

Markets for Firearms*

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Abstract

Gun violence in the United States claims over 30,000 lives per year. Despite this large social cost, gun violence is understudied, due in no small part to lack of data and relatively weak regulatory environment. In particular, little is known about supply-side forces in the secondary market. This paper documents new empirical facts about markets for firearms. To study the secondary market, we develop a novel dataset that includes detailed listing information from a major online platform for firearms sales. We complement our dataset with pricing data collected from a major firearms trade publication. Using these two data sources, we document cross-state differences in secondary gun market activity and pricing. We incorporate information on the locations of licensed dealers to examine the structure of competition within and between primary and secondary markets. Finally, we use data on crime guns to study the movement of firearms across states.

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1 Introduction

Gun violence in the United States claims over 30,000 lives per year, and while researchers disagree about how precisely to quantify the total cost of gun violence, credible estimates exceed \$100 billion per year (Cook et al. (2000)). Despite this large social cost, little is known about supply-side forces in the market for firearms. Much of this uncertainty is due to the ubiquity of secondary gun markets, which are subject to substantially weaker regulatory oversight. While firearms dealers in primary markets must obtain a Federal Firearms License (which subjects them to various requirements under federal law) to be considered legal sellers, there are no such regulations for individuals conducting private sales. This lack of oversight has prompted activism for state-level regulations in secondary markets, such as requiring background checks for private sales.

Although the policy conversation tends to focus on the role of secondary markets in transmitting firearms to prohibited persons, most firearms possessed illegally entered the firearms market through licensed dealers. Even so, little is known about the total quantity of firearms transacted in primary markets, since records of sales—though maintained by the dealer for a specified period of time—are not retained by federal agencies. Dealers’ access to large numbers of weapons poses serious public safety concerns when they neglect their responsibilities under federal law, or worse, willfully violate gun laws and source firearms to prohibited persons. Compliant dealers may unwittingly supply guns to prohibited persons who use a straw purchaser¹ to buy a gun on their behalf², while negligent dealers may transmit guns to prohibited persons if they do not conduct the requisite background checks. Furthermore, prior investigations have indicated that large numbers of trafficked firearms are sourced directly from licensed dealers, even though few such corrupt dealers are involved (ATF (2000)).³ Despite the importance of licensed dealers, few studies have focused on the ways primary markets facilitate the transmission of guns from legal to illegal hands.

In this paper, we present an empirical overview of descriptive features of firearms markets. We begin by discussing the current state of the literature to highlight what is known about firearms markets. We then describe key institutional details about the firearms regulations, focusing specifically on the relationship between primary and secondary markets, and on the importance of considering market and regulatory structures when studying gun crime. After reviewing the regulatory environment, we discuss the

¹A straw purchase occurs when the buyer of a firearm is not the intended end-user. Straw purchases may be used to circumvent background checks and are often conducted by friends, family members, or intimate partners.

²According to an ATF report, straw purchases constituted almost half of all trafficking cases (ATF (2000)).

³According to the ATF report, in the two year period from 1996-1998, FFLs were responsible for over 40,000 trafficked guns, but represented fewer than 10 percent of the trafficking investigations. Cases involving FFLs averaged 350 firearms per investigation. See pp. x-xi for more details.

various data sources used in our analyses. We develop a novel dataset which includes detailed listing information from a major online platform for firearms sales, which we complement with pricing data collected from a major firearms trade publication. We bring this together with existing data sources containing national firearms tracing data and locations of licensed dealers.

In the first set of analyses, we analyze the geographic distribution and concentration of primary market dealers and document trends in aggregate firearms production. In our second set of analyses, we discuss firearms demand and provide new insights on supply using our novel data on the secondary market. The next section reports a set of empirical about firearms prices, drawing from data on wholesale prices and the novel pricing data we collect from secondary sellers' firearms postings. We then examine spatial patterns in the movement of crime guns between states. We end by describing state-level regulatory changes over time.

The paper proceeds as follows. In Section 2 we discuss the existing literature related to firearms markets. Section 3 reviews the regulatory environment governing firearms at the federal level, with a focus on dealer regulations. In Section 4 we discuss the data sources for this project. Section 5 presents results related to competitions in firearms markets. We provide an overview of supply and demand in Section 6 and analyze primary and secondary market prices in Section 7. In Section 8 we use firearms tracing data to study crime guns. In Section 9 we discuss current state-level regulations of firearms.

2 Current Literature on Firearms Markets

Our paper relates to the literature examining the relationship between primary and secondary markets for firearms (see [Cook \(2018\)](#) for an overview). Most firearms currently in circulation were initially sold by a licensed dealer. The vast majority of these transactions are fully legal and conducted in full accordance with federal, state, and local law, however some are not, and in some cases licensed dealers are even willing to make illegal sales. For instance, [Wintemute \(2010\)](#) conducted phone interviews with licensed firearms sellers and found that approximately 20% were willing to sell to someone explicitly trying to make an illegal straw purchase. Secondary market transfers—including private transfers/gifts between family and friends, transfers between strangers arranged through the internet or at gun shows, and purchases from underground dealers—account for approximately 36% of recent firearms purchases ([Miller et al. \(2017\)](#)). In addition to legitimate reasons for preferring secondary markets (e.g., greater product choice, bundling of accessories, the option to buy used), some may seek out secondary markets because private transfers do not require a background check in many states (and background checks are often not conducted even where private sales are tightly regulated). For example, [Miller et al. \(2017\)](#) conducted a survey of gun owners and found that a majority of private sales included no

background checks. Most relevant to our paper, [Drake et al. \(2019\)](#) provide evidence that firearms listings on a popular internet platform frequently neglect to mention background checks, suggesting that secondary market transfers coordinated through the internet may be attractive to buyers unable to obtain firearms in the primary market.

Multiple studies suggest that illicit firearms secondary markets are thin—that is, illegal firearms are often obtained through personal connections and require substantial search costs for would-be buyers without those personal connections. [Cook et al. \(2007\)](#) conduct interviews with law enforcement officers, gun industry professionals, as well as criminals and their associates, and find that illegal gun transactions make up only a small fraction of the underground economy. As a result, transaction costs are high, and prices may exceed those in legal markets by an order of magnitude or more. Nonetheless, research suggests that secondary markets are an important source of guns used in crimes. [Cook et al. \(2015\)](#) survey inmates in Chicago’s Cook County Jail system, and find that the majority of illegal firearms reported by survey participants were obtained through social connections—typically as purchases, though occasionally as gifts—and that very few firearms were acquired through official dealers or by direct theft. Interviews conducted by David Hureau show the same patterns for firearms acquired by active gang members in Boston ([Hureau and Braga \(2018\)](#)). Finally, [Chesnut et al. \(2017\)](#) confirm these findings through surveys of randomly-selected offenders incarcerated in Los Angeles County jails.

Some have taken these results as evidence that dealers bear little to no responsibility for firearms falling into the wrong hands (e.g., [Kleck and Wang \(2008\)](#)). However, surveys of inmates and gang members only provide information about the most recent purchase, and do not paint a complete picture of the life cycle of illegal firearms (see [Braga et al. \(2012\)](#)). More information is needed if we hope to understand how firearms enter illegal markets in the first place.

To that end, our paper also contributes to the literature examining spillovers in firearms markets, which has tended to focus on the relationship between state regulations and crime. Early studies on this relationship document statistical associations between various firearms policies and firearms used in crime. Notable early examples include [Webster et al. \(2006a\)](#), [Webster et al. \(2006b\)](#), and [Webster et al. \(2009\)](#), who look at spillovers associated with different dealer regulations and practices. [Webster et al. \(2006a\)](#) look at a single Milwaukee dealer whose sales practices abruptly changed to be less permissive; using an interrupted time-series design, the authors argue that this change resulted in a large decrease in crime guns recovered in the city. Using a similar interrupted time-series design, [Webster et al. \(2006b\)](#) examine the effect of police sting operations against suspected corrupt dealers in three Midwestern cities, and find that the stings led to significant decreases in guns recovered in the cities. [Webster et al. \(2009\)](#) examines cross sectional data from major U.S. cities and documents an association between low-regulation (and low-enforcement) jurisdictions and sourced crime guns. While these early

studies suggest a relationship between regulation and crime, more evidence is needed to establish this relationship as causal.

A small handful of studies examine the movement of firearms across state and national borders in response to changing market and regulatory conditions. [Dube et al. \(2013\)](#) look at the expiration of the U.S. Federal Assault Weapons Ban in 2004, which resulted in an increased number of firearms being used in crimes in Mexican towns near the U.S. border, with the increases concentrated in towns near the borders of low-regulation states. [Matthay et al. \(2018\)](#) focus on gun shows occurring in Nevada near the California border, and argue that gun shows in Nevada tend to be followed by upticks in gun incidents in California, suggesting that secondary markets in adjacent states may facilitate transfers from low-regulation states to high-regulation states.

Illegally obtained firearms can often be traced back to the initial point of purchase from a licensed dealer. [Braga \(2017\)](#) examined 25 years of tracing data from the Boston Police Department and found that a disproportionate number of recovered firearms were initially purchased from licensed dealers in Southern states with comparatively few regulations. This sort of rich longitudinal trace data is rare, however, and more recent studies often rely on data gathered from across the country, albeit usually only over a short period of time. For instance, [Kahane \(2013\)](#) uses data from the grassroots organization *Mayors Against Illegal Guns*, and apply a gravity model to model illegal firearm trade flows between states. [Kahane \(2020\)](#) conducts a similar analysis using a richer set of state-level regulations and six years of data from the ATF Electronic Tracing System, which also includes information on time-to-crime (a useful indicator of trafficking activity). Both gravity papers provide some evidence that guns flow from states with weaker dealer regulations to those with stronger dealer regulations, but neither attempts to account for differing market conditions across states.

Finally, [Knight \(2013b\)](#) constructs a model of supply and demand for trafficked guns in which potential traffickers choose a source state to traffic firearms for resale in their home state. In this model, traffickers incur travel and non-travel costs when sourcing guns from a state, but prices in the source state are not modeled explicitly and state-level regulations affect the cost of all guns sourced from that state equally. In reality, firearms prices differ substantially across states. Further, trafficked guns come from both primary and secondary markets, and many states likely have large and persistent differences between primary and secondary market prices. States also differ substantially in the type of regulations they adopt, and many state-level regulations are likely to place differential burdens on buyers in primary and secondary markets.

3 Background and Regulatory Environment

Firearms laws in the U.S. are enacted at the federal and state level. Substantial variation in the types and quantities of laws across states creates a complex regulatory system that should affect the incentives of both sellers and buyers of firearms. We first review the major federal legislation governing firearms commerce, after which we discuss the regulations that we believe are most important for understanding the incentives that lead to the the transmission of firearms from legal to illicit hands. In this draft, we do not discuss in detail the state-level differences.⁴

3.1 Major Federal Firearms Legislation

The primary federal laws regulating firearms commerce and trade in the U.S. are the National Firearms Act of 1934 (NFA), the Federal Firearms Act of 1938 (FFA), and the Gun Control Act of 1968 (GCA), as well as their subsequent amendments.⁵ As the first federal law on firearms manufacture and transfer, the NFA was a direct response to gang violence, instituting regulations on the firearms favored by criminals.⁶ The NFA created mandatory registration requirements for narrow categories of firearms that exclude handguns but include machine guns, silencers, and short-barreled shotguns and rifles. Enacted as part of the Internal Revenue Code, it also introduced a statutory excise tax on the manufacture and sale/transfer of certain classes of firearms. This \$200 tax was fairly prohibitive at the time, but it was not indexed to inflation nor has it been changed since it was initially imposed.

The FFA of 1938 instituted regulations on the shipment and transfer of firearms and ammunition across states and mandated licensing of manufacturers, importers, and individuals engaged in the business of selling firearms. It also imposed firearms marking rules and required licensees to maintain customer transaction records. Furthermore, it established categories of prohibited purchasers, such as felons. The FFA was repealed by the GCA, although many of its provisions were maintained.

The Gun Control Act of 1968, passed in the wake of the assassinations of President John F. Kennedy, Attorney General Robert Kennedy, and Dr. Martin Luther King, built

⁴In the future, we may take advantage of differential timing in the adoption of state-level policies.

⁵There are other important Federal Acts concerning firearms. The Public Safety and Recreational Firearms Use Protection Act (a subtitle of the Violent Crime Control and Law Enforcement Act of 1994), also known as the Federal Assault Weapons Ban (AWB), prohibited the manufacture, transfer, and possession of semi-automatic assault weapons and the transfer and possession of large-capacity ammunition feeding devices. Congress allowed the AWB to expire in 2004. Two others are the Protection of Lawful Commerce in Arms Act and the Child Safety Lock Act of 2005 (“PLCAA” and “CSLA”). The former, which prohibited a “qualified civil liability action” from being brought in state and federal courts, effectively provides the gun industry with immunity from most civil tort liability. For more details, see <https://lawcenter.giffords.org/gun-laws/federal-law/other-laws/key-federal-acts-regulating-firearms/>.

⁶For more details about the historical context of firearms legislation, see <https://www.atf.gov/our-history/atf-history-timeline>.

upon the FFA by regulating domestic and foreign commerce in firearms and establishing stricter licensing laws. Among other things, it established minimum ages for firearms purchasers, required all firearms to have a serial number (whether produced domestically or imported from abroad), and expanded the categories of prohibited purchasers.

In 1986, Congress passed the Firearms Owners Protection Act (also known as the McClure-Vokmer Act) as an amendment to the GCA. The overall effect of FOPA was to relax a number of restrictions on firearms sellers, including redefining the definition of “gun dealer” to exclude individuals making sales or repairs on occasion, repealing record-keeping requirements on ammunition sales⁷, and excluding dealers who sell ammunition from current licensing requirements. Furthermore, the Act placed limitations on the federal government’s regulatory capabilities: It added a “willful violation” condition to the criteria determining whether a license can be revoked, and required that the government obtain a warrant (based on reasonable cause) to examine dealer records, firearms, or ammunition, except for (at most) one annual inspection to ensure record-keeping compliance. The Act also enabled interstate transactions of shotguns and rifles if conducted in person and if permitted by the state laws of both parties, and enabled dealers to conduct business at temporary locations other than the one specified on their license. The latter provision legalized sales by licensed dealers at a gun show in the same state.⁸

FOPA also strengthened a few regulations, including requiring licensed collectors to maintain records of transactions and dispositions, mandating the reporting of multiple firearms sales by all licensees, and broadening the definition of machine gun to include any part that is created specifically for the purpose of converting a weapon to a machine gun.

Two additional important amendments to the GCA are the Brady Act and Tiahrt Amendments. The Brady Handgun Violence Prevention Act of 1993 introduced mandatory federal background checks on firearms purchased from federally licensed dealers, manufacturers, or importers (with some exceptions), in an effort to enforce the laws that precluded certain groups from legal possession of firearms (e.g., felons, fugitives, controlled substance users/addicts, domestic violence offenders, those deemed as a mental defective or committed to a mental institution, and others). It originally provided a 5-day waiting period on handgun purchases, but individuals with a federal firearms license or a state-issued permit to possess or acquire firearms are exempt from the waiting period (this includes concealed carry permits). The 5-day waiting period has been replaced with an instant check system. In 1998, the Brady Act also became applicable to rifles and shotguns.

The original Tiahrt Amendment was an amendment to the 2003 Department of Justice appropriations bill that restricted certain activities of the Bureau of Alcohol, To-

⁷Except for armor-piercing ammunition.

⁸Additional information available at <https://www.congress.gov/bill/99th-congress/senate-bill/49>.

bacco, Firearms, and Explosives (ATF)—the regulatory agency that enforces the aforementioned federal laws on firearms—by limiting ATF’s use of federal funds. The 2003 Tiahrt Amendment had three major elements that substantially altered the enforcement capacity of the ATF. The first was to prohibit ATF from publicly disclosing firearms trace data (including to law enforcement agencies, except in the case of criminal investigations/prosecutions) and other information submitted by federal firearms licensees to the ATF. The second component prohibits ATF from requiring licensed dealers to submit inventories to ATF or law enforcement. The third component requires that the FBI destroy, within 24 hours, all records from background checks on approved firearms purchasers from the National Instant Criminal Background Check System (NICS), which is used exclusively for firearms background checks.

The original Tiahrt language was updated in the fiscal year 2008 appropriations bill to relax some of the restrictions on data disclosure, including allowing ATF to share trace data with law enforcement agencies and publish statistical aggregate data on firearms tracing and trafficking. The language also was altered to make the remaining Tiahrt provisions permanent law.

3.2 Supply Side Regulations in the Primary Market

3.2.1 Federal Firearms Licensing

In the United States, firearms are regulated at the federal level by the Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF) within the Department of Justice, in accordance with Title 18 of the U.S. Code and Title 27 of the U.S. Code of Federal Regulations. As the agency charged with protecting the public from violent crime involving firearms, the ATF is responsible for licensing and regulating parties that manufacture, import, or deal (i.e. sell or trade) firearms in the U.S.⁹

All individuals in the “business”¹⁰ of dealing in firearms must obtain a federal firearms license (licensees are referred to as “FFLs”) through the ATF.¹¹ There are 9 types of licenses, shown in Table 5 in Appendix A; a separate license is required for each type of activity in which the individual will engage, and each carries a separate application fee. Application fees for a dealer or pawnbroker license, which entitles the license holder to sell firearms, cost \$200. It is important to note that sales of ammunition alone

⁹The ATF formerly was part of the Department of the Treasury. In 2003, the Bureau’s regulatory functions were moved to the Department of Justice while the tax functions remained in the Treasury Department under the newly created Alcohol and Tobacco Tax and Trade Bureau (TTB).

¹⁰The definition of “engaged in the business” is “as applied to a dealer in firearms,... a person who devotes time, attention, and labor to dealing in firearms as a regular course of trade or business with the principal objective of livelihood and profit through the repetitive purchase and resale of firearms” 18 U.S.C. §922 (a)(21)(c).

¹¹Individuals who collect firearms as a hobby, or who periodically sell a firearm in their possession without the objective of maintaining a profit for business purposes, are not required to obtain an FFL. This includes individuals who are liquidating their firearms collections. See 18 U.S.C. §922 (a)(21)(c).

does not require a federal firearms license (ATF (2019)). To obtain a license, individuals must submit an application, fee, photograph, and fingerprints, and pass a background check¹²; applicants must be aged 21 or older and may not be prohibited from possessing a firearm.¹³ For corporations, partnerships, or associations, in addition to the sole proprietor, licenses must be obtained by each “responsible person.”¹⁴ However, federal law does not require any background checks or other screening measures for employees who are not “responsible persons.”

3.2.2 Federal Firearms Licensee Regulations

FFLs must agree to annual on-site compliance inspections¹⁵ and comply with all of the transactions regulations and record-keeping mandates under federal law.¹⁶ This includes conducting a federal background check through the FBI’s National Instant Criminal Background Check System (NICS) for each prospective buyer to ensure that he or she is legally permitted to acquire a firearm.¹⁷ Table 6 in Appendix A lists those who are prohibited under federal law from acquiring or possessing a firearm. Furthermore, FFLs generally may only sell or deliver firearms to individuals who reside in the state of business, although there are some exceptions, including lawful bequests and over-the-counter acquisition of a shotgun or rifle as long as the transaction is permitted both by the FFL’s state of business and the buyer’s state of residence.¹⁸

Under current federal law, FFLs must complete (with the buyer) and maintain ATF

¹²Type 03 applicants (Collectors of Curios and Relics) are not required to submit a photograph or fingerprint card, nor are they subject to on-site inspections. This license type enables the person to acquire curio or relic firearms in interstate commerce. Other than transacting in curio or relic firearms, licensed collectors have the same status under the GCA as non-licensees. See <https://www.atf.gov/firearms/qa/there-specific-license-which-permits-collector-acquire-firearms-interstate-commerce> and <https://www.atf.gov/firearms/qa/does-collector’s-license-afford-any-privileges-licensee-respect-acquiring-or-disposing>.

¹³Application materials are reviewed and sent to the ATF field office closest to the application’s stated business location, which assigns an Industry Operations Investigator (IOI) to conduct an on-site inspection and in-person interview with the applicant. The IOI also discusses federal, state, and local requirements with the FFL applicant. The IOI prepares a report of the interview and inspection for the field office supervisor, making a recommendation whether to issue or deny the license. The field office supervisor reviews the IOI report and submits his or her own recommendation to the Federal Firearms Licensing Center. According to the ATF website, applications may be denied because of “failure to comply with State or local law (such as zoning ordinances), evidence of previous willful violations of the Gun Control Act, or falsification of the application.”

¹⁴A “responsible person” is “any individual possessing, directly or indirectly, the power to direct or cause the direction of the management, policies, and practices of the Corporation, Partnership, or Association, insofar as they pertain to firearms. In a corporation this includes corporate officers, shareholders, board members, or any other employee with the legal authority described above.”

¹⁵However, FFLs may not be subject to more than one ATF compliance inspection annually.

¹⁶In addition to complying with the GCA and NFA, FFLs must comply with the Arms Export Control Act (AECA) and the ATF regulations found in Parts 447, 478 and 479 under Title 27 of the Code of Federal Regulations (CFR).

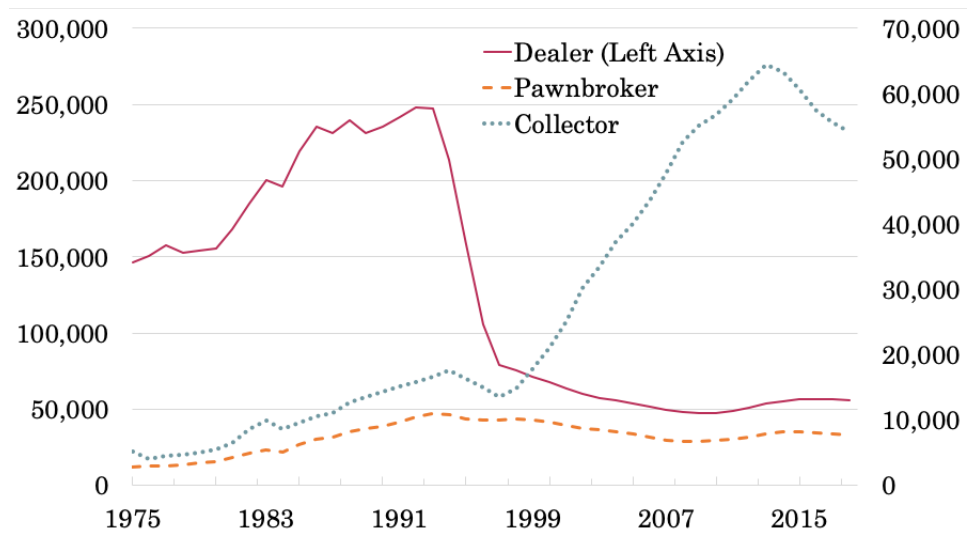
¹⁷For more information on background checks, see Section 3.4.

¹⁸For additional details, see <https://www.atf.gov/questions-and-answers/qa/may-unlicensed-person-acquire-firearm-under-gca-any-state>, or the relevant law at 18 U.S.C §922(a)(3); 27 CFR 478.29.

Form 4473 for each firearm transaction, falsification of which is punishable by law. FFLs also must complete the multiple firearms sales report (ATF Form 3310.4) whenever they sell an individual two or more handguns at the same time or within five consecutive business days; this form must be submitted both to ATF and the Chief Local Law Enforcement Official no later than the close of business on the day that the multiple sale or other disposition occurs. These record-keeping requirements are essential for law enforcement agencies to trace firearms used in crime or suspected crime guns. Federal law prohibits ATF/the federal government from maintaining a centralized database of these sales records, so the FFLs must retain the records, which do not have to be digitized. FFLs must maintain records of completed transactions for 20 years (and those of incomplete transactions for 5 years), and if they discontinue being an FFL, they must transfer the records to ATF.

Figure 1 shows the evolution over time in the number of firearms licenses by license type, excluding licenses for manufacturers, importers, and those specifically for destructive devices that are not firearms. One aspect of the Brady Act was an increase in the price of a dealer license, from \$10 per year to \$200 every 3 years. The Brady Act also required gun dealers to comply with zoning laws. These regulatory changes, alongside increased regulation by ATF, likely led to the steep decline in FFL dealers in the mid-1990s, in which the number of FFLs declined from 250,000 to approximately 80,000. Some of these individuals who did not renew their dealer licenses may account for the rapid rise in collector’s licenses that follows in the late 1990s and 2000s, which increase from about 12,000 in 1998 to a peak of approximately 65,000 in 2014. In recent years the number of dealers has remained fairly stable in the range of 70,000-80,000.

Figure 1: Federal Firearms Licenses By Type, 1975-2018



3.2.3 ATF Enforcement and FFL Compliance

FFLs must be prepared for ATF Industry Operations Investigators (IOIs) to conduct on-site inspections to monitor the FFL’s regulatory compliance. Although ATF’s stated goal is to conduct inspections of licensees on a 3 year or 5 year basis, ATF does not have the resources to inspect each FFL annually. The actual rate of inspections is quite low—between 6 and 10 percent annually in recent years—which implies that on average, ATF inspects FFLs only every 8-10 years ([Office of the Inspector General \(2013\)](#)). That ATF’s resources are insufficient to execute its regulatory and enforcement duties at its desired level is not a new problem. According to the 2004 Review of the FFL Inspection Program by the Department of Justice, “the Office of the Inspector General (OIG) concluded that ATF’s Inspection Program was not fully effective in ensuring that FFLs comply with federal firearms laws because inspections were infrequent and of inconsistent quality, and follow-up inspections and adverse actions had been sporadic. Also, ATF did not conduct in-person inspections on all applicants before licensing them to sell guns” ([Office of the Inspector General \(2013\)](#), p. i).

A 2013 follow-up review found that since 2004, ATF had improved its inspection process. Nevertheless, between 2007 and 2012, over 58 percent of FFLs had not been inspected within 5 years ([Office of the Inspector General \(2013\)](#)). One of ATF’s updates to the inspection process included prioritizing compliance inspections of “high risk” FFLs, which ATF determines using statistical indicators such as “a high number of crime guns traced to a purchase from the licensee, numerous multiple sales or multiple sales of guns used in crimes, thefts or losses of firearms, location” ([Office of the Inspector General \(2013\)](#), p. ii).

Table 1 shows ATF compliance inspection rates from 2000 to 2018. In the period since 2012, average inspection rates for business entities were 13.4 percent, down from the preceding seven year average of 15.8 percent from 2005 to 2011. Rates exhibit a slight downward trend over the period, from 16.5 percent in 2012 to 11 percent in 2015, subsequently increasing to 12.9 percent in 2018. The highest annual inspection rate was 20.4 percent, which was achieved in 2011; if this rate were sustained over time, business entity FFLs would be inspected on average every 5 years.

In Fiscal Year 2019, ATF reported conducting 13,079 compliance inspections of FFLs out of a total of 61,060 business entity FFLs with license type 01 or 02 (dealers or pawn-brokers) ([ATF \(2020\)](#)). Approximately half (52.84 percent) of these inspections reported no violations. Among the remaining 48 percent of inspected FFLs with violations¹⁹, IOIs

¹⁹The ATF lists the most frequently cited violations on their website ([ATF \(2020\)](#)); 10 such categories are provided. These “common” violations include: Failure to obtain a completed ATF F 4473, Failure to maintain an accurate/complete/timely Acquisition and Disposition (A&D) record, Failure to complete forms as indicated in instructions, Failure to record NICS contact information on ATF F 4473, Failure by transfer to sign and/or date ATF F 4473, Failure to verify or record purchaser’s identification document on ATF F 4473, Failure to report multiple sales or other dispositions of pistols and revolvers, Failure

Table 1: Federal Firearms Licensees and Compliance Inspections (FY 2000-2018)

Fiscal Year	Inspections	All Licensees		Business Entities	
		Total	% Inspected	Total	% Inspected
2000	3,640	103,157	3.50	82,558	4.40
2001	3,677	102,913	3.60	77,768	4.70
2002	5,467	103,411	5.20	73,254	7.50
2003	5,170	104,105	4.90	70,699	7.30
2004	4,509	106,214	4.20	69,008	6.50
2005	5,189	106,432	4.90	66,359	7.80
2006	7,294	107,316	6.80	63,666	11.50
2007	10,141	108,933	9.30	61,243	16.60
2008	11,100	112,943	9.80	60,346	18.40
2009	11,375	115,395	9.90	60,349	18.80
2010	10,538	118,487	8.90	61,807	17.00
2011	13,159	123,587	10.60	64,360	20.40
2012	11,420	130,956	8.70	69,071	16.50
2013	10,516	139,244	7.60	74,795	14.10
2014	10,437	141,116	7.40	77,815	13.40
2015	8,696	139,840	6.30	79,188	11.00
2016	9,790	137,464	7.10	80,119	12.20
2017	11,009	136,081	8.10	80,493	13.70
2018	10,323	134,191	7.70	80,055	12.90

Note: Data from Exhibit 13, “Firearms Commerce in the United States Annual Statistical Update 2019.” Type 03 licenses (Collector of Curio and Relics) excluded from business entity totals, as they are not subject to inspections.

recommended that 19.83 percent (2,594) only have their violations reported, 11.33 percent (1,494) be issued a warning letter, 3.17 percent (415) be required to have a warning conference, and 12.49 percent (1,634) have their license surrendered.²⁰ For the remaining 43 FFLs (0.33 percent), IOIs recommended license revocation or denial. Some of the most frequently reported violations are non-trivial from the perspective of public safety. These include failure to complete the sales/transaction form ATF 4473 and maintain Acquisition and Disposition records, which are essential for ATF to successfully trace firearms, and perhaps more disconcerting, failure to verify the purchaser’s information or complete the required NICS background check, which in less regulated states is the primary safeguard that prevents prohibitive persons from obtaining firearms.

3.3 Supply Side Regulations in the Secondary Market

Not all individuals must be licensed to sell firearms. Federal law allows people who sell on occasion—e.g. as a hobbyist or when liquidating firearms from a personal collection—to sell firearms without an FFL. The seller and the buyer must reside in the same state. Although unlicensed/private sellers, like licensed sellers, are prohibited by law from *knowingly* selling a firearm to a prohibited person, federal law does not require any action on the part of private sellers to determine if the prospective buyer is a prohibited person. In other words, private/unlicensed sellers do not have to conduct a Brady background check of the prospective buyer. Furthermore, federal law does not require private sellers to maintain or submit records of the transaction, as it requires of licensees.

These permissions apply to individuals engaging in private trade among their personal associations/networks, through the internet, gun magazines, or newspaper ads, at flea markets or, most notably, at gun shows. These exemptions constitute what is commonly referred to as the “private sale loophole” or “gun show loophole,” as the lack of legal burden on unlicensed sellers to ensure that the buyer is legally permitted to possess a firearm allows firearms to flow between legal individuals and prohibited persons in an unregulated way.

Finally, note also that federal law permits private unlicensed individuals to sell handguns to an individual between the age of 18 and 21 as long as he or she is not a prohibited person, whereas it does not permit FFLs to sell or deliver handguns to individuals under age 21.²¹

to properly record firearms information on ATF F 4473, Failure to complete a NICS/POC background check, and Failure to maintain an accurate/complete/timely manufacture or acquisition record.

²⁰This category is described as “License surrendered/out of business,” although it is unclear what “out of business” means.

²¹18 U.S.C. §922(b)(1).

3.4 Background Checks

The Brady Act of 1993 mandated FFLs to conduct background checks on all firearms purchasers in order to strengthen the enforcement of federal laws that prohibit individuals from obtaining or possessing firearms. As part of this Act, the National Instant Criminal Background Check System (NICS) was established in 1998 to provide a determination on eligibility (based on federal and state law) in a brief time frame. FFLs submit information of prospective buyers directly to the NICS (or to a state agency where mandated by law). Although the average length of time to complete a background check through NICS is just 2 minutes, on occasion, NICS needs to verify information that is indeterminate, which involves reaching out to judicial and law enforcement agencies. The Brady Act allows NICS 3 business days to reach a determination, after which it is legal for the FFL to proceed with the transfer (NICS (2017)). Note however, that NICS continues to try to make a determination, and if the determination is denial, the case will be referred to the ATF Denial Enforcement Division (DENI) (Karberg et al. (2017)). Applicants who are denied because they submitted a false application or for whom an outstanding warrant exists are subject to arrest and prosecution and may be pursued by law enforcement (Karberg et al. (2017)).

Some state statutes and local laws require that FFLs conduct their background checks through a state or local agency, also known as a state “Point of Contact” (POC). In addition to searching the NICS, state POCs may search state-level databases and therefore have access to supplemental information on criminal history and other records pertinent to firearms eligibility determination that may not appear in the FBI’s record system (which the NICS searches). Thirteen states act as a POC to conduct background checks²²; there are 8 states that implement a mixed system, where FFLs contact NICS for long gun transfers and state POCs for handgun transfers or handgun permits.²³ NICS provides full-service background checks for FFLs in the remaining 30 states.

Some states issue handgun permits. Applicants must pass a background check (and often must satisfy other requirements) to receive the permit. Once obtained, these permits exempt the carrier from background checks at the point of purchase. Permits are a valid substitute for background checks on transfers for no more than 5 years from the date of issuance. Kentucky and Utah periodically run background rechecks on their permit holders (Karberg et al. (2017)).

²²These are California, Colorado, Connecticut, Florida, Hawaii, Illinois, Nevada, New Jersey, Oregon, Pennsylvania, Tennessee, Utah, and Virginia. All states except Florida serve as the state POC for all firearms transactions; licensees may contact the FBI for certain pawn transactions.

²³Maryland, Michigan, New Hampshire, Washington, and Wisconsin use POCs to conduct handgun background checks, while Iowa, Nebraska, and North Carolina use POCs for background checks on handgun permits. See <https://www.atf.gov/rules-and-regulations/permanent-brady-state-lists> for the most updated state-level information.

4 Data

Data availability and quality varies drastically between primary and secondary markets. One contribution of this paper is the creation of a new secondary market dataset of public firearms listings that contains detailed information on firearm prices and firearm types, broken down by geography at the state level (and more detailed where possible). Before describing the dataset we create, we first discuss data sources for the primary market.

4.1 Primary Market Data

Demand for firearms in the primary market can be approximated using background check data from the National Instant Criminal Background Check System (NICS). The NICS is run by the Federal Bureau of Investigation (FBI), and information on the total number of background checks conducted for each state and firearm type is released each month. Background check data is an appropriate proxy for demand in primary markets, though the correspondence is not one-to-one since multiple simultaneous purchases (which account for a non-negligible share of transactions) require only a single background check, and since background checks are often run for purposes of permitting. Furthermore, since states differ in their background check requirements for private sales, NICS data cannot be used to provide complete picture of demand in secondary markets.

To establish the degree of supplier competition in primary markets, we use data on the universe of federal firearms licensees who deal in firearms—Type 01 and Type 02 licenses. The ATF publishes a list of licensed firearms dealers in the U.S.²⁴ which is updated on a monthly basis, creating a monthly panel of all FFLs in the U.S. We have data from 2014-2020, although occasionally a month of data is missing for unexplained reasons. Each record includes the unique FFL ID, name of the licensee, mailing address, business name, business address, phone number, license expiration date, and geographic information for the license (region, district, state/county). In our descriptive analyses below, we focus on current year FFLs (January through June 2020).

Although FFL dealers and pawnbrokers (FFL License Types 01 and 02) are required by law to maintain standardized records of all firearms sales and transactions, such information is not publicly accessible, so disaggregated data on the quantity of sales for a given dealer and/or firearm type are not available. However, the ATF annually releases aggregate counts of manufactured firearms, broken down by firearm type (pistol, revolver, rifle, and shotgun), that have been distributed in the U.S. for consumption by either civilians or law enforcement. We collect these data from two sources, the “Annual Firearms Manufacturing and Export Report 2019” and the “Firearms Commerce in the U.S. Annual Statistical Report 2019,” which yields a time series covering years 1986

²⁴The FFL listing is complete for all categories of FFL licenses except for “Collectors of Curios and Relics,” which is only available as an aggregate monthly statistic by state.

to 2019.²⁵ These data provide a picture of the volume of newly manufactured firearms distributed into the U.S. over time.

We complement the aggregate quantity data on new firearms with information about the value of the items produced. The U.S. Department of the Treasury’s Alcohol and Tobacco Tax and Trade Bureau (TTB) collects the statutory excise tax on every firearm produced in the U.S. The tax is collected quarterly for all U.S. firearms manufacturers and is levied at a rate of 10 percent for handguns and 11 percent for other firearms and ammunition. The data we obtain from the Treasury are “calculated” revenues, which are computed based on the calculated tax owed by manufacturers as stated on the required forms they submit to TTB. We use these “revenue” data, combined with the tax assessment rates, to estimate the total U.S. production revenue/value by firearm type (handgun, rifle, and shotgun) both quarterly and annually. We then divide these annual revenue data by the annual production quantities to generate the average value of new firearms produced in the U.S. We believe this measure provides a reasonable proxy for the annual average wholesale price of firearms in each category, as every firearm that a manufacturer transfers (sells) to a dealer or other retailer is taxed at the aforementioned rates based on the sales price to the dealer.²⁶

4.2 Secondary Market Data

At present, little data exists on firearms transactions. One objective of this project is to improve our understanding of both primary and secondary markets by creating a new supply-side dataset. To that end, we gather pricing data from a major trade publication designed to help buyers and sellers (both hobbyists and collectors) navigate secondary markets. We also gather data on listings posted to a large online platform for firearms sales, which include asking prices for a variety of firearms sold by licensed dealers (in the primary market) and private sellers (in the secondary market).

Data on gun prices comes from the Gun Digest Book of Modern Gun Values, 18th Edition (Peterson and Johnson (2016)), a publication of the Gun Digest trade group. The Book of Modern Gun Values (henceforth “Gun Digest”) includes pricing information on over 30,000 firearms from nearly 600 manufacturers, and includes the vast majority of civilian firearms manufactured between 1900 – 2016. For each firearm, experts and collectors have estimated the fair price for various quality levels; descriptions of gun conditions are shown in Table 2.

Listings on the largest internet-based platform for private firearms transfers—Armslist—are publicly accessible, as it is a non-membership marketplace. We have begun scraping

²⁵These reports are in PDF format and can be found at <https://www.atf.gov/resource-center/data-statistics>.

²⁶Importantly, the tax is levied in the year that the firearm is distributed into U.S. commerce, not the year it is manufactured.

Table 2: *Book of Modern Gun Values - Description of Conditions*

Condition	Description
New	In same condition as current factory production, with original box and accessories.
Perfect	In new condition in every respect, but may be lacking box and/or accessories.
Excellent	Near new condition, used but little, no noticeable marring of wood or metal, bluing perfect (except at muzzle or sharp edges).
Very Good	In perfect working condition, no appreciable wear on working surfaces, visible finish wear but no corrosion or pitting, only minor surface dents or scratches.
Good	In safe working condition, minor wear on working surfaces, no corrosion or pitting that will interfere with proper functioning.
Fair	In safe working condition, but well worn, perhaps requiring replacement of minor parts or adjustments, no rust, but may have corrosion pits which do not render article unsafe or inoperable.

Note: Price information is typically provided for a subset of these categories. Few firearms contain a price for “Fair” condition, and older firearms have no price information for “New.”

posting data from this platform to develop a novel dataset that contains detailed information on firearms listings. Each listing includes a title (usually containing the name of the firearm), posting date, asking price, vendor type²⁷, and location of sale. Optional fields include firearm category, manufacturer, caliber of munition, and type of weapon. The majority of listings contain information on one or more of these fields. Eventually, we would like to use this data to match firearms from Armslist to their counterparts in the Gun Digest pricing dataset, which would allow us to make direct comparisons between prices primary and secondary markets.

We also collect the full text of each listing. Although this information is not being utilized at the present, the full-text listing could be used to fill in missing or inaccurate data from the predefined fields.²⁸ Finally, in many cases, the full-text listing includes information about the history or quality of each firearm (e.g., “like new,” “barely used,” “gently used”) which can be used to generate a separate quality field in the dataset.

Our data is scraped on a recurring basis, approximately five times per day, which ensures that the majority of listings are contained in our final dataset. Listings on Armslist are searchable for three months after the original posting, but the majority are removed prior to the three month mark, and those that remain are disproportionately

²⁷Vendors on Armslist are either listed as “Premium” or “Private.” Premium vendors are licensed dealers and must include business phone numbers (and many include a link to the dealer website).

²⁸For instance, a small but non-trivial number of listings have prices of \$0 in the price field, and others include unrealistic prices like \$12,345. Many of these listings a separate price in the full-text, and others provide indication that the listing should be dropped entirely (e.g., the listing is classified as “for sale” but the full text describes a trade).

likely not to have resulted in a transaction.²⁹ Further, repeated scraping provides accurate information about the posting date of all firearms. A large number of premium vendors re-post their firearms, meaning that infrequent scraping will tend to overstate the number of premium vendors posting on recent dates and understate the number of premium vendors posting on past dates. Further, vendors who re-post are likely to remove their listings after a sale, meaning that infrequent scraping will disproportionately miss listings by premium vendors.

4.3 Additional Data Sources

We also obtain data on firearms recovered from criminal investigations that are successfully traced back to their original point of sale. Firearms recovered by law enforcement agencies may be submitted for tracing through the ATF Electronic Tracing System, and this data is released to the public each year (it is currently available for the period 2010-2019). In accordance with federal law, this data must be released in aggregate form. Aggregation is at the level of year, source state, recovery state, and time-to-crime³⁰, and summary statistics about weapon type and type of offense are available for each recovery state, but are not further broken down by source state or time-to-crime. ATF tracing data is frequently used as an indicator of interstate trafficking of firearms. Additionally, we have more granular data obtained from local law enforcement by The Trace³¹, which includes trace results for guns reported lost or stolen at the level of individual firearms.

We obtain information on state gun laws from the State Firearms Laws Database³², a project of Boston University School of Public Health. For each of 134 state laws, the database contains hand-coded binary indicators for whether each state had such a law in place for each year between 1991-2020. Laws are grouped by type, and these law types are summarized in Table 7 in Appendix A.

Finally, we have submitted a Freedom of Information Act (FOIA) request for ATF inspection reports. These reports would allow us to see the extent of malfeasance on the part of licensed dealers, which could be helpful for modeling the decision-making process of dealers in the primary market and for determining how the enforcement decisions affect the number of crime guns sourced from primary markets.

²⁹Drake et al. (2019) used data scraped from the Armslist marketplace, and examined listings for indications that a purchase required a background check, concluding that only a small fraction of listings gave any such indication. However, the scraped data omitted listings which had been removed from the site prior to scraping, which includes many listings corresponding to completed transactions.

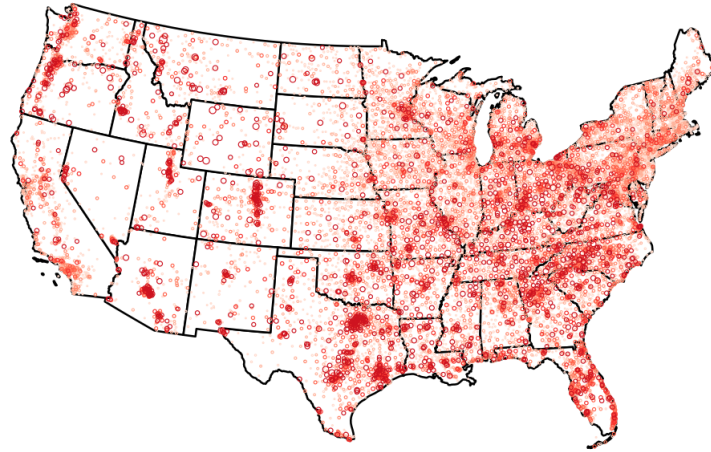
³⁰Time-to-crime is defined as the time elapsed between first purchase of a firearm from a licensed dealer to the date of recovery. Categories include (1) 0 – 3 months, (2) 4 – 7 months, (3) 8 – 12 months, (4) 1 – 2 years, (5) 2 – 3 years, and (6) 3+ years.

³¹See <https://www.thetrace.org/missing-pieces/>.

³²See <http://www.statefirearmlaws.org/>.

5 Competition in the Primary Market

Figure 2: Federal Firearms Licensees, 2020



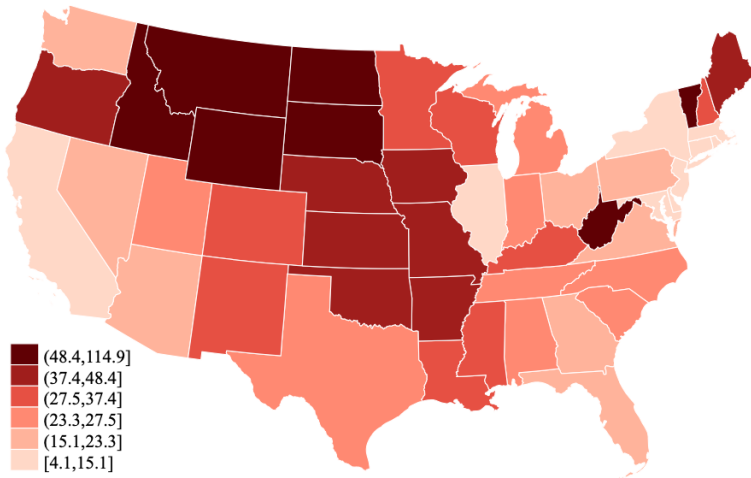
Note: The figure plots Type 01 (Dealers) and Type 02 (Pawnbrokers) FFLs by zip code. Large red dots represent a large number of FFLs per zip code, while small orange dots represent a small number of FFLs per zip code. Authors' calculations based on data from ATF.

Figure 2 shows the location and number of 2020 Federal Firearm Licensees at the zip code level. Each circle represents a zip code, with larger and darker circles indicating more FFLs in the zip code. Unsurprisingly, dealers concentrate near major population centers, although most rural areas have at least one nearby dealer. While most northeastern zip codes have at least one dealer, southeastern states tend to have a greater number of FFLs per zip code.

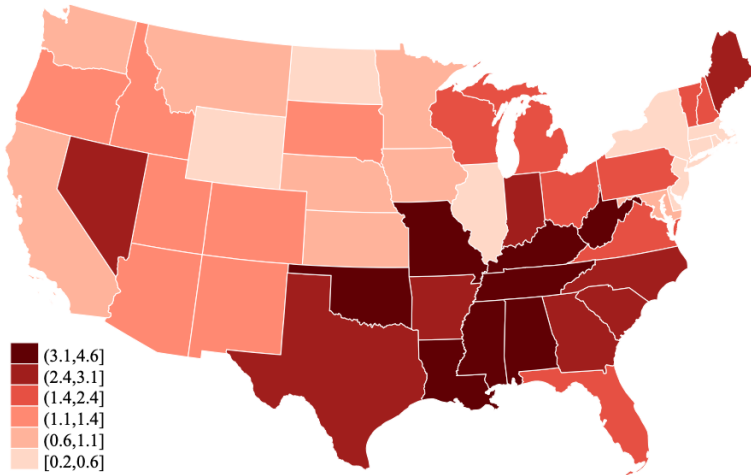
Figure 3a depicts the total number of licensed dealers per 100,000 residents. The greatest concentration of dealers is in the West and Midwest. As Figures 3b and 3c show, this trend is explained by a relative abundance of smaller, non-corporate dealers in the West and upper-Midwest. Meanwhile, the South and lower-Midwest have a greater number of corporate dealers per capita, but these corporate dealers make up only a small portion of licensed dealers.

Figure 3: Firearms Dealers Per 100,000 Residents, 2020

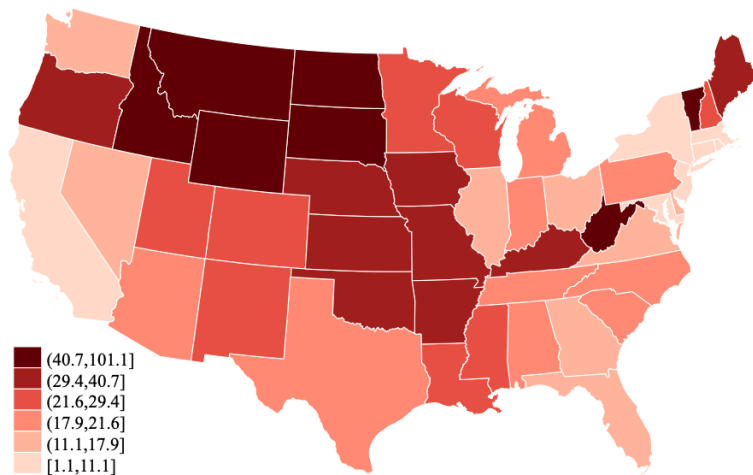
(a) All Dealers



(b) Corporate Dealers



(c) Non-Corporate Dealers



Note: The figure plots Type 01 (Dealers) and Type 02 (Pawnbrokers) FFLs that list a business name on their application. Corporate dealers include large retailers such as Cabela's, Walmart, Dick's Sporting Goods, Gander Mountain, Southern Outdoor Sports, Bass Pro Shops, Cash America, First Cash, and Academy Sports. Authors' calculations based on data from ATF.

6 Measures of Firearms Demand and Supply

One of the largest roadblocks to gun research is the lack of data on quantities and prices. Publicly available firearms transactions data do not exist at the federal level as a result of laws prohibiting the federal government from maintaining a centralized database of sales.³³ As a result, gun researchers turn to an alternative measure as a proxy for demand: the National Instant Criminal Background Check System, which by law must be checked by FFLs for every firearms transaction, except where exempt. Aggregate counts of queries into this system are available at the state-by-month level and for various categories of background checks, including by firearm type and separately for private sales, although private/unlicensed sellers are not required to conduct a background check to sell or transfer a firearm.

This proxy has important limitations because queries into NICS do not map one-to-one to firearms purchases, for various reasons. First, some individuals may not complete the purchase even if approved. Second, multiple firearms may be purchased at a given time. Third, individuals with handgun or conceal carry permits will obtain background checks in order to be issued the permit, but the permit acts as a substitute for the background check at the time of purchase. Nevertheless, this series, which dates back to 1998 (when the NICS was created), provides a helpful benchmark for firearms demand.

Figure 4a plots the historical evolution of NICS background checks since their introduction in 1998. After remaining relatively stable during the first six years of implementation (at just under 9 million checks per year), the number of annual NICS checks has been increasing over time since 2005, more than doubling from 2010 to 2019. Figure 4b shows the aggregate counts of monthly background checks from July 2010 to July 2020 for prospective purchases of handguns, long guns, and multiple firearms. Seasonal patterns are evident, with the largest increases in demand occurring annually in November and December. These firearms categories exhibit a slight upward trend over time in the number of background check requests leading up to March 2020, after which demand spikes (likely in response to the COVID-19 epidemic).

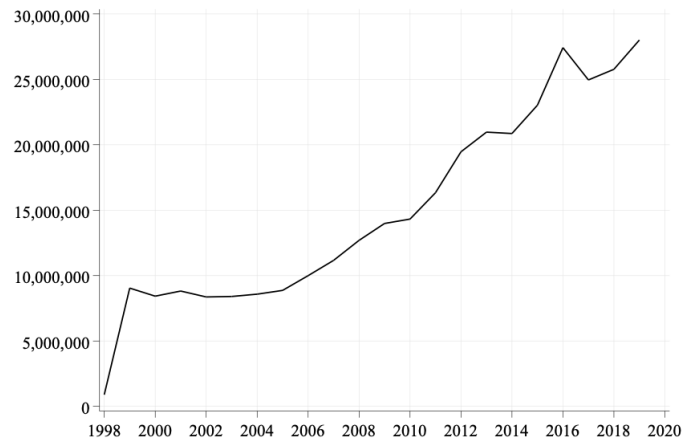
To adjust for seasonality, Figure 4c plots year-over-year percent changes in monthly checks. After this adjustment, a few months stand out as being associated with larger than normal increases in demand. Vertical lines are plotted at these months: January

³³A few states require licensed dealers to report firearms transactions to law enforcement, including California, Hawaii, Connecticut and Massachusetts; these states also require private sellers to report transactions (although in California, all transfers must occur through FFLs). A few other states require licensed dealers to report handgun sales: Maryland, Michigan, New Jersey, New York, Pennsylvania, and Washington. All of those states except New York require private sellers also to report transactions of handguns to law enforcement, but New York has a state licensing program for handguns which retains the same information. Washington also requires all firearms transfer be conducted through an FFL. Additional details on state policies can be found at <https://lawcenter.giffords.org/gun-laws/policy-areas/gun-sales/maintaining-records-of-gun-sales/>.

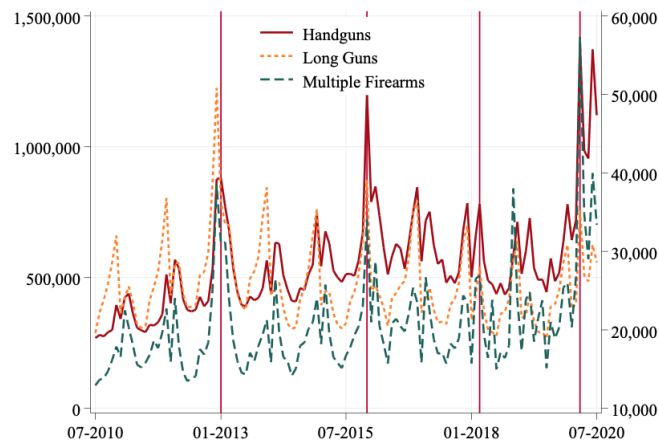
2013, December 2015, and February 2018. The spike in background checks occurring during each of these months corresponds to a firearms-related event. In order, these are, President Obama's January 5th, 2013 speech on gun control following the mass shooting at Sandy Hook Elementary School in Newtown, CT; the San Bernardino terrorist attack mass shooting on December 2, 2015; and the mass shooting on February 14 at Marjory Stoneman Douglas High School in Parkland, FL. A vertical line is also plotted in March 2020, corresponding to the beginning of the COVID-19 epidemic in the U.S., a period which has seen the largest surge in NICS checks since its inception.

Figure 4: NICS Background Checks as a Proxy for Primary Market Firearms Sales

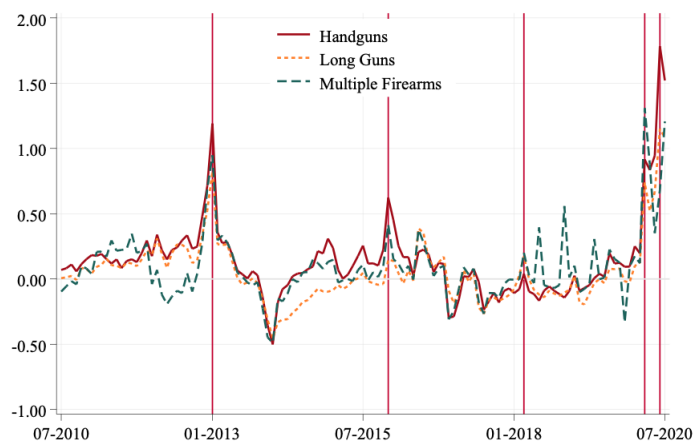
(a) Annual NICS Background Checks



(b) Monthly NICS Background Checks



(c) Year-Over-Year Change in Monthly NICS Background Checks

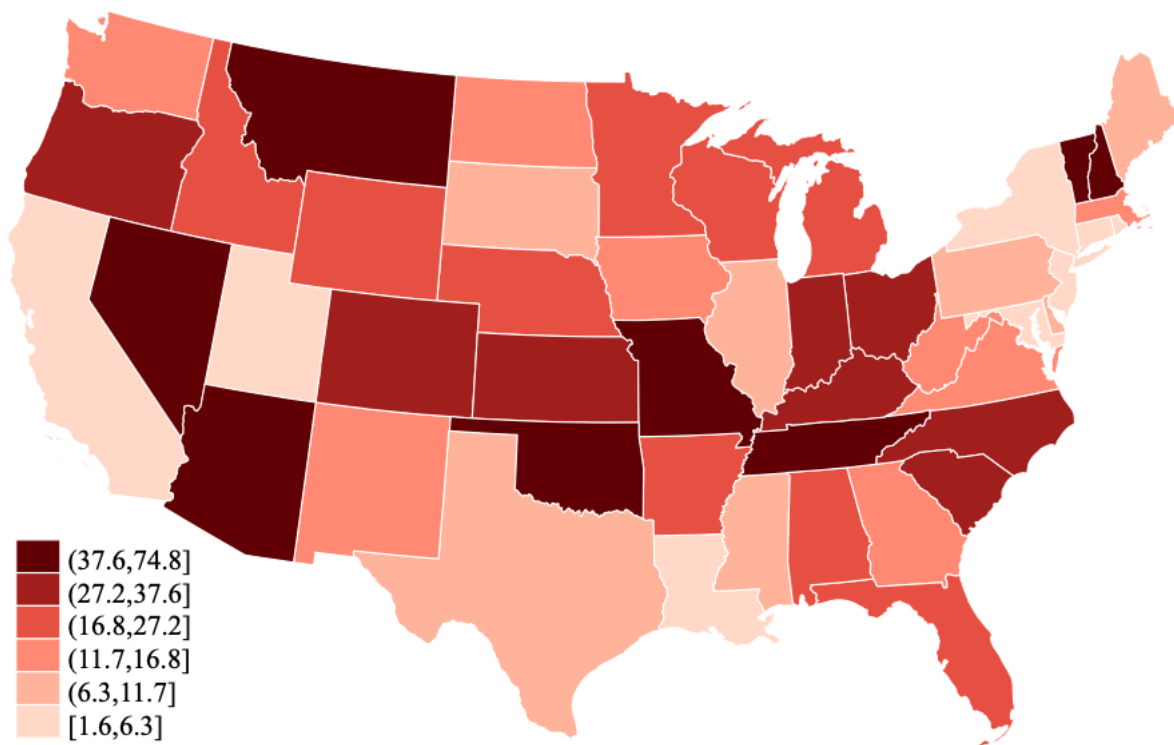


Note: Figure 4a shows aggregate counts of yearly NICS background for all types of checks and for handguns and long guns, while Figure 4b shows monthly NICS background checks for different categories of firearms during the period July 2010 through July 2020. Figure 4c shows the year-over-year changes for these categories over the same period. Data are aggregated across states for each month. NICS background checks are often used as a proxy for firearms sales, since they are conducted by FFLs every time an unlicensed individual wishes to purchase a firearm.

Next we discuss a proxy for secondary market firearms supply: Offers of firearms on the internet platform Armslist.com for the period August 1-24, 2020.³⁴ While we recognize that Armslist postings and trades represent only a subset of the secondary market, Armslist nevertheless accounts for a non-trivial share of the overall firearms market. We gather approximately 2,500-3,000 new Armslist postings daily, which, if annualized, would correspond to nearly 1 million postings per year. Given that U.S. manufacturers introduced approximately 8.5 million new firearms into commerce in 2018 (some of which were purchased by local law enforcement), the Armslist postings appear to represent an important fraction of the overall market.

Figure 5 depicts per capita listings on Armslist, with state colors assigned by quantile. The data are not necessarily indicative of total firearm supply within a state. For example, the state with the highest number of listings per capita has more than 40 times the per capita listings as the state with the lowest number. This is not proportional to the likely difference in either demand or supply between the states, but may be due to data limitations at this early stage. Nevertheless, the map suggests that population-adjusted firearms supply is not concentrated in any single region. However, one noticeable pattern is that states with little supply per capita frequently border states with high postings per capita, as in the case of California (Nevada, and Arizona) and New York (Vermont).

Figure 5: Armslist Firearms Postings (Per 100,000), Aug. 2020



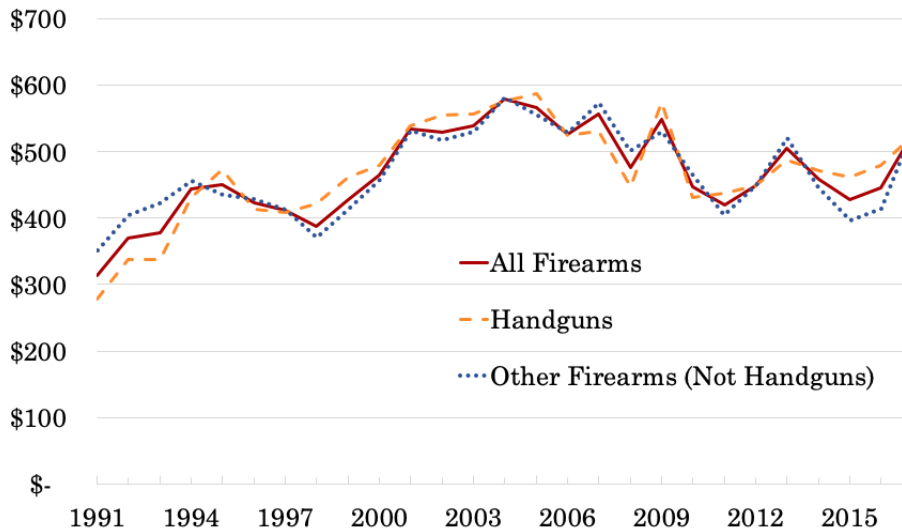
³⁴We have listings posted as early as April (from URLs that were collected as early as July 1). However, our sample of data is only representative for August 1 and later due to selection issues among postings that remained when the content was scraped.

7 Prices

No comprehensive pricing data exists for firearms sold by dealers to consumers. However, excise taxes allow us to compute the average price paid by dealers to manufacturers, in other words, wholesale prices. Figure 6 depicts the historical trend in wholesale firearms prices (converted to 2015 USD) from 1991 to 2018. Over the past 3 decades, average gun prices have risen 38.5 percent. Although year-to-year fluctuations average to 1.8 percent, they range from -18.5 percent (2010) to 18.1 percent (2017). While these price changes may reflect changes in industry composition, both among dealers and among manufacturers, they also may reflect shocks to firearms demand driven by perceived increases in gun control regulation or business cycles. In 2018 the average wholesale firearm sold for approximately \$435, 17.5 percent less than the prior year. This drop in prices is consistent with anecdotal evidence of the so-called “Trump Slump” in firearms demand (following the surge in demand leading up to the 2016 election), during which dealers and manufacturers had to slash prices after accumulating large inventories.³⁵ Interestingly, the prices of handguns increased 61 percent over the period, compared with 19.8 percent among long guns.

³⁵See <https://www.npr.org/2018/02/27/589061976/thanks-to-trump-slump-shops-have-more-guns-than-buyers>.

Figure 6: Estimated Average Wholesale Firearms Prices in the U.S., 1991-2018 (\$2015)



Note: The figure displays changes over time in average wholesale prices (sales revenue/quantity) for new firearms distributed for commerce the U.S. (includes law enforcement but excludes federal government purchases). Revenues have been converted to 2015 USD. Sales revenue for new firearms produced is computed by dividing the federal excise tax revenue (Alcohol and Tobacco Tax and Trade Bureau) for each firearm category by the corresponding tax rate on each item produced (10% for handguns and 11% for other firearms). To compute a measure of average price, the estimated revenue is then divided by the number of firearms produced in the U.S. (Annual Firearms Manufacturing and Export Report 2018, Bureau of Alcohol, Tobacco and Firearms).

The previous analysis provides a useful benchmark for wholesale firearms prices nationwide. But to understand incentives facing different types of sellers and buyers (both legal and prohibited), we need information about sales prices both in primary and secondary markets. Unfortunately, due to the lack of data on firearms transactions, little is known about how prices compare across primary and secondary markets. In the next analyses, we use price data we collected from Armslist.com to give a picture of these differences. One feature of Armslist data that we find beneficial for our purposes is the distinction between premium and non-premium vendors, where premium vendors are those with a Federal Firearms License. Since only sellers with an FFL sell in the primary market, we believe these sellers will be a reasonable proxy for primary market dealers, and we operate under this assumption in the discussions that follow.

We begin with an exercise that is aimed at examining whether our Armslist prices align with the distribution of fair market prices provided in Gun Digest. Table 3 presents suggestive evidence that handgun prices on Armslist reflect primary and secondary market prices reasonably well. In an effort to make an apples-to-apples comparison, we restrict the samples in Armslist and Gun Digest to include only those firearms manufac-

tured by the ten largest firearms manufacturers³⁶ plus Beretta USA, which specializes in handguns and accounts for a large volume of handgun sales. We restrict attention to these manufacturers because they tend to sell relatively standardized products that vary little in price. Other manufacturers may have large variation in prices due to some weapons being popular among collectors.³⁷

Handguns listed on Armslist have an average asking price of \$590 (in \$2020), while average Gun Digest prices are \$475 (in \$2016). Looking at firearms listed as “new,” average Armslist prices are approximately \$25 lower than their Gun Digest counterparts. This may reflect differences in prices over time, or it may suggest that new handguns sold on Armslist may be of slightly lower quality than the average handgun listed in Gun Digest. This would be consistent with the hypothesis that manufacturers tend to produce fewer units of more expensive firearms, and thus the prices in Gun Digest would be biased upward due to the presence of more expensive products.³⁸ Table 4 conducts a similar exercise for rifles. Mean prices on Armslist are comparable to those in Gun Digest, though prices on Armslist have lower variance.³⁹

Having established that our Armslist prices compare reasonably well to the fair-market prices that are suggested by Gun Digest, we use the Armslist postings to investigate differences in prices across states and market type (primary versus secondary). To our knowledge, ours is the first paper to document cross-sectional variation in U.S. firearms prices.

³⁶This list includes Ruger (Storm, Ruger), Smith & Wesson, Remington Arms, Sig Sauer, Mossberg, Anderson Manufacturing, Savage Arms, Henry Repeating Arms, and Glock. We use the list provided in an article by The Motley Fool from March 2017; in the future we hope to verify this list using data from ATF, which currently is not in a usable format.

³⁷For instance, Gun Digest lists antique shotguns and rifles that sell for up to \$25,000-85,000 depending on quality.

³⁸This problem arises because our gun digest price statistics do not yet account for differences in quantity. Once we have more data from Armslist, we plan to match listings to Gun Digest prices for more accurate comparison. We expect these differences to be reduced once we adjust for the type and quantity of each firearm being sold.

³⁹This is because there are more collectors items among rifles listed in Gun Digest.

Table 3: Comparison of Handgun Prices in Armslist vs. Gun Digest For 10 Largest U.S. Manufacturers

	Median	Mean	SD	p25	p75	N
<i>Armslist</i>						
All	590	657	381	450	775	33,362
FFL	545	605	320	418	699	9,483
Private	600	678	400	450	800	23,878
New	550	608	304	420	700	4,082
Used	550	593	310	410	700	838
<i>Gun Digest</i>						
All Quality Classes	475	602	615	350	650	1,882
New	575	639	329	425	700	213
All Used	460	597	642	350	600	1,669
<i>Gun Digest - Used Classes</i>						
Perfect	500	538	222	400	600	300
Excellent	475	665	785	385	650	632
Very Good	425	580	654	325	595	494
Good	400	531	533	300	600	243

Note: Gun Digest prices are from 2016. Armslist prices are from August 2020.

Table 4: Comparison of Rifle Prices in Armslist vs. Gun Digest For 10 Largest U.S. Manufacturers

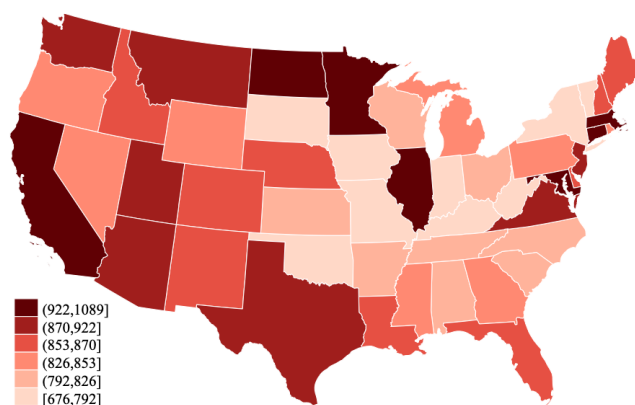
	Median	Mean	SD	p25	p75	N
<i>Armslist</i>						
All	650	776	568	400	950	14,455
FFL	500	612	414	357	767	4,400
Private	715	847	610	450	1000	10,055
New	549	648	418	360	800	1,268
Used	670	764	555	399	950	305
<i>Gun Digest</i>						
All Quality Classes	375	712	2683	250	595	2,605
New	550	640	323	375	850	125
All Used	375	715	2749	250	575	2,480
<i>Gun Digest - Used Classes</i>						
Perfect	592	1488	5250	430	900	310
Excellent	410	756	2688	275	600	854
Very Good	350	604	2060	225	495	882
Good	250	310	334	150	325	434

Note: Gun Digest prices are from 2016. Armslist prices are from August 2020.

Firearms prices on Armslist vary substantially across states. Figure 7 plots quantiles of average handgun prices for the lower 48. Average handgun prices vary from \$676 (Vermont) to \$1030 (California).⁴⁰ Mean prices in the South and Midwest are in the lower part of the distribution, while handguns in the West and Northeast are offered at much higher prices on average. Figure 8 breaks down prices by vendor type. Examining the map of premium vendors (i.e., licensed dealers) in Figure 8a reveals that a state’s position in the mean price distribution often differs from its position in the distribution of licensed dealer prices. Premium vendor prices tend to vary within geographic regions, whereas high private vendor prices appear to be concentrated in states west of the Mississippi (see Figure 8b).

In the bottom panel (Figure 8c)⁴¹, we compare private and premium vendor average handgun prices by taking their ratio and then plotting those by quantile. Values greater than one indicate that private prices are higher than premium prices, while prices less than one indicate that the state’s average handgun prices for premium vendors exceed those for private sellers. The figure shows that within a state, the relative spread of handgun prices across vendor types is greatest among southwestern states, while such prices are fairly compressed in southeastern states. Meanwhile, most states⁴² with premium vendor prices exceeding private vendor prices (ratio less than one)—such as Washington, California, Illinois, Maryland, Massachusetts, Connecticut, Rhode Island, and to some extent, Minnesota—have some of the strongest gun laws in the country. In this regard, New York and New Jersey are outliers, as they have strong gun laws and relatively large price spread. In many cases, the heavily-regulated states with higher premium vendor prices border states with higher private prices and relatively weaker gun laws (Arizona, Missouri, Wisconsin, Iowa, Indiana, Kentucky, Virginia, and Vermont).

Figure 7: Armslist Mean Handgun Prices, Aug. 2020



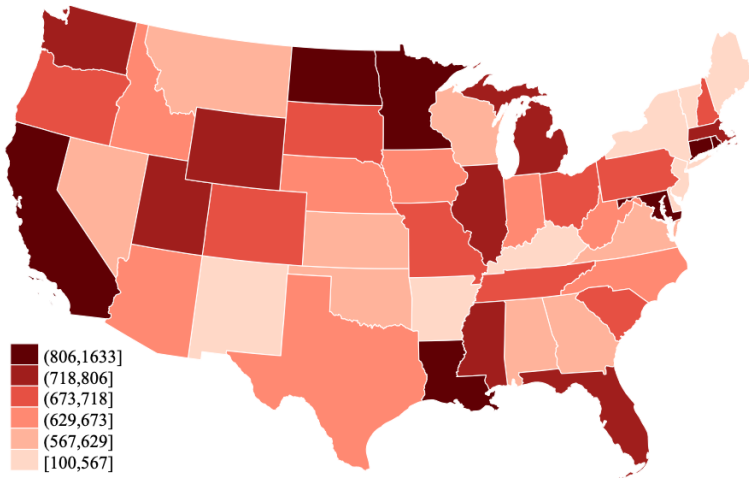
⁴⁰In our data, the average price in North Dakota was \$1089, but we only have 29 observations.

⁴¹We also conduct this same exercise using median prices (see Table 13 in Appendix B) and find similar patterns.

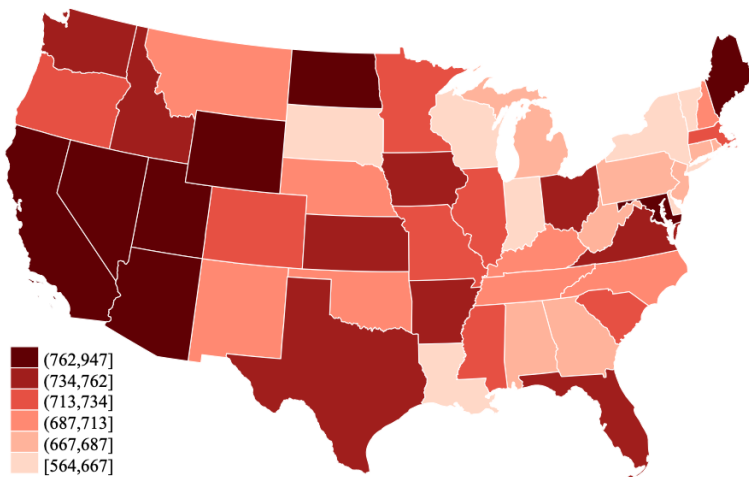
⁴²The other states with a ratio less than one—North Dakota, South Dakota, Louisiana, Mississippi—have fewer than 10 handgun postings by premium vendors, so the ratio is likely driven by the small sample sizes. This issue should disappear as we collect more data.

Figure 8: Armslist Mean Handgun Prices By Vendor Type, Aug. 2020

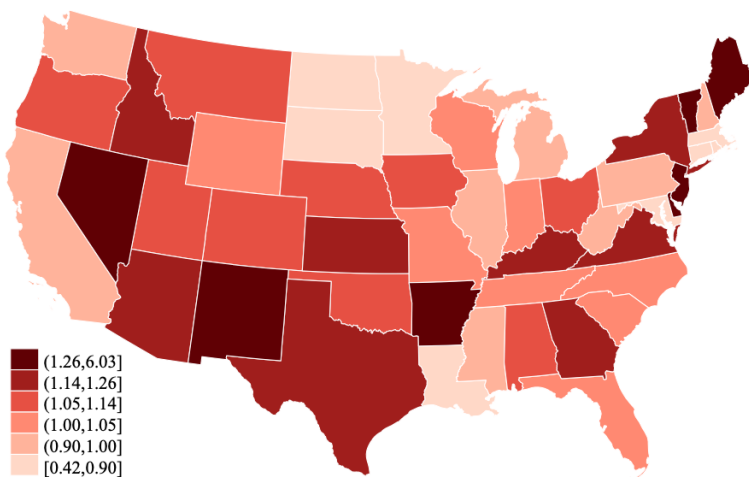
(a) Premium Vendors (FFLs)



(b) Private Vendors (Private Sellers)



(c) Ratio Private/Premium



Note: States are divided into quantiles. Data obtained by authors from Armslist.com

8 Firearms Tracing

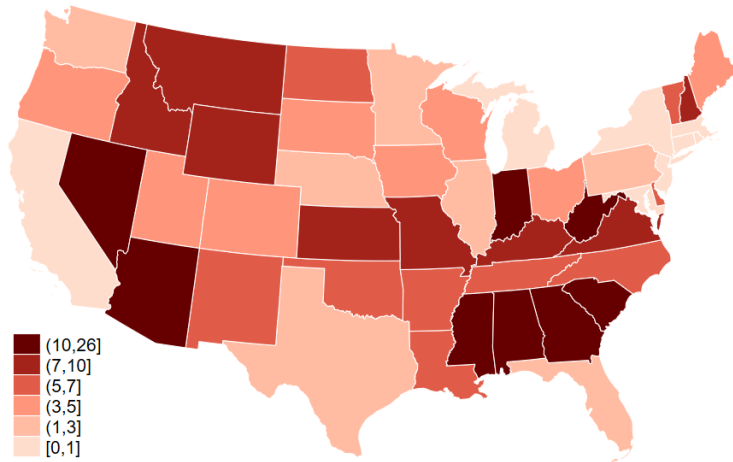
In this section, we examine spatial patterns in crime guns traced to and from each state. We categorize the ATF tracing data into two groups: low time to crime (low TTC) for crimes committed less than two years after firearms purchased from the licensed dealer, and high time to crime (high TTC) for crimes committed two years or more after the purchase from the FFL. As before, we adjust for population, so the values are measured as rates (crime guns per 100,000 residents).

These export (Figure 9) and import (Figure 10) figures provide suggestive evidence that greater regulation reduces the number of exported firearms. They also suggest the presence of (negative) spillovers from low-regulation states to high-regulation states. Figure 9a graphs low TTC exports. States like California, Massachusetts, New Jersey, and New York, which have some of the strongest firearms laws, have the lowest rates of crime gun exports. Meanwhile, a belt of states in the south, stretching from Mississippi to South Carolina, as well as two California border states—Arizona and Nevada—export more than 10 times as many low TTC crime guns per capita as the states in the lowest quantile. Similar patterns exist for high TTC gun exports, but the distribution is shifted to the right, reflecting the fact that many more guns recovered and traced in crimes were purchased from licensed dealers multiple years before the crime was committed.

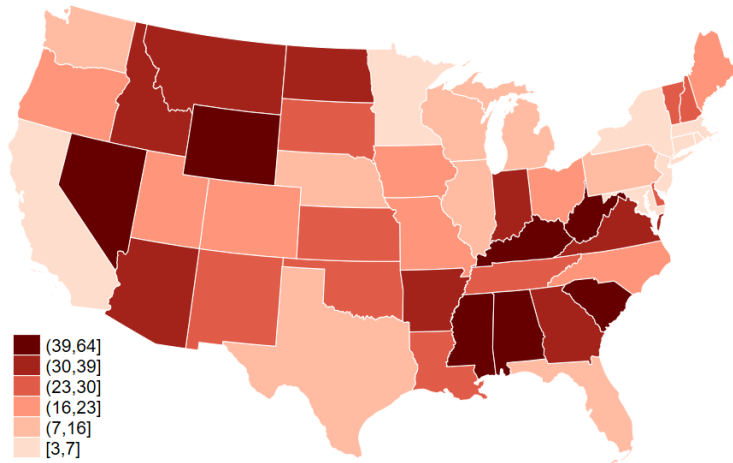
Moving to crime gun imports, Figure 10 shows that states with the largest numbers of crime gun imports represent a range of regulatory strength. Focusing on the panel of low TTC imports (Figure 10a), states that exported low TTC guns at high rates tend to import them at lower rates, and tend to place lower in the distribution than they did in the export distribution. Meanwhile, many of the low count exporters are in the upper part of the distribution for imports. These patterns could indicate that a state's regulatory efforts are undermined by other states with lax regulations, especially those nearby (examples of two such pairs are California and Nevada and Missouri and Illinois).

Figure 9: State Crime Gun Exports (2019)

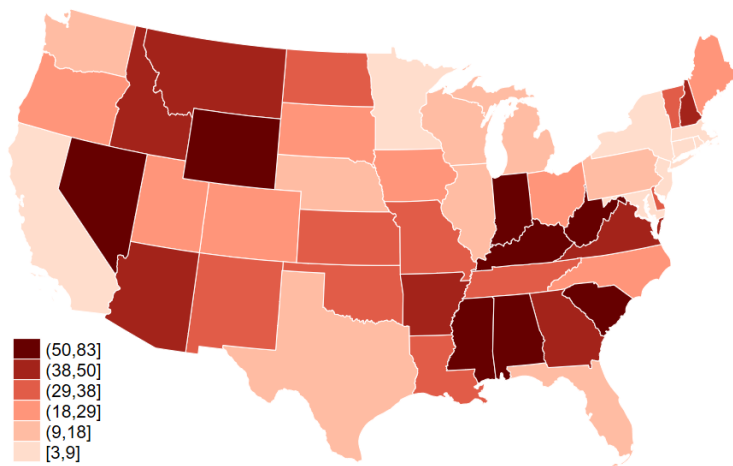
(a) Low Time to Crime Gun Exports (Per 100,000)



(b) High Time to Crime Gun Exports (Per 100,000)



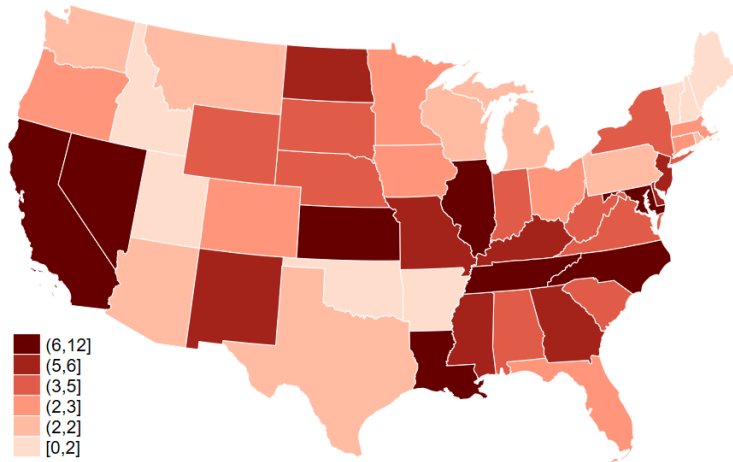
(c) All Crime Gun Exports (Per 100,000)



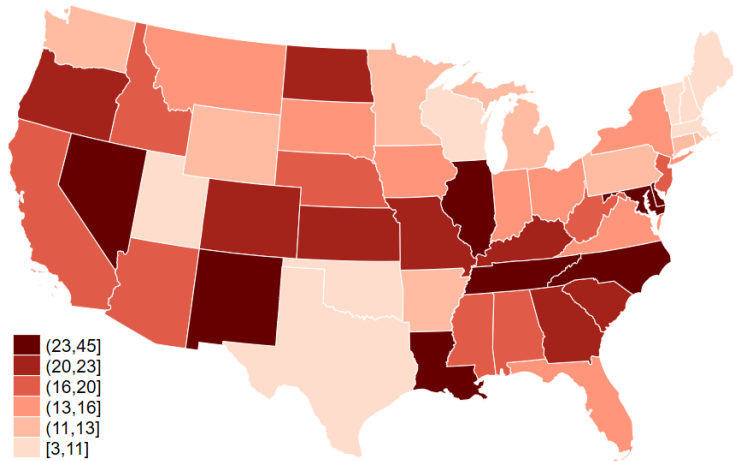
Note: Low time to crime is defined as less than 2 years. High time to crime is 2 years or more. Data from ATF.

Figure 10: State Crime Gun Imports (2019)

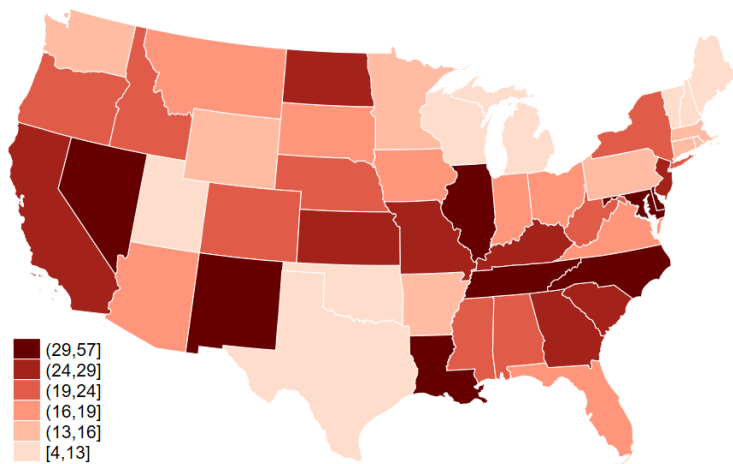
(a) Low Time to Crime Gun Imports (Per 100,000)



(b) High Time to Crime Gun Imports (Per 100,000)



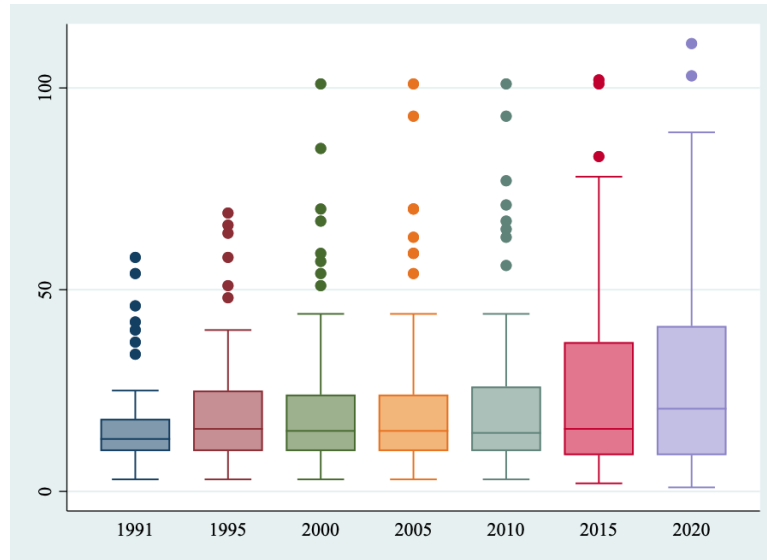
(c) All Crime Gun Imports (Per 100,000)



Note: Low time to crime is defined as less than 2 years. High time to crime is 2 years or more. Data from ATF.

9 State Regulations

Figure 11: Changes Over Time in the Distribution of State Gun Law Counts



Note: The figure shows boxplots over time of the number of gun control measures adopted by U.S. states. Data from the State Firearms Laws Database hosted at the Boston University School of Public Health.

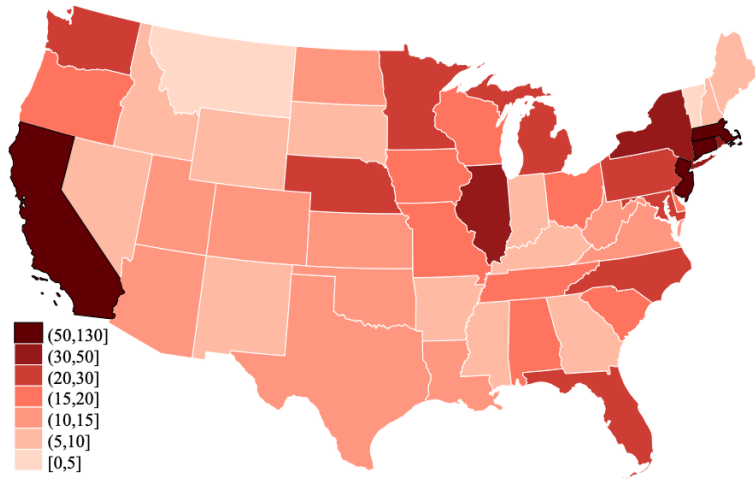
In our last descriptive analyses, we explore variation in the number of gun control laws adopted, both across states and within states over time. Figure 11 presents box plots (for select years) of the number of gun control laws at the state level. Figure 12 shows the number of firearms regulations adopted in each state. For both figures, firearms laws are coded as dummy variables which receive a value of one whenever a state either (1) has passed a restriction or additional requirement for firearms owners or dealers, or (2) has failed to pass a gun law which removes such restrictions.⁴³

As Figure 11 shows, the median number of state firearms laws has increased over the period 1991-2020, with the least-regulated states decreasing the number of regulations slightly and the most-regulated states increasing regulations drastically. In 1995 (Figure 12a), four states (California, Connecticut, Massachusetts, and New Jersey) had over 50 laws in place, and the vast majority of states had fewer than 20. By 2020 (Figure 12b), these trends had changed significantly, with the number of states with over 50 laws more than doubling, and about half of states now including at least 20 laws. As shown in Figure 12, this upward trend was most noticeable during the period 2010-2015 (the period during which the mass shooting at Sandy Hook Elementary School took place).

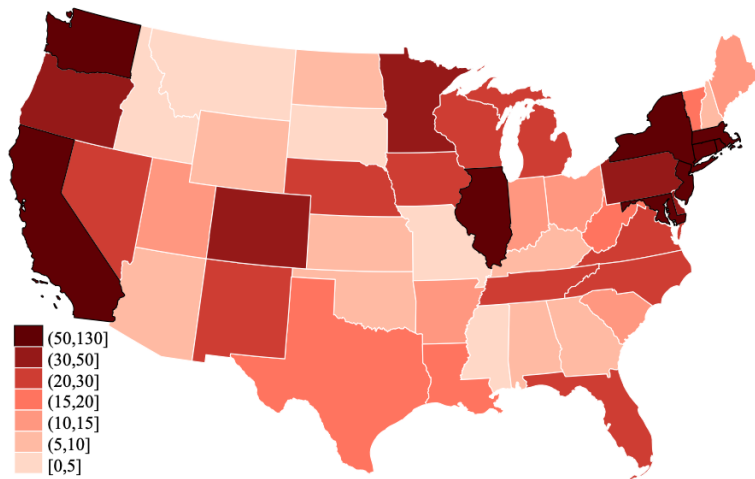
⁴³For instance, states with “stand-your-ground” laws are coded as 0, while those lacking such laws are coded as 1.

Figure 12: State Firearms Regulations

(a) 1995



(b) 2020



10 Conclusion

In this paper, we provide a descriptive overview of firearms markets. First, we introduce new data which we believe marks an important contribution to the study of firearms markets. Our postings-level dataset goes beyond existing sources and allows for novel insight into secondary markets, of which there is limited data, regulation, and research.

We document considerable firearm price dispersion across states, with regional variation: Handgun prices in the South and Midwest tend to be in the lower part of the distribution, while prices in the West and Northeast are on the higher end. We find that states with higher licensed vendor prices (compared to private seller prices) have some of the strongest gun laws nationwide. To validate our data, we compare key data moments to other sources; reassuringly, the secondary market price data averages are in line with trade publication recommendations. We also show that relative market thickness across states is comparable to suggestive estimates from TRACE and NICS background checks

data. In the future, we will extend the data coverage to a longer time horizon and introduce data on firearms violence to study the relationship between the incidence of gun deaths and local firearms market conditions.

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Appendix

A Regulatory

Table 5: Federal Firearms License Types

Type	App. Fee	Description
01	\$200	Dealer in Firearms Other Than Destructive Devices (incl. Gunsmiths)*
02	\$200	Pawnbroker in Firearms Other Than Destructive Devices*
03	\$30	Collector of Curios and Relics
06	\$30	Manufacturer of Ammunition for Firearms
07	\$150	Manufacturer of Firearms Other Than Destructive Devices
08	\$150	Importer of Firearms Other Than Destructive Devices
09	\$200	Dealer in Destructive Devices
10	\$3,000	Manufacturer of Destructive Devices
11	\$3,000	Importer of Destructive Devices

* Includes: rifles, shotguns, pistols, revolvers, gunsmith activities, and National Firearms Act (NFA) weapons. Licenses are issued for a 3 year period.

Table 6: Persons Prohibited from Shipping, Transporting, Receiving, or Possessing Firearms or Ammunition

Any Person Who:

- Has been convicted in any court of a crime punishable by imprisonment for a term exceeding one year;
- Is a fugitive from justice;
- Is an unlawful user of or addicted to any controlled substance (as defined in section 102 of the Controlled Substances Act, codified at 21 U.S.C. § 802);
- Has been adjudicated as a mental defective or has been committed to any mental institution;
- Is an illegal alien;
- Has been discharged from the Armed Forces under dishonorable conditions;
- Has renounced his or her United States citizenship;
- Is subject to a court order restraining the person from harassing, stalking, or threatening an intimate partner or child of the intimate partner;
- Has been convicted of a misdemeanor crime of domestic violence; or
- Is under indictment for a crime punishable by imprisonment for a term exceeding one year.

Note: From the Gun Control Act (GCA), codified at 18 U.S.C. §922(g) and §922(n). Furthermore, 18 U.S.C. §922(d) makes it unlawful to sell or otherwise dispose of firearms or ammunition to any person who is prohibited from shipping, transporting, receiving, or possessing firearms or ammunition.

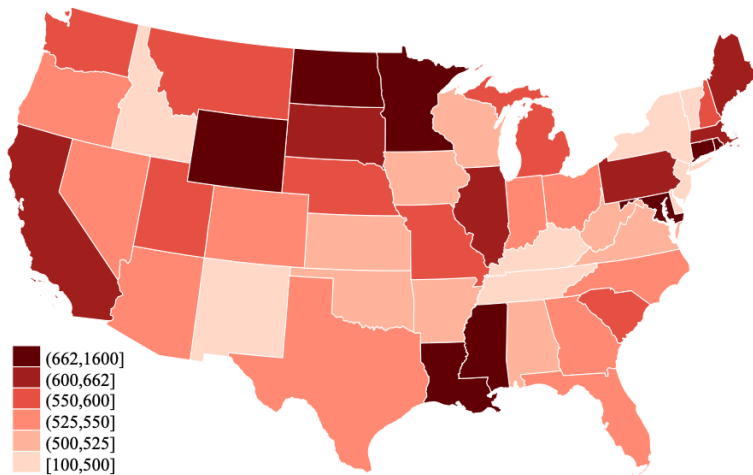
Table 7: State Firearms Laws Database: Categories

Category	Laws	Sub-Categories
Dealer regulations	17	Licensing, Recordkeeping, Reporting, Location, Theft reporting, Security, Inspections, Liability, Junk guns
Buyer regulations	17	Waiting period, Permitting, Fingerprinting, Safety training, Registration, Age restrictions, Theft reporting, Bulk purchase limit
Prohibitions for high-risk gun possession	11	Felony, Violent Misdemeanor, Mental Health, Drugs, Alcohol, Relinquishment of weapons
Background checks	11	Universal background checks, Gun shows, Background checks through permits, Background check records, Background checks time limit, Mental health records, State records
Ammunition regulations	7	Licensing, Recordkeeping, Permitting, Prohibitors, Age restrictions, Background checks
Possession regulations	12	Age restrictions, Gun violence restraining orders, Campus carry, School zones, Open carry
Concealed carry permitting	7	Permitting, Background checks
Assault weapons and large-capacity magazines	8	Assault weapons ban, Large capacity magazine ban
Child access prevention	11	Safety locks, Storage
Gun trafficking	7	Gun trafficking, Straw purchase, Crime gun identification, Personalized gun technology
Stand your ground	1	Stand your ground
Preemption	3	Preemption
Immunity	1	Immunity
Domestic violence	21	Misdemeanor crimes, Firearm removal, Restraining order, Stalking

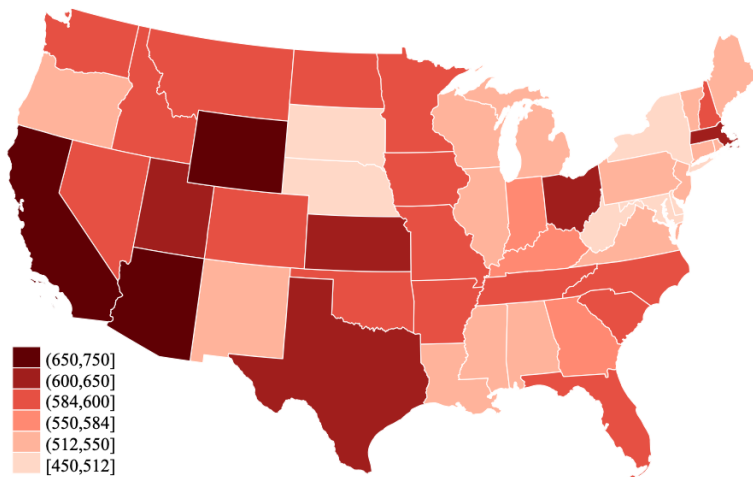
B Additional Descriptives

Figure 13: Armslist Median Handgun Prices By Vendor Type, Aug. 2020

(a) Premium Vendors (FFLs)



(b) Private Vendors (Private Sellers)



(c) Ratio Private/Premium

