"A Critique of Methods Used to Estimate Civilian Firearms in **Small Arms Survey 2007, Guns and the City"**

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In this essay I briefly criticize the methodology used in the recent publication, **Small Arms Survey 2007, Guns and the City**, to estimate global firearm stock. My critique will focus exclusively on Chapter 2, "Completing the Count, Civilian Firearms", by Aaron Karn, which introduces important modifications to previous approaches used by the Small Arms Survey (SAS) group for estimating firearm stock (Killias, 1993; SAS 2002, 2006). The principal innovation in Chapter 2 is a new way to estimate the number of firearms held outside of national governments, referred to here as "civilian firearms". Using this new approach, the SAS estimates have nearly doubled for world-wide firearm stock, jumping to 875 million from 500 million. This increase is only apparent, as it is due entirely to changing methods for estimating non-governmental firearms. The author asserts that 650 million of these firearms are held outside of government (by "civilians"). It is important to assess this new, and supposedly more sophisticated, approach in order to evaluate its contribution.

The first point to consider is the doubtful utility of firearms stock as an explanatory variable. No empirical justification is offered, so it is somewhat surprising to discover that the author of this chapter merely assumes that firearms ownership, and particularly civilian firearms ownership, is the driving force behind civil unrest and criminal violence internationally.

There is very little explanatory power in such a simplistic measure as firearms stock. Over the past few decades, academic researchers, political scientists as well as economists, have studied a wide variety of factors that theoretically may contribute to intra-national and inter-national conflict. A few of the more important factors are: lack of economic freedom, income disparity, poverty, slow economic growth, organized crime, non-democratic government, governmental corruption, low adult-education levels, drug trafficking, and a history of violent ethnic conflict. Scholars have empirically evaluated these variables in a wide variety of studies, but little evidence has emerged that would suggest that firearms stock or civilian firearm ownership are important contributory factors (Azar and Burton, 1986; Deering and Pollins, 2003; Rummel, 1981, 1998; United Nations, 2007; Zartman, 2000).

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Interestingly, the author appears to want to have it both ways. In the introduction, the author asserts that the availability of firearms is equated with social problems, even depravity: ”Many of the examples in this chapter illustrate a strong connection between ownership levels and depravity.” At the same time, he readily admits that “ ‘gun cultures’ do not automatically translate into armed conflict” (both on p. 40). One might reasonably ask: if firearms are only occasionally associated with social problems, does it not follow that other factors may well be more important? No empirical evidence is presented in this chapter that demonstrates a link between lawful civilian firearms ownership and social problems.

Later in the chapter, the author admits that “gun ownership is highly concentrated among the largest and wealthiest societies”. Table 2.3 shows the countries that the author estimates to have the largest holdings of firearms. Many of these are among the most politically stable countries in the world and are able to boast of admirable histories of low levels of violence[2]. Thus the very data presented in Chapter 2 undermine their author’s claim that civilian firearm ownership contributes to social chaos, violent crime or armed conflict. Moreover, analyses of other data collected by the Small Arms Survey, for other subsets of countries, fail to conform to their assumption that civilian firearm ownership is linked to criminal or political violence (Kates and Mauser 2007; Kopel, et al, 2003; Mauser 2005).

Conceptual problems

Conceptual confusion abounds in Chapter 2. The author frequently moves back and forth between terms such as, ‘criminal violence’, ‘gun violence’, ‘gun crime’, ‘armed conflict’ and ‘social chaos’. The result is to equate violence involving firearms with civil unrest or criminal violence. This is confusing because firearm-related violence is only a fraction of total criminal violence. In politically stable countries, violent crime involving firearms is typically a very small portion of total criminal violence. For example, in Canada firearms were used against a victim in just 2.4 percent of all criminal violence in 2006 (Dauvergne, and De Socio, 2007). Nor are firearms the primary weapons involved in countries torn by civil strife or insurrectionary violence. In Rwanda, for example, machetes were used to murder almost all of an estimated 800,000 people in 1994. Firearms were not widely available to the killers, although the government did distribute grenades, and to a lesser extent, firearms, to select groups of their supporters (Human Rights Watch, 2008). Such intellectual sloppiness on the part of the author obscures real

[2] In fact, 11 of the countries identified as having the largest civilian holdings of firearms are included in the list of 50 most secure countries in the world that was recently released by Jane’s Information Services (2008). As well, this list somehow fails to include the 10 least stable countries in the world (Gaza, Somalia, Afghanistan, Sudan, Cote d’Ivoire, Haiti, Zimbabwe, Chad, Democratic Republic of Congo, and the Central African Republic), also identified by Jane’s (2008).

differences in the types of violence that threaten civil society, e.g., criminal activity or insurrectionary violence. The result is that the threat of firearms is greatly exaggerated.

Additional conceptual problems mar the chapter. In analysing the potential threat of firearms, it is important to distinguish basic types of firearms and firearm owners. This is not done. Surprisingly, the author uses the term "firearm" to include a wide variety of things that are not firearms[3]. The author's treatment of firearms owners is equally egregious. While ignoring definitions, he initially recognizes three distinct types of firearm owners: governments, civilians, and criminals. Despite recognizing the difference between civilians and criminals, and presumably terrorists and revolutionaries, the author quickly subsumes them all into a vague general category, "private ownership", which he then labels "civilians". This is overly simplistic and misleading.

By treating criminals as equivalent to responsible citizens who obey laws surrounding gun ownership, the author, perhaps inadvertently, violates not only common sense but also the basic assumptions that underlie democratic governments around the world. This approach abandons any pretense that governments derive their legitimacy from popular sovereignty. If there are no real differences between criminals and responsible citizens, then democratic government is no different from dictatorship. Indeed, the author implies that governments have no duty to be responsible to their citizens. In taking this approach he undermines the legitimacy of modern democratic governments.

On a more practical and immediate level, by not differentiating between responsible civilians and criminals, the author confuses the problems in estimating firearm numbers for each of these categories. (This point will be expanded on in the next section). There is a great deal of information published about legal firearms that is not available for illegal firearms. Finally, this confusion unnecessarily exaggerates the potential threat of longstanding civilian firearms ownership within any given country.

The analysis in this chapter errs in still another way. In evaluating the threat of firearms, the author simplistically ignores important differences amongst countries. The justification offered for glossing over this is that the focus is merely to gain a count of the number of firearms. This is disingenuous because accuracy in counting of firearms would be facilitated if he recognized important national differences. More and better data (e.g., surveys, official records) are available for wealthier and more democratic countries but not for many others. Moreover, in all likelihood differences among countries have much more to do with the potential of violence and social chaos than the mere number of firearms in a country.

The author merely assumes there is a greater danger in privately owned firearms than firearms possessed by a government, although he does not provide any support for such a

[3] Some examples illustrate this confusion. Starter pistols (which cannot shoot projectiles) are included in his analysis of firearms in the United Kingdom; in a later section, he includes a wide variety of military weapons, such as mortars and grenades, as if they were firearms.

belief. It would appear obvious that the potential threat of a government depends critically upon the nature of the government in question. Some governments (e.g., North Korea, the former USSR, or Zimbabwe) undoubtedly pose larger threats to their citizens than do more democratic governments (e.g., France, Canada, or New Zealand). Unfortunately, the author appears oblivious to this important observation, for in his discussion of the threat posed by firearms, he makes no serious attempt to evaluate or even in passing to identify differences among national governments around the world.

Methodological problems

The author reports that he used three different approaches to estimate private firearms stock in 178 countries. The first relies upon the firearm registry in a country, the second utilizes so-called "independent" estimates made by experts or informants selected by the author, and the third uses a simple statistical model. Despite the scanty description of these approaches, I will attempt to briefly evaluate them. The bulk of the claims for countries included in this chapter are derived from these "independent estimates". Unfortunately, none of the estimating approaches used here are described sufficiently to be able to adequately evaluate them.

The author, quite properly in my judgment, employs a variety of approaches to estimate firearm stocks. However, instead of presenting and evaluating each of these approaches separately, the author jumbles them all together, mixing countries and approaches together seemingly at random. This violates accepted practice. When multiple estimation methods are employed, each one should be evaluated separately and accompanied by individual error analyses. Beyond painting his problems and solutions with very broad brushstrokes, the author provides no empirical support for his claims of accuracy for any of the methods he employs. [4]

It is exceptionally challenging to estimate the number of firearms because of the sensitive nature of this inquiry and the intrinsic importance of firearms to both owners and governments. All gun owners – governments, civilians, criminals and insurrectionary forces – have clear reasons for being less than candid about firearm ownership. This reluctance can be found both in survey studies and in official records. These challenges necessitate, as the author recognizes, deploying multiple methods that rely upon different types of data. Used properly, multiple methods allow for cross checking. Unfortunately, the author fails to adequately present empirical support for his claims.

One of the hallmarks of responsible research is the open reporting of methodology. Openness allows readers to decide for themselves the validity of the findings, and it allows others to attempt to reproduce the findings from the data. Criminological phenomena are complex. Anyone who ventures into the minefields of estimating such

[4] The annexes in which the methodology is supposedly described more fully are still not available more than one year after publication. Such failure to publish annexes and methodological details has also occurred in earlier SAS publications.

phenomena, including estimating the numbers of weapons, is rudely introduced to the inherent challenges of the undertaking. While the author allows that he encountered difficulties in making these estimates, he is not more specific in admitting what they were or what limitations were thereby imposed. Instead, he incongruously stresses the validity of the approach.

Firearm registration. The author is quite correct in believing that firearm registration records do not include all firearms within a country. This is certainly true even for the most modern and technologically advanced countries for a variety of reasons. It would be unreasonable to expect that criminals would register their firearms. In addition, many countries exempt their own military, as well as other classes of governmental firearms, from the civilian registry. Thus, even for the 52 countries that the author believes have solid and reliable firearm registries, the author quite legitimately relies upon independent estimates for substantial contributions to his estimate of total civilian firearms stock in a country. Another 25 countries, according to the author, have firearm registration, but he does not trust the data, preferring to rely upon independent estimates[5]. No firearm registry data are available for another set of 25 countries. Here his estimates are based solely upon his so-called "independent estimates".

Independent estimates. Given the importance of so-called "independent estimates" in the determination of privately held (or non-governmental) firearm stock, that is, what the author refers to as "civilian" firearms, it is especially disappointing that the author does not provide adequate information to allow the approach to be evaluated. He says he carefully weighed the various estimates made for each country. Yet, with a few exceptions, he does not provide any details about the independence or the quality of the estimates. Evaluating the quality is crucial. It is important to know who these estimators were; how they were selected; how many separate estimates were used in determining the number of firearms in each country; and exactly how conflicting estimates were resolved. We are not told. Despite using sophisticated language, the author does not make clear how these "independent estimates" differ substantially from the previous methods which the author scorns as "unsophisticated" since they are merely "indirect techniques" or worse, generated from "a sense of feel". The details that might demonstrate the superiority of the author's approach remains unavailable in the yet-to-be-published annexes.

Statistical modelling. The author uses a simple statistical model to estimate the number of firearms in the remaining 76 countries. Despite the implications that this model is based upon more than one basic national indicator, I could find only one, the GDP per capita. Apparently, this model is a simple bivariate linear regression between GDP per capita and the estimated non-governmental firearms stock. The author's description is vague and incomplete. It is not clear whether one world-wide model was used to estimate civilian firearms stock, or regional models were used. And if regional models, it is unstated how many were involved. Nor is it clear how many countries the author used as

[5] Many countries, such as South Africa, simply lack the technical infrastructure to adequately maintain a firearm registry.

the base for his model. Was the model developed on the 52 countries where the author had the best estimates, or were all 102 countries included where estimates of any quality were made? Whichever is the case, the author calculates a linear relation between GDP per capita and his estimates of gun ownership using his base, and then he predicts from their GDP per capita the number of firearms civilians own in individual countries. This is not a very sophisticated model, and merely results in the non-threatening and totally unsurprising discovery that civilians in the richer and more stable countries in the world have more firearms than do non-state actors in the poorer and less stable countries.

Summary

This paper reviewed the methodology used in, "Completing the Count, Civilian Firearms," **Small Arms Survey 2007, Guns and the City**, to estimate the number of firearms held outside of national governments. The principal innovations consist of so-called "independent estimates" and a simple regression model.

Conceptual confusion riddles this chapter and exaggerates the threat of civilian firearms ownership. The author conflates responsible firearms owners with criminals, revolutionaries and terrorists, who are together referred to as "civilians". Gun violence, even though it is but a fraction of total violent crime, is treated as synonymous with violent crime and civil unrest. The term "firearm" is mistakenly used to include objects other than firearms.

The firearms count relies upon "independent estimates" that are not described in a fashion sufficient to allow evaluation. Despite their critical nature, no systematic attempt is made to justify the qualifications of the people making these estimates. The author claims that important information is to be found in the annexes, which however remain unpublished.

The author merely assumes his conclusions. He uses a simple linear model to estimate the number of firearms held outside of government uniquely from the wealth of a country. This simplistic model merely reaches the obvious and non-threatening prediction that individuals in richer countries have more firearms. This result contradicts the author's claims about the threats posed by "civilian" firearms ownership because richer countries tend to be more politically stable and to have less civil unrest.

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