in the first section of Table 12 with a new variable using Jeffrey's index. The one change that we made was to reverse the order of the index so that higher scores now imply fewer restrictions and change the index so that it ranges from 1 to 75.

The new regressions shown in Section B clearly show that the states with the fewest gun free zones have the greatest reductions killings, injuries, and attacks. Each one point increase in the index is associated with about a two percent further reduction in these crimes and all the estimates are statistically significant at least at the one percent level. All the other variables are very similar to what is reported in Section A.[43]

---

[43] We also tried running a simple poisson regression on only those states that had the right-to-carry law in effect in a particular year. The number of deaths, injuries, deaths and injuries, and attacks was regressed on either a dummy

VII. Do Shootings Produce More Shootings?

Does a public shooting lead others to imitate or mimic the behavior of the first gunman? One might reason that the attention and notoriety surrounding the shooting by gunman A might encourage B to undertake a similar act, and B's act might encourage C and so on. The notion of a crime "fad" or epidemic is not new. One of us [Landes (1978, pp. 16-18)] investigated and rejected the hypothesis that the increase and subsequent decrease in airline hijackings in Europe and the United States over the 1961 to 1976 period could be explained as a passing fad. Instead, the pattern was explained by the increase in apprehension rates and penalties.

To test for fads or imitative behavior, we calculate the number of mass shootings per month for the 252 months in the 1977 to 1997 period. We specified the dependent variable as the number of monthly shootings. The regression includes dependent variables denoting various monthly lags in either the number of shootings (or number reported in the New York Times) or the change in the number of shootings. We control for the increase in the number of states with right-to-carry laws during this period by adding a variable denoting the percentage of the U.S. population covered by these laws. Because of our concern that passage of the late 1995 Federal law banning guns within a thousand feet of a school might have encouraged attacks, a dummy variable was included for when that law was enacted. If this law is primarily obeyed by law-abiding citizens, it is plausible that the law encourages attacks by making armed resistence less likely. We also include month dummy variables and a time trend (in months). Table 13 reports the Poisson estimates of the regression equations

In Table 13, we find the following regressions to be consistent in all five regressions: the percent of the U.S. population covered by right-to-carry laws, the time trend variable, and the one month lags for the number of shootings and the number of New York Times stories. The positive coefficients on the lagged values of shootings provide some weak evidence of faddish behavior. But the lagged values of the New York Times stories imply the opposite. If coverage in the New York Times implies that those stories were receiving more national news coverage, any fad effect should be strongest for that variable, but in fact it shows that recent news coverage reduces the number of attacks. In short, the evidence on fads is mixed.[44]

One reason we may not find significant evidence of faddish behavior is that lagged shootings and lagged stories on shootings in the New York Times are highly collinear. To account for this collinearity, the last two regressions in Table 13 use either lagged shootings or lagged stories by

---

variable that equalled one for the states that had an index value above the median and zero otherwise or the index. In both cases, the states with fewer gun free zones had fewer attacks and the differences were always significant at better than the .1 percent level. Using the simple dummy implied that the states with above the median level of freedom to carry concealed handguns had 58 percent fewer killings and injuries and 52 percent fewer attacks.

[44] Note that October appears to be the most dangerous month although he number of shootings in October is only significantly greater than the number in January, September and November. Note, however, that the monthly dummy variables are not jointly significant.

themselves. However, the results remain unchanged: lagged values of shootings are positively related to monthly shootings while lagged differences are negatively related to differences in monthly shootings. Again, the percent of the population covered by right-to-carry laws continues to have a statistically significant reduction on the number of monthly shootings.

While we find little consistent support for the copycat hypothesis, we note that our data contains almost exclusively shootings by adults. The recent public school shootings, which involve children might be different. However, school shootings are very rare, making it impossible to study these shootings separately.

VIII. Conclusion

Right-to-carry laws reduce the number of people killed or wounded from multiple victim public shootings as many attackers are either deterred from attacking or when attacks do occur they are stopped before the police can arrive. We are able to provide evidence for the first time that the harm from crimes that still occur can be mitigated. Given that half the attackers in these multiple victim public shootings have had formal diagnoses of mental illness, the fact that some results indicate concealed handgun laws reduce these attacks by almost 70 percent is remarkable.

Differences in state right-to-carry laws are also important: restricting the places where permits are prohibited increases murders, injuries and shootings; more training requirements reduce injuries; and higher fees increase injuries and the number of attacks. The much greater deterrence that right-to-carry laws have for multiple victim public shootings than for other crimes like murder is consistent with the notion that a higher probability of citizens being able to defend themselves should produce a greater level of deterrence. The results are robust with respect to different specifications of the dependent variable, different specifications of the handgun law variable, and different control variables. Not only does the passage of a right-to-carry law have a significant impact on multiple shootings but it is the only gun law that appears to have a significant impact. While other law enforcement efforts -- from the arrest rate for murder and the death penalty -- reduce the number of people harmed from multiple shootings, the effect is not as consistently significant as for right-to-carry laws. Finally, the data provides no evidence of substitution from shootings to bombings and little consistent evidence of “copycat” effects.

Bibliography

Alschuler, Albert W., "Two Guns, Four Guns, Six Guns, More Guns: Does Arming the Public Reduce Crime," Valparaiso Law Review 31 (Spring 1997): 365-373.

Ayres, Ian and Steven D. Levitt, "Measuring Positive Externalities from Unobservable Victim Precaution" An Empirical Analysis of Lojack," Quarterly Journal of Economics 113(1998): 43-77.

Bartley, William Alan; Cohen, Mark A. and Frobe, Luke. "The Effect of Concealed Weapon Laws: Estimating Model Uncertainty." Economic Inquiry 36 (April 1998): 258-265.

Black, Dan A. and Daniel S. Nagin, "Do 'Right-to-Carry' Laws Deter Violent Crime?" Journal of Legal Studies 27 (January 1998): 209-219.

Bronars, Stephen G. and John R. Lott, Jr., "Criminal Deterrence, Geographic Spillovers, and the Right to Carry Concealed Handguns," American Economic Review, 82 (May 1998): 475-478.

Cook, P. J., "The Role of Firearms in Violent Crime," in M.E. Wolfgang and N.A. Werner, eds., Criminal Violence, Sage Publishers: Newbury, N.J.(1982).

Cook, P. J. and Jens Ludwig, "You got me: How many defensive gun uses per year?" Paper presented at the annual meetings of the Homicide Research Group, Santa Monica, California (May 17, 1996).

Ehrlich, Isaac, "The Deterrent effect of Capital Punishment: A Question of Life and Death," American Economic Review 65 (1975): 397-417.

Ehrlich, Isaac, "Capital Punishment and Deterrence: Some Further Thoughts and Additional Evidence." Journal of Political Economy 85 (August 1977): 741-88.

Ehrlich, Isaac and Zhiqiang Liu, "Sensitivity Analyses of the Deterrence Hypothesis: Let's Keep the Econ in Econometrics," Journal of Law and Economics (forthcoming).

Fessenden, Ford, "They Threaten, Seethe and Unhinge, Then Kill in Quantity," New York Times, Sunday, April 9, 2000, p. 1.

Goodstein, Laurie and William Glaberson, "The Well-Marked Roads to Homicidal Rage," New York Times, April 10, 2000, p. A1.

Kates, Don, and Dan Polsby. "Of Genocide and Disarmament," Journal of Criminal Law and Criminology, 86 (Fall 1995): 247-256.

Kleck, Gary, and Marc Gertz, "Armed Resistance to Crime: The Prevalence and Nature of Self-Defense with a Gun," 86 Journal of Criminal Law and Criminology 86 (Fall 1995): 150-187.

Kleck, Gary, Targeting Guns: Firearms and their control, Aldine de Gruyter:Hawthorne, NY (1997).

Landes, William M., "An Economic Study of U.S. Airline Hijacking, 1961-1976," Journal of Law and Economics 21 (April 1978): 1-32.

Lott, John R., Jr. and David Mustard, "Crime, Deterrence, and Right-to-Carry Concealed Handguns," Journal of Legal Studies 26 (January 1997): 1-68.

Lott, John R., Jr., "The Concealed Handgun Debate," Journal of Legal Studies 27 (January 1998a): 221-243.

Lott, John R., Jr., More Guns, Less Crime: Understanding Crime and Gun Control Laws, University of Chicago Press: Chicago, Illinois (1998b).

Marvell, Thomas B., and Carl E. Moody, The Impact of Enhanced Priosn Terms for Felonies Committed with Guns," Criminology 33 (May 1995).

New York Times Editorial, "A Closer Look at Rampage Killings," The New York Times, Thursday, April 13, 2000, p. A30.

Petee, Thomas A., Kathy G. Padgett, and Thomas York, "Debunking the Sterotype: An Examination of Mass Murder in Public Places," Homicide Studies 1 (November 1997): 317-337.

Plassman, Florenz and T. Nicolaus Tideman, "Does the Right to Carry Concealed Handguns Deter Countable Crimes?: Only a Count Analysis Can Say," Virginia Polytechnic Institute Working Paper (October 9, 1998).

Reuters Newswire, “Police praise man in PA dance hall shooting,” Sunday, April 26, 1998.

Stigler, George J., “The Optimum Enforcement of Laws,” Journal of Political Economy 78 (May/June 1970): 526-536.

Zimring, Franklin, “The Medium is the Message: Firearm Caliber as a Determinant of Death from Assault,” Journal Legal Studies, 1 (1972): 97-123.

Table 1
The Number of Multiple Victim Murders and Injuries in Public Shootings by Year and by the Presence of a Concealed Handgun Law

Year	All States			States Without Right-to-Carry Handgun Law (Including the District of Columbia)						
	Number of Murders in Public Shootings	Number of Injuries in Public Shootings	Number of Public Shootings	Number of States Without Right-to-Carry Concealed Handgun Law	Number of Murders in Public Shootings	Number of Injuries in Public Shootings	Number of Shootings	Percent of Total Deaths (Column 5/ Column 1)	Percent of Total Injuries (Column 6/ Column 2)	Percent of Total Deaths (Column 7/ Column 3)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1977	19	46	7	43	19	46	7	100%	100%	100%
1978	14	12	8	43	14	12	8	100%	100%	100%
1979	23	77	13	43	20	74	12	87%	96%	92%
1980	30	51	11	43	22	46	8	73%	90%	73%
1981	44	60	30	43	37	50	27	84%	83%	90%
1982	32	92	20	43	28	92	19	87%	100%	95%
1983	19	36	18	43	16	22	14	84%	61%	78%
1984	56	76	26	43	53	73	24	95%	96%	92%
1985	38	45	24	43	34	37	21	89%	82%	88%
1986	41	54	21	42	41	52	20	100%	96%	95%
1987	44	73	36	42	41	69	34	93%	95%	94%
1988	49	90	35	41	47	85	32	96%	94%	91%
1989	49	84	31	40	39	79	24	80%	94%	77%
1990	29	53	22	37	20	43	20	69%	81%	91%
1991	58	68	22	34	53	58	18	91%	85%	82%
1992	31	55	18	33	29	54	17	94%	98%	94%
1993	87	83	33	33	83	76	30	95%	92%	91%
1994	15	20	10	33	13	19	9	87%	95%	90%
1995	26	11	11	29	23	11	10	88%	100%	91%
1996	128	191	96	23	82	154	76	64%	80%	79%
1997	99	144	71	20	55	94	41	56%	65%	58%

Table 1 (Continued)

Year	States With Right-to-Carry Concealed Handgun Law						
	Number of States With Law	Number of Murders in Public Shootings	Number of Injuries in Public Shootings	Number of Shootings	Percent of Total Deaths (Column 12/ Column 1)	Percent of Total Injuries (Column 13/ Column 2)	Percent of Total Deaths (Column 14/ Column 3)
	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1977	8	0	0	0	0%	0%	0%
1978	8	0	0	0	0%	0%	0%
1979	8	3	3	1	13%	4%	8%
1980	8	8	5	3	27%	10%	27%
1981	8	7	10	3	16%	17%	10%
1982	8	4	0	1	13%	0%	5%
1983	8	3	14	4	16%	39%	22%
1984	8	3	3	2	5%	4%	8%
1985	8	4	8	3	11%	18%	12%
1986	9	0	2	1	0%	4%	5%
1987	9	3	4	2	7%	5%	6%
1988	10	2	5	3	4%	6%	9%
1989	11	10	5	7	20%	6%	23%
1990	14	9	10	2	31%	19%	9%
1991	17	5	10	4	9%	15%	18%
1992	18	2	1	1	6%	2%	6%
1993	18	4	7	3	5%	8%	9%
1994	18	2	1	1	13%	5%	10%
1995	22	3	0	1	12%	0%	9%
1996	28	46	37	20	36%	20%	21%
1997	31	44	50	30	44%	35%	42%

Table 2

The Rate of Multiple Victim Murders and Injuries in Public Shootings by Year and by the Presence of a Concealed Handgun Law (Population Weighted Averages)

Year	States Without Right-to-Carry Law			States With Right-to-Carry Law			Comparison of Rates Between Two Types of States	
	Number of States Without Right-to-Carry Law (Including the District of Columbia)	Murders and Injuries in Public Shootings Per 100,000 People	Number of Shootings Per 100,000 People	Number of States With Right-to-Carry Law	Murders and Injuries in Public Shootings Per 100,000 People	Number of Shootings Per 100,000 People	Does the Murder and Injury Rate in States Without Laws Exceed the Rate in States with Laws?	Does the Shooting Rate in States Without Laws Exceed the Rate in States with Laws?
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1977	43	0.033	0.005	8	0	0	Yes	Yes
1978	43	0.013	0.006	8	0	0	Yes	Yes
1979	43	0.046	0.008	8	0.031	0.002	Yes	Yes
1980	43	0.033	0.006	8	0.067	0.006	No	No
1981	43	0.041	0.019	8	0.087	0.006	No	Yes
1982	43	0.057	0.013	8	0.020	0.002	Yes	Yes
1983	43	0.018	0.010	8	0.086	0.008	No	Yes
1984	43	0.058	0.017	8	0.030	0.004	Yes	No
1985	43	0.032	0.014	8	0.060	0.006	No	No
1986	42	0.042	0.014	9	0.009	0.002	Yes	Yes
1987	42	0.050	0.023	9	0.033	0.003	Yes	Yes
1988	41	0.063	0.022	10	0.021	0.005	Yes	Yes
1989	40	0.057	0.017	11	0.037	0.010	Yes	No
1990	37	0.034	0.014	14	0.031	0.002	Yes	Yes
1991	34	0.061	0.012	17	0.022	0.004	Yes	Yes
1992	33	0.045	0.012	18	0.004	0.001	Yes	Yes
1993	33	0.085	0.021	18	0.002	0.003	Yes	Yes
1994	33	0.017	0.006	18	0.004	0.001	Yes	Yes
1995	29	0.046	0.007	22	0.004	0.001	Yes	Yes
1996	23	0.148	0.074	28	0.059	0.024	Yes	Yes
1997	20	0.103	0.028	31	0.069	0.024	Yes	Yes
Average	38	0.055	0.0166	13	0.033	0.005	Yes (Testing whether the Difference in annual means is not equal to zero t=2.269 P>|t| = .0345)	Yes (Testing whether the Difference in annual means is not equal to zero t=4.950 P>|t| = .0001)

Table 3

The 23 States that Adopted Right-to-Carry Concealed Handgun Laws Some Time Between 1977 and 1997 (Each cell in the first three rows shows the mean and, in parentheses, the standard deviation. The cells in the last two rows shows the difference in means between either rows (1) and (2) or (1) and (3). The t-statistic for these differences are shown in parentheses and the level of significance for a two-tailed t-test are shown below that.).

Twenty-three States that Changed from Not Having to Having a Right-to-Carry Concealed Handgun Law	Murders in Multiple Victim Public Shootings Per 100,000 People	Injuries in Multiple Victim Public Shootings Per 100,000 People	Murders and Injuries in Multiple Victim Public Shootings Per 100,000 People	Number of Shootings Per 100,000 People	Actual and Attempted Bombings Per 100,000 People	Actual and Attempted Incendiary Bombings Per 100,000 People	Other Bomb Related Incidents Per 100,000 People	Total Explosive Incidents Per 100,000 People
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Years during Which These States Did Not Have Right-to-Carry Concealed Handgun Laws (Observations = 374)	.021 (.0938)	.028 (.0916)	.050 (.1611)	.0119 (.0410)	.584 (.5648)	.135 (.1864)	.961 (.8565)	1.681 (1.2379)
(2) Years During Which They Did Have Right-to-Carry Concealed Handgun Laws (Observations = 109)	.012 (.0313)	.020 (.0664)	.0326 (.095)	.009 (.0226)	.721 (.5595)	.1395 (.1363)	.954 (.8443)	1.8079 (1.1452)
(3) Years During Which They Did Have Right-to-Carry Concealed Handgun Laws --Excluding cases in involving school and government buildings where permitted concealed handguns were obviously forbidden (Observations = 109)	.0099 (.0251)	.0137 (.0424)	.0236 (.0640)	.0076 (.0161)				
Difference Between Rows (1) and (2)	-.0098 (1.068) 28.6%	-.0075 (.795) 42.7%	-.0172 (1.063) 28.8%	-.0024 (.581) 56.2%	.137 (2.235) 2.6%	.0045 (.235) 81.4%	-.0075 (.080) 93.6%	.127 (.960) 33.8%
Difference Between Rows (1) and (3)	-.0119 (1.314) 18.9%	-.0143 (1.589) 11.3%	-.0263 (1.664) 9.7%	-.0042 (1.052) 29%				

Table 4
Examining the Means for States that Adopted Right-to-Carry Concealed Handgun Laws During the 1977 to 1997 Period (Based on years before and after the adoption of right-to-carry laws in which at least 10 states have the law in place)

		States that Adopted Right-to-Carry Concealed Handgun Laws During the 1977-1997 Period: Using State Averages to Compute Rates							
Years Before and After the Adoption of the Law (Year 1 is the first full Year that the Law is in Effect)	Number of States that Fall into that Category	Murders in Multiple Victim Public Shootings Per 100,000 People	Injuries in Multiple Victim Public Shootings Per 100,000 People	Murders and Injuries in Multiple Victim Public Shootings Per 100,000 People	The Number of Shootings Per 100,000 People	Total Number of Murders in Multiple Victim Public Shootings for all States in this Category	Total Number of Injuries in Multiple Victim Public Shootings for all States in this Category	Worst attack in terms of number of murders	Worst attack in terms of number of injuries
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
-8	23	0.0101456	0.0405985	0.0507441	0.0103365	11	48	Arkansas (2) South Carolina (2)	North Carolina, South Carolina (9) Pennsylvania (7)
-7	23	0.0197525	0.0473767	0.0671293	0.0144247	19	50	Kentucky (8) North Carolina (4)	Kentucky (12) North Carolina (5)
-6	23	0.0371508	0.0220103	0.0591611	0.0194834	16	14	Idaho (5) Florida, Texas (2)	Florida (3) Texas (2)
-5	23	0.0033196	0.0019764	0.005296	0.0007807	8	5	Florida (8)	Florida (3) Pennsylvania (2)
-4	23	0.0162439	0.022061	0.0383049	0.01125	41	39	Texas (23) Pennsylvania (4)	Texas (18) Pennsylvania (7)
-3	23	0.0078046	0.014694	0.022498	0.0045959	10	25	Texas (2) Florida (1)	Arizona, Texas. (6)
-2	23	0.0144374	0.015557	0.0299943	0.0085042	12	13	Virginia (3) Texas (2)	Arkansas (7), Georgia (2)
-1	23	0.0347137	0.054553	0.0892667	0.028057	13	17	Florida (6) Virginia, Texas (2)	Georgia, Wyoming (4)
0	23	0.0240361	0.0606451	0.0846812	0.0295402	40	69	Florida (6) Texas (5)	Florida (10) Louisiana (6)
1	23	0.0102542	0.0131601	0.0234143	0.008053	18	25	Texas (5) Kentucky (3)	Texas (6) Georgia , Louisiana (4)
2	20	0.0072348	0.0070638	0.0142986	0.0078284	14	14	Arizona, Texas (3)	Pennsylvania, 2 North Carolina (3)
3	14	0.0174765	0.0398359	0.0573125	0.01494	10	10	Florida (8) Alaska, Tennessee (1)	Florida (6) Alaska (3)
4	10	0	0.0016	0.0016	0.00083	0	2	none	Pennsylvania (2)
5	10	0	0	0	0	0	0	none	none
6	10	0.0113749	0.0230758	0.0344507	0.0119722	9	19	Mississippi (4) Florida (3)	Mississippi (10) Florida (3)

Table 5
Means and Standard Deviation of Variables

	Obs.	*Mean*	*Standard Deviation*
Shall Issue Law Dummy	1071	0.2586368	0.4380902
Arrest Rate for Murder	1045	88.17906	52.77598
Murders in Multiple Victim Public Shootings Per 100,000 Persons	1071	0.0188385	0.0782509
Injuries in Multiple Victim Public Shootings Per 100,000 Persons	1071	0.0307867	0.1806079
Murders and Injuries in Multiple Victim Public Shootings Per 100,000 Persons	1071	0.0496252	0.2380429
Murders in Multiple Victim Public Shootings	1071	0.8618114	2.622253
Injuries in Multiple Victim Public Shootings	1071	1.420168	4.614375
Murders and Injuries in Multiple Victim Public Shootings	1071	2.281979	6.678102
Attempted or Actual Bombings Per 100,000 Persons	1071	0.5768352	0.4942879
Attempted or Actual Incendiary Bombings Per 100,000 Persons	1071	0.1543275	0.2231764
Attempted or Actual Other Bombing Incidents Per 100,000 Persons	1071	0.7380498	0.6925256
Attempted or Actual Bombings	1071	27.13259	43.94869
Attempted or Actual Incendiary Bombings	1071	8.420168	19.3333
Attempted or Actual Other Bombing Incidents	1071	30.53035	45.27652
Deaths per shooting	293	1.616356	1.44935
Injuries per Shooting	293	2.655577	4.085048
Deaths or Injuries per Shooting	293	4.271933	4.426812
Number of Shootings	1071	.5620915	1.533922
Number of Shootings per 100,000 Persons	1071	.0128497	.0656067
Murders per 100,000 Persons	1068	7.532612	7.571831
Death Penalty Execution Rate per 1,000 murders	1068	1.3425	5.8497
Waiting Period Dummy	1071	0.3582726	0.4759902
NRA Members Per 100,000 Persons	1071	4766908	5181944
State Population	1071	4.96E+13	1.24E+14
State Population Squared	1071	13082.76	2377.003
Real Per Capita Personal Income	1071	170.1907	67.42687
Real Per Capita Income Maintenance	1071	70.53992	43.68931
Real Per Capita Unemployment Insurance Payment	1071	394.2354	610.888
Real Retirement Payments Per Person Over 65	1071	355.6367	1382.601
Unemployment Rate	1071	6.41378	2.087943
Poverty Rate	1071	13.49024	4.193104
Percent of the Population that is:			
Black Males 10 to 19 Years of Age	1071	1.000924	1.073925
Black Females 10 to 19 Years of Age	1071	0.9861901	1.08779
White Males 10 to 19 Years of Age	1071	6.522034	1.554608
White Females 10 to 19 Years of Age	1071	6.212554	1.518811
Other Males 10 to 19 Years of Age	1071	0.3739574	0.7276978
Other Females 10 to 19 Years of Age	1071	0.3619659	0.7037917
Black Males 20 to 29 Years of Age	1071	0.9357873	1.002613
Black Females 20 to 29 Years of Age	1071	1.010992	1.181078
White Males 20 to 29 Years of Age	1071	7.05599	1.303731
White Females 20 to 29 Years of Age	1071	6.904337	1.339297
Other Males 20 to 29 Years of Age	1071	0.362629	0.6881269
Other Females 20 to 29 Years of Age	1071	0.3671231	0.6964837
Black Males 30 to 39 Years of Age	1071	0.7481225	0.8423609
Black Females 30 to 39 Years of Age	1071	0.8550366	1.002243

White Males 30 to 39 Years of Age	1071	6.746516	1.202193
White Females 30 to 39 Years of Age	1071	6.692243	1.196271
Other Males 30 to 39 Years of Age	1071	0.3210689	0.67081
Other Females 30 to 39 Years of Age	1071	0.3520146	0.7068117
Black Males 40 to 49 Years of Age	1071	0.5086571	0.5992915
Black Females 40 to 49 Years of Age	1071	0.5975951	0.7313905
White Males 40 to 49 Years of Age	1071	5.158535	1.146857
White Females 40 to 49 Years of Age	1071	5.170353	1.114372
Other Males 40 to 49 Years of Age	1071	0.2235525	0.5198493
Other Females 40 to 49 Years of Age	1071	0.2504653	0.5625374
Black Males 50 to 64 Years of Age	1071	0.5150453	0.6695444
Black Females 50 to 64 Years of Age	1071	0.6479795	0.8692419
White Males 50 to 64 Years of Age	1071	5.740179	1.032121
White Females 50 to 64 Years of Age	1071	6.146133	1.212804
Other Males 50 to 64 Years of Age	1071	0.207363	0.6047414
Other Females 50 to 64 Years of Age	1071	0.2421665	0.6969355
Black Males Over 64 Years of Age	1071	0.3613871	0.4908613
Black Females Over 64 Years of Age	1071	0.5593317	0.8077022
White Males Over 64 Years of Age	1071	4.374812	1.160827
White Females Over 64 Years of Age	1071	6.357397	1.686213
Other Males Over 64 Years of Age	1071	0.1328229	0.4933583
Other Females Over 64 Years of Age	1071	0.1559203	0.5368273
Violent Crime Rate Per 100,000 Persons	1061	487.6289	339.2621
Murder Rate Per 100,000 Persons	1068	7.532612	7.571831
Rape Rate Per 100,000 Persons	1061	34.05506	15.72533
Aggravated Assault Rate Per 100,000 Persons	1068	287.2832	179.6146
Robbery Rate Per 100,000 Persons	1068	161.1047	174.7755

Table 6: The Impact of Right-to-Carry Concealed Handgun Laws on The Average Rate of Public Shootings and Bombings

(The regressions use the Poisson procedure, and the incidence rate ratios are reported. The regressions include the following independent variables: detailed demographic information by sex, race, and age; population and population squared; state unemployment rate; state poverty rate; real per capita personal income, unemployment payments, income maintenance, and retirement payments per capita; arrest rate for murder; the execution rate; waiting period dummy, and length of waiting period in days and days squared; one-gun-a-month law; safe storage gun law; penalties for using guns in the commission of crime; and state and year fixed effects. The absolute z-statistics are shown in parentheses.)

	Endogenous Variables			
Exogenous Variables	Murders in Multiple Victim Public Shootings	Injuries in Multiple Victim Public Shootings	Murders and Injuries in Multiple Victim Public Shootings	Number of Shootings
	(1)	(2)	(3)	(4)
Right-to-Carry Law Dummy Variable	.2457 (5.435)	.1877 (7.769)	.2151 (9.609)	.3280 (3.820)
Model Chi-Square	1919.76	3682.4	5260.4	1210.6
Log Likelihood	-1033.42	-1437.4	-2080.73	-679.71
Number of Observations	1045	1045	1045	1045

	Endogenous Variables			
Exogenous Variables	Attempted or Actual Bombings	Attempted or Actual Incendiary	Other Bombing Incidents	Total Bombing Incidents
	(5)	(6)	(7)	(8)
Right-to-Carry Law Dummy Variable	.9596 (0.179)	1.1897 (0.352)	.9784 (0.108)	.9929 (0.050)
Model Chi-Square	216.47	117.34	345.66	470.27
Log Likelihood	-796.12	-352.03	-892.87	-1235.52
Number of Observations	1045	1045	1045	1045

Table 7: Including Other Gun Control Laws and Death Penalty Execution Rates

(The regressions use the Poisson procedure, and the incidence rate ratios are reported. The regressions include the following independent variables: detailed demographic information by sex, race, and age; population and population squared; state unemployment rate; state poverty rate; real per capita personal income, unemployment payments, income maintenance, and retirement payments per capita; arrest rate for murder; the execution rate; waiting period dummy, and length of waiting period in days and days squared; one-gun-a-month law; safe storage gun law; penalties for using guns in the commission of crime; and state and year fixed effects. The absolute z-statistics are shown in parentheses.)

	Endogenous Variables							
Exogenous Variables	Murders in Multiple Victim Public Shootings	Injuries in Multiple Victim Public Shootings	Total Murders and Injuries in Multiple Victim Public Shootings	Number of Shootings	Attempted or Actual Bombings	Attempted or Actual Incendiary	Other Bombing Incidents	Total Bombing Incidents
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Time Trend for Years Before the Right-to-Carry Law Went into Effect	1.0347 (1.112)	.9664 (1.247)	.9968 (0.165)	1.0724 (1.835)	.9897 (0.413)	1.0036 (0.070)	1.0011 (0.056)	.9958 (0.282)
Time Trend for Years After the Right-to-Carry Law Went into Effect	.8238 (3.177)	.7791 (5.114)	.7967 (6.283)	.8449 (2.550)	1.0226 (.401)	1.0313 (.258)	1.0537 (1.117)	1.0441 (1.281)
Waiting Period Dummy	4.6569 (1.647)	.7340 (0.461)	1.2054 (0.368)	2.1098 (0.763)	1.3123 (0.338)	.8887 (0.067)	1.162 (.206)	1.2515 (0.439)
Length of Waiting Period in Days	.6471 (1.561)	1.0149 (0.072)	.9073 (0.642)	.7603 (0.970)	.9109 (0.454)	.9771 (0.052)	.8843 (0.648)	.8980 (0.816)
Length of Waiting Period Squared	1.0170 (1.032)	.9879 (0.858)	.9957 (0.422)	1.0110 (0.653)	1.0062 (0.561)	1.0019 (0.079)	1.0087 (0.852)	1.0072 (1.025)
One Gun a Month Purchase Rules	2.1932 (0.892)	7.9701 (2.484)	4.022 (2.350)	3.638 (1.255)	.5357 (.694)	.3206 (.511)	1.0702 (0.342)	.5534 (.996)
Safe Storage Gun Laws	.83198 (0.798)	.7980 (1.050)	.7987 (1.474)	.6477 (1.435)	1.2021 (0.676)	1.4434 (0.640)	1.2652 (0.871)	1.2380 (1.187)
Additional Penalty for Using Gun in the Commission of a Crime Dummy	.5918 (1.975)	1.2652 (1.106)	.9649 (0.222)	.6534 (1.255)	.9740 (0.104)	.8422 (0.347)	1.0702 (0.342)	.9873 (0.087)
Death Penalty Execution Rate	.9892 (0.858)	.9634 (2.536)	.9787 (2.361)	.9976 (0.179)	.9970 (0.042)	.9871 (0.664)	.9942 (0.180)	.9939 (0.371)
F-test for Differences in Time trends (probability in parentheses)	13.00 (.0003)	16.69 (.0000)	33.16 (.0000)	10.26 (0.0014)	0.28 (.5940)	0.04 (.8347)	.99 (.3194)	1.64 (.2005)
Model Chi-Square	1901.5	3644.6	5203.2	1205.98	216.76	117.29	346.9	471.96
Log Likelihood	-1042.5	-1456.3	-2109.3	-682.0	-795.97	-352.1	-892.3s	-1234.7
Number of Observations	1045	1045	1045	1045	1045	1045	1045	1045

Table 8: The Impact of Right-to-Carry Concealed Handgun Laws on the Rate of Public Shootings and Bombings When the Data for the Year of Adoption and the Two Years Prior to Adoption are Dropped

(The regressions use the Poisson procedure, and the incidence rate ratios are reported. The regressions include the following independent variables: detailed demographic information by sex, race, and age; population and population squared; state unemployment rate; state poverty rate; real per capita personal income, unemployment payments, income maintenance, and retirement payments per capita; arrest rate for murder; the execution rate; waiting period dummy, and length of waiting period in days and days squared; one-gun-a-month law; safe storage gun law; penalties for using guns in the commission of crime; and state and year fixed effects. The absolute z-statistics are shown in parentheses. Number of observations is 976 for all specifications.)

	Endogenous Variables			
Exogenous Variables	Murders in Multiple Victim Public Shootings	Injuries in Multiple Victim Public Shootings	Murders and Injuries in Multiple Victim Public Shootings	Number of Shootings
	(1)	(2)	(3)	(4)
Right-to-Carry Law Dummy Variable	.2742 (3.877)	.2642 (4.619)	.2725 (6.191)	.4728 (1.932)
Model Chi-Square	1811.4	3492.03	4971.9	1122.7
Log Likelihood	-956.2	-1316.3	-1922.3	-620.6
	(5)	(6)	(7)	(8)
Time Trend for Years Before the Right-to-Carry Law Went into Effect	1.0286 (0.849)	.9296 (2.437)	.9493 (2.227)	1.0532 (1.241)
Time Trend for Years After the Right-to-Carry Law Went into Effect	.8969 (1.493)	.9192 (1.340)	.8736 (3.600)	.9348 (.803)
F-test for Differences in Time trends (probability in parentheses)	2.80 (.0941)	0.02 (.8746)	2.89 (.0890)	1.48 (.2236)
Model Chi-Square	1798.4	3477.8	4939.5	1120.9
Log Likelihood	-962.7	-1323.4	-1938.5	-621.5

Figure 1: Sensitivity of the Relationship Between Right-to-Carry Laws and Annual Change in Crime Rates

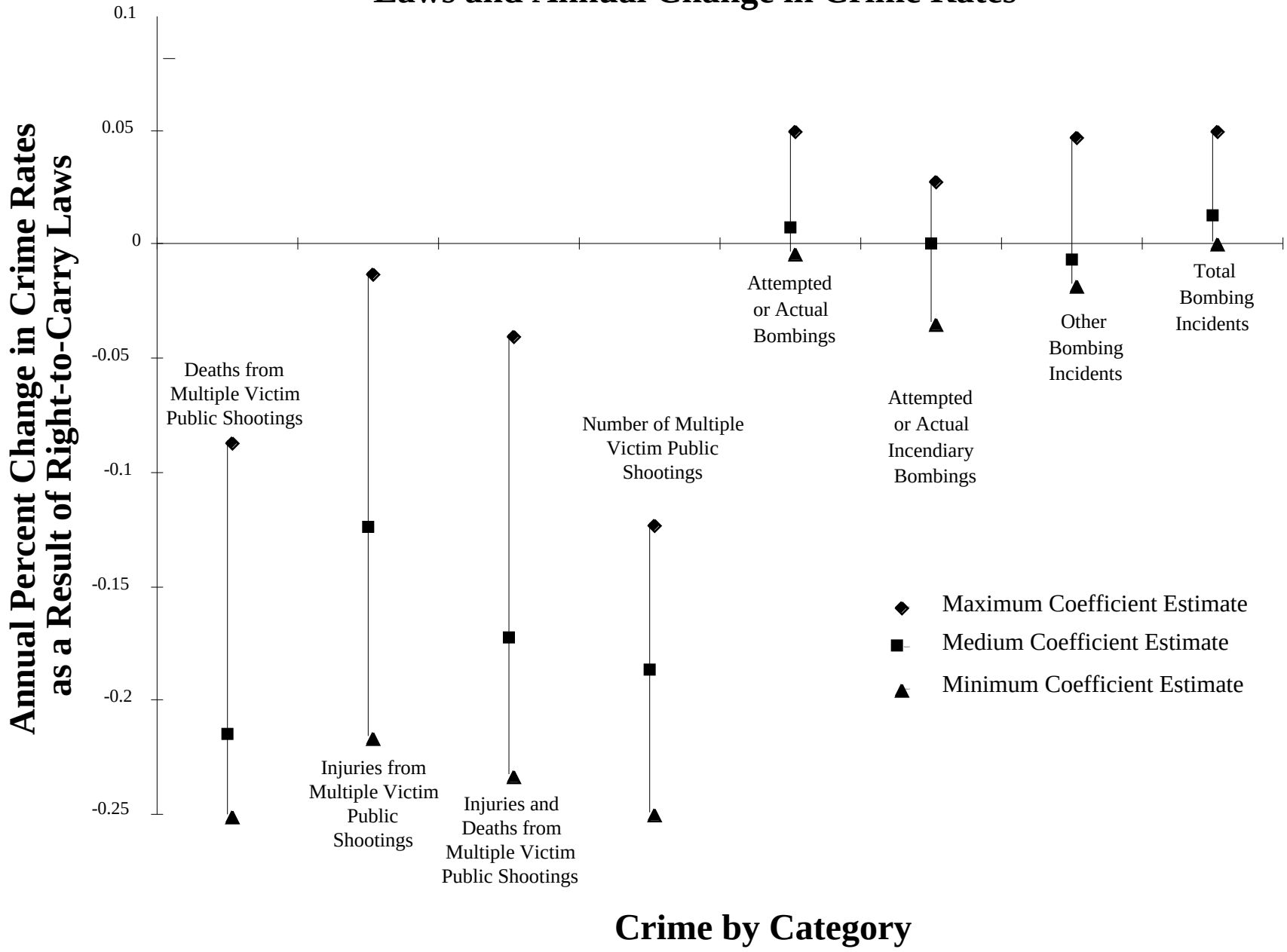

Table 9
Simultaneous Poisson-Logit Estimates

(The regressions control for sex, race, age; population, population squared, state unemployment rate, state poverty rate, real per capita personal income, unemployment payments, income maintenance payments, retirement payments, arrest rate for murder and state and year fixed effects. The first stage estimates do not report the various demographic and fixed effects that were in the regression. Incidence rate ratios are reported for the second stage estimates. Absolute z or t-statistics are shown in parentheses.)

Second Stage Estimates	Endogenous Variables		
Exogenous Variables	Murders in Multiple Victim Public Shootings	Injuries in Multiple Victim Public Shootings	Murders and Injuries in Multiple Victim Public Shootings
Right-to-Carry Law Dummy Variable	.534 (2.223)	.3116 (4.672)	.3842 (5.249)
Model Chi-Square	4287.95	7893.02	11379.8
Log Likelihood	-1591.7	-1997.8	-2862.02
Number of Observations	984	984	984

First Stage Estimate	Exogenous Variables											
Endogenous Variable	Lagged Violent Crime Rate	Lagged Property Crime Rate	Change in Violent Crime Rate	Change in Property Crime Rate	% Rep. Pres. in State Vote * Year Dummy 1977-78	% Rep. Pres. in State Vote * Year Dummy 1979-82	% Rep. Pres. in State Vote * Year Dummy 1983-86	% Rep. Pres. in State Vote * Year Dummy 1987-90	% Rep. Pres. in State Vote * Year Dummy 1991-94	% Rep. Pres. in State Vote * Year Dummy 1995-98	Log likelihood	Chi-Square
Right-to-Carry Law Dummy Variable	-.0089 (4.869)	-.00009 (0.305)	.0075 (2.346)	.00007 (.118)	.045 (0.397)	.022 (0.396)	.1751 (2.632)	.2401 (3.141)	.2942 (3.192)	.3142 (5.116)	-216.88	823.6

Table 10
The Impact of Right-to-Carry Concealed Handgun Laws on the Number of Deaths or Injuries from each Shooting

(The regressions use the Poisson procedure and incidence rate ratios are reported. The regressions include the following independent variables: detailed demographic information by sex, race, and age; population and population squared; state unemployment rate; state poverty rate; real per capita personal income, unemployment payments, income maintenance payments; retirement payments; arrest rate of murder; and regional and year fixed effects. Regional fixed effects were used because the specifications were otherwise unable to converge. The absolute z-statistics are shown in parentheses.)

	Endogenous Variables		
Exogenous Variables	Murders in Multiple Victim Public Shootings	Injuries in Multiple Victim Public Shootings	Total Murders and Injuries in Multiple Victim Public Shootings
	(1)	(2)	(3)
Right-to-Carry Law Dummy Variable	.4790 (2.936)	.4747 (3.427)	.4709 (4.732)
Number of Shootings	1.3987 (15.461)	1.3425 (16.567)	1.355 (22.599)
Model Chi-Square	2202.2	3989.8	5842.2
Log Likelihood	-892.2	-1283.7	-1789.9
	(4)	(5)	(6)
Time Trend for Years Before the Right-to-Carry Law Went into Effect	1.001 (.0394)	.9558 (1.598)	.9768 (1.148)
Time Trend for Years After the Right-to-Carry Law Went into Effect	.8922 (1.876)	.8737 (2.815)	.8743 (3.772)
Number of Shootings	1.406 (15.734)	1.3549 (17.358)	1.3655 (23.389)
F-test for Differences in Time trends (probability in parentheses)	3.45 (0.0632)	3.02 (0.0823)	8.59 (0.0034)
Model Chi-Square	2197.2	3987.1	5834.1
Log Likelihood	-894.7	-1285.1	-1793.9
Number of Observations	1045	1045	1045

Table 11: Using the Data Collected from the New York Times

A) "Rampage Killings"

(The regressions use the Poisson procedure and incidence rate ratios are reported. The first set of regressions account for state population and population squared as well as state and year fixed effects. The second set of regressions as well as the estimates in section (B) include the following independent variables: detailed demographic information by sex, race, and age; population and population squared; state unemployment rate; state poverty rate; real per capita personal income, unemployment payments, income maintenance, and retirement payments per capita; arrest rate of murder; execution rate for the death penalty; waiting period dummy and length of waiting period in days and length squared; one-gun-a-month law; safe storage gun law; penalties for using guns in the commission of crime; and state and year fixed effects. The absolute z-statistics are shown in parentheses.)

	Endogenous Variables			
Exogenous Variables	Murders in "Rampage Killings"	Injuries in "Rampage Killings"	Murders and Injuries in "Rampage Killings"	Number of Attacks
Using the New York Times Data from 1995 to 1999 and controlling for state population and population squared as well as state and year fixed effects	(1)	(2)	(3)	(4)
Right-to-Carry Law Dummy Variable	.5301 (1.554)	.2642 (4.619)	.2524 (4.926)	.3898 (1.310)
Model Chi-Square	259.6	454.2	625.4	81.22
Log Likelihood	-234.0	-274.7	-463.2	-95.72
Number of observations	253	253	253	253
Using the New York Times Data from 1977 to 1998 and controlling for all the variables used in the earlier regressions	(5)	(6)	(7)	(8)
Right-to-Carry Law Dummy Variable	.02933 (5.435)	.2565 (1.910)	.0603 (6.541)	.2943 (1.254)
Model Chi-Square	1325.4	1985.9	3040.7	309.5
Log Likelihood	-352.7	-350.9	-695.6	-129.6
Number of observations	1093	1093	1093	1093

B) News Stories on Multiple Victim Public Shootings in the First Section of the New York Times

(Number of observations is 1045 for all specifications.)

Exogenous Variables	Multiple Victim Public Shooting Stories Appearing in the First Section of the New York Times for a State (Poisson estimates)	Multiple Victim Public Shooting Stories Appearing in the First Section of the New York Times for a State (ordinary least squares)
Right-to-Carry Law Dummy Variable	.1889 (3.335)	.0089 (.045)
Chi-Square	1029.7	
Log Likelihood	-388.8	
adj-R^2		0.3746

Table 12: Examining the Differences in State Laws

(The regressions use the Poisson procedure and incidence rate ratios are reported. The regressions include the following independent variables: detailed demographic information by sex, race, and age; population and population squared; state unemployment rate; state poverty rate; real per capita personal income, unemployment payments, income maintenance, and retirement payments per capita; arrest rate of murder; execution rate for the death penalty; waiting period dummy and length of waiting period in days and length squared; one-gun-a-month law; safe storage gun law; penalties for using guns in the commission of crime; and state and year fixed effects. The absolute z-statistics are shown in parentheses.)

A. Examining the Differences in Training, Fee, and the Number of Years that the Permit Rules Have Been in Effect

	Endogenous Variables			
Exogenous Variables	Murders in Multiple Victim Public Shootings	Injuries in Multiple Victim Public Shootings	Total Murders and Injuries in Multiple Victim Public Shootings	Number of Multiple Victim Public Shootings
	(1)	(2)	(3)	(4)
Train Period in Hours	.9704 (0.476)	.2642 (4.619)	.9267 (2.036)	1.062 (0.845)
Real Permit Fee	1.387 (0.488)	3.9135 (2.626)	1.9558 (1.771)	1.2512 (1.726)
Years After the Adoption of the Right-to-Carry Law	.4740 (4.234)	.5248 (4.700)	.5020 (6.473)	.5892 (2.890)
Years After the Adoption of the Right-to-Carry Law Squared	1.0878 (3.548)	1.0599 (3.285)	1.0697 (4.832)	1.0494 (2.114)
Murder Rate	1.1649 (4.252)	1.1296 (4.057)	1.1281 (5.449)	1.1019 (2.183)
Model Chi-Square	1937.4	3679.2	5268.5	1217.83
Log Likelihood	-1024.6	-1439.0	-2076.7	-676.1
Number of observations	1045	1045	1045	1045
B. Examining the Areas Where Permitted Concealed are Allowed				
Index of Prohibited Places (75 implies that that the concealed handgun law has no prohibitions, 1 equals the most restrictive concealed handgun law)	.9774 (4.324)	.9732 (6.040)	.9748 (7.623)	.9844 (2.721)
Model Chi-Square	1909.15	3658.3	5227.15	1203.3
Log Likelihood	-1038.7	-1449.5	-2097.4	-683.4
Number of observations	1045	1045	1045	1045

Table 13
Do Shootings Encourage Yet More Shootings?

(Equations use the Poisson procedure. The regression also includes monthly dummy variables. Incidence rate ratios are reported and the absolute z-statistics are shown in parentheses.)

	Endogenous Variable: Number of Shootings Per Month				
Exogenous Variables	(1)	(2)	(3)	(4)	(5)
Number of Shootings in Previous Month	1.0842 (6.534)	1.0698 (4.358)	1.067 (4.168)	1.0775 (6.028)	. . .
Number of Shootings Two Months Ago	. . .	1.0199 (1.323)	1.0002 (0.015)	. . .	. . .
Number of Shootings Three Months Ago	. . .	. . .	1.0305 (2.138)	. . .	. . .
Number of New York Times' Stories in the Front Section in Previous Month	.8928 (3.084)	.8907 (3.177)	.8865 (3.427)	. . .	.9236 (2.452)
Number of New York Times' Stories in the Front Section Two Months Ago	. . .	.9648 (0.992)	.9597 (1.160)	. . .	. . .
Number of New York Times' Stories in the Front Section Three Months Ago	. . .	. . .	.9310 (1.797)	. . .	. . .
Percentage of the Nation's Population Covered by Right-to-Carry Laws	.0413 (2.799)	.0461 (2.660)	.0632 (2.364)	.0286 (3.156)	.0298 (3.223)
Monthly Time Trend	1.0060 (3.525)	0.139 (3.719)	1.0057 (3.262)	1.0061 (3.610)	1.0064 (3.874)
Safe School Act	4.3138 (5.789)	4.1764 (5.587)	3.9361 (5.290)	4.6002 (6.073)	7.9725 (9.382)
Model Chi-Square	385.12	386.44	390.31	370.3	340.6
Log Likelihood	-422.34	-420.27	-416.14	-429.7	-444.6
Number of Observations	251	250	249	251	251

Appendix 2
Examining the Means for States that did not Change Their Concealed Handgun Laws During the 1977 to 1997 Period

States that did not Change Their Concealed Handgun Laws During the 1977-1997 Period: Using State Averages to Compute Rates								
Year	Murders in Multiple Victim Public Shootings Per 100,000 People	Injuries in Multiple Victim Public Shootings Per 100,000 People	Murders and Injuries in Multiple Victim Public Shootings Per 100,000 People	Number of Shootings Per 100,000 People	Number of Murders in Public Shootings	Number of Injuries in Public Shootings	Number of Murders and Injuries in Public Shootings	Number of Shootings
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1977	0.0131	0.0840	0.0970	0.0059	19	35	54	5
1978	0.0252	0.0543	0.0794	0.0148	14	10	24	7
1979	0.0031	0.0294	0.0325	0.0069	10	19	29	7
1980	0.0020	0.0060	0.0080	0.0015	5	11	16	3
1981	0.0282	0.0215	0.0496	0.0195	21	29	50	18
1982	0.0145	0.0504	0.0649	0.0097	12	72	84	8
1983	0.0036	0.0059	0.0095	0.0048	5	11	16	8
1984	0.0120	0.0250	0.0370	0.0081	31	52	83	12
1985	0.0095	0.0126	0.0221	0.0067	15	16	31	9
1986	0.0052	0.0090	0.0143	0.0052	11	24	35	11
1987	0.0149	0.0213	0.0362	0.0115	18	26	44	15
1988	0.0238	0.0250	0.0487	0.0122	32	42	74	18
1989	0.0168	0.0232	0.0400	0.0140	21	58	79	15
1990	0.0038	0.0103	0.0141	0.0047	16	38	54	16
1991	0.0153	0.0113	0.0266	0.0043	29	30	59	8
1992	0.0105	0.0139	0.0244	0.0053	27	43	70	14
1993	0.0212	0.0156	0.0368	0.0072	73	61	134	25
1994	0.0150	0.0092	0.0242	0.0087	13	19	32	9
1995	0.0070	0.0034	0.0104	0.0033	13	7	20	7
1996	0.1061	0.3432	0.4494	0.1421	72	194	266	89
1997	0.0627	0.1142	0.1768	0.0446	55	94	149	41

Data Appendix

Death Penalty Execution Rate
- Death penalty executions by state U.S. Census Bureau of Justice Statistics
- # of murders per state FBI Uniform Crime Reports

Crime rates per 100,000 people FBI Uniform Crime Reports

Arrest rates per crime (Violent crime, murder, property crime, rape, robbery, aggravated assault, burglary, larceny-theft, motor vehicle theft)
- Arrest rate FBI Uniform Crime Reports, though the data is not available for all years.

State populations
U.S. Census Bureau, Population Estimates Program released on Internet at www.census.gov/Press-Release/state02.prn

Income measures based on tables from
http://fisher.lib.virginia.edu/reis/county.html
These tables could not be downloaded in a condensed form via the Internet. I had to contact Al Silverman at the U.S. Dept. of Commerce, Economics and Statistics Administration, Bureau of Economic Analysis, Regional Economic Measurement Division (202-606-9277) to have him send me a readable table that includes all states for all years. Numbers are based on those published in June, 2000 for the years 1995-1998.

Per Capita Personal Income (RPCPI) is in Table SA05
Per Capita Income Maintenance (RPCIM) is in Table CA30
Per Capita Unemployment Insurance Benefits (RPCUI) is in Table CA30
Per Capita Retirement & Other (RPCRPO) is in Table CA30

°ßReal°® refers to 1982-1983 dollars (average of those two years)
- Consumer Price Index conversion factors based on table at
http://www.orst.edu/Dept/pol_sci/fac/sahr/cv98.htm

Unemployment rate
- From custom tables at Bureau of Labor Statistics website -
http://146.142.4.24/cgi-bin/dsrv?la

Poverty rate
- Bureau of Labor Statistics - Table 25. Poverty Status by State and Ten Large Metropolitan Areas in 1998 (same for 1997)
http://ferret.bls.census.gov/macro/031998/pov/new25_001.htm (1997 data)
http://ferret.bls.census.gov/macro/031999/pov/new25_001.htm (1998 data)

Demographic variables from census
U.S. Census Bureau - 1990 to 1998 Annual Time Series of State Population Estimates
By Age, Sex, Race, and Hispanic Origin - Table ST-98-39 (for 7/1/97 and 7/1/98)
http://www.census.gov/population/www/estimates/st_sasrh.html

Appendix 2

More Detailed Set of Regression Coefficients from the Simple Estimate Reported in Table 6 (Number of observations = 1045)				
Exogenous variables	Table 6 Column 3 Explaining total deaths and injuries		Table 6 Column 4 Explaining the number of shootings	
	Incidence Rate Ratio	absolute z-statistic	Incidence Rate Ratio	absolute z-statistic
Shall Issue Law Dummy	0.2151	9.609	0.3280486	3.82
Arrest Rate for Murder	0.9960666	2.942	0.9952213	1.818
Execution Rate	0.9715	1.209	0.9931	0.505
Waiting Period Dummy	0.8975358	0.71	4.198896	1.515
Waiting Period in Days	0.9939132	0.584	0.6725213	1.425
Waiting Period in Days Squared	1.014414	0.09	1.016592	0.982
One-gun-a-month Law	1.109443	0.191	0.8748271	0.144
Safe Storage Gun Law	1.073774	0.459	0.8250622	0.628
Penalty for using a gun in a commission of crime	2.91E13	3.078	0.6718624	1.166
State Population	0.9999999	0.712	1	0.92
State Population Squared	1	1.573	1	0.243
Real Per Capita Personal Income	1.000023	0.239	1.000258	1.355
Real Per Capita Income Maintenance	1.005806	3.131	1.002375	0.666
Real Per Capita Unemployment Insurance Payment	1.001974	1.136	0.9986415	0.364
Real Retirement Payments Per Person Over 65	0.9998008	0.612	0.9997663	0.378
State Unemployment Rate	1.343001	6.553	1.24501	2.424
State Poverty Rate	0.9480791	2.37	1.026594	0.617
Percent of the Population that is:				
Black Males 10 to 19 Years of Age	0.0309393	0.992	0.2262022	0.21
Black Females 10 to 19 Years of Age	5341.427	2.433	137.6209	0.704
White Males 10 to 19 Years of Age	23.66847	1.9	25.9636	0.941
White Females 10 to 19 Years of Age	1.27E01	1.2	0.0341304	0.939
Other Males 10 to 19 Years of Age	8.28E+08	4.998	1891463	1.775
Other Females 10 to 19 Years of Age	1.70E13	6.707	3.23E08	1.996
Black Males 20 to 29 Years of Age	0.8167172	0.108	0.1138905	0.58
Black Females 20 to 29 Years of Age	20.24739	1.549	69.20485	1.09
White Males 20 to 29 Years of Age	0.1132487	3.417	0.2358618	1.12
White Females 20 to 29 Years of Age	14.88749	3.919	2.971733	0.773
Other Males 20 to 29 Years of Age	265.2411	1.65	0.975273	0.004
Other Females 20 to 29 Years of Age	9.35E01	0.02	0.0163516	0.63
Black Males 30 to 39 Years of Age	1.56E06	5.426	0.0017685	1.248
Black Females 30 to 39 Years of Age	6622.304	4.514	16.02969	0.706
White Males 30 to 39 Years of Age	2931.809	5.823	5.983502	0.703
White Females 30 to 39 Years of Age	8.18E04	5.521	0.1100072	0.909
Other Males 30 to 39 Years of Age	0.0000256	2.906	0.0125477	0.587
Other Females 30 to 39 Years of Age	15353.86	2.78	55.37337	0.572
Black Males 40 to 49 Years of Age	0.0897098	0.868	0.0864408	0.45
Black Females 40 to 49 Years of Age	4475.959	3.33	1263.454	1.435
White Males 40 to 49 Years of Age	2.284444	0.736	1.268709	0.103
White Females 40 to 49 Years of Age	5.264373	1.394	1.866689	0.252
Other Males 40 to 49 Years of Age	2050366	2.98	105.0116	0.491
Other Females 40 to 49 Years of Age	1.71E06	3.288	0.0061294	0.661
Black Males 50 to 64 Years of Age	0.0007524	2.163	0.0019288	0.967
Black Females 50 to 64 Years of Age	0.5939145	0.184	0.2258918	0.266
White Males 50 to 64 Years of Age	2092.919	6.121	2.955171	0.439
White Females 50 to 64 Years of Age	0.0012159	6.487	0.1355853	0.953

Other Males 50 to 64 Years of Age	5.89E+08	4.036	10895.66	0.968
Other Females 50 to 64 Years of Age	5921817	3.279	35.11413	0.378
Black Males Over 64 Years of Age	6.30E07	4.656	2.94E06	2.012
Black Females Over 64 Years of Age	21782.44	4.657	17103.05	2.201
White Males Over 64 Years of Age	16.42544	2.886	0.5631965	0.298
White Females Over 64 Years of Age	4.65E01	1.153	1.23927	0.161
Other Males Over 64 Years of Age	9.49E+02	1.134	1.87E+08	1.637
Other Females Over 64 Years of Age	1.97E12	5.233	6.26E10	2.161
Year Fixed Effects				
1978	0.6144086	1.867	1.55637	0.774
1979	2.419846	3.374	2.874282	1.671
1980	1.345762	0.854	2.543089	1.205
1981	1.40725	0.792	6.546625	2.087
1982	0.7702999	0.511	2.975671	1.035
1983	0.2209044	2.601	2.13218	0.65
1984	0.8123332	0.327	3.5013	0.98
1985	0.4271977	1.21	2.893901	0.759
1986	0.383171	1.235	2.158159	0.5
1987	0.2857228	1.512	2.550774	0.575
1988	0.2195504	1.69	1.829284	0.344
1989	0.1474414	1.975	1.44242	0.195
1990	0.0431717	2.975	0.7075152	0.17
1991	0.0214102	3.356	0.3822376	0.437
1992	0.0058973	4.132	0.211221	0.653
1993	0.0074061	3.645	0.2843393	0.491
1994	0.0011508	4.742	0.0693321	0.986
1995	0.0017162	4.008	0.1080188	0.735
1996	0.0094291	2.905	1.262951	0.077
1997	0.006131	3.195	0.7214349	0.108
State fixed effects				
Alaska	9.28E07	2.873	2273.677	0.872
Arizona	315.1895	2.014	1601230	2.571
Arkansas	4.365399	1.162	186.3471	2.072
California	2.440504	0.346	166.7339	0.976
Colorado	21.46203	1.059	48874.94	1.956
Connecticut	58.64235	1.669	15476.08	2.031
Delaware	1.02E06	0.046	7.05E07	0.065
D.C.	0.0421282	0.616	2.05E06	1.281
Florida	4.83E+02	2.938	4327.855	1.915
Georgia	0.345945	1.496	0.1434456	1.332
Hawaii	6.39E33	5.461	1.98E07	0.615
Idaho	3.145178	0.355	173727.4	1.933
Illinois	2.457148	0.566	33.78523	1.06
Indiana	735.1607	3.191	28185.45	2.505
Iowa	11.55945	0.829	81700.39	1.957
Kansas	231.4512	2.136	296075.2	2.521
Kentucky	275.7836	2.507	12924.33	2.147
Louisiana	0.3802884	1.299	0.1998901	1.169
Maine	8.050525	0.643	106969.7	1.862
Maryland	1.465251	0.32	26.21247	1.439
Massachusetts	1153.813	2.694	74088.35	2.16
Michigan	19.02617	1.887	210.9348	1.716
Minnesota	16.10909	0.947	92580.94	2.005
Mississippi	0.0282325	2.601	0.0018076	2.31
Missouri	62.75716	2.238	3059.725	2.198
Montana	0.1028048	0.645	425725.4	1.934
Nebraska	64.66929	1.491	93351.13	2.086
Nevada	4.73E11	0.078	0.0208509	0.012
New Hampshire	4.496229	0.449	108751.2	1.837
New Jersey	20990.25	1.702	6.433943	0.216

New Mexico	340.1913	1.806	1967074	2.282	
New York	26342.01	1.705	0.1482885	0.211	
North Carolina	59.80803	4.83	74.89252	2.578	
North Dakota	1.712374	0.158	2069468	2.197	
Ohio	106.9125	2.57	645.0559	1.727	
Oklahoma	109.1635	1.849	54169.02	2.186	
Oregon	5.277829	0.539	288417.7	2.135	
Pennsylvania	515.5245	3.071	2975.216	1.897	
Rhode Island	238.1297	1.915	118140.2	2.07	
South Carolina	0.8126614	0.232	0.4070634	0.553	
South Dakota	0.0000363	0.033	22.12971	0.009	
Tennessee	1.188541	0.119	27.37615	1.283	
Texas	683.977	3.75	317.7401	1.526	
Utah	756.0805	2.12	276217.5	2.012	
Vermont	49.71928	1.195	226144.5	1.949	
Virginia	146.215	3.742	1348.581	2.842	
Washington	2.719711	0.333	184117.6	2.123	
West Virginia	58.00059	1.497	109994.8	2.197	
Wisconsin	5.079271	0.626	38522.63	2.088	
Wyoming	0.019079	1.082	26236.05	1.473	
Model ChiSquare	5260.4		1210.6		
Log Likelihood	2080.7		679.7		