

The Stock and Flow of US Firearms: Results from the 2015 National Firearms Survey

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ABSTRACT

We estimate that there were approximately 270 million guns in the US civilian gun stock in 2015, approximately 70 million more guns than in the mid-1990's. Over that time, the fraction of the stock that is handguns has grown (to over 40 percent), as has the fraction of owners with both handguns and long guns (to over 75 percent). Compared to 1994, current gun owners own more guns, but gun ownership is highly concentrated: while the median gun owner owns two guns, the 8 percent of all gun owners who own 10 or more guns account for 39 percent of the stock. We estimate that approximately 70 million firearms changed hands within the past five years, the large majority of which were purchased. Two and a half percent of our sample reported having had a gun stolen within the past 5 years, accounting for an estimated 400 thousand guns per year.

Keywords: Firearms, Guns, Gunstock, Handguns

INTRODUCTION

The US is widely described as having more firearms in civilian hands than any other nation in the world. The empirical basis of this claim is derived primarily from aggregate firearm sales and importation/exportation data that are collected by the Federal Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF). ATF data indicate that between 1899-2013, more than 360 million firearms entered the US firearms market, with annual additions to the stock growing in recent years (e.g., by approximately 16 million guns in 2013)(Bureau of Alcohol Tobacco Firearms and Explosives 2015). ATF's figures, however, fail to account for guns no longer in circulation and do not speak to the extent to which guns in the U.S. are concentrated within subpopulations (e.g., by sex, age, race, SES, geography, etc.).¹

While many surveys(Gallup 2016, Morin 2014, Smith and Son 2015) ask respondents about whether or not there is a gun in the home, it is rare for surveys to ask about the number of guns respondents own. The best and most widely used estimates of the number and distribution of firearms across the US are derived from the two national surveys dedicated to producing

¹ Several national surveys, most notably the General Social Survey, regularly collect information on one facet of the distribution of firearms – the proportion of U.S. households that contain firearms.

detailed, disaggregated, estimates of the U.S. gun stock, one conducted in 1994(Cook and Ludwig 1997, 1996), the other in 2004, by members of the current research team (LH, MM, DA, DH)(Hepburn et al. 2007). These two surveys carefully characterized gun ownership and produced aggregate estimates of the total number of firearms in the US civilian gun stock. The surveys, taken together, suggested several important trends in firearm ownership in the U.S: 1) a steady increase in the number of firearms in civilian hands, 2) a growing proportion of the gun stock represented by handguns, and 3) concentration of firearms among fewer gun owners. In the 1994 survey, sponsored by the National Institute of Justice (NIJ), Philip Cook and Jens Ludwig estimated that American civilians owned approximately 192 million firearms, approximately one third of which (65 million) were handguns. In 2004, we updated this estimate to approximately 283 million firearms (more than 4 per owner), 40 percent of which were handguns.

Less is known about the movement of firearms into and out of US civilian hands than is known about the gun stock. Firearm manufacturing data provide one measure of the annual number of new guns available to be purchased (flow of new guns into the market), while other data collected by the ATF provide a related, but overlapping measure: the annual number of adults who undergo a background check before acquiring (or attempting to acquire) 1 or more guns.² Other movements of firearms, such as dispositions by the police and military are not centrally recorded(Wright , Rossi, and Daly 1983, Cook and Ludwig 1996). The National Crime Victimization Survey (NCVS) collects information on firearm theft(Langton 2012, Rand 1994), with recent estimates suggesting that between 2005 and 2010, approximately 250 thousand guns

² Federal law requires that those involved in the business of firearm commerce have a federal firearms license (FFL). Since 1994, the buyer in all gun sales originating with an FFL must undergo a background check. Other transactions, such as private sales, inheritance, etc. do not require a background check (or associated Federal record of the transaction) under Federal and many state laws.

were stolen annually(Langton 2012), but no single source provides an estimate of the flow of guns. In consequence, as with the gun stock, the best available evidence to date regarding the frequency of gun transfers, and the number of guns transferred, comes from the 1994 and 2004 surveys.

To learn more about private ownership and use of firearms in the US today, as well as to characterize where and to what extent new and used firearms have exchanged hands over the past five years, in 2015 we conducted the first nationally representative survey of firearm ownership and use in over a decade (the National Firearms Survey, NFS). In this article we focus on features related to the gun stock (e.g., its size, composition, and distribution; the reasons for private gun ownership) and also characterize salient aspects firearm transfers between parties, such as where current firearm owners acquired their most recent firearm, by type of gun and recency of acquisition.

METHODS

Data for this study come from a national web-based survey (N=3949) conducted in January 2015 by the survey research firm GfK. Respondents were drawn from GfK's KnowledgePanel (KP), an on-line panel that includes approximately 55 thousand U.S. adults. The KP panel is selected (on an ongoing basis), using an equal probability of selection design so as to provide samples, after minor adjustments for deviations from equal probability selection (base weights), that are representative of the US population. Prior to selection of a study sample, GfK adjusts panel base weights to account for any discrepancies between panel composition and the distribution of key demographic characteristics of the US population as reflected in the most recent Current Population Survey(GfK 2013). We oversampled gun owners (n=2072) and veterans (n=1004).

The final study weights provided by GfK combined pre-sample weights with a set of study-specific post-stratification weights accounting for oversampling and for survey nonresponse.

For our survey, 7,318 KP panel members received an invitation to participate. Of these, 3,949 completed the survey, yielding a survey completion rate of 54.6 percent. In contrast, non-probability, opt-in, online panels typically achieve a survey completion rate between 2 percent to 16 percent (Callegaro and DiSogra 2008). All panel members, except those currently serving in the US armed forces were eligible to participate.

Following earlier work (Cook & Ludwig 1997; Hepburn et al. 2007), our estimates of the magnitude and distribution of the US gun stock, as well as gun transfers and theft come from the reports of those who personally own guns. Gun owners were identified through two questions: “Do you or does anyone else you live with currently own any type of guns?” followed by, among all respondents who answered in the affirmative: “Do you personally own a gun?” Gun owners were then asked about the types of guns they owned (handguns, broken into pistols and revolvers; long guns, and “other” guns) and the number of each type of gun they owned. Respondents were also asked about their most recent firearm acquisition, including whether they bought the gun or acquired it in some other way (e.g., via an inheritance), and whether, and if so how many, guns had been stolen from them in the past five years. Data for this paper come from respondents who personally own guns.

A supplement to our survey was conducted by GfK in November 2015. For the supplement, all gun owners from the original survey (n=2072) who were still in the KP panel (n=1880) were invited to answer an additional set of questions about the timing of their most recent gun acquisition, the number of guns they had acquired in the past 5 years and the number of guns that had been stolen from them in the past 5 years. Of those eligible for the survey

(n=1880), 1613 responded (86 percent). The respondents to the supplemental survey did not differ from respondents to the original survey with respect to age, gender, race, type of gun most recently acquired or acquisition patterns. Non-responders (n=267) were more likely than responders to be younger and female and to have acquired their most recent firearm as a gift or inheritance rather than by purchase. Respondents to the original survey who were no longer in the GfK panel (n=192) were more likely to be younger and have refused to describe the type of gun they most recently acquired than those in the original sample. They were also less likely to have purchased their most recent firearm. These differences did not affect the overall similarities between the supplemental and original samples. We use the original survey weight provide by GfK for analyses using the supplemental survey.

The Northeastern University Institutional Review Board approved this study.

RESULTS

1. The Gun Stock

Twenty-two (22) percent of our sample reported that they personally owned a gun (0.223, CI: 0.207-0.240). Extrapolating to the US population of adults 18 and older (245,157,000 in 2014) (Colby and Ortman 2015), we estimate that there are 54.7 million gun owners in the US (CI: 50.7-58.8). Sixty (60) respondents who said that they owned guns did not answer our questions about how many guns they owned. We use results from the 2012 respondents who did provide an answer to estimate the mean number of guns owned by our gun owners: 4.8 (CI: 4.37-5.32), yielding a gun stock of 265 million (CI: 245 million-285 million).³

³ Including or excluding those who reported being a gun owner, but reported owning 0 guns, or calculating the mean number of guns per gun owner including those who reported owning 0 guns does not materially change our estimates (21.8 percent personal gun ownership; mean number of guns, 4.7).

Number and types of guns in US gun stock: Of the estimated 265 million guns in civilian hands in the US, approximately 4 of 10 guns (42 percent) are handguns, with the remainder consisting primarily (53 percent) of long guns (4 percent are “other” guns). Among handguns, the majority are semi-automatic pistols (62 percent), and revolvers (29 percent), with the remainder described by respondents as “other” handguns. Approximately 6 of 10 long guns (62 percent) are rifles and 4 of 10 (38 percent) shotguns (see Figure 1).

[Insert Figure 1 approximately here]

Distribution of gun ownership: Gun owning respondents owned an average of 4.85 firearms (range: 1-140); the median gun owner reported owning approximately 2 guns. As can be seen in Figure 2, approximately half (48 percent) of gun owners report owning 1 or 2 guns, accounting for 14 percent of the total US gun stock, while those who own 10 or more guns (8 percent of all gun owners), own 39 percent of the gun stock. Put another way, one half of the gun stock (~130 million guns) is owned by approximately 86 percent of gun owners, while the other half is owned by 14 percent of gun owners (14 percent of gun owners equals 7.6 million adults, or 3 percent of the adult US population).

Distribution of gun ownership, by gun type: Although the majority of guns in the US gun stock are long guns, in terms of the distribution of gun types, only one in five gun owners (21 percent) own long guns only, 25 percent of gun owners own handguns only (2 percent report own “other guns” only), and half of gun owners own both handguns and long guns (44 percent) or handguns, long guns and other guns (6 percent). The remainder of gun owners (4 percent) reported owning either “other guns” along with handguns or long guns, or did not specify what types of guns they own. Among those who own handguns only, two thirds (67 percent) own one gun; for those owning long guns only, 43 percent own only a single gun (see Figure 2).

[Insert Figure 2 approximately here]

Distribution of gun ownership by gun owner demographics: Table 1 describes the demographic characteristics of respondents who own handguns only, long guns only, and both handguns and long guns (i.e., for simplicity of presentation, it does not include the small number of respondents (ninety-one) who are not in one of these three categories). The demographic characteristics of gun owners have been well established in multiple surveys. Consistent with these surveys, we find that gun owners overall are disproportionately male, white, older, non-urban and from the South.

Differences among gun owners emerge, however, when those who own handguns only and those who own long guns only are compared to those who own both types of guns. Handgun only owners, in particular, appear to be a distinct group, more likely to be female, non-white and urban (compared with other gun owners), and less likely to have grown up in a house with a gun. For example, while approximately 20 percent of long gun owners are female, among those who own handguns only, 43 percent are women, and almost a quarter (23 percent) live in urban areas, compared to 13 percent of long gun owners and 14 percent of those who own both handguns and long guns.

[Insert Table 1 approximately here]

Reasons for gun ownership: Almost two out of three gun owners (63 percent) reported that one of the primary reasons they own their guns is for protection against people (see Table 2). Three quarters of handgun owners (76 percent) reported that they owned a handgun primarily for protection (not shown). Other reasons for ownership include hunting (40 percent), for a collection (34 percent), sporting use (28 percent), protection against animals (20 percent), and for

some other reason (40 percent). Other reasons volunteered by respondents included that they owned guns as a result of a gift or inheritance or because they had a “right” to have them.

Reasons for ownership varied significantly depending on what types of guns respondents owned (handguns only, long guns only or both) and by demographic characteristics. Overall, those who own only handguns or both handguns and long guns were similar to one another with respect to owning guns for protection, while those who own only long guns and those who own both were similar with respect to hunting and sporting use. For example, while almost eight of ten people who own handguns only cite protection against strangers as a primary reason for ownership, as do 72 percent of those who own both handguns and long guns, only 31 percent of those who own long guns only do. Likewise, while only 2 percent of those who own handguns only report that hunting is one of the primary reasons for gun ownership, 57 percent of those who own long guns only and 55 percent of those who own handguns and long guns do.

Across demographic characteristics, female gun owners were more likely than male gun owners to report owning any gun for protection, and less likely to report owning a gun for any other reasons (see Table 2). Reasons for ownership were relatively consistent across age groups, although owning a gun for protection was less common among older gun owners. Strikingly, protection was cited as a primary reason for ownership far more often by those from the South (73 percent) than those from any other region of the country.

[Insert Table 2 approximately here]

2. Gun Transfers

In addition to characterizing the stock of firearms in civilian hands, our survey provided information on the flow of guns in the US over the past five years, including gun acquisitions, dispositions and theft.

Firearms acquisitions: We asked current gun owners a series of questions about the firearm they had acquired most recently. Approximately half had acquired their most recent gun within the past five years (28 percent within the past two years, 21 percent between three and five years ago) and half (50 percent) more than five years ago (see Table 3). Extrapolating to the US population, we estimate that our firearm owners acquired approximately seventy million guns in the past five years⁴.

[Insert Table 3 approximately here]

The large majority of gun owners purchased their most recently acquired gun, with purchase more common for guns acquired in the past one to two years (86 percent) than for those acquired more distally (79 percent two to five years ago; 61 percent more than five years ago).

Across all three time periods, the most commonly acquired firearm was a handgun, with handguns constituting almost six of ten guns acquired in the past five years, and five of ten guns

⁴ The NFS asked respondents who reported that they were current gun owners to describe when they acquired their most recently acquired firearm still in their possession and, separately, how many guns they had acquired in the past five years (irrespective of whether those guns were still in their possession). Some respondents reported that they had acquired one or more guns during the past five years even though they had previously indicated that their most recent firearm acquisition (among the guns they currently owned) took place more than five years ago. Overall, when directly asked when they had most recently acquired a gun in their possession, 49 percent of people reported doing so within the past five years, whereas 62 percent said that they had acquired one or more firearms in the past five years when prompted to provide the number of firearms acquired (irrespective of whether or not those guns were still in their possession). In estimating that 70 million firearms were acquired over the past five years, we privileged the stem question to mitigate the well established phenomenon of telescoping (i.e., we excluded from our five year estimate the 23 percent of respondents who reported acquiring at least one gun in the past five years but also indicated their last acquisition was more than five years ago) (see Appendix 1). Including respondents who initially reported that their most recent acquisition was more than five years ago increases our estimate of the total number of guns acquired over the past five years to eight-five million. One possible explanation for this discrepancy is the tendency to telescope, which may have inflated the latter estimate. Alternatively, since only the second question explicitly asked respondents to consider guns that are no longer in their possession, these guns may have been excluded when respondents considered the first question.

acquired more than five years ago. Stores (gun stores, sporting good stores, etc.) were the most common source of purchased guns, while gifts and inheritance were the most common form of non-purchase transfer.

[Insert Table 4 approximately here]

Firearms most recently acquired by gun owners tended to be new, rather than used (see table 4). The proportion of new guns was higher among those acquired more recently; used guns account for four of ten firearms acquired more than five years ago, but only three of ten acquired in the past two years. The majority of new guns were purchased (89 percent in the past two years, 91 percent two to five years ago, 78 percent more than five years ago). Among used guns, nearly six of ten acquired more than five years ago were not purchased, compared with only one-third of those acquired within the past two years. Inherited guns constitute 40 percent of used guns acquired more than five years ago, but only 16 percent of those acquired in the past two years, mirroring a decrease in the overall share of guns obtained by inheritance from 21 percent of those acquired more than five years ago to 4 percent of those acquired in the past two years.

The cost of the most recent firearm purchased (among respondents whose most recently acquired gun was purchased) was relatively evenly distributed around the mode of \$250-\$500 (48 percent; see Table 5). Overall, used guns were less expensive than new guns and guns that were acquired longer ago were less expensive than guns purchased more recently. The most commonly cited reason for buying a firearm was for self-protection, a reason that was more common for firearms purchased within the last five years (43 percent) than more than five years ago (35 percent).

[Insert Table 5 approximately here]

Gun dispositions: Approximately 5 percent of gun owners reported that they had sold, or otherwise gotten rid of a gun in the past five years (average number of guns disposed of, 2.0). Of these, the large majority (71 percent) had sold the gun they disposed of most recently, while 13 percent had given the gun to someone else as a gift, and 10 percent had traded it for something else. A very small number of gun owners who had disposed of a gun (1 percent) reported having gotten rid of the gun through a gun buy back program. When gun owners sold guns, they most often sold them to a friend directly (35 percent) or to a gun dealer (32 percent), with 12 percent reporting that they had sold the gun via an on-line advertisement and another 14 percent having sold it to a family member.

Approximately 2.5 percent of gun owners reported having had a gun (or guns) stolen from them in the past 5 years, with a mean number of guns stolen of 1.49 (range 1 to 6; CI: 1.02-1.96). Assuming that theft was evenly distributed across the 5 years, we estimate that approximately 2.04 million guns were stolen over the past five years (CI: 1.40-2.68 million). Assuming that theft was evenly distributed across the 5 years, this implies that approximately 400 thousand guns are stolen annually.

DISCUSSION

The stock of guns in the US is exceptionally large and growing. In 1994, when the NSPOF was conducted, Cook and Ludwig estimated that there were approximately 192 million guns in the hands of US civilians (Cook and Ludwig 1997). In 2015, we estimate that that number has grown by more than 70 million guns, to approximately 265 million. The guns acquired over the past 20 years, are disproportionately handguns; of the total gun stock the share of handguns is 42 percent, compared to approximately one third of guns in 1994, while the share of long guns has fallen commensurately from 66 percent in 1994 to 53 percent in 2015.

The shift we observe in the gun stock towards a greater proportion of handguns may reflect the decline in hunting and indicate a change in motivations and use of firearm ownership (Smith 2001). Indeed, a perceived, and growing, need for self-protection appears to drive contemporary gun ownership in the US (Pew Research Center 2013). Consistent with our findings that the majority of the guns that have been added to the gun stock are handguns and that gun owners in 2015 were more likely than gun owners in 1994 to report that they owned any handgun primarily for self-protection (76 percent vs. 48 percent), we find that almost seven out of ten gun owners report that a primary reason for owning a gun is protection against people. Consistent with this trend towards owning firearms for protection, we find that respondents who owned only handguns were just as likely to live in an urban environment as a rural one and to be demographically more diverse compared with owners of long guns (who, as a group, are more likely to be white, male, and live in a rural area).

Not only are there many more guns overall, there are also more gun owners (54.7 million from the NFS compared to 44.3 million from the NSPOF), although the percentage of the adult population who own guns has declined, from 25 percent in 1994 to 22 percent in 2015. Indeed, gun owners today each own, on average, more guns (4.8 in the NFS compared to approximately 4.3 in the NSPOF). Moreover, gun ownership appears to be even more concentrated in 2015 than it was in 1994: while the top 20 percent of gun owners owned 55 percent of the gun stock in 1994, they now own 60 percent.

In the absence of a gold standard to which to compare our estimates (of the sort that would render survey-based estimates largely unnecessary), two sources of administrative data – from the ATF (Bureau of Alcohol Tobacco Firearms and Explosives 2015), FBI (Federal Bureau of Investigation 2016) – provide an opportunity to grossly validate results. Firearm

manufacturing and import/export data, available from the ATF, suggest that, from 1899 through 2013 (the last year for which data are available), approximately 363 million firearms have been available for sale in the US (see Appendix I).⁵ While guns are highly durable, it is reasonable to expect that every year some fraction is permanently removed from the marketplace (through seizure, irrecoverable loss or breakage). Following Cook (Cook 1993; Cook and Goss 2014) applying a 1 percent per year depreciation (permanent removal from use) rate to the available manufacturing data yields an estimated gun stock in 2013 of approximately 270 million guns. Assuming the number of guns was added to the market in 2014 (the last full year before our survey) was the same as the number added in 2015 (sixteen million; the largest number of guns manufactured/imported in US history), our estimate of the US gun stock increases to 285 million guns, a figure close to the 265 million guns we estimate from our survey.⁶

Our estimate that approximately seventy million firearms changed hands within the past five years is also broadly consistent with estimates derived separately using 1) ATF data on firearm manufacturing, imports, and exports (which should track our estimates of new firearms

⁵ The data series presented in Table 1 combines a summary (1899-1968), assembled from ATF reports (manufacturing plus imports) by Newton and Zimring (Newton and Zimring 1968), ATF data compiled by Gary Kleck (1969-1986; Kleck 1991) and the remainder from on-line data available from ATF (Bureau of Alcohol Tobacco Firearms and Explosives 2015).

⁶ The NSPOF estimate of 192 million guns in 1994 is also remarkably consonant with ATF data up to 1994 applying the same 1 percent annual removal from market estimate. However, our estimate is 30 percent, not 15 percent lower than ATF figures. The estimate of approximately 270 million guns from our 2004 random digit dial telephone survey, appears to be an overestimate. Extrapolating from surveys to the US population, especially for relatively rare events (such as owning an extremely large number of guns), has been shown to have the potential to lead to large overestimates. In the 2004 survey, two factors came into play: first, by 2004 RDD surveys were increasingly plagued, as our survey was, by low response rates, suggesting the possibility that even with the application of post-stratification weights, that results may not have been generalizable (and thus suitable for extrapolation) to the US population. Second, because ownership of large numbers of guns is relatively uncommon, our estimates of the gun stock were sensitive to the inclusion (or exclusion) of respondents who reported that they owned large numbers of guns.

acquired), and 2) NICS background check data (which should correspond to the number of people who acquired firearms and underwent a background check). Given the percentage of people in the NFS who report that their most recently acquired gun was new (rather than used) and assuming that new guns correspond to the firearms that the ATF report enumerates, the total number of firearms acquired over the past five years should be approximately eighty-two million.⁷ It is important to note that our estimates based on ATF data may be an underestimate because they were calculated based on commerce data from a five-year period ending in 2013, the most recent year for which ATF data is available (and sales have been accelerating upwards). Nonetheless, our estimates of the total number of guns acquired in the past five years using NICS data are remarkably similar: eighty-three million (derived using our soon to be published finding that the percentage of respondents who report undergoing a background check over the past five years is 75 percent, not shown).⁸

⁷ Missing answers as to whether the most recently acquired gun was new (i.e., as opposed to used) were imputed, based on the assumption that the three percent of respondents with missing data with respect to whether their most recently acquired firearm was new or old, were missing at random. The estimate we arrive at using ATF data is higher (i.e., ninety-one million vs. seventy million) if we do not restrict respondents to those who indicated in a stem question that they had acquired the last firearm currently in their possession within the past five years. The reason for this is that some of these respondents indicated that they had acquired a non zero number of firearms in the past five years when asked directly how many firearms they had acquired regardless of whether they still had the firearm in their possession. Incorporating these respondents' answers into our estimate of the gun flow increased the estimate we arrived at using ATF data because the flow of all guns (i.e., both new and used) is derived by dividing the ATF enumeration of new guns by the percentage of new guns that our respondents reported were acquired in the past five year period (and, ignoring the stem question restriction decreased the percentage of new guns from 68 percent to 62 percent).

⁸ If respondents were not required to indicate in the stem question that their most recently acquired firearm was acquired within the past five years, 69 percent of gun owners reported having undergone a background check with respect to their most recently acquired gun (and therefore the estimate of the number of firearms acquired over the past five years increases to ninety-one million). NB this number is likely to be an underestimate given that each NICS background check may result in the acquisition of more than one firearm.

Our estimate of the number of guns stolen annually also squares well with external data sources, although our estimate that 400 thousand guns are stolen annually is somewhat higher than the most recent gun theft estimate (233 thousand) reported from the NCVS. Overall, however, the number of guns stolen appears to have remained relatively stable over time. In the late 1980's the NCVS estimated that there were approximately 340 thousand firearms stolen each year. While, in an estimate that combined data on the fraction of US adults who reported that they had had a firearm stolen from them in the past 5 years with data from a state-level survey that estimated the number of guns stolen per theft incident in that state, the NSPOF estimated that slightly fewer than 500 thousand guns/year are stolen in the US.

The NFS used an existing probability based on-line panel (KnowledgePanel) to examine US gun ownership, whereas our 2004 survey and the NSPOF both relied on random digit dialing to produce their sample. It is possible that on-line panel surveys and RDD surveys elicit systematically different responses from survey participants, suggesting that comparisons over time (and across survey modes) should be undertaken with some caution. Even if it were possible (or desired) to conduct an RDD survey about gun ownership today, such a survey would be unlikely to be comparable to surveys from 1994 or 2004 due to increasingly poor response rates on telephone surveys(Link et al.). Moreover, probability-based on line samples have been found to reduce social desirability bias and yield more accurate results than telephone surveys(Chang and Krosnick).

While the NFS is thus likely to produce a good estimate of firearms in civilian hands, as well as to accurately characterize the flow of guns and other characteristics of gun ownership, some gun owners may nevertheless have chosen not to report their gun ownership on a survey, and some non-gun owners may have reported owning guns when in fact they do not. What

evidence there is, however, suggests that gun owners appear to respond accurately with respect to their firearm ownership on surveys. Studies that have validated survey reports of gun ownership against administrative data have reported low levels of false negative reports (approximately 10 percent), and virtually no false positive reports (Kellermann et al. 1990, Rafferty et al. 1995). In the NFS, less than one percent of respondents refused to answer our stem question about household gun ownership, and none refused the subsequent question regarding whether they personally owned a gun. Nonetheless, it is likely that some groups of gun owners (e.g., those who possess firearms illegally, such as someone with a felony conviction), are not reflected in our estimates, and possible that non-response to some questions affect the validity of our findings if those choosing not to answer a question differed systematically from those who did. Given that 2 percent or fewer of respondents refused to answer the vast majority of our questions about firearms, non-response bias among those in our survey is unlikely to have had a material influence on our findings.

CONCLUSION

As of 2015, we estimate there were approximately 270 million guns in the US civilian gun stock, an increase of approximately 70 million guns since the mid 1990's. Over that time, the fraction of the gun stock that is handguns – most often bought for self-protection – has grown (to over 40 percent), as has the fraction of gun owners who own both handguns and long guns (to over 75 percent). While the fraction of US adults who report owning guns has declined only modestly, from 25 percent in 1994 to 22 percent in 2015, current gun owners are less likely to be male (32 percent in 2015 vs. 42 percent in 1994), more likely to be female (12 percent in 2015 vs. 9 percent in 1994), and more likely to own more guns (the mean number of guns has increased from 4 to 5). Despite the increase in the average number of guns, the median gun owner owns

only 2 guns (28 percent of gun owners own 1 gun and 31 percent own 2 guns, accounting for 14 percent of the total US gun stock), while the 8 percent of all gun owners who own 10 or more guns account for 39 percent of the gun stock (and 14 percent of gun owners own half the US gun stock).

With respect to firearm transfers, we estimate that approximately seventy million firearms changed hands within the past five years, a number broadly consistent with manufacturing data from the ATF, the large majority of which were purchased, more so in the past two years (86 percent) than for those acquired more remotely (79 percent two to five years ago; 61 percent more than five years ago). Across all three time periods, the most commonly acquired firearm was a handgun.

Guns not only move into, but also out of the hands of US gun owners. Five (5) percent of gun owners in our sample reported having disposed of a gun within the past 5 years, most often (35 percent) through a sale to family or friends. Another 2.5 percent of our sample reports having had a gun stolen within the past 5 years, accounting for an estimated 400 thousand guns per year.

The National Firearm Survey provides the first nationally representative data about the stock and flow of guns in the US since 2004 (and before that 1994). These data have the potential to ground public health, public safety and public policy discussions about guns and gun transfers in what we assume is largely the legal firearms market, which is where firearms, even those that end up in the gray or black market, all start out.

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Appendix 1: Estimation of gun stock using gun manufacturing data. Data come from Newton and Zimring, Kleck, and ATF. We apply a 1% depreciation (permanent removal from use) rate to each year's adjusted "stock." Pre 1969 figures do not appear to include import (and net out export) data.

Year	Millions of guns added	Δ	Adjusted Estimate (.99)
1899-1945	47		
1946	48	1	48
1947	51	3	50
1948	53	2	52
1949	55	2	53
1950	58	3	56
1951	60	2	57
1952	62	2	58
1953	64	2	60
1954	66	2	61
1955	67	1	62
1956	69	2	63
1957	71	2	64
1958	73	2	66
1959	75	2	67
1960	78	3	69
1961	80	2	71
1962	81	1	71
1963	84	3	73
1964	86	2	75
1965	89	3	77
1966	93	4	80
1967	97	4	83
1968	102	5	87
1969	107	5	92
1970	112	5	96
1971	117	5	100
1972	122	5	104
1973	128	6	109
1974	135	7	115
1975	140	5	118
1976	146	6	123
1977	151	5	127
1978	156	5	131
1979	162	6	135
1980	168	6	140
1981	173	5	144
1982	178	5	147
1983	182	4	150
1984	186	4	152

1985	191	5	156
1986	194	3	157
1987	198	4	160
1988	203	5	163
1989	209	6	167
1990	213	4	170
1991	217	4	172
1992	223	6	176
1993	231	8	182
1994	238	7	188
1995	243	5	191
1996	247	4	193
1997	252	5	196
1998	256	4	198
1999	261	5	201
2000	265	4	203
2001	270	5	206
2002	274	4	208
2003	279	5	211
2004	284	5	214
2005	289	5	217
2006	295	6	220
2007	301	6	224
2008	308	7	229
2009	316	8	235
2010	325	9	241
2011	334	9	248
2012	347	13	258
2013	363	16	272

Table 1: Demographic characteristics of gun owners. Reported values are percent of respondents indicating ownership of the specified firearm(s). Author's tabulation.

Demographic (% Total Survey Population)		Any Firearm	Handgun Only	Long Gun Only	Both
All Respondents		22	6	5	11
Age	18-29 (19.1)	13	3	4	6
	30-44 (23.5)	21	6	4	10
	45-59 (28.2)	24	6	5	13
	≥60 (29.2)	25	6	5	14
Sex	Male (48.3)	32	7	8	18
	Female (51.7)	12	5	2	5
Race	White (70.5)	25	5	6	13
	Hispanic (11.7)	16	6	3	7
	Black (11.0)	14	8	1	5
	Multi-Racial (1.4)	25	4	6	15
	Other (5.5)	8	3	<1	5
Marital Status	Married (54.0)	26	6	6	14
	Never Married (23.6)	12	3	3	5
	Divorced (9.2)	23	6	5	12
	Living with Partner (6.9)	19	6	4	9
	Widowed (5.4)	21	5	4	12
	Separated (1.0)	24	14	2	8
Community	Urban (23.0)	15	6	3	7
	Suburban (50.3)	19	6	4	10
	Rural (26.1)	33	5	9	19
Education	Less than High School (10.5)	11	4	3	5
	High School (29.5)	23	6	5	12
	Some College (28.6)	26	6	5	15
	College (31.4)	20	5	5	10
Annual Income	<25,000 (16.9)	13	4	3	6
	25,000-59,999 (29.2)	22	6	5	11
	60,000-99,999 (27.6)	24	7	4	12
	≥100,000 (26.3)	25	5	6	14
Military Service	Veteran (9.7)	44	10	9	25
	Non-Veteran (90.3)	19	5	4	10
Political Views	Liberal (20.2)	14	5	3	7
	Moderate (46.3)	19	6	4	9
	Conservative (31.5)	30	6	7	17
Region	Northeast (18.3)	15	3	4	7
	Midwest (22.4)	23	4	6	12
	South (36.9)	25	8	4	13
	West (22.4)	20	5	4	11
Child <18	Yes (29.8)	19	5	7	9
	No (70.2)	23	6	5	12
Grew Up with a Gun	Yes (47.5)	35	7	8	20
	No (48.0)	9	4	2	3
	Don't Know (3.2)	17	9	4	4

Figure 2. Distribution of US Gun Ownership by Number and Type of Firearm

Distribution of Gun Ownership by Number (1 or >1) and Type

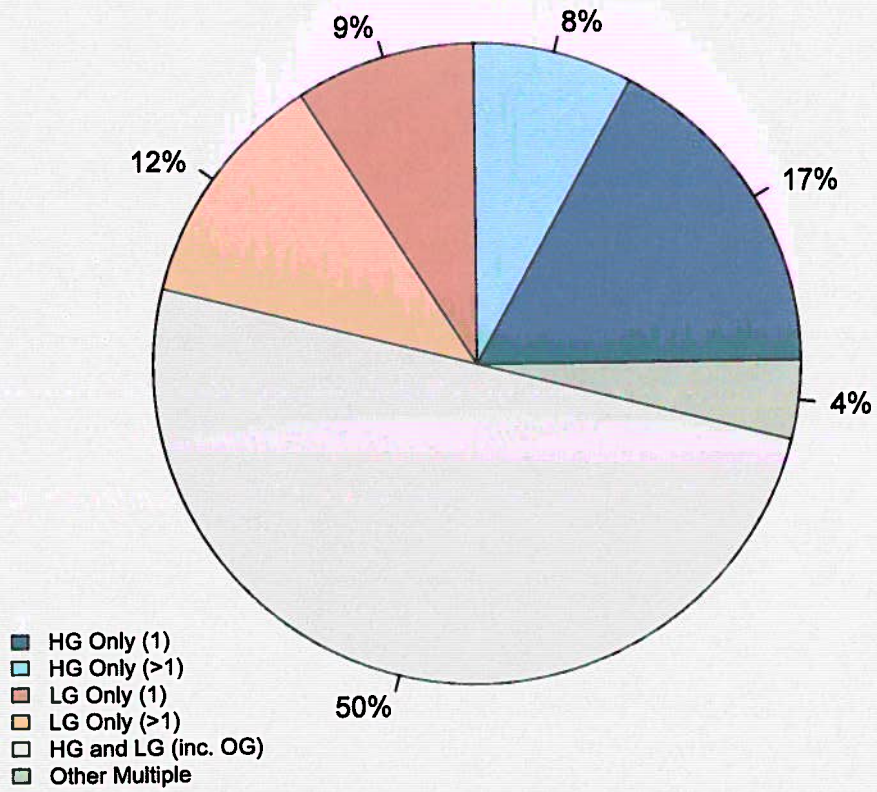


Table 5: Cost of purchased firearms, in US dollars. Values are percentages. Author's tabulations.

	\$0-99	\$100-249	\$250-499	\$500-999	\$≥1000
All	4.2	18.0	48.1	25.1	4.6
Handguns	3.1	14.3	50.3	29.6	2.7
Long guns	5.1	22.8	45.4	19.3	7.5
New	2.5	14.3	49.9	28.0	5.3
Used	9.1	29.1	41.9	17.3	2.7
≤5 Years	2.3	11.6	48.6	30.2	7.4
>5 Years	6.9	26.1	46.7	18.6	1.7
Protection from Strangers	3.6	15.3	51.0	27.1	3.1
Hunting	4.2	24.5	45.7	18.9	6.7
Sport Shooting	6.7	15.3	48.9	25.2	5.0
Collection	2.6	17.7	42.4	28.2	9.0

Table 4 Continued

	More than 5 years prior (50%)		
	% Transfers (100%)	New (71%)	Used (26%)
% Purchased at/from			
Any Store	42	69	9
Family	3	0	6
Friend/Acquaintance	7	1	15
Gun Show	2	3	2
Pawn Shop	3	1	5
Online	1	1	0
Other	3	4	3
All Purchased Firearms	61	78	40
% Non-purchased transfers			
Gift	15	14	15
Inheritance	21	3	41
Trade	0	0	1
Other	3	3	2
All non-purchased firearms	39	20	59
All Transfers	100		

Table 4 Continued

	2 to 5 years prior (21%)		
	% Transfers (100%)	New (61%)	Used (37%)
% Purchased at/from			
Any Store	54	79	10
Family	3	1	6
Friend/Acquaintance	9	1	23
Gun Show	3	3	3
Pawn Shop	6	3	10
Online	1	1	2
Other	3	3	2
All Purchased Firearms	79	91	56
% Non-purchased transfers			
Gift	11	9	20
Inheritance	8	0	20
Trade	1	0	1
Other	1	1	0
All non-purchased firearms	21	10	41
All Transfers	100		

Table 4: Percentage of where current firearm owners most recent firearm transfer occurred, by type of gun and reported time of acquisition relative survey administration in the spring of 2015. Author's tabulations.

	Less than 2 Years (28%)		
	% Transfers (100%)	New (71%)	Used (26%)
% Purchased at/from			
Any Store	62	78	16
Family	2	0	6
Friend/Acquaintance	6	1	19
Gun Show	4	3	6
Pawn Shop	5	2	11
Online	2	1	5
Other	3	3	4
All Purchased Firearms	84	89	67
% Non-purchased transfers			
Gift	8	6	12
Inheritance	4	0	16
Trade	0	0	0
Other	5	5	5
All non-purchased firearms	17	11	33
All Transfers	100		

Table 3 Continued

	More than 5 years prior (50%)		
	All Guns (100%)	Handguns (51%)	Long guns (48%)
% Purchased at/from			
Any Store	42	42	42
Family	3	2	3
Friend/Acquaintance	7	9	5
Gun Show	2	3	2
Pawn Shop	3	4	2
Online	1	1	0
Other	3	4	2
All Purchased Firearms	61	65	57
% Non-purchased transfers			
Gift	15	13	15
Inheritance	21	17	25
Trade	0	0	1
Other	3	4	2
All non-purchased firearms	39	34	43
All Transfers	100		

Table 3 Continued

	2 to 5 years prior (21%)		
	All Guns (100%)	Handguns (60%)	Long guns (39%)
% Purchased at/from			
Any Store	54	48	58
Family	3	2	4
Friend/Acquaintance	9	11	8
Gun Show	3	4	2
Pawn Shop	6	7	3
Online	1	1	2
Other	3	3	4
All Purchased Firearms	79	76	81
% Non-purchased transfers			
Gift	11	16	8
Inheritance	8	6	9
Trade	1	0	0
Other	1	2	6
All non-purchased firearms	21	24	19
All Transfers	100		

Table 3: Distribution of where current firearm owners acquired their most recent firearm (as a % of all transfers), by type of gun and reported time of acquisition since survey administration (2015). Author's tabulations.

	Less than 2 Years (28%)		
	All Guns (100%)	Handguns (59%)	Long guns (40%)
% Purchased at/from			
Any Store	62	65	54
Family	2	3	1
Friend/Acquaintance	6	6	7
Gun Show	4	3	5
Pawn Shop	5	4	6
Online	2	2	2
Other	3	3	4
All Purchased Firearms	84	86	79
% Non-purchased transfers			
Gift	8	8	9
Inheritance	4	3	8
Trade	0	0	0
Other	5	4	6
All non-purchased firearms	17	15	23
All Transfers	100		

Table 2: Given reasons for gun ownership. Author's tabulations.

Gun Type	Protection From:					
	People	Animals	Hunting	Other Sporting Use	Collection	Other Reason
Handgun only, 1	0.78	0.10	0.03	0.00	0.16	0.03
Handgun only, >1	0.83	0.12	0.01	0.00	0.18	0.01
Long gun only, 1	0.36	0.14	0.46	0.17	0.11	0.46
Long gun only, >1	0.27	0.20	0.65	0.41	0.21	0.65
Handgun and Long gun	0.72	0.27	0.55	0.47	0.36	0.55
Sex						
Male	0.60	0.20	0.49	0.32	0.37	0.44
Female	0.69	0.21	0.32	0.21	0.28	0.32
Age						
18-29	0.60	0.21	0.38	0.26	0.39	0.38
30-44	0.67	0.18	0.41	0.30	0.38	0.41
45-59	0.65	0.24	0.41	0.27	0.33	0.41
≥60	0.58	0.18	0.41	0.29	0.32	0.41
Census Region						
Northeast	0.53	0.18	0.40	0.29	0.37	0.40
Midwest	0.55	0.16	0.51	0.38	0.36	0.51
South	0.73	0.23	0.37	0.25	0.28	0.37
West	0.56	0.18	0.35	0.25	0.42	0.35

Figure 1. Distribution of US Gun Stock by Gun Type

Distribution of US Gun Stock by Gun Type

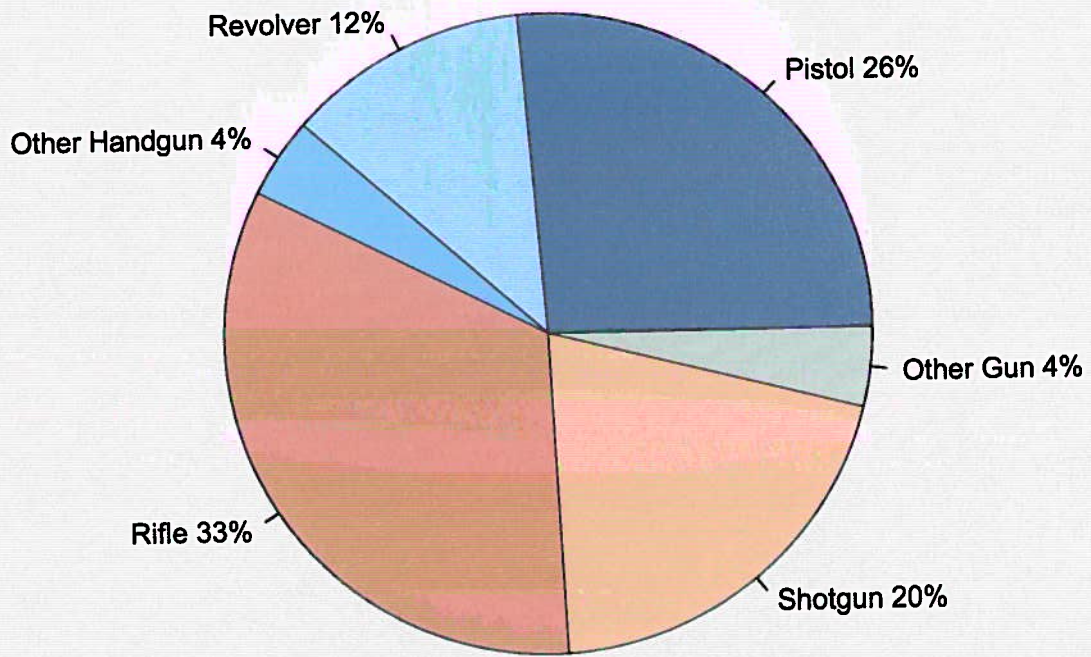


Figure 3: Cumulative distribution of gun stock

