Games with Guns and Statistics

Franklin E. Zimring

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The United States Congress is not by design or inclination an efficient research organization. To a significant extent, it must depend upon the fact findings of others. At a time when the nation is divided by a bitter controversy over the need for comprehensive weapons control legislation, many must wonder where Congress arms itself with the empirical information on firearms and crime required to make the difficult but necessary judgments about the need for such legislation.

This gap in many people's knowledge has recently been filled by the National Shooting Sports Foundation, Inc. That institution has published a pamphlet entitled, *The True Facts of Firearm Legislation—Three Statistical Studies*, that draws together three related research papers by Alan S. Krug on the relationship between firearms and crime. All three studies were introduced by different Congressmen into the *Congressional Record* during the pendency of firearms control proposals in 1967 and early 1968. The Shooting Sports Foundation counsels us that "[t]his report, using all of the pertinent statistics available, is the first comprehensive study on a national basis ever made on the relationship of firearms to crime in the United States. Most of the statistics are from the Federal Bureau of Investigation."¹

These statistics are important because they have achieved an important circulation. They should be closely reviewed.

The first study in the *True Facts* trilogy is *The Misuse of Firearms in Crime*. The study was introduced into the *Congressional Record* by Senator Bourke B. Hickenlooper of Iowa on April 2, 1968. Mr. Krug's first finding is that from 1910 to 1967, the firearm homicide rate in the United States has shown a decided downward trend. Furthermore, he stated that "during this 57-year period in which the firearm homicide rate has shown this downward trend, the extent of firearms ownership in the United States has trended upward."² The basis of Mr. Krug's finding is contained in his Figure 1 shown below.


² Id. at 2.
The statistics are impressive, but a few problems remain. First, Mr. Krug and his graph point out that the per capita firearm homicide rate, as opposed to the absolute number of homicides, has trended downward since 1910. However, his statement that the extent of firearms ownership in the United States has trended upward is in terms of the absolute number of firearms now owned in the United States, and gives no information on per capita rates of firearms ownership. No information is provided on more specific questions, such as the rate of pistol ownership per 100,000 of population and the rate of firearms ownership among differing social classes in the United States. Moreover, since the firearm homicide rate data for the 57 year period included important upward and downward trends, any useful data on firearm ownership would have to tell us when ownership trended upward. However, this information is not provided. Thus, while we do know that the rate of firearms homicide decreased in certain periods, Mr. Krug provides no information about the rate or quality of weapons ownership patterns in the United States during these periods.

Second, the rate of firearms homicide has not declined alone; the total homicide rate in America has declined over the period covered in these statistics. This raw correlation therefore is insufficient proof for the claim: ‘These data are not at all consistent

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3 Indeed, the firearms homicide rate in the early years of the depression exceed the currently experienced total homicide rate. Compare True Facts 6 with reports cited at notes 8-12 infra.
with the contention that firearms are a causative factor in homicides but rather tend to refute such a view.\(^4\) The more precise question to be asked is: With fewer firearms, would the decline have been sharper?\(^5\) These data tend to support only the proposition that no matter how strong the positive relationship between firearm availability and the firearm and overall homicide rates might be, firearm possession trends in the United States have been insufficient to maintain the homicide rate in America at its previous and outrageously high levels.

Third, the least squares distribution\(^6\) of firearm homicide rates and time periods represented by Figure 1 displays a curious omission. The data are presented as a series of dots representing five year averages for each five year period from 1911 to 1965. Yet the title to Figure 1 talks about the trend of the rate from 1910 to 1966. And the text has it “from 1910 until the present time the firearm homicide rate in the United States has shown a decided downward trend.”\(^7\) Yet, since the mid-sixties, the decided trend of homicides generally, and of firearm homicides, has been upward, and significantly upward. The last point on Mr. Krug’s graph represents an average of the firearm homicide rate from 1960 to 1965, and that average is 2.7 per 100,000 population. However, all of the low firearm homicide years in that five year period appear at the beginning of the decade, and an upward trend starts in 1964. In 1964, the overall homicide rate rose 7 percent.\(^8\) In 1965, this rate rose another 6 percent over the 1964 rate.\(^9\) In 1966, the rate rose another 10 percent.\(^10\) In 1967, it increased at least another 13 percent.\(^11\) These rate calculations have already controlled the popula-

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\(^4\) True Facts 2.

\(^5\) A more familiar example will illustrate the problem: since 1900, both the rate of cigarette smoking per 100,000 adults and the average life expectancy of American citizens have increased dramatically. Yet it has been a long time since anybody has, on the basis of those statistics, cautioned us that cigarette smoking may be good for our health, or suggested that the life expectancy trend is inconsistent with cigarette dangers. The now known truth is that without smoking the life expectancy would have grown ever faster. The homicide rate fluctuates for a wide variety of reasons, just like the American life expectancy statistics. The relevant statistic, therefore, would be one that would shed some light on what our homicide rate would be today in the absence of widespread firearm possession.

\(^6\) Least squares is a statistical method of fitting a straight line to data points on a graph in such a way that the sum of the squares of the distances of the points from the line drawn through the points is a minimum.

\(^7\) True Facts 2. This article is dated March 12, 1968.

\(^8\) FBI, 1964 Uniform Crime Reports 3.


\(^11\) FBI, 1967 Uniform Crime Reports, Preliminary Annual Release 1 (March 14, 1968). Statistics covering the first nine months of 1967 showing an even steeper rise in the yearly total, were published and released on December 11, 1967, by the FBI. This was three months before the date of Mr. Krug’s study.
tion increases. During the period from 1964 to the end of 1966, the percentage of firearm homicides to total homicides increased slightly so that, at minimum, the firearm homicide rate kept pace with the over-all homicide rate. Mr. Krug ignores the evidence of increase averaged into his larger period statistics for 1964 and 1965, and does not include data for the years 1966 and 1967. If this is the period during which firearms ownership trended upward, statistics on homicide are hardly evidence that no relationship exists between firearms and violent crime. Thus, Figure 1 does not represent current trends in the firearm homicide rate in the United States. Rather its labeling and descriptive textual material suggesting a 57 year downward trend in the firearm homicide rate misrepresent the modern trend in this rate. Moreover, this recent deviation from linearity is one of many, and it is perhaps inappropriate to discuss the homicide trend as a straight line phenomenon.

Fourth, to the extent that Figure 1 establishes any trend for the firearm homicide rate, it is based on a comparison of two different samples. As the author indicates in footnote 2 to Figure 1, "[t]he trend line was constructed from the actual data for the period 1910 to 1966." However, "[d]ata for 1910-1932 are for 'Death-registration States' only; data for 1933-1966 are for the entire United States." One wonders whether the rate for death registration states is significantly higher or lower than for the country generally. One could find out easily if Mr. Krug had kept a consistent sample in his reportage over time by giving parallel information on the rates for death reporting states from 1932 to 1966. In the absence of such information, we must begin with the serious suspicion that the rates for death reporting states are different from the rates of states generally. The most dramatic changes over time are those changes between the 1930-1933 rates of firearm homicide and the rates after the larger national sample was included. Moreover, the single greatest fluctuation in the firearm homicide rate over the entire graph occurs when the 1930-1935 period is compared with the 1935-1940 period—the period during and just after the introduction of the nationwide sample. Thus, the lion's share of the trend is attributable to what may be a false comparison.

But we are only half way through The Misuse of Firearms in Crime. The study makes a second, very important point: "Firearms were misused in 3.4 percent of the 3,243,370 serious crimes that were committed in the United States in 1966." A table (Table 1)

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12 1964 Uniform Crime Reports, supra note 8, at 6; 1965 Uniform Crime Reports, supra note 9, at 6; 1966 Uniform Crime Reports, supra note 10, at 7.
13 True Facts 3.
14 Id.
15 Id. at 2.
is included showing the relationship of firearms to other weapons used in the commission of serious crimes in that year. Somewhat stunned by this de minimis demonstration, the reader turns to Table 1. Table 1 tells us that 59.3 percent of all homicides involve firearms and that 18.8 percent of all aggravated assaults reported to the FBI involved firearms. It adds that 38.9 percent of all the robberies reported to the FBI, or some 59,680 in 1966, involved firearms. None of these figures looks remotely like 3.4 percent. How does Mr. Krug get that figure? He includes auto theft in a sample of serious crimes and, happily for the survival of Western civilization, there were about 50 times as many auto thefts last year as there were homicides. In addition to lumping over half a million auto thefts in with 10,000 homicides to reduce the apparent role of firearms in crime, Mr. Krug adds almost 900,000 larcenies and in excess of 1,300,000 burglaries to the potage of serious crime he uses as a baseline for the assessment of firearms impact. The 3.4 percent figure was obtained by the cheap trick of including into the base a host of crimes in which firearms are not reported. By adding indecent exposure and traffic offenses to his sample, he could have done still better.

The proper baseline for assessing the costs of firearms in crime is, of course, the area of violent crime against the person. If we assume that homicides, aggravated assaults, all forms of robbery, and forceable rape are the relevant classification of violent crime, firearms are involved in more than 25 percent of those occurrences. Nevertheless, there are some interesting statistics in Mr. Krug's Table 1. For example, firearms account for 60 percent of the national homicide statistics but only 19 percent of the aggravated assaults experienced and reported to the FBI. This means that while only slightly less than one in every five nonfatal aggravated assault is perpetrated with a gun, 60 percent of those assaults that result in homicide are gun related. Put more concretely, when the rate of gun killings per 100 reported gun aggravated assaults is compared with the rate of knife killings per 100 reported knife aggravated assaults, the ratio of deaths per 100 gun aggravated assaults is about five times that of the knife aggravated assault category. Guns thus are vastly more dangerous than any other attack weapon.

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16 Id. at 4.  
17 Id.  
18 1966 UNIFORM CRIME REPORTS, supra note 10, at 11. The use of these FBI statistics may understate the proportion of firearms in violent crime because the statistics on the weapons used in forceable rape are not reported to the FBI.  
There is a second, rather pregnant statistic available for the asking in Mr. Krug's analysis. His Table 1 indicates that nationally, 38.9 percent of all robberies involve individuals armed with firearms. The New York City Police Department statistics show that “[h]and guns were used in 23.4 percent of these [New York] robberies and rifles, shotguns and machine guns in 0.6 percent.”

Compared with the national average, New York, with its rigid Sullivan gun control law, has achieved a more than one-third reduction in the proportion of robberies carried out with firearms. Now we turn to Mr. Krug's second study in the True Facts trilogy: The Relationship Between Firearms Licensing Laws and Crime Rates. This was read into the Congressional Record in 1967 by Representative John D. Dingle of Michigan, who called the document “the first comprehensive statistical study ever made on the relationship of firearms availability to crime with firearms . . . .” As such, it deserves serious study.

The study begins with the hypothesis that states with firearm licensing laws have lower crime rates than states without such laws. By analyzing murder and nonnegligent manslaughter rates, robbery rates, aggravated assault rates and total serious crime report rates by state, Mr. Krug manages to reject his hypothesis. Unfortunately, the reader cannot be convinced by these findings. In the first place, Mr. Krug’s definition of what constitutes licensing is all embracing. Among the 36 states he lumps within this group, New York has a fairly restrictive gun control law; Hawaii requires the registration of all hand guns with the police. On the other hand, according to Mr. Krug, Florida, also a “licensing state,” requires a purchase permit only in Jacksonville and Miami, and Louisianna requires such permits only in New Orleans. Alabama, Connecticut, Indiana, Oregon, Rhode Island, and South Dakota have no requirement of a permit to purchase firearms but merely require a waiting period between purchase and delivery of certain firearms; yet they are considered “licensing” states. This treatment of licensing dilutes the gun control concept to its bare minimum and, on this basis alone, the general conclusion would be suspect.

But the study displays a much more serious error. There are vast regional differences in the overall homicide rates of the various states of the union. Using the data that Mr. Krug sets forth in his tables on overall murder and nonnegligent manslaughter

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20 True Facts 4.
21 Now there are many reasons for not comparing New York City with the national average. Such a use of proportional criminal statistics is highly speculative, and I claim no truth value in comparisons of this kind with this type of rough composite of national crime statistics. Such figures do, however, suggest methods of research that should be pursued.
rates, the data used in the comparison begin to take a rather un-
usual shape. First, it can be noted that the difference between the
overall homicide rates among nonsouthern, border, and southern
states are startling. The median overall homicide rate for the nine
Deep South states is 8.9 per 100,000—more than three times as high
as the nonsouthern, nonborder homicide rate.\textsuperscript{23} A proper study
would therefore make separate comparisons of southern and non-
southern states to test licensing effects. Yet all of the Deep South
states are represented in the licensed category, so the southern
states should not be used at all. The same holds true for aggra-
vated assault.\textsuperscript{24}

The brave explorer who would use Mr. Krug's concept of licens-
ing would find that the mean nonsouthern state overall homicide
rate in the licensing states amounted to 3.34 per 100,000. Thus, if
we remove southern states, we would arrive at a lower overall
homicide rate in licensing states than in the nonlicensing states
(4.1). Given the rather broad definition of licensing, this is prob-
ably not terribly meaningful. But it is also certainly not evidence
against the preventive potential of effective firearms control.\textsuperscript{25}

For those who are bored with arcane points of methodology,
I have sought a more direct method of communicating the magni-
tude and importance of the methodological error involved in treat-
ing homicide data without any regional stratification. Using Mr.
Krug's undifferentiated national sample, we will ask the question:
Does the existence of capital punishment for homicide cause homi-
cide? In 1966, Mr. Krug's comparison year, the death penalty state
mean homicide rate was 5.89; the nondeath penalty state mean was
3.44. The data indicate that there is a positive correlation between
a state's homicide rate and the existence of the death penalty for
homicide in that state.\textsuperscript{26} Do these results indicate that capital
punishment causes homicide? Of course not. The same regional
bias is imported into the statistics, because all southern states
have the death penalty. This merely illustrates that the failure to

\textsuperscript{23} The median nonsouthern, nonborder state homicide rate is 2.7 per
100,000 of population. The median for border states, including West Vir-
ginia, Delaware, Maryland, Kentucky, Arkansas, Missouri, and Tennessee,
is more than twice as high—3.9.

\textsuperscript{24} In addition to aggravated assault, Mr. Krug correlates licensing with
serious crime rates. For discussion of the serious crime index, see notes
15-18 supra and accompanying text. For a discussion of robbery rates as
an index, see Figure 4 infra and accompanying text.

\textsuperscript{25} In rough multiunit comparisons, comparative data are danerous
whether the data support the hypothesis that we wish to forward or reject
it.

\textsuperscript{26} The correlation is 0.318. This difference is significant at the .05 level.
Richard Block, a graduate student in the Department of Sociology at the
University of Chicago, performed the capital punishment and homicide rate
computation under conditions of maximum duress.
stratify areas can produce spurious associations, and can hide genuine associations of some magnitude.

Mr. Krug's third and final study in *True Facts* is *The Relationship Between Firearms Ownership and Crime Rates: A Statistical Analysis*. This study was introduced into the *Congressional Record* in 1968 by Representative Robert R. Casey of Texas. The introductory headline in the *Record* states that the study proves that gun ownership is a major deterrent to crime and the introductory headline in *True Facts* claims the study proves there is no causal relationship between gun ownership and crime. Mr. Casey says:

> Mr. Speaker, I would like to bring to the attention of my colleagues in the House a recent statistical study which should clear away much of the confusion and contradiction which has been so prevalent in the long debate over firearms legislation.

Alan S. Krug describes this enterprise in the following terms:

> This study tested the hypothesis, "There is a causal relationship between the availability of firearms and crime rates." The extent of firearms ownership was compared with rates of serious crime, murder, aggravated assault, and robbery in each of the fifty states...

> It was found that there is no positive correlation between the extent of firearms ownership and crime rates. Rather there is a negative correlation...

> The negative correlations between the index of firearms ownership and serious crime, aggravated assault and robbery were statistically significant. This means that firearms ownership by the law-abiding public could be a factor in restricting the number of these criminal acts. However, such a cause and effect relationship is not proven by, but is only consistent with, the results of this study.

The statistical bulwark of this study is a series of four scatter diagrams.

Figure 1 places states as dots with respect to two variables: each state's total serious crime rate (vertical axis), and that state's index of firearm ownership (horizontal axis).

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28 Id.
29 *True Facts* 14, 17.
The use of a total serious crime rate index in any discussion of the role of firearms in violent crime has already been discussed.\textsuperscript{30} Since unrelated crimes, such as larceny, auto theft, and burglary are seven times as frequent in the "serious crimes" statistics as those crimes in which firearms are usually carried, failure to discriminate between those two kinds of crimes makes comparisons based on total classifications meaningless.

Furthermore other factors that may not be randomly distributed over states differing in firearm ownership may be expected to influence the rate of crimes like auto theft. Per capita wealth, the number and kind of automobiles available, and population density are all factors that might not be evenly distributed over states with different indexes of firearms ownership. For instance, if states with a high index are more rural than other states we would expect their auto theft, larceny and burglary rates to be much lower than other states even if firearms did cause crime. How different such states might be can best be expressed by examining the horizontal axis variable used as an index of firearms ownership.

With respect to this statistic, Mr. Krug says, "[b]ecause the major use of firearms is for hunting, the number of individuals who purchase hunting licenses in each state is a reliable guide to the ex-
tent of firearms ownership in those same states.” Mr. Krug cites no evidence for the proposition that hunting is the major use of firearms in this country. On the contrary, there are some indications that hunting is not the primary use of weapons in the United States. A national poll, conducted by the National Opinion Research Center in 1966, found that 36 percent of the individuals polled owned a gun that was used for, among other things, household protection. A 1967 Harris poll estimates that 54 percent of the households in the United States contain a family member who owns one or more guns. Thus, a very large portion of American gun ownership is related to household protection.

As a result, the use of hunting licenses as an index of firearms ownership appears to be misleading. The South, as we shall soon see, has a lower than average rate of hunting licenses per 100,000. Yet the Harris poll shows the South with the highest rate of firearms ownership in the United States. The average hunting license proportion in the South is about 7 percent; yet 67 percent of the households in the South report firearms ownership. Furthermore, Mr. Krug’s unsupported major premise results in some deficiencies that lead to real dangers of misinterpretation.

First, even assuming that hunting is the major use of all firearms, that does not mean that hunting is the major use of particular types of firearms, such as hand guns. Indeed, we are told that pistol hunting is a rather exotic sport. Therefore, while hunting licenses per 100,000 population might be a decent index of the rate of rifle ownership in particular states, it very well might have nothing to do with the rate of pistol ownership in the several states. Since pistols are considered a major crime problem, this itself is a serious deficiency. Since pistol ownership is a major portion of firearms ownership, a more general validity problem is raised.

Yet even with respect to the use of the hunting license statistics as an interstate index of rifle ownership, there are serious problems. Let us assume that, in a state like South Dakota, a large majority of weapon ownerships are devoted to hunting intentions. In a more urbanized jurisdiction, California for example, far fewer firearms ownerships proportionally may be related to hunting intentions. In that case, California could have half the hunting license applications per 100,000 rate that South Dakota exhibits, and yet have just as many rifles per 100,000 population, and certainly could have many, many more hand guns. Now, if hunting is not the major use of rifles in all states, the index differential could be such that two and three times the proportion of firearms

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31 **True Facts** 14.
33 See text accompanying notes 35 to 38 infra.
34 Philadelphia Inquirer, Sept. 20, 1967.
in one state are used for hunting in a high hunting proportion state than in a neighboring low hunting proportion state. Even if we can assume that the major use of rifles in all jurisdictions is hunting, the margin of error from the use of hunting licenses as an index of rifles alone could be close to 50 percent. Particularly since the degree of urbanization of a particular jurisdiction might affect both the propensity to experience particular kinds of crime rates and the amount of weapons ownership devoted to hunting, this casts a serious shadow on the use of hunting license proportions as an index of firearms ownership (even if the relevant universe is rifles rather than all firearms).

We can expect states with large urban areas to have higher property crime rates than states with smaller urban areas. In addition, states with large urban areas would have a greater proportion of the population using weapons for purposes other than hunting than states without large urban areas where the distribution of guns is concentrated in rural settings. States with large urban areas will probably have a greater proportion of pistols in their total firearm population than do states with predominantly rural populations. Also predominantly urban states could have half the rate of hunting licenses displayed by a rural state and have just as many rifles, and two or three times as many hand guns per 100,000 population. At the same time, we would expect

Figure 2. Correlation of murder and non-negligent manslaughter rates with index of firearms ownership by state: 1966.
the urban states to have a higher serious crime rate, even if firearms contributed to crime.

Figure 2 represents the correlation of murder and nonnegligent manslaughter rates with the index of firearms ownership. Murder and nonnegligent manslaughter are the kind of violent crimes that proponents of gun control legislation feel may be associated with the availability of firearms. Thus, objections dealing with the misleading and skewed nature of the category of "serious crimes" do not apply to this analysis.

All of the problems mentioned above relating to the choice of index of firearms ownership used by Mr. Krug do apply, and are very real dangers in this analysis. In addition, the already mentioned failure to stratify the population of states represented on the correlation graph into northern and southern states is a serious error. As indicated, for a variety of cultural and demographic reasons the southern states of the United States have homicide rates vastly in excess of the nonsouthern states. If southern states are concentrated in one area of the graph states by areas of hunting licenses per 100,000 population, this could seriously affect the results. In fact, southern states tend to have rather low hunting license rates per 100,000 citizens, with the highest southern state total being Mississippi's 12,005,35 the lowest southern state figure being quoted as 3,520 (Florida),36 and the median southern state figure being in the 7,000's.37 They range from 17th to 44th in per capita hunting licenses.38 If the southern states were removed from the murder analysis and the other states were stratified by index of firearms ownership, it is possible that a positive relationship between hunting license rates and homicide rate might emerge. With this degree of crude control, even if a relationship could be noted, it would have absolutely no meaning.

Figure 3 deals with aggravated assault rates and demonstrates the same pitfalls attributed to Figure 2. Again, aggravated assault rates are distributed geographically in ways that make the use of aggregate national correlation statistics inaccurate. This time, both urbanization and southern states correlate with high rates and are missing in the high license category.

35 True Facts 19.
36 Id.
37 Id.
38 Id.
Figure 3. Correlation of aggravated assault rates with index of firearms ownership by state: 1966.

Figure 4. Correlation of robbery rates with index of firearms ownership by state: 1966.
Figure 4, dealing with robbery rates, introduces a whole new set of possibly confounding variables to Mr. Krug's study. Wealth per capita, urbanization, race distributions, and a host of other variables affect robbery. Unless we can assume that high hunting license states are much like low hunting license states in relevant variables, we cannot compare the two groups in any meaningful way. Such similarities do not appear. According to Mr. Krug's figures, the highest hunting license rate states in this survey are Wyoming, Vermont, Idaho, Montana, South Dakota, and Maine, in that order. The lowest jurisdictions include: Hawaii, Rhode Island, Connecticut, New Jersey, and California, in that order. The bias seems painfully obvious. Of course New Jersey is more robbery prone than South Dakota. So what?

Would it be unfair to conclude that these studies are sadly lacking in persuasiveness on issues relating to the relationship between firearms and amount of crime? Can this be our final conclusion? There is one further point that must be made. The National Shooting Sports Foundation, Inc., says these papers are "the first comprehensive study on a national basis ever made on the relationship of firearms to crime in the United States." If the statement is true, it is to be lamented. Mr. Krug has had this question all to himself far too long. There is every indication that he could make good use of the assistance of serious students of crime in America.

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39 Id.
40 Id. at cover page.