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# **The Characteristics and Dynamics of Crime Gun Markets: Implications for Supply-Side Focused Enforcement Strategies\***

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## **ABSTRACT**

This study aims to assist law enforcement agencies in analyzing the dynamics of illegal markets in firearms by using accessible incident level data on crime gun traces and to develop problem-solving interventions designed to help enforce laws against illegal selling, possession and use of firearms. The study is divided into three parts: an overview of what is known about crime-related gun markets and their federal regulation; an analysis of crime gun trace data and the use of this information-related resource to focus law enforcement investigations and strategies; and an assessment of the potential value of crime-gun information to identify violent offenders and improve community safety.

Our overview of illegal gun markets research leads us to conclude that well-focused supply-side enforcement can be used to good effect on point sources of illegal firearms transfers (such as federally licensed dealer knowingly engaged in the sale of firearms to juveniles or other prohibited persons) and diffuse sources of illegal firearms transfers (such as straw purchasers) of new guns originating from retail outlets. These analyses simply document that a significant share of guns that are recovered from violent offenders and other prohibited persons could be affected by supply-side interventions that focus on guns recently diverted from retail sources. Indeed, multiple known sources of illegal guns, ranging from residential gun thefts to sales by unlicensed sellers at gun shows and elsewhere, need to be addressed.

Our analysis of crime gun information focuses on one aspect of the illegal gun market that holds immediate promise for supply-side enforcement: close-to-retail diversions of guns that are illegal under federal law. It makes use of information about crime guns recovered by federal, state and local law enforcement agencies in 1999 that were traced by ATF to retail dealers and purchasers. First we describe the character and nature of crime-related gun markets at the national level and within seven selected cities. Second, we used these data to identify patterns among actors associated with the illegal market in firearms. Third, based on our analyses of the dynamics of illegal markets in firearms and patterns among actors associated with the illegal market in firearms, we identify 11 indicators of gun trafficking. These indicators can be constructed from available trace information and used to assist law enforcement in assessing the investigative potential of particular gun traces. They can enable law enforcement officials to focus resources on the parts of the illegal market in firearms involved in diversion of guns from federally licensed retail sources and/or private citizens to violent offenders, juveniles and other prohibited persons.

## **EXECUTIVE SUMMARY**

Current debate about proper measures to reduce illegal access to guns, places insufficient emphasis on the fact that for every six firearms used in crime only one was legally obtained (Reiss and Roth 1993). Yet, two populations of most concern to law enforcement, adult career criminals and juveniles, are legally prohibited from purchasing handguns nearly everywhere in

the United States, and firearms violence in the United States has been linked to illegal markets in firearms (Blumstein and Cork 1996). Clearly, we have a problem with gun acquisition from illegal sources, both regulated and unregulated: we need to hold those who make illegal transfers accountable and develop much more effective interventions to prevent them. Unfortunately, illegal markets in firearms are very complex and present a substantive challenge to policy makers and law enforcement officials interested in disrupting the illegal supply of guns to prohibited persons.

This study aims to assist law enforcement agencies in analyzing the dynamics of illegal markets in firearms by using readily accessible incident level data on crime gun traces and to develop problem-solving interventions designed to help enforce laws against illegal selling, possession and use of firearms. The study is divided into three parts: an overview of what is known about crime-related gun markets and their federal regulation; an analysis of crime gun trace data and the use of this information-related resource to focus law enforcement investigations and strategies; and an assessment of the potential value of crime-gun information to identify violent offenders and improve community safety.

Our overview of crime-related gun markets research leads us to conclude that well-focused supply-side enforcement can be used to good effect on point sources of illegal firearms transfers (such as federally licensed dealer knowing engaged in the sale of firearms to juveniles or other prohibited persons) and diffuse sources of illegal firearms transfers (such as straw purchasers) of new guns originating from retail outlets. Almost a third of traceable crime guns are fast time-to-crime guns and a nearly a third of all traced crime guns have two or more indicators of gun trafficking involving dealers, purchasers or purchasers and possessors. This does not suggest that, at best, supply-side interventions could influence only about one third of the guns that enter into criminal hands. These analyses simply document that a significant share of guns that are recovered from violent offenders and other prohibited persons could be affected by supply-side interventions that focus on guns recently diverted from retail sources. Indeed, multiple known sources of illegal guns, ranging from residential gun thefts to sales by unlicensed sellers at gun shows and elsewhere, need to be addressed.

Our analysis of crime gun information focuses on one aspect of the illegal gun market that holds immediate promise for supply-side enforcement: close-to-retail diversions of guns that are illegal under federal law. It makes use of information about crime guns recovered by federal, state and local law enforcement agencies in 1999 that were traced by ATF to retail dealers and purchasers. First we describe the character and nature of crime-related gun markets at the national level and within seven selected cities. Key findings include:

- Crime gun traces are highly concentrated among a few federally licensed retail dealers.
- Crime guns originate from federally licensed retail dealers very close to the recovery location and from dealers distant from the recovery location.
- Crime guns recovered in cities located in states with tight legal controls are more likely to be first purchased in other states than crime guns recovered in cities located in cities with looser legal controls.

- Traced crime guns are usually not recovered in the possession of the original retail purchasers.
- Crime gun possessors tend to be younger than the retail purchasers of the crime gun. Both distributions tend to be disproportionately young.
- Traced crime guns are disproportionately newer guns. A large majority of these new guns have changed hands at least once before recovery in crime.
- A majority of traced crime guns are handguns, often less expensive medium caliber pistols.

Second, we used these data to identify patterns among actors associated with the illegal market in firearms. Our key findings include:

- Active dealers with a high number of traces to a particular city are more likely to be associated with fast time-to-crime guns.
- Active dealers who make many multiple sales of handguns are more likely to be associated with fast time-to-crime guns.
- Active dealers with a large number of National Instant Criminal Background Check System (NICS) gun purchase denials are more likely to be associated with fast time-to-crime guns.
- Firearms with a shelf life greater than 2 years are more likely to be fast time-to-crime guns.
- The concentration of crime gun traces associated with high trace dealers varies across cities.
- The importance NICS gun purchase denials in relation to time-to-crime vary across cities.
- The crime guns purchased by individuals with a large number of crime gun traces to the purchaser's home zip code are more likely to be fast time-to-crime guns.
- Purchasers ages 18 - 24 are more likely to be associated with fast time-to-crime guns.
- Purchasers with two or more crime gun traces are more likely to be associated with fast time-to-crime guns.
- Purchasers and possessors who reside within a short distance of each other are more likely to be associated with fast time-to-crime guns.
- Purchasers and possessors who are close in age proximity are more likely to be associated with fast time-to-crime guns.
- Purchasers and possessors who are family members or known associates are more likely to be associated with fast time-to-crime guns.
- Possessors who have associates that live in close proximity to first purchasers are more likely to be associated with fast time-to-crime guns.
- Possessors' ages 18 - 29 are more likely to be associated with fast time-to-crime guns.
- Semi-automatic pistols have the fastest time-to-crime of all gun types.

Third, based on our analyses of the dynamics of illegal markets in firearms and patterns among actors associated with the illegal market in firearms, we identify 11 indicators of gun trafficking. These indicators can be constructed from available trace information and used to assist law

enforcement in assessing the investigative potential of particular gun traces. They can enable law enforcement officials to focus resources on the parts of the illegal market in firearms involved in diversion of guns from federally licensed retail sources and/or private citizens to violent offenders, juveniles and other prohibited persons. Four of these indicators are at the dealer level; two are at the purchaser level; and five focus on relationships between purchasers and possessors. For the most part, we selected the cut-off points for these indicators based on our analyses of time-to-crime. It is entirely possible for law enforcement agencies to vary the cut-off points for these indicators. Our intent was to develop a framework for identifying leads on potential gun traffickers that was robust but also flexible enough to respond to local illegal market variations. The eleven indicators are:

### **Dealer-level Indicators**

1. 11 or more traces to a particular city in a year
2. 51 or more multiple gun sales in a year
3. Any gun sold with a shelf life greater than 2 years

### **Purchaser-level Indicators**

1. More than 1 trace to a specific purchaser
2. More than 25 traces originated from the purchaser's home zip code
3. Firearm was part of a multiple sale

### **Purchaser – Possessor Relationship Indicators**

1. Possessor lives within 5 miles of purchaser
2. Possessor's age is within 4 years of the purchaser's age
3. Possessor and purchaser have the same last name (but are different people)
4. Possessor has a known associate that is the purchaser
5. Possessor has a known associate that is not the purchaser, but lives within 5 miles of the purchaser

Using these indicators, or indicators like them appropriate to particular jurisdictions, analysts can develop a manageable number of solid leads on illegal gun traffickers. Law enforcement agencies can then focus investigative and regulatory resources on developing the appropriate problem-solving responses to shut down these illegal supply lines to violent offenders and juveniles and other groups. This information intensive approach is consistent with and complementary to problem-oriented strategies that continue to gain a higher profile and greater credibility in the local, state and federal law enforcement community.

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## **Chapter 1. A Literature Review of Legal and Illegal Markets in Firearms: Elements of An Analytic Framework for Research**

### **1.1 Introduction**

In 1994, it was estimated that the civilian gun stock consisted of 192 million firearms, 65 million of which were handguns (Cook and Ludwig 1996, p. 14). By 1998, an additional 7.5 million handguns and 10.5 million long guns had been added to the nation's inventory (calculated from ATF 2000a, pp. A3-A5). This vast stockpile serves as a source of guns to juveniles and other prohibited persons, who may obtain them through a variety of means. The pervasiveness of guns in the United States suggests to some that it is simply not feasible to prevent people barred by law from possessing firearms from obtaining them if they are so inclined. Gun control restrictions on commerce and possession of firearms are argued to be futile (see, Wright 1995). Others suggest that, even in gun-rich environments, supply-side enforcement strategies directed at reducing access by those who are legally proscribed can be used to good effect in increasing the transactions costs in the types of gun markets relevant to youths and criminals, thereby reducing the prevalence of gun possession and use by these groups (see, e.g., Cook and Cole 1996; Cook and Braga 2001; Braga, Cook, Kennedy, and Moore 2002).

Both of these perspectives claim the support of research findings (as discussed in Cook and Braga 2001). As we shall see, surveys of youths and criminals provide data suggesting that their guns are often stolen or in some other way diverted from private (and more-or-less legitimate) ownership. Indeed, the tens of millions of guns in private hands form a vast pool that is readily tapped. Those who view supply-side measures more positively offer as evidence the recent data from federal gun tracing and trafficking investigations that indicate some percentage of the guns used in crime come rather directly from licensed dealers; in effect criminals are being supplied by dedicated "pipelines" as well as the pool of firearms in private hands (Cook and Braga 2001).

As such, it is plausible that closer regulation of legal firearms commerce could be effective in reducing access by youths and criminals. Equally important, enforcement resources focused on the illegal sources of guns can enable law enforcement to hold accountable, prevent, or deter major violators of state and federal firearms laws who are illegally funneling firearms to troubled and high crime communities.

In this chapter, we review the major factors that govern the legal distribution of firearms among the general population. We then consider the various avenues through which guns "leak" from legal distribution channels to offenders and juveniles, and review additional factors that shape legal and illegal markets in firearms. Based on our review of existing research and policy analyses we select a framework for interpreting our analysis of firearms trace data, and also for developing observations on the prospects of supply-side enforcement strategies based on the available research evidence.

## 1.2 Primary and Secondary Firearms Markets

Firearms are distributed in markets, which scholars and authorities refer to as primary and secondary markets (Cook, Molloconini and Cole 1995). Illegal gun transactions can occur in both the primary and secondary markets, and throughout this report, we use phrases like "illegal market" and "illicit channels" to refer to illegal transactions in both markets. Such transactions can involve illegality by the buyer, seller, or both parties.

Primary markets include transactions by federally-licensed gun dealers<sup>1</sup>, referred to as federal firearms licensees, or FFLs. At the wholesale level, licensed importers and distributors purchase firearms directly from manufacturers and advertise them through catalogs and display ads in nationally distributed publications such as *Shotgun News*. Under federal law, purchasers may include walk-ins who reside in the distributor's state and FFLs from anywhere who can order guns by telephone, fax, or mail. Primary-market dealers include both large chain stores and smaller-volume independent firearms specialists known as stocking gun dealers who offer advice, gun service, sometimes shooting ranges, and other professional services of interest to gun enthusiasts. At both the wholesale and retail level, primary-market sellers are legally required to follow federal and state background check procedures to verify that the purchaser is legally eligible to make the purchase, to observe any legally required waiting period prior to making transfers, to maintain records of sales for possible future use in ATF traces of the sales histories of guns used in crime, and, since the effective date of the Violent Crime Control and Law Enforcement Act of 1994, to report losses and thefts of guns to ATF. Further, FFLs must submit paperwork notifying ATF whenever one individual buys more than one handgun from them within five business days.

Under federal law, it is illegal to knowingly transfer firearms or ammunition to the following nine categories of persons: persons who have been indicted or convicted of a crime which carries a penalty of more than one year's incarceration; fugitives from justice; users of illegal drugs; persons who have been adjudicated as mentally defective or been committed to a mental institution; dishonorable dischargees from the armed forces; persons who have renounced American citizenship; illegal aliens; persons who are under court orders restraining harassment, stalking, or threatening of an intimate partner or partner's child; persons who have been convicted of a misdemeanor crime of domestic violence; and, in the case of handguns, persons under age 18 (with some exceptions). In addition, FFLs may not transfer handguns or handgun ammunition to persons under age 21, and they may not transfer any firearms or ammunition to persons under age 18.<sup>2</sup>

Beginning in 1994, the Brady Act required a criminal background check system for primary market gun buyers along with a five-day waiting period. Congress also determined that "the background check portions of the Brady Act would only apply to states without their own qualifying background check law. For states with such background check laws ... the Brady Act's background check and maximum five-day waiting period did not apply in that state." (Vernick and Hepburn, 2003, p. 352)

Since 1993, federal law has required that would-be handgun purchasers provide FFLs with valid photo identification and a written certification that they are not ineligible purchasers. Beginning in 1994, FFLs also had to notify the chief law enforcement officer of the purchaser's home about the application to purchase and wait a minimum of five days before making the transfer so that the chief law enforcement officer could verify the applicant's eligibility. However, sales could take place immediately in states meeting certain conditions specified in the law.<sup>3</sup> State laws could also require longer waiting periods. In late 1998, the national waiting period provision was replaced by the NICS, which is a nationally computerized, instant background check system operated by the FBI in conjunction with the states. If the "instant check" system does not provide prompt approval of a sale, then the FFL must wait three days during which state offices are open and the system provides no rejection of the transfer before making the sale. As with the prior national waiting period provision, the instant check system may be bypassed in jurisdictions meeting certain conditions. A confusing point is that while federally licensed dealers may sell both new guns and used guns, and both new and used gun transactions are subject to a background check, only new gun retail sales are effectively traceable. It is also important to note that NICS relies on information supplied by state and local authorities as well as the information submitted on the application of the purchaser. ATF keeps reports on potential purchasers that were denied a firearm and the information kept is the purchaser's name and the reason they were denied.

The secondary market for firearms encompasses transactions made by non-licensed persons. Under federal law, persons who make only occasional sales or who sell from their personal collection are not required to obtain a federal firearms license (ATF 2000a, p. 11). Sellers other than FFLs include collectors or hobbyists who typically resell used guns through classified ads in newspapers or, consumer classified sheets, through newsletters oriented toward gun enthusiasts, or through word of mouth to family and friends. The secondary market also includes gun show transactions by non-FFLs, street sales, and gifts or sales to family, friends, or acquaintances. Although secondary market participants are legally prohibited from knowingly transferring guns to ineligible possessors, secondary transfers are not subject to the record keeping and background check requirements placed on FFLs by federal law, thus making the secondary market almost entirely unregulated. However, a few states and localities have regulations governing secondary transfers.

National survey data indicate that gun owners make nearly 6.9 million gun acquisitions a year, 60% to 70% of which appear to be primary market transactions involving FFLs (Cook and Ludwig 1996, pp. 24-27). Gun owners make about 2 million acquisitions a year in the secondary market.

### **1.3 Illegal Markets in Firearms: Channels Through Which Prohibited Persons and Juveniles Acquire Firearms**

One of the key characteristics distinguishing illegal markets for guns from many other illegal markets is that the former revolve around illegal transfers of a lawful product. In general, guns are legal commodities that are legally distributed and widely owned throughout society. Consequently, there are many avenues through which offenders and juveniles may illegally acquire guns: e.g., FFLs, family members, friends and acquaintances, strangers at gun shows, street sources (such as drug addicts and fences), and theft. In the sections below, we describe the avenues through which guns "leak" from legitimate owners and businesses into illicit channels and consider available evidence regarding the volume and prevalence of guns moving through them.

Figure 1-1 illustrates these avenues in very general terms. The far left box of Figure 1-1 (marked "FFLS") represents federally licensed actors in the primary market -- gun manufacturers, importers, distributors and dealers. The multiple paths away from the FFLS box illustrate the general ways in which guns flow from the primary market distribution chain into the hands of offenders and juveniles. Note from the figure that once a gun moves into the illegal channels it may go through a number of additional transactions before being used in a crime and confiscated by police for possession or use.

The majority of crime guns are initially sold by FFLs to legally entitled, private possessors in legal transactions. In some of these cases, the original gun purchaser will use the gun in a crime or transfer the weapon to another legal possessor who eventually uses the gun in a crime (see path A-B-C). In other cases, firearms will remain in the possession of one or a succession of legal possessors for varying lengths of time before being eventually transferred to illegal possessors in secondary market transactions (path A-B-E). In the secondary market, prohibited persons may obtain guns from non-FFL gun owners through direct sales on the street or at gun shows, through media advertising or through various trading, gift, or loan arrangements. Under these circumstances, the last legal possessor of the gun may or may not be aware of the prohibited status of the person receiving the firearm (see paths A-B-E-F and A-B-E-G). Of course, offenders may also steal guns from private, legal possessors (path A-B-D).

Guns can also flow directly from the legal primary market into illegal channels. Straw purchasers (eligible buyers acting as agents on behalf of prohibited buyers), for example, may buy guns directly from FFLs on behalf of traffickers or other prohibited possessors (see path A-H, particularly A-H-J). Undetected gun traffickers with clean records may accumulate guns through buys from FFLs and sell them to ineligible buyers. Prohibited buyers might also purchase guns from FFLs using fake identification. In Cook and Leitzel's (1996) terminology, these are all "formal" transactions that create official records, but the records do not identify the actual consumer. Further, corrupt FFLs may sell guns informally (i.e., without transaction records and background checks) to ineligible purchasers at gun shows or through "street" or "back door" sales (path A-H-I). Unethical or negligent FFLs may also facilitate gun leakage by turning a blind eye to obvious straw purchases occurring at their businesses. Finally, offenders can steal guns from FFLs (path A-K).

The path taken by any given firearm may be more complex than those described above. For instance, a legal possessor may buy a gun and later sell the gun back to an FFL who then sells the gun illegally. To provide another example, an illegal possessor may conceivably sell a gun to a legally entitled possessor in a secondary market transaction, thus moving the gun from the illegal market back into the legal market. Nonetheless, our classification scheme is designed to capture the nature of transactions in which guns move from legal to illegal possessors.

The relative importance of these paths in supplying offenders has important ramifications for enforcement and policy. As will be discussed later, some researchers have estimated that there are enough guns stolen every year from the nation's civilian stockpile to potentially supply all criminals committing violent gun crimes in a given year (Brill 1977, p. 105; Kleck 1997, pp. 90-94). Such a finding implies that efforts to regulate primary market transactions will have limited effects on the availability of guns to offenders.

Trying to judge the volume and prevalence of guns moving through these avenues is difficult with available data. Information regarding illegal transactions in guns must be pieced together from a variety of sources: studies of weapons confiscated by police, gun tracing studies, surveys of offenders and/or juveniles, and more general surveys of gun owners and crime victims. In the sections below, we attempt to extrapolate from these data to make some tentative judgments about the flow of crime guns through different channels. This must be done very cautiously. Prior studies cover a variety of different populations, geographic areas, and time periods, and they all have various other methodological strengths and weaknesses. We do not discuss these issues in detail; rather, we attempt to draw some generalizations from the strongest evidence on these points.

### ***Legal Transactions From Retail Outlets***

Existing data indicate that a substantial fraction of adult offenders obtain guns from FFLs. In prior surveys of adult offenders, the percentage of respondents reporting that they had obtained guns from retail sources has varied between 7% for a group of armed career criminals (ATF 1992, p. 28) to 27% in a Bureau of Justice Statistics (BJS) study of a nationally representative sample of nearly 14,000 offenders in state prisons (Beck, Gilliard, Greenfield, Harlow, et al. 1993, p. 19; also see Burr 1977, cited in Wright et al. 1983, p. 185; Wright and Rossi 1986, pp. 183,185). Most recently, a BJS study reports that the percentage of state prison inmates who possessed a firearm fell from 21% in 1991 to 14% in 1997. At the same time the percentage of inmates that reported they used firearms provided by family or friends increased from 34% to 40% between 1991 and 1997 (Harlow, 2001). The study notes that between the two surveys of inmates the Brady Handgun Violence Prevention Act of 1993 was enacted, and that the "act requires background checks for persons purchasing firearms from federally licensed dealer" (Harlow 2001, p. 6). A problem with existing evidence, however, is that the specific nature of these transactions is often ambiguous. Although the offenders in these samples may have been legally eligible buyers at the time of the reported transactions, it is also possible that these transactions were illegal in some way. In addition to making legal purchases, offenders may obtain guns from FFLs through theft, straw purchases, or the use of fake identification. Corrupt

FFLs may collude with felons seeking firearms. In addition, the surveys cited above were done prior to the federal Brady Act; therefore, offenders in jurisdictions without background checks might have obtained guns from FFLs by providing false information about their criminal records.<sup>4</sup>

Wright and Rossi surveyed approximately 2,000 adult inmates serving time in medium and maximum security prisons in 10 states during late 1982 and early 1983 and found that 21% of gun-owning respondents indicated having obtained their most recent handgun from a retail outlet (1986, p. 183). After adjusting for thefts from FFLs, it seems that about 18% of the guns were obtained from retail outlets by means other than theft (calculated from pp. 183,185). It is not clear how many of these transactions involved other illegal methods such as straw purchasing. Such ambiguities in survey studies are also apparent from juvenile studies showing that a small percentage of juvenile gun possessors (both offenders and non-offenders) report getting guns from retail outlets (e.g., see Callahan and Rivara 1992, p. 3040; Sheley and Wright 1993, p. 6) despite federal laws prohibiting juveniles from buying any guns from FFLs and prohibiting youth under 21 from buying handguns from FFLs.

A national study of ATF traces done during 1996 and 1997 found that 15.5% of traced crime guns were seized from their original purchasers, though this figure may be less applicable to older firearms (Pierce, Briggs, Carlson 1998, p. 11).<sup>5</sup> Similarly, 14% of successfully traced crime guns from the Los Angeles area in the late 1980s and early 1990s were seized from their original buyers (Wachtel 1998, p. 228). A higher estimate was reported by Moore (1981, p. 107), who found that 32% of a sample of Boston guns traced end-to-end during the late 1970s was recovered from their original retail buyers.<sup>6</sup> Legally prohibited buyers purchased only 6% of the Boston guns. Overall, therefore, it seems that a modest fraction of offenders in possession of firearms who do not have to seek out illegal sources or even the secondary market for their firearms.

### ***Indirect Leakage: Secondary Market Acquisitions***

As noted earlier, offenders and juveniles may obtain guns from private owners in secondary market transactions. Our focus here is upon the voluntary flow of guns from legal owners to criminal users (we address thefts in a separate section). In some cases, the party receiving the firearm may be a legally entitled gun recipient who later uses the gun in a crime. In cases where the recipient is a prohibited possessor, the gun seller may or may not have knowledge of the recipient's legal status.

Existing data allow us to place some rough upper bounds on the fraction of crime gun acquisitions, which involve such secondary market transactions. Perhaps the most direct evidence on the issue comes from a study of over 100 end-to-end traces conducted in Boston during the mid-1970s, which found that 23% of the guns had gone through a series of unbroken, private transfers prior to being confiscated (calculated from Moore 1981, p. 107).<sup>7</sup>

Survey studies of offenders and juveniles allow for somewhat rougher assessments. Typically,

such studies enable one to screen out guns obtained from stores, through thefts, or from illegal channels (such as fences, drug addicts, and drug dealers). Other sources noted in survey studies consist primarily of acquisitions from family and friends or "other" sources, which might include private, gun-owning strangers (e.g., purchases from private owners at gun shows). Although it is possible that these sources themselves are illegal possessors or traffickers, they should provide a potential upper bound on secondary market leakage.

Two studies of gun-owning adult offenders suggest that about one-third get their guns from family, friends, or "other" sources (Beck, et al. 1993, p. 19; Wright and Rossi 1986, pp. 183-185).<sup>8</sup> For juveniles, secondary market sources tend to be more important, though perhaps less so for more criminally involved youth. Sheley and Wright (1993) surveyed juvenile inmates and inner city students in six juvenile correctional facilities and 10 schools across 4 states. They found that 38% of the inmates and 65% of the students had obtained guns from family, friends, or "other" sources (1993, p. 6). Numbers in this range have been found in other youth surveys as well (e.g., Callahan and Rivara 1992; New Mexico Criminal Justice Statistical Analysis Center 1998; Sheley and Wright 1998). More recently, Webster, Freed, Frattaroli, and Wilson (2002) examined access to firearms among delinquent youths. Their study of 45 youths in a juvenile justice facility found that 30 youths had acquired at least one gun prior to their most recent incarceration, and that the first guns youths acquired usually came from family or friends (Webster, Freed, et al., 2002).

Gun shows provide another potential mechanism for secondary market leakage. Gun shows are events dedicated primarily to the sale or exchange of firearms. More than 4,000 of these events are held annually around the country (ATF 1999a). Further, there are an unknown number of other public events each year, such as flea markets, at which persons may sell or exchange firearms. Typically, 25% to 50% of sellers at gun shows are not FFLs (ATF 1999a, p. 4). Depending upon state and local regulations, gun shows can present prohibited gun buyers with a time and place where they know they can obtain guns from non-FFL owners who will sell to them without background checks.

Previous offender and juvenile surveys have not usually inquired directly about guns shows. However, one ATF survey of a group of armed career criminals found that 6% reported acquiring firearms at gun shows or flea markets (ATF 1992, p. 28). Inferences consistent with this figure can be drawn from other surveys. For example, 7% of state prisoners surveyed by BJS reported getting their most recent handgun from an "other" source, which may have included a gun show (other response categories were "family/friends", "retail outlet", "theft", and "black market/fence") (Harlow 2001, p. 6). Such figures tentatively suggest that few offenders obtain their guns directly from gun shows, perhaps in part because gun shows tend to be held in suburban and rural locations farther removed from urban centers where gun crime is concentrated. The percentage of crime guns that pass through a gun show at some point between first sale and use in crime is unknown.

### ***Primary Market Leakage: Straw Purchases***

Guns can also leak directly from FFLs into illicit channels by virtue of illegal non-theft

transactions. Straw purchases are one such method. A straw purchase occurs when a legally eligible buyer purchases a gun on behalf of a non-eligible consumer.<sup>9</sup> The person who makes the transaction from the retail outlet is the straw buyer. At one extreme, a straw purchaser may be someone who buys a gun for a family member or friend on one occasion. At the other extreme, a straw purchaser may engage in this activity on a repetitive basis, acting as, or on behalf of, a gun trafficker. It seems that most straw purchasers are family members, intimates, or friends of those for whom they buy guns (ATF 2000b, p. 18; Sheley and Wright 1993, pp. 6-7), but illegal operators may also recruit strangers, such as drug addicts, to act as straw buyers (e.g., see Thomas 1991).

Law enforcement authorities in some jurisdictions believe that straw purchases supply a very substantial share of crime guns (Kennedy, Piehl and Braga 1996, p. 169). Yet, there is little data with which to judge the extent of straw purchasing and the degree to which it supplies illegal gun markets. Existing survey studies have rarely asked directly about straw purchases. Hence, in a typical survey study, a respondent who obtained a gun through a straw purchase conducted by a friend might answer that he/she obtained the gun from a friend or even from a gun store. Sheley and Wright's (1993) addressed this issue more explicitly in their survey of juvenile offenders and inner city students by asking the respondents whether they had ever asked someone else to purchase a gun on their behalf. Just about a third of the incarcerated juveniles and 18% of the students indicated that they had asked someone to buy a gun for them at a store, though it was not clear how often these requests were granted (p. 6).<sup>10</sup>

These findings may lack generalizeability to other adult offenders. Due to the legal restrictions on FFL sales to juveniles, juveniles may be more reliant on straw purchases than are adult offenders. On the other hand, straw purchases may be an important source for adult offenders with prior criminal records. It is possible that adult offenders have become more reliant on straw purchases since the implementation of the Brady Act.

The role of straw purchases in supplying offenders was also highlighted by a recent national study of gun trafficking investigations conducted by ATF (2000b). Nearly half of the investigations and almost a third of the guns estimated to have been diverted were tied to straw purchasers (2000b, pp. 11-13). Even after excluding those cases with active FFL involvement, about one quarter of the trafficked guns were linked to straw purchase cases (calculated from p. 15). Because we can expect ATF to focus its resources on higher volume actors, however, we cannot determine whether such figures can be generalized to all crime guns and illegal gun acquisitions.

### ***Primary Market Leakage: Corrupt FFLs***

Corrupt FFLs may also facilitate the flow of guns into illicit channels by making illegal sales directly to end users or by colluding with other unlicensed street sellers (see Wachtel 1998). FFLs are in a unique position to acquire and dispense of large numbers of guns. Indeed, gun trafficking cases involving FFLs have notably higher gun volumes than do cases without FFL involvement. Although FFLs served as the gun source in less than 9% of the gun trafficking

cases investigated by ATF from July 1996 through December 1998, FFL cases accounted for 40,365 (48%) of the 84,128 estimated total of guns diverted in these cases (see ATF 2000b, pp. 12-13,15).

Corrupt FFLs moving high volumes of guns are likely to be over represented in ATF investigative files in light of ATF's regulatory oversight of dealers and the agency's likely preference for higher volume cases. Unfortunately, survey data shed little light on FFL involvement in gun diversion. As noted earlier, a substantial minority of gun offenders reports obtaining guns from FFLs. Yet, many of these transactions are likely to be legal and still others may involve straw purchases. Further, buys from bad FFLs might also appear under categories like "the street." In some cases, scofflaw FFLs might even be family members or friends of illegal buyers.

In other ATF studies, a review of FFL transactions in three cities during the 1970s found that between 0.6% and 4% of the sales were illegal or questionable (ATF 1977, cited in Moore 1981, p. 97). Using the 4,337,000 guns added to the nation's stock in 1998 (ATF 2000a, calculated from pp. A3-A5)<sup>11</sup> as a rough estimate of the current annual volume of gun sales would suggest that FFLs make between 26,000 and 173,500 illegal sales per year. These numbers seem rather low, however, compared to those noted above for just cases of known FFL traffickers.

A 1993 ATF study of a random sample of gun dealers found that 7% had violations serious enough for follow-up action and 4% could not account for the disposition of one or more firearms (ATF 1993, p. 8). Likewise, about 5% of 1,700 dealer inspections conducted during fiscal year 1999 resulted in license revocation, denial of license renewal, surrender of a license, or an out of business placement (ATF 2000a, p. 31). Hence, 5% may be a reasonable estimate of the prevalence of bad dealers. There is little data, however, upon which to base an estimate of the rate of illegal diversions by such dealers. In ATF's national gun trafficking study, corrupt FFLs diverted an average of 354 guns per case. The time period over which these transactions occurred was not clear, but using the 2.5 year period covered by the study suggests a rate of about 141 guns diverted per year. Applying these figures to the 73,044 dealers operating in 2001 (ATF 2001/2002, p. E12) would suggest that corrupt dealers divert about 514,960 guns annually. However, this estimate is probably too high because dealers cited in trafficking investigations probably represent the very worst of FFLs, and their diversion rates may be significantly higher than those of other bad dealers.

Finally, Wachtel's (1998) study of trafficking cases in Los Angeles from 1992 through 1995 provides one other relevant figure. Fourteen dealers targeted in these cases were linked to 12% of the guns seized in the Los Angeles area and traced successfully to a California dealer. While the generalizeability of all these statistics is open to question, they do suggest that corrupt dealers are a potentially significant source of crime guns to offenders.

We should also note that the flow of guns from FFLs to criminal users is channeled very narrowly among a small fraction of all FFLs. National studies show that half or more of traced crime guns are originally sold by less than one percent of all FFLs (Pierce et al. 1995; 1998).

Much of this pattern may be explained by the concentration of gun sales among a small fraction of gun dealers and by proximity to high-crime areas. However, dealer illegality and negligence or lax business procedures (such as turning a blind eye to potential straw purchases) may also be contributing factors. Accordingly, better regulation of a relatively small number of FFLs could have potentially significant effects on gun availability to prohibited owners.

### ***Gun Thefts***

Thefts from both private gun owners and FFLs provide another major source of guns for offenders and juveniles. Of course, offenders may also steal guns from illegal owners, but our focus here is upon the diversion of guns from legitimate to illegitimate channels. Prior work on illicit gun markets has placed much emphasis on the importance of theft in supplying offenders (Wright and Rossi 1986; Sheley and Wright 1993; also see discussion in Kennedy et al. 1996). Moreover, some data suggest that theft is the preferred acquisition method for offenders obtaining guns specifically for use in crime (Wright and Rossi 1986, p. 187).

In a recent survey, private gun owners nationwide reported losing about 593,000 guns to theft during 1994 (Cook and Ludwig 1996, pp. 29-30). In addition, FFLs reported an annual average of 13,100 guns lost or stolen from 1996 through 1999 (based on figures in ATF [2000a, p. 27] for 1998 and 1999 and analysis of data provided by ATF to the authors for 1996 and 1997).<sup>12</sup> Common carriers also reported an annual average of 1,850 guns thefts for 1998 and 1999 (ATF 2000a, p. 28), though this figure is almost certainly a low estimate because common carriers are not required by law to report gun thefts. In sum, these data suggest that there are roughly 593,000 guns stolen per year from private owners and at least another 15,000 stolen from businesses, for an annual total of about 608,000 guns stolen from legitimate sources.<sup>13</sup>

In relative terms, how important are these thefts in supplying offenders? Survey estimates suggest that thefts are the proximate source for between 9% and 32% of criminal gun acquisitions. The upper and lower bounds come from the BJS (Beck et al. 1993) and Wright and Rossi (1986) surveys of adult offenders, respectively (also see ATF 1992; Burr 1977, cited in Wright et al. 1983; Decker, Pennell and Caldwell 1997).<sup>14</sup> Studies of juvenile offenders have generally produced estimates in between these two extremes, ranging from 14% to 29% (Ash, Kellerman, Fuqua-Whitley and Johnson 1996; Decker et al. 1997; New Mexico Criminal Justice Statistical Analysis Center 1998; Sheley and Wright 1993).<sup>15</sup>

Generally, these studies do not distinguish between thefts from lawful, private gun owners, FFLs, or unlawful possessors. One notable exception is Wright and Rossi's survey of adult felons. When asked about the source from which they stole their most recent gun, about 10% of Wright and Rossi's gun thieves reported stealing from a retail outlet (1986, p. 185). This implies that about 3.2% of all the respondents' gun acquisitions involved theft from an FFL (32% \* 10%).<sup>16</sup> Further, a third of the gun thieves reported stealing guns from "gray/illegal market" sources such as fences and drug dealers (Wright and Rossi 1986, p. 185). Sixty percent of the thieves reported stealing guns from family, friends, or other sources (these sources were 'overwhelmingly' homes and apartments according to Wright and Rossi). The latter group of

thefts, which accounted for 19% of all the felons' gun acquisitions (32% \* 60%), would seem to be those most likely to involve private, lawful gun owners as victims. If the felons' most recent gun acquisitions were indicative of their earlier gun acquisitions and if these data can be generalized to other offenders and the current time period, then the results imply that approximately 22% (19% + 3%) of criminals' gun acquisitions involve theft from legitimate sources. Similarly, data from a study of juvenile offenders in New Mexico suggest that about 25% of these offenders acquired guns through thefts from legitimate sources (1998, pp. 15-16).<sup>17</sup>

This estimate is substantially higher than the 10% figure estimated from the BJS survey of state prisoners (Harlow 2001, p. 6), and the discrepancy might suggest that thefts have become less important over time as a source of crime guns; the BJS survey was conducted in 1997 and the Wright and Rossi survey was conducted in late 1982 and early 1983.

Also note that while 9% to 25% may serve as a good estimate of the percentage of criminal gun acquisitions involving theft from legitimate sources, the percentage of crime guns, which were initially diverted into illicit channels through theft, could be considerably higher because theft incidents typically involve multiple guns. Thefts from private owners involve an average of two guns stolen (Cook and Ludwig 1996, pp. 29-30) and thefts from FFLs involve averages of more than 5 guns stolen (ATF 2000a, p. 27). A few of the more carefully conducted studies of guns confiscated by police imply that roughly 20% to 25% of crime guns are stolen (ATF 1976; Brill 1977, pp. 102-110), but other evidence suggests that the figure may be greater. For example, some of Wright and Rossi's respondents who had not personally stolen their guns believed that others had stolen their guns. Altogether, 46% of the respondents had stolen their most recent gun or believed that the gun was 'definitely stolen' by someone else (1986, p. 196), though it is not clear how many of these thefts were from legitimate sources.<sup>18</sup> Similarly, a study of end-to-end ATF traces of over 100 guns confiscated in Boston during the mid-1970s revealed that 45% had been stolen at some point (calculated from Moore 1981, p. 107).

### **Acquisitions from Criminal Sources**

Once guns have leaked into illicit channels, of course, they may pass through many hands. Selling, buying, and trading guns seem to be common among illicit gun owners (see Sheley and Wright 1993). Survey evidence suggests that adult offenders make roughly a quarter of their acquisitions from what might be considered "illegal market" or "street" sources. Twenty six percent of Wright and Rossi's respondents got their most recent handgun from fences, drug dealers, "street" sources, or the "black market" (1986, p. 183). Likewise, 8% of the state prisoners surveyed by BJS in 1997 had obtained their most recent handgun from a fence or the "black market" and 21% were obtained from a drug dealer/off street source (Harlow 2001, p. 6). Surveys of juvenile students and inmates have yielded estimates around 20% (Callahan and Rivara 1992, p. 3040; New Mexico Criminal Justice Statistical Analysis Center 1998, p. 15; Sheley and Wright 1993, p. 6) with the exception of Sheley and Wright's inmate respondents, 43% of whom identified an illicit source ("street", drug addicts, or drug dealers) as their most recent handgun source.

### ***Summary on Channels of Gun Leakage***

Available data do not permit precise estimates of the flow of guns to offenders through specific primary and secondary market channels, but, in general, it seems that thefts and mutual transactions in both the primary and secondary market are all important crime gun sources. Estimates reviewed in the previous sections suggest that, as an upper bound, almost half of all crime guns may be diverted to offenders through theft. Conversely, this suggests that at least half of crime guns make their way to offenders through one or a series of non-theft primary and/or secondary market transactions. Judging the importance of non-theft leakage from the primary and secondary markets relative to one another is difficult with available data. Due to the heavier restrictions on primary market transactions, we would expect secondary market transactions to be more important to the criminal supply. On the other hand, there are also data to suggest that primary market transactions provide at least a modest share of crime guns. As noted earlier, a significant share of adult offenders state that they obtain guns from retail sources. Further, evidence to be reviewed later in this report indicates that new firearms are somewhat more likely to be used as crime guns than are older firearms. To provide further illustration, note that 33% of Wright and Rossi's (1986, p. 183) respondents reported that their most recently acquired handgun was new rather than used. This implies that these respondents most likely obtained their guns directly from FFLs or received them as gifts (8% reported receiving their most recent handgun as a gift, though it was not clear if the guns were new). The acquisitions from FFLs could have occurred in a variety of ways: buys from corrupt FFLs; theft from FFLs (data reviewed earlier suggest that about 3% of Wright and Rossi's respondents stole their most recent gun from a gun store); buys from FFLs through fraudulent means, including straw purchases, the use of fake identification, or the provision of false information about buyer eligibility; or legal buys from FFLs (some respondents may have had clean records at the time of their most recent purchase). At any rate, it seems that both the primary and secondary market are important sources of guns for prohibited users.

### ***Estimating Annual Criminal Gun Acquisitions***

Can we estimate the annual number of illicit gun acquisitions and the number of guns flowing into illicit channels annually? There are no precise estimates of these numbers, but the gun theft data discussed above provide a tentative basis for making ballpark estimates. In 1994, there were 287,020 incidents of firearm theft from households, cars, and persons reported to the National Crime Victimization Survey (NCVS) (Bureau of Justice Statistics 1997, p. 77), an estimate reasonably consistent with Cook and Ludwig's finding that 269,000 households nationwide reported losing one or more guns to theft during 1994 (1996, pp. 29-30). In addition, there are at least 3,450 incidents of theft from FFLs and common carriers each year (ATF 2000a, pp. 27-28). As we noted earlier, between 10% and 25% of criminal gun acquisitions appear to involve thefts from legitimate gun owners and businesses. If there are about 290,450 gun theft incidents per year from legitimate sources (taking the higher NCVS estimate for non-business thefts) and if we can assume that these thefts account for 10% to 25% of annual criminal gun acquisitions, this implies that there are roughly 1.2 to 3.2 million criminal gun acquisitions (i.e., transactions) a year.

The number of guns procured in these transactions will be higher. If thefts from private owners typically involve 2.2 guns (Cook and Ludwig 1996, pp. 29-30), then we can estimate that about 631,400 guns are stolen from private owners annually. ATF data suggest that thieves' steal at least 15,000 annually guns from FFLs and common carriers (ATF 2000a, pp. 27-28). To estimate the number of guns acquired in all theft and non-theft transactions, we can rely on prior estimates that stolen guns represent between roughly 20% and 45% of all crime guns. This implies that offenders procure between 1.4 and 3.2 million guns annually from legitimate and illegitimate sources.<sup>19</sup> A somewhat higher range can be derived by utilizing the estimated number of criminal gun transactions that occur each year. If thefts represent 9% to 25% of these transactions, then the remaining 1.1 to 2.9 transactions are non-theft acquisitions. If each of these non-theft transactions involved only one gun, this would imply that offenders obtain a lower bound range of roughly 1.8 million to 3.6 million guns per year. Overall these estimates combined provide a lower bound of 1.2 million and upper bound of 3.6 million guns acquired per year from illegitimate sources.

## **1.4 Market Factors Affecting Illegal Gun Markets**

### ***Supply-Side Factors: Gun Controls***

The earlier discussion of primary gun markets reviewed a number of key federal regulations that govern gun transactions in America. However, there are many other federal, state, and local provisions that are intended to affect the supply of firearms to prohibited possessors. These include registration of firearms, licensing of gun buyers, additional restrictions on who may buy guns, waiting periods on gun purchases, limitations on the number of guns, which buyers can purchase within a given period, and bans on certain types of firearms. These laws are designed to reduce gun crime by limiting gun supplies and raising acquisition costs (e.g., prices and search time).<sup>20</sup>

There has been relatively little systematic research examining the impact of gun control policies on the characteristics of gun markets. However, there are indications that gun control policies influence the channels through which guns leak to offenders and the geography of illegal gun markets. One apparent pattern is that jurisdictions with tight gun controls have higher fractions of crime guns that originate out of state. The states of Massachusetts, New Jersey, and New York, for example, have some of the strictest gun control regimes in the nation (see Peters 2000). Over two-thirds of guns confiscated in Boston, Massachusetts and about 85% of guns confiscated in New York City and Jersey City, New Jersey originate from out of state (i.e., their first retail purchases were out of state) (ATF 1999b). At the other extreme, two states with relatively little gun regulation are Texas and Georgia. Only about 20% of the guns confiscated in Texas cities like San Antonio and Houston originate from out of state, while about 25% of guns confiscated in Atlanta, Georgia originate from out of state (ATF 1999b). Webster, Vernick and Hepburn's (2001) study of the relationship between licensing and registration gun sale laws and the source state of crime guns on crime guns recovered in 25 cities in the United States

provides further evidence that gun control policies can influence the channels through which firearms reach offenders. They conclude, “states with registration and licensing systems appear to do better job of keeping guns initially sold within the state from being recovered in crimes.” (Webster et al., 2001, p. 184)

This pattern often creates the perception that organized trafficking of guns into tight regulation areas is common. It does appear that strict state or local gun controls create financial incentives for illegal trafficking of guns from jurisdictions with more lax controls. Cook et al. (1995, p. 72), for instance, provide anecdotal evidence that street prices for guns in New York City are about 3 to 5 times their typical retail prices. However, even in tight control jurisdictions, we can expect that there is an abundant secondary market supply of cheaper firearms discounted because of their age, prior criminal uses, or other factors.<sup>21</sup> Moreover, as other scholars have noted (Moore 1981, p. 94; Kleck 1997, p. 88-90), some of the in-state/out-of-state origins pattern may be explained by the migration of gun owners from loose to tight regulation states.

At the national level, recent federal legislation has had an important influence on gun markets. Beginning in 1994, the Brady Act required a criminal background check system for primary market gun buyers. From 1994 through 1999, about 536,000 prohibited gun buyers have been prevented from purchasing guns in retail transactions (Gifford, Adams and Lauver 2000). In the short term, the Brady Act has not reduced gun homicide (Ludwig and Cook 2000), but one can speculate that it has affected the direct flow of guns from FFLs into illegal channels, making thefts, secondary market transactions, and perhaps straw purchases more important for offenders. It may also be possible that illegal gun markets can adapt to single and/or modest interventions. Cook and Braga (2001) present strong evidence suggesting that criminals in Chicago were being supplied to a large extent by organized gun trafficking from south-central states, in particular Mississippi, and that a modest increase in regulation—imposed by the Brady Act—shut down that pipeline. However, this large change in the market did not have any apparent effect in gun availability to violent people in Chicago, as the percentage of homicides with guns did not drop after 1994 (Cook and Braga 2001).

Similarly, the federal government instituted new fees and regulations for licensed gun dealers in 1993 and 1994. In the wake of these actions, the number of FFLs declined by over 60% from 1993 to 1999 (ATF 2000a, p. A18). In part, these measures were intended to weed out invalid and corrupt FFLs and enhance regulation of existing FFLs. We may speculate that this measure has reduced the direct flow of guns from FFLs into illegal channels, but this is not yet clear. Nor is it clear that these laws have reduced gun crime.

Another effect of gun control policies can be to limit access to certain types of firearms. National restrictions on machine guns and semiautomatic assault weapons, for instance, appear to have limited or reduced the use of those weapons in crime (Kleck 1991, pp. 67-70; Roth and Koper 1997; 1999). Similarly, state-level bans on certain weapon classes, such as Saturday night special-type handguns, can influence the composition of crime guns in the affected states (Vernick, Webster and Hepburn 1999). Finally, Webster, Vernick and Hepburn (2002) in their analysis of Maryland’s law banning “Saturday Night Special” handguns found that the law was

associated with lower post-ban homicide rates.

Nevertheless, while gun controls may influence the availability of certain types of firearms and affect how guns flow from legitimate to illegitimate possessors, prior studies have produced little evidence that existing gun control measures have actually reduced rates of gun crime or the fraction of crimes committed with guns (see Cook 1979; Kleck 1991; Ludwig and Cook 2000). It seems likely that the ability of gun control laws, particular those at the local and state level, to reduce gun crime are undermined by the large accumulated stock of guns in the United States, the flow of guns from loose to strict regulation areas, the interchangeability of various types of guns for criminal purposes, and perhaps a lack of enforcement emphasis with respect to illegal gun transfers. In addition, there may also be a lack of enforcement on laws prohibiting the possession of guns by persons with certain characteristics, such as domestic violence offenders

Trends in Washington, D.C., for example, illustrate the obstacles of state and local control efforts. A handgun ban implemented in that city during the mid-1970s appeared to reduce gun deaths for a period of about 10 years (Loftin, McDowall, Wiersema and Talbert 1991). However, the emergence of crack cocaine during the mid to late-1980s touched off a cycle of violence that increased the demand for handguns and sharply escalated gun violence in D.C. during the late 1980s and early 1990s. This demand seemed to be met easily by the flow of guns from outside jurisdictions and the existing stock of older guns in the city. Currently, the majority of D.C.'s crime guns originate from the bordering states of Maryland and Virginia; at most, only 2% of D.C.'s traced crime guns originate from within D.C. (ATF 1999b). Nevertheless, the D.C. ban was associated with a 25% decrease in homicide that lasted 10 years, which can be seen as a success.

### ***Demand-Side Factors***

To this point, our discussion has focused on the supply side of the firearms market. Of course, demand for firearms also plays a primary role in shaping gun markets. There are a number of factors that drive the demand for firearms among illicit possessors. In very general terms, motivations for acquiring guns include the utility of using guns in criminal activities, protection from other offenders, and status enhancement.

Gun use in crime has a substantial impact on the gains and costs from criminal activity. For example, gun robberies are more successful than non-gun robberies and typically result in the acquisition of goods with higher values (Cook 1991). The use of a gun in a robbery presents a more lethal and intimidating threat to the victim, thereby increasing the likelihood of victim compliance and reducing that of victim resistance. This also enables gun offenders to attack more invulnerable, yet potentially more lucrative, targets like commercial establishments with greater expectations of success. When asked about their motivations to go armed, Wright and Rossi's (1986, pp. 128-129) survey respondents cited a number of utility factors as being important or very important. Thirty-nine percent of the gun offenders in the survey said a "very important" motivation was that they needed a gun to commit crimes and forty-two percent said a "very important" motivation was that guns made it easier for them to commit crimes. Many

others cited related factors such as not having to hurt a victim (57%) or the chance that an intended victim would be armed (50%) as very important reasons for carrying guns. Similarly, 40% of Sheley and Wright's (1993) juvenile inmate respondents reported having obtained a gun specifically for use in a crime.

A related factor is that guns make it easier inflict death or serious injury on intended victims (e.g., see Alba and Messner 1995; Cook 1991). It is not clear what fraction of gun attacks involve such motivations. However, 40% of Wright and Rossi's respondents indicated that being able to hurt someone easily with a gun was an important or very important reason for acquiring a gun. This could also be a factor in revenge assaults or impulse, "passion" crimes. Equally important, independent of motivation and/or in conjunction with an offender's motivation firearms may have a significant impact on the outcome of an altercation. Saltzman and colleagues at the CDC used Atlanta Police Department offense reports to study weapon use and outcomes of family and intimate assaults. A total of 142 nonfatal assaults and 23 domestic homicides were included in the analysis. The researchers found that family and intimate assaults with a firearm were 3 times more likely to end in the death of the victim than assaults involving knives or other cutting instruments, and 23 times more likely to result in death than assaults involving other weapons or bodily force (Saltzman, Mercy, O'Carroll, Rosenberg, et. al. 1992)

Self-defense is an important motivation for gun ownership between both criminal and non-criminal groups. Sixty-three percent of all civilian handgun owners cite self-defense as the primary reason for owning a gun (Cook and Ludwig 1996, pp. 36-39). Likewise, self-defense is typically one of the most frequently cited motives for gun ownership among gun-owning criminals and juveniles (Sheley and Wright 1993; Wright and Rossi 1986). For the latter groups, the protection motive has at least two sources. First, persons involved in deviant lifestyles, particularly participation in illegal markets, are more likely to need guns for protection during their criminal activities. In Sheley and Wright's (1993, pp. 8-9) study, for instance, involvement in drug sales and gang membership were both associated with higher levels of gun activity (also see Callahan and Rivara 1992; Decker et al. 1997).

A second factor driving gun ownership among criminals and juveniles is general fear stemming from threatening environments, exposure to violence, and/or prior victimization experiences (Sheley, McGee and Wright 1992; Webster, Gainer and Champion 1993). This factor is thought to have been particularly important in driving recent patterns of youth gun acquisition. To illustrate, nearly 45% of Sheley and Wright's inner-city student respondents claimed to have been threatened with a gun or fired upon during the previous few years, and 45% knew schoolmates who had been fired upon (1993, p. 4). Victimization levels were even higher among the inmate respondents.

Indeed, a leading hypothesis about the rise of gun crime in the late 1980s and early 1990s is that increased participation in the inner city crack-cocaine trade escalated levels of gun carrying and gun violence among young men and teens. As this violence spread, it sparked a vicious cycle in which increasing numbers of youth, including many not directly involved in the crack trade, armed themselves with guns out of fear that virtually any type of confrontation on the street

could result in gunfire (Blumstein 1995).

A modest fraction of gun possessors acquire firearms to enhance their status or reputation. Only 10% of both the inmate and student handgun owners in the Sheley and Wright study, for example, acquired guns to "impress people" (1993, p. 8; also see New Mexico Criminal Justice Statistical Analysis Center 1998, p. 21). To some extent, this motivation can overlap with a protection motive; among Wright and Rossi's adult felons, just over 50% felt that an important or very important motive for gun carrying was that "people don't mess with you" (1986, p. 128).

Firearm legislation and enforcement initiatives may also have some impact on criminal demand for firearms. Prior studies of the impact of sentence enhancements for firearms crimes have provided mixed results (see Marvell and Moody 1995; McDowall, Loftin and Wiersema 1992), but homicide reductions in Richmond, Virginia following in the wake of Project Exile, a joint federal-state-local initiative to enhance prosecution of gun offenders in Richmond, Virginia (Sickmund and Snyder 1999, pp. 145-147), have renewed interest in this policy initiative. Further, there is some evidence that aggressive enforcement of laws against illegal gun carrying also reduces gun crime (Sherman, Shaw and Rogan 1995; also see Pierce and Bowers 1981; Deutsch and Alt 1977). In Boston, an interagency problem-oriented policing intervention was found to be associated with a significant decrease in youth homicides and non-fatal indicators of gun violence (Braga, Kennedy, Waring, and Piehl 2001). In general, however, there has been little examination of gun enforcement efforts and its effects on gun crime.

The nation's recent drop in gun crime implies that demand for firearms has probably dropped somewhat in recent years. If so, we can speculate criminals demand driven by general fear has probably been the most affected, while demand driven by utility considerations has probably been the least affected. How this might impact gun leakage patterns is not clear. However, there are some indications that more active offenders, i.e., those who are perhaps the most likely to be motivated by utility considerations, are more likely to obtain guns through street sources or theft. To illustrate, 55% of Sheley and Wright's juvenile inmate respondents had obtained their most recent gun through theft, a drug dealer, a drug addict, or a "street" source. For students, the corresponding figure was 24% (1993, p. 6). Hence, a drop in demand inspired by general fear, combined with recent federal initiatives to better regulate primary market transactions (e.g., the Brady Act and new restrictions on FFLs), could possibly be shifting the illegal market away from direct leakage from FFLs and towards thefts and secondary acquisitions from other prohibited possessors.

### ***The Nature of the Product***

Finally, guns have a number of properties that shape illegal gun markets in important ways. Among these are their legal status, durability, size, and price (Koper and Reuter 1996). Together, these factors make the gun market a relatively low volume and diffuse market with many small operators.

For most persons, guns are legal commodities, widely owned and shared throughout society. As noted earlier, ineligible possessors can therefore obtain guns from a wide variety of sources, including trusted family members and friends. Further, they can recruit others, including family and friends, to obtain guns from legal sources. We can also expect many burglars to come across firearms in the course of their crimes.

The size of guns makes it difficult for illegal operators to sell large numbers in a street setting. Carrying more than a small number of guns on one's person is difficult to do inconspicuously, particularly in warm weather. Thus, street sellers trying to sell more than a very small number of guns must maintain their inventories in an interior setting or perhaps a nearby automobile.

Primary and secondary market prices of higher quality handgun models, both new and used, are typically hundreds of dollars (see Fjestad 1999; Warner 1998). However, general secondary market prices and illicit transaction prices have not been studied systematically across a range of places, circumstances, and actors. Depending on the age and quality of the firearm and the motivation of the buyer and seller, gun prices are likely to vary substantially. Anecdotally, for example, one can find stories of drug addicts selling guns for as little as ten dollars in cash or drugs (e.g., Walsh 1993). Considering that drug addicts appear to be important suppliers in the illegal market (Sheley and Wright 1993), this suggests that a non-trivial fraction of guns available in the illegal market can come very cheap. Further, prohibited possessors can also borrow guns or work out sharing arrangements that reduce costs.

Nevertheless, handguns typically cost \$50 or more when procured through non-retail sources. Among Sheley and Wright's (1993, p. 7) respondents who had obtained handguns through informal, non-retail channels, three-quarters or more of both the inmates and students had paid \$50 or more for their most recent acquisition. Thirty-one percent of the inmates and 17% of the respondents had paid \$100 or more. Hence, guns are relatively expensive items even when purchased through secondary channels. Further, secondary market gun prices may be notably higher in jurisdictions with stringent gun controls (Cook et al. 1995). We can therefore expect prices to also limit users' acquisitions and to limit profit margins for illegal traffickers.

The durability and price of guns will limit the number of transactions made by buyers. When buyers do seek guns, they can turn to a variety of sources, including family, friends, and other trusted associates, thus limiting their need for street sources and limiting their vulnerability to law enforcement operations. Generally, this limits profits from illegal gun dealing and undermines the development of large, sophisticated gun running operations. Most gun running operations involve small numbers of persons and short distribution chains, and many do not specialize in gun sales (ATF 2000b; Koper and Reuter 1996; Moore 1981).

These factors also limit the development of a street market for guns. This is not to say that a street market does not exist, but, rather, that the street gun market is a low volume market relative to other illegal markets like the drug market. Extrapolating primarily from Sheley and Wright's (1993) data, for example, Koper and Reuter (1996, pp. 129,144-146) estimate that youth (in this case, persons under 21 years of age) in a large city like Washington, D.C. may collectively make as

few as 13 gun acquisitions a day from street sources. Further, the street market is likely to have relatively few open-air sales. As noted earlier, guns are difficult to carry in high numbers in open settings. Further, gun buyers often deal with others whom they know; therefore, transactions can often be prearranged for times and places that limit the participants' vulnerability to street-level law enforcement operations. These factors can be expected to limit the development of specific illegal gun dealing locations. Street-level sales that do occur are likely to be most prevalent in drug market areas; approximately one-third to one half of Sheley and Wright's respondent's who obtained their most recent handguns from street sources cited drug dealers or addicts as their source (calculated from Sheley and Wright 1993, p. 6).

Gun shows provide an open-air market of sorts for prohibited gun buyers in some jurisdictions (depending upon state regulation of secondary market transfers and gun shows; see ATF 1999a). But although gun shows have been linked to some high profile gun cases, such as the Columbine high school massacre (Diaz 1999), the available evidence reviewed earlier suggests that few offenders get their guns *directly* from gun shows. Furthermore, gun shows are not every day events. On the other hand, it is not clear at this time how many crime guns pass through gun shows at some point between their first retail sale and their use in crime. Illegal gun traffickers operating at gun shows tend to sell more guns than do traffickers in most other types of cases. In a recent review of ATF gun trafficking cases, the 14% of cases involving gun show activity were linked to 31% of all guns estimated to have been trafficked (ATF 2000b, p. 13). An earlier review of ATF gun show investigations revealed that prohibited persons, such as felons and juveniles, do personally buy firearms at gun shows and that gun shows are sources of firearms that are trafficked to prohibited persons (Braga and Kennedy 2000). The gun show research revealed that firearms were diverted at and through gun shows by straw purchasers, unlicensed private sellers (some of which were previously licensed dealers whose licenses were revoked), and licensed dealers (Braga and Kennedy 2000). Felons were associated with selling or purchasing in 46% of the gun show investigations and the trafficked firearms were recovered in subsequent crimes, including homicide and robbery, in more than a third of the gun show investigations (Braga and Kennedy 2000). Thus, it is possible that gun shows play a limited but meaningful role in facilitating illegal gun distribution. Fully understanding the role of gun shows in supplying illegal markets, however, will require better data on primary and secondary market transactions which take place at these events.

### **1.5 The Prospects of Supply-side Enforcement**

These various considerations raise questions about whether law enforcement operations targeting gun traffickers and street sales can have more than a modest impact on gun availability to offenders (Koper and Reuter 1996; but see ATF 1977, Zimring 1975). However, the intimacy of sellers and buyers may present other enforcement opportunities. [Many gun offenders personally know their weapon providers. Accordingly, it is reasonable to conclude that many of these providers know the legal status of their buyers (or, borrowers, traders, etc.).] Hence, more concerted efforts to debrief gun offenders and to identify and prosecute their gun sources may be feasible. Currently, law enforcement authorities place relatively little emphasis on determining offenders' gun sources,

typically focusing their attention on only those elements needed to prosecute an offender for the proximate gun crime.

A related outcome is that gun markets are predominantly local. In most places, except those with tight ownership restrictions, the majority of crime guns originate (i.e., were first sold at retail) within state rather than out of state (ATF 1997; 1999a). Further, half of successfully traced crime guns are seized within 50 miles of the place where they were originally purchased (Pierce et al. 1998). This fact may also present greater opportunities for secondary market tracking and enforcement than previously realized.

To some observers, the broad lesson of the available research is that guns are available to criminals and juveniles from a variety of sources, so that even if one or two of them (straw purchases, trafficking) were to be curtailed it would make little difference to the use of guns in crime (Kleck 1999). That interpretation should be viewed as speculation, rather than as fact. The available evidence is simply not conclusive. And economic reasoning indicates that under some circumstances curtailing some sources of guns will influence the terms on which guns are available from other sources (Cook and Leitzel 1996).

The various sources of data on the illegal supply of firearms indicate that a substantial minority of crime guns comes from licensed dealers, either directly or indirectly, while a majority of crime guns comes from diffuse sources (Braga, Cook, Kennedy, and Moore 2002). In the parlance of environmental regulation, illegal gun markets consist of both “point sources”- ongoing diversions through scofflaw dealers and trafficking rings- and “diffuse sources”- acquisitions through theft and informal voluntary sales (Cook and Braga 2001). A reasonable conclusion is that, as in the case of pollution, both point sources and diffuse sources are important (Cook and Braga 2001). Braga and his colleagues (forthcoming) speculate that the mix of point and diffuse sources differs across jurisdictions depending on the density of gun ownership and the strictness of gun controls. Systematic gun trafficking may well be more important in strict-control jurisdictions such as Boston and New York than in looser-control jurisdictions such as Atlanta and Dallas. Given that there is a mix of concentrated and diffuse sources, the potential effectiveness of supply-side enforcement may be greater in jurisdictions where guns are relatively scarce and hence not so readily available from other sources (Braga et al. forthcoming; Cook and Braga 2001). Unfortunately, there is little direct evidence that successful regulatory and enforcement actions on point sources will actually reduce availability and hence gun use in crime. More research on the structure of illegal gun markets and experimentation with market disruption tactics is sorely needed.

The complexity and diversity of illegal gun markets suggests that there is no single best policy or approach to disrupting the illegal supply of guns across the numerous jurisdictions in the United States. We believe that jurisdictions interested in reducing the availability of guns should develop a portfolio of interventions based on problem-solving partnerships between federal, state, and local authorities. Problem-oriented policing holds great promise for creating a strong response to illicit firearms markets. Problem-oriented policing works to identify *why* things are going wrong and to frame responses using a wide variety of often untraditional approaches.

Using a basic iterative approach of problem identification, analysis, response, evaluation, and adjustment of the response, problem-oriented policing has been effective against a wide variety of crime, fear, and disorder concerns (Goldstein 1990; Eck and Spelman 1987; Braga, Weisburd, Waring, Mazerolle, et al. 1999). This adaptable and dynamic analytic approach provides an appropriate framework to uncover the complex mechanisms at play in illicit firearms markets and to develop tailor-made interventions to disrupt the gun trade.

## **1.6 Overview of Present Study**

The “point sources and diffuse sources” perspective on the structure of illegal gun markets provides law enforcement with a framework to think about constructing focused supply-side enforcement strategies that are appropriate for the characteristics and dynamics of local illegal gun markets. At present, this new perspective on gun markets is based on a synthesis of research evidence and its utility has not been examined using data on the nature of gun markets in U.S. cities. In this research study, we use the problem-solving approach to unravel the workings of illegal gun markets, identify problem point sources of firearms, and make observations on the prospects of focused supply-side enforcement strategies. ATF firearms trace data are used in this problem analysis exercise to describe the nature of gun markets at the National level and within seven cities. Chapter 2 describes the firearms tracing process and the nature of firearms trace data. Chapter 3 presents our findings on the characteristics of illegal gun markets (these dimensions include types of guns recovered, characteristics of gun purchasers, characteristics of crime gun possessors, time between first retail purchase and subsequent recovery in crime, and the like). Chapter 4 presents our analyses of illegal gun market dynamics (includes analyses of licensed dealers associated with crime guns, relationships between gun purchasers and crime gun possessors, and the like). Chapter 5 uses the patterns revealed in the previous chapters to develop indicators of illegal trafficking and diversion, and uses these indicators to describe the nature of gun markets at the National level and within seven cities. Chapter 6 discusses the implications of our findings for supply-side enforcement strategies.

## Chapter 2. Federal Firearms Regulations and Firearm Tracing

Over the past sixty years, a series of legislative acts have created a regulatory framework for the firearms industry in the United States. The Federal Firearms Act of 1938 granted the Treasury Department authority over a national licensing system of firearms dealers, manufacturers, and importers (Spitzer 1995). The low license fee for dealing in firearms has assisted in the popularity of the license. (The initial firearms dealer license fee of \$1.00, imposed in 1938, was increased to only \$10.00 thirty years later, through passage of the Gun Control Act of 1968.) There have been, in this present decade, at least as many as 284,000 federal firearms licensees (FFLs), whose business operations fall within the regulatory jurisdiction of the Bureau of Alcohol, Tobacco and Firearms (Spitzer 1995). Recent ATF figures indicate the FFL population reached an apex of approximately 287,000 in 1993.

Until 1994, firearms dealers were not required to provide ATF with responses to the vast majority of trace requests. Although the Crime Act of 1994 imposed this requirement (FFLs must now respond within 24-hours to a trace request), voluntary cooperation with ATF was the norm regarding firearms traces. However, there were exceptions, of course, which prompted this legislation. Those FFLs who are uncooperative in firearms trace requests now face sanctions. But more seriously, those licensed firearms dealers who ignore ATF regulations, or worse, commit criminal acts in the conduct of their firearms business, may oftentimes be central to the problem of illegal firearms trafficking. Their legal access to a supply of weapons can fuel a substantial stream of weapons into illegal markets.

Table 2.1. Changes in the Population of Federally Licensed Firearms Dealers in the United States, 1992 to 2001

<b>Apex of FFL Population 1992</b>	<b>FFL Population 2001</b>	<b>Total FFL Decrease</b>	<b>Total FFL Change</b>
284,117	102,913	181,204	64%

Source: ATF 2001/2002

In recognition of this, federal firearms dealer (FFL) licensing requirements were made more rigorous in 1993. The Federal Firearms License Reform Act of 1993 increased the initial application fee from \$10 to \$200. Applicant requirements were further revised by ATF in December 1993 and in September 1994, the requirements for applicant fingerprints and a photograph were made a statutory requirement by the Violent Crime Control and Law Enforcement Act. The total changes imposed upon FFL applicants include submission of fingerprints and photograph for the application, a face-to-face interview with an ATF Inspector, notification to the applicant's local chief law enforcement officer (CLEO) of the applicant's intent to conduct a firearms business, certification by the applicant of compliance with applicable state and local laws regarding their business and the payment of a \$200 fee for a three-year license, and a renewal fee of \$90.00 (Kelly 1997). These changes in the FFL licensing system have significantly reduced the number of federally licensed firearms dealers (See Table 2.1).

The FFL population has decreased about 57 percent during the past four years.

The significance of this licensee reduction in regard to the monitoring the commerce of firearms is two-fold: (1) the regulatory assets of ATF will not be as thinly stretched in conducting compliance checks of FFLs and (2) the tracing process will eventually be less burdened by these reduced numbers of potential FFLs who may need to be contacted during the trace process.

## **2.1 The Firearms Tracing System (FTS) For Crime Related Guns**

The Bureau of Alcohol, Tobacco and Firearms, United States Treasury Department, is responsible for the enforcement of the Gun Control Act of 1968, as amended (GCA 1968). The Bureau established the National Tracing Center (NTC). The National Tracing Center is “the sole agency responsible for tracing firearms used in crimes and recovered at crime scenes” (Magaw 1994). Firearms tracing is described as “the systematic tracking of firearms from manufacturer to purchaser for the purpose of aiding law enforcement officials in identifying suspects involved in criminal violations, establishing stolen status, and proving ownership” (Bentsen 1994). The National Tracing Center is located in Falling Waters, West Virginia.

The National Tracing Center has developed and implemented a Firearms Trace System (FTS) to conduct traces of firearms. This development is a continuing process, and was initiated soon after passage of the GCA 1968. During this present decade, computer automation has facilitated the Bureau’s Firearms Trace System. The FTS consists not only of a computer system, but also of Bureau employees. Many of these employees have years of experience in responding to police requests for firearms traces, in the identification of firearms, and in communications with federally licensed firearms manufacturers and dealers.

To initiate a trace, the requesting agency is required to furnish some detailed information to the NTC. It is required that information be clearly identified on ATF Form 7520.5, the National Tracing Center Trace Request Form.

A successful trace of a crime-related firearm generally requires that several conditions be met. First, the firearm must have a legible, identifiable serial number. Firearms without serial numbers cannot be traced. Once a firearm in question is properly described, personnel of the National Tracing Center may communicate a trace request to the firearm’s manufacturer. The manufacturer is asked to provide information regarding the identification of the wholesale/retail distributor to which they sold the firearm in question, and the date of transfer. From that point on, the weapon is traced through all wholesale/retail distributor sales of the weapon. A trace is typically stopped at the point at which a weapon is for the first time sold to a private citizen. A firearms trace sometimes goes beyond the point of first retail sale. However, that process usually requires special agent investigatory resources. The Bureau in cases of the most significant criminal investigations typically undertakes this more extensive form of “end-to-end” firearms trace.

The NTC relocated from its previous location in Landover, Maryland to Falling Waters, West Virginia during June 1994. The new NTC facility was dedicated on June 6, 1994. Growing awareness of the importance of tracing in effective law enforcement operations regarding firearms-related violent crime prompted this move, in part. The new facility provided an environment for a continuing expansion of firearms tracing capabilities.

The use of firearms tracing assets of the NTC, and the efficiency of NTC trace operations has significantly increased since its relocation of the West Virginia facility. In calendar year 1993, the National Tracing Center responded to 54,195 requests for traces of crime guns submitted by law enforcement agencies. The average response time of the NTC was 13 days. In 1997, the NTC received trace requests on approximately 195,000 (179,728 of which represented unduplicated requests) crime-related guns. The average response time was reduced to 9.4 days.

## **2.2 Historical Changes in the Firearms Tracing Process**

Figure 2.1 provides information about the decade-long trend of increasing utilization of NTC's trace resources by law enforcement agencies. The figures are slightly different from those presented in previous ATF publications because we have excluded duplicate trace request data from these figures. The data presented in Table 2.2 represent the number of non-duplicate traces requested for 1999.

Many municipal, county, state and federal, law enforcement agencies use the trace capabilities of the NTC during the course of a year. To a lesser extent, trace requests also originate from foreign governments and police agencies. International trace requests and NTC responses are channeled to the National Tracing Center through the Bureau's International Firearms Enforcement Office.

In addition to tracing firearms used in crimes, the NTC is also the repository for the records of federally licensed firearms manufacturers, wholesalers, and dealers (FFLs) who have gone out-of-business (OOB). This is an important NTC function, as more than half of all firearms traces require information from the Center's OOB files.

The receipt/collection of FTS information concerning thousands of trace requests, and the NTC trace responses to those requests represents the core information resource of the Firearms Trace System. This resource is central to the potential for identifying sources of illegal firearms trafficking. Importantly, along with the increase in the volume of traces received, the quality of these data have also continue to improve.

In 1999, 52.1% of trace requests submitted to the NTC ended with the identification of a purchaser (See Table 2.2). When a purchaser was not identified, the process most often broke down because of 1) missing, incorrect or illegible information about the gun's serial number (10.8%), 2) the firearms was considered too old to be traced (9.6%), 3) the federal firearm licensee reported that the records had been destroyed or stolen (7.5%), or 4) information about the importer was missing, incorrect or illegible (6.4%).

The number of trace requests submitted to the National Tracing Center has increased considerably during the last decade. Prior to 1994, firearm tracing was the exception to the rule. The system was not used to identify trends in crime guns, in their purchasers and in the dealers who sold them. Tracing was not done on a standard, systematic basis. Crime guns were predominantly tracked when involved in atypical cases.

Beginning in 1994, the system began to change dramatically. Four times as many traces were requested in 1999 as were in 1990. The changes in the number of requests increased in small increments during the first four years, nothing more than about 10,500 increased requests year-to-year. Then in 1994, there was a jump of over 30,000 requests. It is at about this time that the NTC enacted several important procedural and technical changes.

Before this time, it was extremely difficult to determine whom a dealer was or where a dealer was located. The records were not automated and the licensing system and out-of-business records were not linked. In 1994, these problems were remedied: the system became automated, and a link between the licensing database and the FTS was integrated for both active and inactive records.

In conjunction with this sweeping technological change, a major attempt to encourage law enforcement agencies to submit requests was undertaken. Two teams of NTC employees traveled to all ATF division offices, all ATF regional centers, and to many duty posts to persuade agencies to submit requests for all recovered crime guns. These reforms brought about significant increases in the number of requests submitted.

They also increased the number of comprehensive traces completed and where the purchaser was identified, as Table 2.2 illustrates. In a comprehensive gun tracing scenario, a request for information about a crime gun would ideally pass through three sets of organizations: local law enforcement, the NTC, and the firearm industry, ending with information about the purchaser. The process is set in motion by a local law enforcement agency submitting a trace request to the NTC. If this request form is filled out properly, it will include the type of firearm, its caliber, the manufacturer, the location in which the crime gun was recovered and the crime gun possessor's date of birth. From here, the NTC will contact the gun industry. Beginning with the manufacturer, they will attempt to trace the assent of the gun into a private citizen's hands. This path usually takes the form of the manufacturer leading to the wholesaler, leading to the dealer, and finally, leading to the purchaser.

At any place along this route, errors or breaks in the inquiry may occur. It is these less perfect data, certainly more comprehensive than in the tracing data's infancy but imperfect in form, that make up our analysis. In order to understand why and at what stage the search may break down, six categories have been created to track the process. They are organized in the following manner: 1) the firearm was too old to be traced. The firearm in question was manufactured prior to a specified date and could not be, or was deemed unable to be traced at the time the request was submitted; 2) The trace was uninitiated because of one of several "special conditions". These include a request terminated by law enforcement, the weapon was not a legally traceable firearm (BB gun, flare gun,

a “destructive device”, a machinegun, or military weapon), the trace was delayed, or the firearm was traced to a foreign dealer or foreign government; 3) The trace was uninitiated because of insufficient information. The information about the serial number, model, importer, or description of the gun was either missing, incorrect, illegible or purportedly coming from a previously lost, destroyed or stolen gun; 4) The firearm was previously reported stolen or was reported stolen by the manufacturer; 5) There was a problem with the dealer or the dealer’s records; 6) The trace was completed and the purchaser was identified.

As Table 2.3 illustrates, 1999 had far fewer cancelled traces due to firearms being too old to trace (9.6%). There were also slightly fewer traces interrupted by insufficient information, 20.5% in 1999 and 22.0% in 1996. The percent of firearms reported stolen remained consistent over the four years. However, the problems with dealers and dealer records increased to 10.8% in 1999, and traces not initiated because of special conditions went up slightly in 1999 to 6.1% of the traces requested.

In addition to the six summary completion codes, there are also four categories of additional information that are submitted by local law enforcement to the NTC. Table 2.4 shows that in three of the four categories (possessor age, recovery city and recovery date) 1999 had the greatest percentages of compliance. There was little change in submission of the possessor’s name. It was recorded 65.0% of the time in 1996 and 64.8% of the time in 1999.

### **2.3 The Use of Firearms Trace Data in Describing Gun Markets and Gun Market Dynamics**

Understandably, research studies based on analyses of firearms trace data have been greeted with a healthy dose of skepticism. Trace data analyses are subject to a number of widely recognized problems (see Kleck 1999; Blackman 1999; Congressional Research Service 1992). All are based on firearms recovered by police and other law enforcement agencies, which may not be representative of firearms possessed and used by criminals. Trace datasets are also influenced by which guns are submitted for tracing, a decision made by law enforcement agencies for a variety of reasons. Beyond that, however, not all firearms can be traced, and administrative decisions by ATF influence those that are traced. The trace-based information that results is biased to an unknown degree by these factors.

Even more centrally, trace analysis cannot show directly whether a firearm has been trafficked, or what the mode of trafficking might have been. Trace studies typically contain information about the first retail sale of a firearm and about the circumstances associated with its recovery by law enforcement. These studies cannot show what happened in between: whether a firearm was legitimately purchased and subsequently stolen, sold improperly by a licensed dealer, or any other of a myriad of possibilities. As such, trace analysis cannot directly show that trafficking is occurring; inferences about trafficking are made based on the characteristics of recovered crime guns.

As discussed earlier, the quality of firearms trace data has improved rapidly over the past decade. From the beginning in 1993, the Clinton Administration was concerned about the apparent ease

with which criminals and juveniles obtained. ATF was charged with initiating a concerted effort to increase the amount of crime gun tracing, improve the quality of firearms trace data, increase the regulation of gun dealers, educate law enforcement on the benefits of tracing, and increase investigative resources devoted to gun traffickers (Cook and Braga 2001).

Comprehensive tracing of all firearms recovered by police is a key component of ATF's supply-side strategy. Comprehensive tracing is "[t]he tracing of all recovered crime gun a geographic area (e.g., town county, metropolitan area, state). Trace information is used to maximize investigative leads for use in identifying illegal firearms traffickers and violent criminals, and to analyze crime gun trends and patterns (ATF 2002)." In 1996, ATF initiated the Youth Crime Gun Interdiction Initiative, "a youth-focused firearms enforcement program that is component of ATF's overall firearms enforcement program (ATF 2002)." The program began with commitments from 17 cities to trace all recovered crime guns (ATF 1997). This program expanded to 47 cities in 2000 with additional cities to be added in subsequent years (ATF 2002). Other jurisdictions have also expanded their use of gun tracing; six states, for example, have recently adopted comprehensive tracing as a matter of state policy, either by law (California, Connecticut, North Carolina, and Illinois), by executive order (Maryland), or by law enforcement initiative (New Jersey) (ATF 2000c).

Comprehensive tracing of all firearm recoveries reduces some of the bias in trace data introduced by police decision making. Jurisdictions that submit all confiscated guns for tracing can be confident that the resulting database of trace requests is representative of a well-defined "population" of guns recovered by police during a particular period of time and a reasonable "sample" of guns used in crime (Cook and Braga 2001). Using recovered crime guns, as a basis for estimating the characteristics of all guns used in crime is analogous to using arrestees as a basis for estimating the characteristics of all criminals. Although both are unrepresentative of the relevant populations in various ways and both are influenced heavily by police priorities and procedures, the validity of the conclusions drawn from these data depends on the application and the care that is taken to provide appropriate qualifications (Cook and Braga 2001).

## **Chapter 3. The Characteristics of Illegal Markets in Firearms**

Our analyses of the characteristics of illegal gun markets focuses on crime-related firearms recovered during calendar year 1999 and traced by the National Tracing Center. Calendar year 1999 represents the first full year of a new commitment by the NTC to trace all firearms except for those manufactured prior to 1968 or firearms for which licensed dealers are no longer required to retain records on (i.e., firearms over 20 years of age). The number of firearms not traced due to age dropped to 9% of all trace requests in 1999. We first present the results of our analyses of all crime gun traces recovered in the United States. Although most major cities participate in the YCGII program, these National data are not representative of all crime guns recovered by law enforcement agencies in the U.S. These data include guns submitted for tracing from jurisdictions that do not engage comprehensive tracing practices and, as such, are biased to an unknown degree by police decision-making processes. Therefore, our analyses of the national data should be regarded as exploratory. We then present the results of our analyses for seven cities that engage comprehensive tracing practices. These city-level analyses can be considered to be representative of guns recovered by police during a particular period of time in a specific city and a reasonable sample of guns used in crime in a specific city.

The city-level analyses examine traced firearms in Baltimore, Boston, Memphis, Milwaukee, New York, Philadelphia, and San Antonio. Five of these cities (Baltimore, Memphis, Milwaukee, New York, and San Antonio) were identified in the original NIJ solicitation (NIJ 1997) for an intensive examination of their local illegal gun markets based on the quality of local police department data related to gun confiscations and incidents, the size of the gun violence problem in their local and to provide a diversity of locations by city size and region (NIJ 1997, p. 3). Two additional cities (Boston and Philadelphia) were added as the study progressed because these jurisdictions also collected high quality information on firearms and could provide this information to the study with a minimum of extra expense to the project. Importantly, these seven cities were established participants in the YCGII program, and were identified as having a diversity of law enforcement approaches to gun-related youth crime. In addition, the seven cities also show diversity in terms of their state gun sale laws. Webster et al. (2001) grouped state gun sale laws into three categories, 1) states with both permit-to-purchase licensing of firearms buyers laws and firearms registration laws, 2) states with either licensing or registration laws but not both, and 3) states with neither type of law (Webster et al., 2001, p. 185).

### **3.1 National Level Analysis of Firearms Trace Data**

#### **Characteristics of Traced Crime Guns**

Characteristics of firearms associated with crime gun traces for 1999 are presented in Tables 3.1a-d. For table 3.1a, the type of weapon associated with crime gun traces is broken out. Handguns are the most frequently traced firearms in the United States. In 1999, handguns (i.e., pistols, derringers, and revolvers) accounted for nearly 74% of all traced firearms. Among the different types of handguns, 45.9% of all firearms trace requests were from semiautomatic pistols. Revolvers accounted for 26.3% of all traced guns while Derringers accounted for only

1.3%. Long guns (i.e., rifles and shotguns) accounted for about 26% of all trace guns. Rifles and shotguns accounted for 14.8% and 11.4% of traced guns, respectively.

Firearms can also be examined in terms of the caliber associated with a weapon. Caliber refers to the diameter of a projectile to be expelled from a firearm or the dimension of the bore of a given firearm. Tables 3.1b and 3.1c present the caliber of handguns and rifles traced in 1999. Information is presented on caliber for handguns and rifles because these are the two most commonly categories of firearms traced by ATF. For handguns, caliber has been grouped into three categories, low caliber weapons comprised primarily of 22 and 32 caliber weapons, medium caliber composed of weapons such as 9MM and 38 caliber weapons and high caliber weapons comprised of weapons such as 10MM and 357 Magnum caliber weapons. The majority of handguns have calibers in the medium range (51.8%). For rifles, caliber has been grouped into three categories, low caliber consisting of 22 and 25 caliber weapons, hunting caliber comprised of mostly 30 caliber (but also 270, 300, 303, 308, 32, 44, and 45 calibers) weapons, and military caliber comprised of calibers used by the armed forces consisting of 223, 243 and 762 calibers. Military calibers were identified as a separate category to assess the potential popularity of this type of weapon among criminal offenders and other prohibited groups. More than 37% of the traced rifles had low calibers, 31% had military calibers, and about 22% had hunting calibers.

Table 3.1d presents information on the cost of traced crime-related firearms. Cost estimates were derived by examining the manufacturer, caliber, type and where possible, model of firearm. Using these four sources of information, approximately 1,300 specific types of manufacturer, weapon type, caliber and model firearm were identified in the NTC trace database. Using this information, price estimates were derived from the Blue Book of Gun Values for 1999. Where retail price information was available, this information was used to estimate the cost of the firearms. Where no retail information was available, the second-hand or “used” gun price for a weapon type was employed. The price for a used gun can vary according to the condition of the weapon. We used the 90% of used gun valuation for our estimated price. (Guns with lower valuations may not be fully functional and thus difficult to sell and few used guns will typically be valued at their full valuation). In addition, where retail gun prices were available, but it could be determined with certainty that the gun was sold as a used weapon, the used gun price was substituted. This rule was used for firearms identified as having been traced back to a law enforcement source of sale. When law enforcement agencies are identified as the seller of a firearm, it means that the weapon has been sold as a used weapon after being used by a police agency’s law enforcement officers. As Table 3.1d denotes, approximately 43% of the firearms recovered in 1999 cost under \$200, and about 20% of the crime guns recovered in 1999 cost \$500 or more.

### **Characteristics of Crime Gun Purchasers and Possessors**

Tables 3.2a-c present the characteristics of crime gun purchasers and possessors. Note that only 11.2% of all traced crime guns are recovered by law enforcement in the possession of the original buyer (Table 3.2a). Unfortunately, not all firearms traces yield information on the

possessors and first purchasers of the firearm. In this study, only 64.8 % of the traced firearms identified possessors for firearms recovered in 1999 (see Table 2.4), 52.1 % identified purchasers for firearms recovered in 1999 (see Table 2.3), and 34.8% identified both purchaser and possessor. Identification of the individuals was based on individual identifiers constructed from the first two letters of a person's first name plus the first three letters of a person's last name plus their month and year of birth and their state of residence. (34.8% is the product of the 57,123 traces where both purchasers and possessors were identified divided by the 164,137 traces recovered in 1999). It is important to remember that guns are durable goods that can change hands many times over the life of the good. As such, it is not surprising that most recovered crime guns have changed hands at least once before being recovered in crime. We will return to this point later in this chapter when we consider sales of newer guns.

Crime gun possessors tend to be younger than first retail purchasers (Tables 3.2b and 3.2c). In part, this is because juveniles are not permitted to purchase guns at retail in the United States. Nearly 35% of crime gun *possessors* are ages 24 and under, while only 23.8% of *purchasers* are ages 24 and under.

### **Geography of Purchase Location Relative to Recovery Location**

Potential firearm markets can be examined in terms of distance between the original retail sale of the firearm and their ultimate recovery by law enforcement. Distance in this case is measured in terms of miles between the centroid of the zip code of the first time retail gun dealer and the centroid of the zip code of the recovery location of the firearm. Of the 52,704 traces where the location of the retail dealer and the gun recovery location could be determined in 1999, data presented in Table 3.3a indicates that 51.9% of crime guns were recovered within 50 miles of the original retail dealer. The geographic distribution suggests that a majority of crime guns are recovered fairly close to the location of the first retail dealer and a significant minority are recovered far away, and 31.5% were recovered within ten miles of the first retail dealer. About 24% of traced crime guns are recovered more than 500 miles away from the first retail dealer. Table 3.3b shows that a majority of traced crime guns are recovered in the same state of first retail purchase. About 65% of crime guns are recovered in the same state as the first retail dealer while some 35% are recovered in a different state.

### **The Distribution of Crime Gun Traces Among First Retail Dealers**

The number of traces associated with a retail dealer may also be an indicator of potential diversion from the retail system. Previous research has noted that fewer than one percent of the active retail dealers in the United States account for over fifty percent of the firearms traces to active retail dealers (Pierce et al., 1995). In this study, we also find that a small number of licensed retail dealers ever have a crime gun traced to them. Only 14.5% of the 80,523 active licensed dealers were associated with one or more successful traces. Pawnbrokers licensed to sell firearms were more likely to have at least one gun traced to them (31%) relative to more traditional gun store licensed dealers (12.1%). As Table 3.4 indicates, the distribution of crime gun traces to retail dealers is highly skewed. A very small fraction of retail dealers generate a

majority of crime gun traces. Only 0.2% of all licensed dealers accounted for 24.7% of all traced crime guns and only 1.2% of all retail crime gun dealers accounted for 54.6% of all trace crime guns. Less than 0.1% of gun store dealers were associated with 27.7% of gun traces to gun store dealers, while 0.3% of pawnbrokers were associated with 16.7% of gun traces to pawnbrokers.

Of course, it is possible that the concentration of trace data may simply reflect a concentration of firearms sales. In his examination of handgun sales volume data and handguns trace data in California, Wintemute (2000) found that sales of handguns are highly concentrated: the 13.1% of FFLs with more than 100 sales during 1996-98 accounted for 88.1% of all sales. Handgun trace volume from 1998 was strongly correlated with handgun sales volume, and is highly concentrated among high-volume dealers, but that is not the whole story: "...trace volume varied substantially among dealers with similar sales volumes" (Wintemute 2000, p. 567). However, Wintemute did not determine whether this variation was greater than could be explained by chance alone. Nevertheless, as we will discuss later, this concentration of traced crime guns provides an important opportunity for focusing limited regulatory and enforcement resources on a small number of dealers associated with large numbers of guns recovered in crime.

### **The Time Between First Retail Sale and Subsequent Recovery in Crime**

Time-to-crime is a state-of-the-art term that describes the period between the firearm's first retail sale through a licensed dealer and its recovery or submission for tracing by a law enforcement agency. Short time-to-crime is an indicator that the recovered crime gun may have been trafficked (ATF 1997, 1999). Recovered crime guns are disproportionately new when compared to annual firearm production figures. Table 3.5 and Figure 3.1 present the annual distribution of firearms produced for the United States market and the annual distribution of firearms recovered in crime over the past 20 years. In 1998, the firearms industry produced only 4.9% of the firearms in the existing stockpile. However, 16.3% of the traced firearms recovered in 1999 were manufactured in 1998. Conversely, for guns recovered in 1999, only 1.69% have a time-to-crime of 19 to 20 years (See the row for 1979 in Table 3.5). The relatively high percentage, 34% of crime guns recovered in 1999 with a time-to-crime of three years or less (the sum of years 1996, 1997 and 1998), out of a possible 20 years suggests that guns through a variety of mechanisms are being diverted into illegal markets. The greater concentration of new guns suggests that new guns are making their way into criminal hands much faster than new guns are entering the existing stockpile of guns in legal hands.

In order to make a judgment as to whether the proportion of relatively fast time-to-crime guns is greater than what we would expect as a result of the normal manufacture and sale of firearms, we compare the distribution of time-to-crime for guns recovered in 1999 with the annual production of firearms produced over the period, 1979 to 1998 produced for the US market. These figures were derived from estimates of the total number of firearms produced by US manufacturers in each calendar year between 1979 and 1998 minus the exports to foreign countries by US manufacturers in each of the prospective calendar years, plus imports by foreign firearms manufacturers in each of the respective years. These figures were further adjusted for potential depreciation in the stock of weapons over time at a rate of 1 (one) percent per year, starting in

1997. The annual percentage age distribution of firearms produced (minus exports, plus imports and adjusted for depreciation) for the US market for the years 1979 to 1998 is presented in the fourth column of Table 3.5.

If most crime guns were stolen or were sold by private citizens as part of a private part of legal private sale transactions, we would expect to have an age distribution of crime guns that closely resembles the age distribution of firearms produced for sale in United States. A pattern of closely matched age distributions would be expected if stolen weapons were the predominant source of crime guns, because thieves have no *a priori* knowledge of the type and age of a gun(s) that exist in homes they break into. Contrary to such expectations (that primary source of crime guns are weapons stolen from private citizens) research indicates that the age distribution of crime guns is disproportionately new when compared age distribution of firearms manufactured for sale in United States over the last twenty years. As Table 3.5 indicates 34% of crime guns recovered in 1999 had a time-to crime of three years or less (among crime guns purchased over the last twenty years). In sharp contrast to 34% of crime guns being short-time-to-crime only 14 % of the all firearms produced for the US market over the twenty year period 1979 to 1998 (and adjusted for depreciation of the stock) were produced in the three year period 1996 to 1998, which is equivalent to the three year short time-to-crime benchmark. Thus the proportion of relatively fast time-to-crime guns recovered by law enforcement is much greater than what we would expect as a result of the normal manufacture and sale of firearms for the US market. This indicates that significant proportions of short-time-to-crime firearms are being diverted from the retail system into the hands of criminal offenders.

Weapon specific comparisons of the distribution of time-to-crime for weapons recovered in 1999 versus annual weapon specific production figures are contained in Appendix Tables 1 through 13. Similar patterns exist for handguns, rifles and shotguns (Appendix Tables 1 though 3), also exist for manufacturer specific comparisons of time-to-crime versus manufacturer specific production statistics (Appendix Tables 4 though 13). Perhaps, the most dramatic pattern among the manufacturer specific analysis occurs for the Bryco Manufacturing Company (Appendix Tables 4). Almost thirty five percent of all Bryco semiautomatic pistols recovered in 1999 had a time-to-crime of one year or less whereas only approximately 6% of all Brycos were produced in 1998.

Fast time-to-crime guns represent a substantial share of traced crime guns recovered in 1999. As Table 3.6 shows, 31.2% of traced crime guns had been first sold at retail less than 4 years prior to their recovery in crime. Fast time-to-crime guns are also concentrated among a fraction of licensed dealers. Table 3.7 shows that 0.1% of all active retail gun dealers generate 19.1% of all fast time-to-crime traces and 1.1% of all active retail gun dealers generate 63.7% of all fast time-to-crime traces. Quick crime guns are more concentrated among traditional retail gun dealers (0.1% of dealers associated with 21.6% of fast guns) when compared to pawnbrokers (0.1% of pawnbrokers associated with 12.9% of fast guns).

Fast time-to-crime firearms that are recovered from possessors who are not the first retail purchasers present particularly strong evidence that these firearms may have been illegally

diverted from legal firearms commerce. Table 3.8 shows that some 80% of fast crime guns are recovered from possessors that were not the first retail purchasers. Although some fraction of these guns could be the same person using false identification to acquire firearms, this finding suggests that recently purchased crime guns usually change hands at least once before being used in crime, possibly via straw purchasers. However, in making the case for regulatory enforcement, the distinction between false identification and a straw purchaser actually does not matter much. It still remains true that the licensed dealer is implicated in the transaction.

Time-to-crime as measured by trace data underestimates the true proportion of recovered crime guns that move quickly into criminal hands. With very few exceptions, ATF trace data can only date a gun to its first retail sale and, for the thousands of second-hand guns resold each year, cannot measure the amount of time from a gun's last known sale to its subsequent recovery in crime. ATF trace data alone do not provide much insight on gun traffickers diverting second-hand guns and illegally operating in secondary firearms markets. The State of Maryland keeps track of sales of guns beyond the first retail purchase and, as such, these state sales data provide an opportunity to measure the time from the last known retail sale to recovery in crime.<sup>22</sup> Table 3.9 shows that, for secondhand guns resold after first retail purchase (i.e. guns with two or more sales) in Maryland, information on subsequent transactions increases the percentage of quick time-to-crime guns from 24.5% to 37.3%. This suggests that data recording subsequent firearm purchases and sales can be used to good effect in detecting individuals who illegal divert second-hand guns to criminals.

### **3.2 Analyses of City Level Variation in Firearms Trace Data**

#### **Characteristics of Traced Crime Guns**

As with the National data, handguns account for the largest percentage of crime gun recovered in the seven cities. Overall, slightly more than 79% of recovered crime guns are handguns (Pistols, Derringers and Revolvers, Table 3.10). Pistols, most of which are semiautomatics, are the weapons of choice in the seven cities. Across the cities, more than 51.3% of the traced firearms are pistols (Table 3.10). Philadelphia has the highest percentage of recovered crime guns that are pistols (63.0%) followed by New York City (53.1%), Milwaukee (51.3%), Memphis (49.3%), San Antonio (45.2%), Boston (43.9%), and Baltimore (43.3%). The majority of traced handguns were medium caliber weapons (Table 3.11). Across the cities, 52.7% of traced handguns were medium caliber, with a high of 58.4% in Philadelphia and a low of 45.1% in San Antonio. High caliber handguns accounted for 16.5% of traced handguns across the seven cities, with a high of 21% in San Antonio and a low of 13.2% in New York City. Similar to the national data, the majority of firearms recovered in each of the seven cities cost less than \$199 (Table 3.12). New York City had the highest percentage of cheap guns among their traced firearms at 51.1% and Philadelphia had the lowest percentage at 41.1%. Interestingly, Philadelphia also had the highest percentage of traced firearms that cost \$500 or more (19.3%), followed closely by San Antonio (19.1%) and Boston (18.7%).

## **Characteristics of Crime Gun Purchasers and Possessors**

Table 3.13 presents the crime gun purchaser and possessors relationships. Across the seven cities, 90.8% of all traced crime guns were recovered by law enforcement in the possession of a person other than the original buyer. This varies across cities. Memphis had the highest percentage of guns recovered from a person other than the original purchaser (97.3%) followed by Boston (96.9%), New York City (94.6%), Baltimore (89.8%), San Antonio (87.6%), Philadelphia (87.2%) and Milwaukee (84.2%). The majority of crime gun possessors are under the age of 24 in the seven cities (Table 3.14). The age group 18-24 accounts for the highest percentage of traced crime guns. Overall, nearly 36% of traced guns were recovered from possessor ages 18-24 in the seven cities with a high of 45.9% in Boston and a low of 31.0% in San Antonio. Boston also had the highest percentage of trace guns recovered from juveniles (15.1%) followed by New York City (12.4%), Milwaukee (12.3%), Baltimore (12.0%), Philadelphia (8.9%), Memphis (8.6%), and San Antonio (7.1%). Crime gun purchasers also tended to be younger persons (Table 3.15). Across the seven cities, 44.8% of crime gun purchasers were 29 or younger. The 18 - 24 age group represented a large share of these younger purchasers, ranging between 24% and 28% of all crime gun purchasers in each city.

## **Geography of Purchase Location Relative to Recovery Location**

The distance between the first time retail dealer and the recovery location of the trace crime gun varies across the cities (Table 3.16). Similar to the national data, the geographic distribution of the sources of traced guns recovered in Baltimore, Memphis, Milwaukee, San Antonio, and Philadelphia suggests that many guns originate from dealers that are very close and dealers that are very far away. However, traced crime guns in New York City (80.9%) and Boston (61.4%) are much more likely to have been first purchased more than 50 miles away from these cities when compared to the other study cities. Likewise, as Table 3.17 shows, guns recovered in New York City (82.6%) and Boston (66.4%) were much more likely than the other cities to originate in states other than the state where the recovery city resides. Relative to the other cities, New York City and Boston reside in states with much stricter gun controls, and criminals as well as juveniles have more difficulty acquiring guns through retail dealers within these states. As such, a higher percentage of guns are imported into these cities from dealers in other states with weaker gun controls (see, e.g. Cook and Braga 2001; Kennedy et al. 1996).

## **The Time Between First Retail Sale and Subsequent Recovery in Crime**

Table 3.18 presents the time-to-crime of traced crime guns recovered in the seven cities. Overall, traced crime guns with a time-to-crime of less than 4 years represent 31.4% of the traced guns. This varies across the cities with Boston (21.9%) and New York City (20.7%) having the smallest percentages of fast guns, and Milwaukee (46.1%) and Philadelphia (44.9%) having the highest percentages of fast guns.

### 3.3 Summary of Findings

Our analysis of ATF firearms trace data found that illegal gun markets have the following characteristics:

- **Crime gun traces are highly concentrated among a few federally licensed retail dealers.**
- **Crime guns originate from federally licensed retail dealers very close to the recovery location and from dealers distant from the recovery location.**
- **Crime guns recovered in cities located in states with tight legal controls are more likely to be first purchased in other states than crime guns recovered in cities located in cities with looser legal controls.**
- **Traced crime guns are usually not recovered in the possession of the original retail purchasers.**
- **Crime gun possessors tend to be younger than the retail purchasers of the crime gun. Both distributions tend to be disproportionately young.**
- **Traced crime guns are disproportionately newer guns. A large majority of these new guns have changed hands at least once before recovery in crime.**
- **A majority of traced crime guns are handguns, often less expensive medium caliber pistols.**

## Chapter 4. The Dynamics of Illegal Markets in Firearms

In this chapter, we use firearms trace data to analyze some of the dynamics of illegal gun markets. While trace data cannot show directly whether illegal gun trafficking is actually occurring, these data are very useful to identify firearms sales patterns that suggest a problem with illegal diversions from legitimate firearms commerce. Suspicious patterns in the trace data can be used to describe the pathways through which firearms are illegally diverted to the street, and to better focus regulatory and enforcement resources on possible illegal sources of guns. In essence, the results of these analyses can help law enforcement to investigate individuals who are most likely to be engaging in illegal sales of guns amongst the large population of legitimate gun dealers and purchasers in the United States.

The analyses in this chapter focus on one important aspect of illegal markets in firearms: how different factors affect the time between a firearm's first sale at retail and subsequent recovery in crime. As ATF notes, "[i]nvestigating crime guns with short time-to-crime allows law enforcement to seek out sources of crime guns and disrupt the flow of illegal firearms trafficking" (ATF 2002). This is not surprising because, the investigative value of information on the first retail sale of a gun depreciates rapidly. The dealers for guns first sold 5 or more years ago may no longer be in business, and the purchasers, even if they were at one time engaged in straw purchases, have quite likely moved on to other things. For such reasons, it seems unlikely that the police would find data on the first retail sale of older guns to be of much use in identifying currently active scofflaw dealers or traffickers.

Newer guns, in contrast, are likely to have passed through fewer hands and this makes it much easier for law enforcement to investigate its diversion and diverters, and to mount prosecutions. As Kennedy and his colleagues (1996) observe, this is one important way illegal gun markets differ from illegal drug markets: there is paperwork, sometimes at a considerable temporal remove, on guns. ATF investigators can figure out where a gun was manufactured or imported, where it was first purchased at retail, and who bought it. Thus, for investigative purposes, the newer a gun is the better. Records are likely to be more complete and more available; individuals listed on paperwork are easier to find; guns are less likely to have been resold, given away, or stolen; and the chain of transfers to illicit consumers is likely to be shorter (Kennedy et al. 1996, p. 174). For these reasons, as ATF's experience indicates, we would expect that law enforcement would find data on the first retail sale of older guns to be of much use in identifying currently active scofflaw dealers or traffickers.

In addition, research on criminal offenders provides support for the proposition that short time-to-crime guns are a useful indicator of firearms trafficking. Survey data suggest that diversions from retail outlets are important sources of guns for criminals. For example, Shelely and Wright (1995) found that 32 percent of juvenile inmates had asked someone, typically a friend or family member, to purchase a gun for them in a gun shop, pawnshop, or other retail outlet. This purchasing arrangement is known as a "straw purchase." A straw purchase occurs when the actual buyer of the firearm uses another person, the "straw purchaser," to execute the paperwork necessary to purchase a firearm from a licensed dealer. This pattern of trafficking is likely to

result in crime guns with relatively short time-to-crimes.

The combination of experience of investigators in the field and research provides strong argument for the relevance of using time-to-crime as an important indicator of whether firearms were likely to be diverted from retail outlets. For investigative and tactical purposes shorter time-to-crime firearms offer law enforcement a better opportunity to identify illegal gun traffickers.

#### **4.1 Analysis of Gun Market Dynamics**

Understanding factors that may affect time-to-crime also has strategic utility for law enforcement. Strategic analyses of fast time-to-crime guns can be used to good effect in uncovering a wide range of point and diffuse sources of new guns from the small-scale straw purchaser to a federally licensed dealer violating criminal regulations to diverting large volumes of guns to prohibited persons. The following analysis will examine a range of potential gun market related factors that may affect the time-to-crime of crime guns recovered by law enforcement. These factors are organized according (to the extent possible) to their temporal location in the sequence of actions that lead to the first time retail purchase of a firearm and subsequent recovery by law enforcement as a crime related gun. Specifically, the gun market dynamics will be examined in terms of activities and/or attributes associated with: 1) first time retail federally licensed dealers, 2) first time retail firearm purchasers of crime guns, 3) potential relationships between first time retail purchasers and the final possessors of crime guns, 4) crime gun possessors, and 5) the characteristics of crime guns recovered by law enforcement.

We first present analyses of dealers of traced crime guns from at the national level and at the city level. We then present analyses of the purchasers, purchaser/possessor relationship and possessors of traced crime guns at the national level. The chapter concludes with a brief section examining illegal gun market dynamics associated with particular characteristics of recovered crime guns.

##### **4.1.1 Dealer Dynamics**

Gun markets dynamics associated with firearms dealers are examined in terms of the business operations of a firearms dealers, the characteristics of clientele who patronize a dealer, and selected indicators of dealer and/or of purchaser behavior associated with crime gun traces.

##### **Dealer Dynamics at the National Level**

A large number of crime guns recovered in a city can originate from a particular dealer. While this does not necessarily mean that the dealer is involved in criminal activity or negligent business practices, dealers that do generate a large number of guns recovered in a city should receive closer law enforcement and regulatory scrutiny as compared to dealers that do not generate many crime guns. Table 4.1 presents the time-to-crime by the total number of traces to an active dealer from a particular recovery city. For those active dealers with 51 or more traces from a given recovery city, more than 54% of the traced guns have a time-to-crime of less than 4

years. By comparison, for active dealers with only 1 traced gun from a given recovery city, only 34% of traced time guns have a time-to-crime of less than 4 years. These results suggest that certain dealers are associated with large, quick flows of guns into particular cities. In general, active dealers with more than one traced gun are associated with higher percentages of quick time-to-crime guns. Table 4.2 presents the time-to-crime of traced guns by the number of multiple gun sales made by active dealers during 1999. Nearly 34% of guns traced to active dealers who did not make any multiple gun sales had a quick time-to-crime. As the number of multiple sales increases, the proportion of crime guns with a quick time-to-crime from an active dealer also increases. For dealers associated with more than 250 multiple sale guns, more than 54% of the traced guns had a time-to-crime of less than 4 years.

Federally licensed dealers can be more or less compliant with the rules and regulations of firearms commerce. Dealers that are less compliant with firearms commerce rules and regulations of firearms commerce may be more likely to be involved in negligent business practices or illegal gun trafficking. When actively in business, federally licensed dealers are not initially responsive when ATF requests sales information on a recovered crime gun, ATF issues a 13-day request letter to the dealer for the information. A large number of 13-day request letters suggests that a dealer may be less compliant with firearms commerce rules and regulations or it may suggest the dealer is inefficient in doing paperwork. Table 4.3 shows that as the number of request letters increases, the proportion of quick time-to-crime guns associated with these uncooperative dealers also increases. For dealers with more than 10 request letters, nearly 59% of the traced guns associated had a time-to-crime of less than 4 years. By comparison, a little more than 41% of traced guns generated from dealers without request letters had a time-to-crime of less than 4 years.

Criminal customers who frequent particular federally licensed dealers may also generate fast time-to-crime gun traces. The number of criminal customers who attempt to purchase firearms at an active dealer may be measured by counting the number of NICS gun purchase denials. A NICS denial is issued by a firearms dealer when an attempt is made to purchase a firearm by an individual who is identified as being ineligible to purchase a gun usually because of a prior criminal record. The NICS information used in Table 4.4 represents the number of NICS denials issued by a firearms dealer over the period October 1997 to November 1998; the trace information is based on firearms recovered in 1999. Table 4.4 presents time-to-crime by the number of NICS denials by active firearms dealers<sup>23</sup>. Active dealers with 6 or more NICS denials have a higher percentage of fast time-to-crime guns when compared to active dealers with no NICS denials or only a handful (1-5) of NICS denials. It is possible that criminal consumers are more likely to purchase new firearms that are sold at a discounted price.

The longer a firearm remains in a dealer's inventory, the more likely it is that the firearm may be sold at a discounted price to facilitate a sale. It is also possible that certain active dealers may be less likely to follow firearms regulations in order to move older inventory. Table 4.5 presents the time-to-crime of traced firearms by the length of time, or "shelf life," it took an active dealer to sell a new gun at retail after it arrived in inventory from the manufacturer or importer. When a gun has been inventory for more than two years (more than 731 days), it is much more likely to

be recovered quickly in crime than guns first sold at retail that have been sitting on dealers' shelves for less than two years. Finally, it is possible that the type of firearms licensee (i.e., pawnbroker versus standard retail FFL) matters in whether an active dealer is more or less likely to be associated with fast time-to-crime guns.

Finally, Table 4.6 suggests that pawnshop licensees may be slightly more likely to be associated with fast crime guns (46.8%) when compared to traditional retail licensees (42.2%). Other types of licensed dealers, such as collectors of curios and relics, are much less likely to be associated with fast crime guns (35.8%).

### **Dealer Dynamics at the City Level**

The concentration of crime gun traces to dealers with high or low numbers of total crime gun traces varied considerably across the seven cities (Table 4.7). A large majority of crime gun traces in Boston (62.7%) and New York City (43.7%) originated from retail dealers with only one crime gun trace. Crime guns in these tight-control cities were first purchased from a diffuse group of gun dealers with only one or a few traces. The percentage of crime gun traces first sold at dealers with 26 or greater total traces was much higher in Milwaukee (51.6%), Philadelphia (48.1%), and Baltimore (43.3%). These cities residing in looser control states had a much higher percentage of guns concentrated among gun dealers with large numbers of traces. Memphis and San Antonio, both cities in loose-control states, had a mixture of guns originating from dealers with only one or a few traces as well as dealers with a large number of traces. Therefore, Baltimore, Boston, Memphis, and San Antonio had guns originating from a mixture of active dealers with no other crime gun traces, a moderate number of multiple firearms traces, and a large number of firearms traces (Table 4.8). More than 55% of Milwaukee's crime guns originated from active dealers with more than 100 crime gun traces. Nearly 56% of Philadelphia's traced guns originated from dealers with between 26 and 100-crime gun traces. In contrast, 45% of traced crime guns recovered in New York City originated from a dealer with no multiple traced firearms.

The cities also varied considerably in the percentage of crime guns originating from dealers with high numbers of ATF 13-day demand letters and dealers with high numbers of NICS gun purchase denials. A small fraction of guns recovered in Baltimore, Boston, Memphis, New York City, and San Antonio originated from active dealers with 5 or more 13-day demand letters (Table 4.9). By comparison, 49% of the traced crime guns recovered in Milwaukee and 34.3% of the traced crime guns recovered in Philadelphia originated from active dealers with 5 or more 13-day demand letters.

A very high percentage of traced guns in Philadelphia (88.5%), Memphis (74.1%), New York City (52.2%), and Boston (40.1%) came from active dealers with no NICS denials (Table 4.10). Milwaukee (51.7%), San Antonio (48.6%), and Baltimore (37.1%) had larger percentages of traced guns originating from dealers with more than 10 NICS denials.

In all cities, most of the traced crime guns had a shelf life of 1 year or less in the dealer's inventory (Table 4.11). Traditional retail gun stores generated the large majority of crime guns

in each of the seven cities (Table 4.12). Memphis had the largest percentage of guns originating from a pawnshop dealer (47.3%), followed by San Antonio (38.7%).

#### **4.1.2 Purchaser Dynamics**

Gun market dynamics associated with first time retail purchasers of crime gun are examined in terms of the characteristics of purchasers' home neighborhoods as well as the characteristics and activities of purchasers themselves. The characteristics were identified through discussions with ATF crime gun analysts and investigators, reviews of existing gun market literature and via statistical analyses of crime gun data. In terms of purchasers' neighborhoods it was suggested that selected communities might have high levels of straw purchasers. We operationalized this indicator by aggregating the number of traces to purchasers' residential/home zip codes. The individual purchaser level indicators were also identified through discussions with ATF analysts and investigators, reviews of existing gun market literature and selected analyses.

When the purchaser home zip code has more than 50 crime guns traced to it, nearly half of the traced crime guns have a time-to-crime of less than four years. This is more than double the percentage of fast traced crime guns traced to purchaser home zip codes with 1-5 crime gun traces (Table 4.13). Thus firearms traced back to purchaser communities (zip codes) that have higher overall community levels of traces are more likely to be shorter time to crime firearms.

A higher percentage of traced crime guns have a time-to-crime of less than 4 years when the purchaser is between the ages of 18 and 24. Nearly 43% of the crime guns traced to purchasers in the 18 - 24 age category had a fast time-to-crime (Table 4.14). As the age of the purchaser increased, the fraction of fast time-to-crime guns decreased.

When the purchaser was associated with two or more crime gun traces, the likelihood that the recovered crime gun was recently purchased at retail increased dramatically (Table 4.15). Only slightly less than 29% of the traced crime guns originating from first purchasers associated with only 1 trace were fast guns. In contrast, nearly 55% of the traced crime guns originating from purchasers associated with 2 or more traced guns were fast guns.

#### **4.1.3 Purchaser/Possessor Dynamics**

Time-to-crime was also associated with the distance between the residence of the first retail purchaser and the residence of the crime gun possessor as well as the age proximity between the purchaser and possessor. When the residence of the purchaser was within five miles of the possessor, almost 44% of the traced guns had a time-to-crime of less than 4 years (Table 4.16). When the purchaser and possessor were with 4 years of age of each other, almost 44% of the traced guns had a quick time-to-crime (Table 4.17).

Earlier research has suggested that youth and criminals acquire guns from friends and family members (see e.g. Wright and Rossi 1986; ATF 2000b). For those traced guns where the possessor and the purchaser were different people, we examined whether the presence of a possible familial relationship influenced time-to-crime. In this analysis, we simply used whether

the purchaser and possessor had the same last name as a measure of family relationship. Table 4.18 shows that nearly 45% of the crime guns originating from different purchasers and possessors with the same last name had a time-to-crime of less than 4 years. In contrast, slightly less than 30% of traced crime guns recovered from purchasers and possessors with different last names had a time-to-crime of less than 4 years. Examining the associates of crime gun possessors can potentially extend the relationship between crime gun possessors and first time retail purchaser. Some police departments submit associate information on crime gun possessors to the National Tracing Center. With these data, we were able to reveal that, when the associate is the first retail purchaser of the traced crime gun, nearly 74% of the recovered crime guns have a fast time-to-crime (Table 4.19). Moreover, if an associate lives within 5 miles of the original purchaser the time-to-crime for these traces are also quite fast (Table 4.20). While these data cannot unravel whether the associate and the purchaser know each other, for fast time-to-crime guns, this information can certainly be regarded as an investigative lead. ATF agents and street police officers can use this information as a starting point to unravel whether illegal gun trafficking is indeed occurring in this instance.

#### **4.1.4 Possessor Dynamics**

Unlike the level of traces associated with a purchaser's home zip code the total number of traces to the possessor's home zip code did not meaningfully influence time-to-crime of recovered crime guns (Table 4.21). Thus, in contrast to purchasers, high levels of firearms traces in the home communities (zip codes) of possessors are not more likely to be associated with shorter time-to-crime firearms. Examining the individual level characteristics of possessors, Table 4.22 shows that possessors ages 18 – 24 and ages 25-29 were associated with the higher percentages of fast time-to-crime guns (41% and 40% respectively). Juvenile possessors were associated with a much lower percentage of quick time-to-crime guns when compared to their young adult counterparts (27.1%).

#### **4.1.5 Dynamics Associated With Particular Characteristics Crime Guns**

Pistols are most likely to be recovered within 4 years of their first retail sale (39.5%), followed by shotguns (25.5%), rifles (24.9%), and revolvers (14.3%), (Table 4.23). Time-to-crime varies only slightly with the type of criminal offense associated with the recovery of the traced firearms (Table 4.24). Between 27% and 33% of each of guns recovered in each crime category had a time-to-crime of less than 4 years. The National Crime Information Center (NCIC) maintains information on stolen guns. Unfortunately, these data are limited because an unknown large percentage of stolen guns are never reported to the authorities. These data are matched against recovered crime guns to determine whether the guns were stolen. In this analysis, only 2.3% (1,939 of 82,737) of the traced guns were reported as stolen according to NCIC records. Since guns held in private hands are older than guns in retail dealer inventories, it is not surprising that guns matched to NCIC as stolen guns were less likely to have a fast time-to-crime when compared to guns that were not matched to NCIC records (Table 4.25).

## **4.2 Limitations of Analysis**

The current analysis of gun market dynamics focused on the potential effect of selected indicators of gun market dynamics on the time to crime of firearms recovered by law enforcement agencies in 1999. The focus of the analysis on the temporal dimension of illegal gun markets, means that the analysis could not assess the potential value of gun market indicators that are interactive with time-to-crime. For example, the current time-to-crime analysis could not be utilized to assess value of guns with short time-to-crimes (e.g., under 4 years) sold by out of state dealers as a potential indicator of firearms trafficking, because the particular indicator is already partially defined in terms of time-to-crime. Similarly, the number of short time-to-crime traces coming from a given dealer to a recovery location is also partially defined in terms of time-to-crime. Finally, traces that are part of a multiple gun sale purchases (versus purchasers that have had more than one crime gun traced to them) also interact with time-to-crime in that information on multiple sale firearms has only been collected since 1995. Each of these attributes of firearms traces are considered by ATF investigators to be potentially useful indicators of firearms trafficking but were not included in the above analysis because of their interaction with time-to-crime.

Other potential indicators of firearms trafficking not evaluated in the above time-to-crime analysis include: obliterated serial numbers weapons, patterns of change in FFL ownership (e.g., change in ownership for high trace FFLs where the business remains in the family), and patterns of FFL business transactions (e.g., high rates of firearms theft or firearms paperwork discrepancies). These potential indicators of firearms trafficking were not incorporated into the present analysis either due to data limitations (i.e., obliterated serial numbers) or due to limits of the scope of the present study. These attributes of firearms traces remain however potentially highly useful indicators of firearms trafficking and can be readily incorporated into the investigative approach outlined in the current study.

### **4.3 Summary of Findings**

Analyses of ATF firearms trace data suggest that illegal gun markets have the following dynamics:

- **Active dealers with a high number of traces to a particular city are more likely to be associated with fast time-to-crime guns.**
- **Active dealers who make many multiple sales of handguns are more likely to be associated with fast time-to-crime guns.**
- **Active dealers with a large number of National Instant Criminal Background Check System (NICS) gun purchase denials are more likely to be associated with fast time-to-crime guns.**
- **Firearms with a shelf life greater than 2 years are more likely to be fast time-to-crime guns.**
- **The concentration of crime gun traces associated with high trace dealers varies across cities.**
- **The importance NICS gun purchase denials in relation to time-to-crime vary across**

**cities.**

- **The crime guns purchased by individuals with a large number of crime gun traces to the purchaser's home zip code are more likely to be fast time-to-crime guns.**
- **Purchasers aged 18 - 24 are more likely to be associated with fast time-to-crime guns.**
- **Purchasers with two or more crime gun traces are more likely to be associated with fast time-to-crime guns.**
- **Purchasers and possessors who reside within a short distance of each other are more likely to be associated with fast time-to-crime guns.**
- **Purchasers and possessors who are close in age proximity are more likely to be associated with fast time-to-crime guns.**
- **Purchasers and possessors who are family members or known associates are more likely to be associated with fast time-to-crime guns.**
- **Possessors who have associates that live in close proximity to first purchasers are more likely to be associated with fast time-to-crime guns.**
- **Possessors' ages 18 - 29 are more likely to be associated with fast time-to-crime guns**
- **Semi-automatic pistols have the fastest time-to-crime of all gun types.**

## **Chapter 5. The Strategic Use of Firearms Trace Data to Focus Supply-side Enforcement**

The findings from our analyses of the characteristics and dynamics of illegal markets in firearms can be used to identify point, networked and diffuse sources of illegally transferred firearms and develop focused supply-side interventions. The key research findings are essentially indicators of illegal trafficking in firearms that can be used to analyze the workings of illegal markets in firearms. Consistent with the problem-oriented approach, law enforcement agencies can use these indicators to identify potential sources of illegal guns that are being rapidly diverted from legal firearms commerce into the hands of violent offenders, juveniles, and other prohibited persons. By strategically analyzing the 82,737 firearm traces with a time-to-crime in 1999 in terms of the gun market dimensions identified in this research, analysts can develop a manageable number of solid leads on illegal gun traffickers. Law enforcement agencies can then focus investigative and regulatory resources on developing the appropriate problem-solving responses to shut down these illegal supply lines to criminals and juveniles.

In this chapter, to assess the robustness of 11 selected indicators of illegal gun trafficking identified in Chapter 4, we conduct a multivariate analysis of the effect of these indicators on time-to-crime using 1999 national level data. Based on the multivariate analysis, the indicators are reassessed and those that continue to show independent predictive effects on time-to-crime are retained indicators of potential firearms trafficking. Indicator variables that do not retain an independent predictive effect when controlling for other variables in the model are not retained as indicators of trafficking. At this stage in the analysis several additional variables that could not be included in the analysis of time-to-crime are reassessed as potential indicators of trafficking.

The revised trafficking indicators are incorporated into three indices of illegal trafficking: 1) dealer related trafficking 2) purchaser related, and 3) purchaser/possessor related indicators. The distribution of these trafficking indices are examined using the 1999 national trace data. This analysis provide estimates of the potential proportion of traces that might yield investigative leads using the identified indicators. The revised indicators are also examined across the seven cities in this study. The cross-city analysis compares how well trace data indicators relate to the insights derived from the analysis of gun trafficking found in investigative reports in the selected cities.

### **5.1 Initial Indicators of Illegal Gun Trafficking**

The Chapter 4 bivariate analyses of 1999 ATF firearms traces examined the dynamics associated with illegal markets in firearms, and produced 11 indicators of the illegal diversion of firearms. Only indicators that were found to have an association with time-to-crime were selected. Four of these indicators were identified at the dealer level; two at the purchaser level; and five which focused on the relationship between purchasers and possessors. See Table 5.1.

**Table 5.1 Initial Indicators of Trafficking**

**Dealer-level Indicators**

1. 11 or more traces to a particular city in a year
2. 51 or more multiple gun sales in a year
3. 2 or more 13-day request letters
4. Any gun sold with a shelf life greater than 2 years

**Purchaser-level Indicators**

5. More than 1 trace to a specific purchaser
6. More than 25 traces originated from the purchaser's home zip code

**Purchaser/Possessor-level Indicators**

7. Possessor lives within 5 miles of purchaser
8. Possessor's age is within 4 years of the purchaser's age
9. Possessor and purchaser have the same last name (but are different people)
10. Possessor has a known associate that is the purchaser
11. Possessor has a known associate that is not the purchaser, but lives within 5 miles of the purchaser

For each of the indicators, predictive cut-off points were selected based on the relationship of a given indicator to time-to-crime. It is entirely possible to select other cut-off points for these indicators. The following analysis is simply an exercise exploring the utility of the indicators. Our intent was to develop a framework for identifying leads on potential gun traffickers that was robust but also flexible. Analysts and investigators using these indicators should be encouraged to customize the cut-off points to the nature of crime gun problems in their jurisdictions. For example, Boston, a jurisdiction that recovers several hundred guns per year, would want to use different criteria than New York City, a jurisdiction that recovers many thousands of guns per year.

**5.2 National Level Multivariate Analysis of Selected Gun Trafficking Indicators**

A multivariate analysis of the independent effect of each of the illegal gun trafficking indicators on time-to-crime was conducted to examine whether the trafficking indicators we identified remained significant predictors controlling for the effects of the other factors. As with the bivariate analysis the indicator variables are entered in the analysis according to their temporal position in the process of illegally diverting guns from legitimate firearms commerce to the ultimate possessors of the crime gun. These stages, which follow the bivariate analysis of illegal gun market dynamics include: 1) dealer dynamics; 2) purchaser dynamics; 3) purchaser possessor dynamics; 4) possessor dynamics, and 5) crime gun characteristics.

The independent effects of individual trafficking indicators (along with the effects of control variables) of time-to-crime are assessed in terms of the temporal stage in which they enter the illegal firearms diversion process. This also enables us to examine to what extent the effects of

individual indicators are mediated by the addition of indicator variables that operate at later stages in the process of the illegal diversion of firearms. Thus variables represented at the purchaser dynamics stage, for example, are assessed as an independent set of variables prior to the entry of variables at later stages. The trafficking indicator and control variables included in the multivariate analysis are listed in Table 5.2.

**Table 5.2 Multivariate Cox Regression Model Variables**  
 (\* Indicates initial gun trafficking indicator identified in bivariate analysis)

<b>Model Block/Market Stages</b>	<b>Variable Name</b>	<b>Variable Description</b>
<b>Block 1 - Dealer</b>	1. LNDLCACT *	Natural log of the number of traces from a dealer to a recovery city
	2. LN99MACT *	Natural log of the number of multiple gun sales sold by a dealer
	3. LND13ACT *	Natural log of 13 day request letters to a dealer
	4. LNNICDEN	Natural log of NICS denials by a dealer
	5. PAWNACT	Dealer is a pawn shop
	6. SHLFACT *	Shelf life of crime gun with two or more years
	7. PURLAW	Dummy variable for states with permit-to-purchase & registration systems
<b>Block 2 - Purchaser</b>	8. PUR1824	Purchaser age 18-24
	9. PUR2529	Purchaser age 25-29
	10. PUR3039	Purchaser age 31-39
	11. RPUKY_CN *	Number of traces to a purchaser
	12. LNTRZIP *	Natural log of number of traces from a purchaser home zip code
<b>Block 3 - Pur/Poss.</b>	13. LNAPPDP *	Natural log of the difference between purchaser/possessor age
	14. LNPUPODP *	Natural log of the distance between purchaser/possessor's home residences
	15. SAMEFMDP*	Possessor and purchaser have same last name
	16. A7SSPURDP *	Possessor has a known associate that is the purchaser
	17. PU8RASDDP*	Associate of possessor lives within 5 miles of purchaser
<b>Block 4 - Possessor</b>	18. POS17	Possessor's age under 18
	19. POS1824	Possessor's age 18-24
	20. POS2529	Possessor's age 25-29
	21. POS3039	Possessor's age 30-39
	22. LNPOSZIP	Natural log of number of associated with a possessor's home zip code

<b>Block 5 - Crime Gun</b>	23. APISTOL	Crime gun is a pistol
	24. BRYCO	Manufacturer of crime gun – Bryco
	25. HIH	Manufacturer of crime gun – High Point
	26. LCN	Manufacturer of crime gun – Lorcin
	27. PHE	Manufacturer of crime gun - Phoenix
	28. STOLEN	Crime gun identified as stolen from NCIC records

The trafficking indicators and control variables included in the multivariate analysis are listed in Table 6. For those variables that represented counts of events (e.g., the number of traces from a specific dealer to a recovery location), we transformed the variable by taking the natural log. As Tuft (1974) suggests, taking the natural log of count data results in a smoother distribution that better represents the functional form of the data. Dummy variables were used for dichotomous independent variables (e.g. whether the dealer shelf life of a traced crime gun was greater than two years or not).

The sample for the multivariate analysis of time-to-crime was restricted to traces where the purchaser and possessor were identified as different individuals, the in-business versus out-of-business status of a firearms dealer was identified, and a time-to-crime was available for the traced firearm. The sample is restricted in this manner because the situation where purchaser and possessor of crime-related guns are different persons represents a far more common pattern of diversion of firearms than the pattern where the purchaser and possessor is the same individual. Of the 82,731 firearms traces with a time-to-crime, 50,141 were associated with firearms where the purchaser and possessor were identified as different individuals, 6,305 were associated with traces where the purchaser and possessor were identified as the same individual, and 26,291 were associated with firearms where there was insufficient information to determine purchaser/possessor relationship. Of the 50,141 traces where the purchaser and possessor were different individuals there were 348 traces where the in or out-of-business status of a dealer could not be identified, resulting in a final sample for the analysis consisting of 49,793 traces.

The level of missing data varied across the different indicator and control variables. There are many techniques available to researchers that deal with the problem of missing data in multivariate analyses (see Little and Rubin 1987 for a full discussion). We included dummy variables in the analysis to control for the missing information in given indicator and control variables. For example, along with each of the possessor's age dummy variables entered into the time-to-crime estimation model (see Table 5.2) we also included a dummy variable that identified all those traces with missing information on possessor's age. In addition, since traces associated with out-of-business dealers in the analysis will tend to have a longer time-to-crime on average than those associated with in dealers still in business in 1999, this could artificially increase the relationship between time-to-crime and dealer characteristics such as the number of traces from a dealer to a recovery city in 1999. To control for this potential bias we included a dummy variable that identified all dealers actively in business in 1999 (62% of the traces in the

sample were associated with active dealers). The coefficients for the dummy variables included in the analysis to control for the effects of missing information and the active business status of firearms dealers are not shown in the Table 5.3, but are available from the authors upon request.

Data that measure lifetimes or the length of time until the occurrence of an event are generally called survival data (Lee 1992). In this analysis, we are interested in modeling the length of time between the first retail sale of a firearm and its subsequent recovery in crime by law enforcement. Survival data have special considerations that must be incorporated into the analysis. The purpose of survival analysis is to model the underlying distribution of the event-time variable and to assess the dependence of the event-time variable on the independent variables. Survival data are often censored. As discussed, a small number of cases in this data set are right censored due to constraints on the measurement of time-to-crime. Survival analyses take the censoring into account and correctly use the censored observations as well as the uncensored observations (see Maddala 1983 for a discussion of the numerous possible censoring schemes that arise in survival analyses).

We use the Cox proportional hazards model to analyze the time-to-crime (failure time) for guns in our data set (Lee 1992). The proportional hazards model does not impose a distributional assumption on the underlying probability process of the time between the first retail sale of a gun and its subsequent recovery by law enforcement. In this way, the Cox model is more robust than other duration-time methods, specifically those based on probability distributions such as the exponential or Weibull models (Lee 1992).

The Cox model can be written as:

$$h(t|\mathbf{x}) = h_0(t)g(\mathbf{x})$$

In this specification,  $h_0(t)$  is the baseline hazard at time  $t$  independent of covariates and  $g(\mathbf{x})$  is a function of the covariate matrix  $X$  that includes our independent variables. The proportional hazards model is thus a multiplicative form of the baseline hazard where solving the above equation for  $g(\mathbf{x})$  gives the ratio of the hazard in time  $t$  given  $\mathbf{x}$  to the baseline hazard,  $h(t|\mathbf{x})/h_0(t)$ . Estimation of the model is done in the log form and produces a vector of  $\beta$ 's, one for each independent variable, which represent the log effect of the covariate on the hazard ratio. The standard errors of the  $\beta$ 's are used to test for statistical significance; for discussion of the effects of the covariates, we focus on the relative risk measures.

We estimate the effect of each independent variable on the relative risk that a gun with this characteristic is traced in time  $t$ . The relative risk is simply the ratio of the probability of failure, hazard, in time  $t$  adjusted for a covariate, to the baseline hazard at time  $t$ ,  $h(t|\mathbf{x})/h_0(t)$ . Thus, there is a relative risk associated with each independent variable. In a model where all independent variables are dichotomous, the relative risk associated with independent variable is simply  $\exp^{\beta_i}$  and represents the likelihood of a trace for a gun with the specified characteristic relative to the baseline hazard of a trace. As our model also includes continuous independent variables, the relative risk measures reported here indicate the likelihood of a trace for a gun with the specified

characteristic relative to a gun at the mean value of all continuously measured characteristics and without characteristics measured by dichotomous indicators.

The interpretation of the relative risk measure is similar to that of the odds ratio. A relative risk, or hazards ratio, equal to 1 indicates that the adjusted hazard is the same as the baseline, i.e., equal risk of a trace for a gun with the characteristic as for one without it. As the relative risk associated with a specific independent variable falls below one, the likelihood that a gun with that characteristic is traced in time  $t$  is less than the baseline, of course, the opposite is true if the relative risk is greater than one. For the duration time, or time-to-crime model, then, a relative risk of .5 for a particular variable indicates a 50% drop in the time-to-crime for a gun with this characteristic with respect to the baseline for a gun without this characteristic. Correspondingly, a relative risk of 1.5 indicates a 50% increase in the time-to-crime for a gun with this characteristic.

Table 5.3 presents the coefficients for the Cox regression model. Of the 49,793 firearm traces in the analysis, 4,246 firearms with time-to-crime greater than 20 years were censored. These cases were censored at 20 years because federally licensed dealers are not required to maintain records on the sale and purchase of firearms beyond that time. Although many dealers continue to maintain records beyond the 20-year limit, the quality and consistency of time-to-crime measurements decreases to an unknown degree.

Omnibus tests of the model coefficients showed at each successive stage in the Cox regression model produced a significant ( $p < .00001$ ) iterative improvement in change to the model Chi-square from the previous step.

Table 5.3 presents the logistic regression results for each of the five stages of the analysis. Dealer-related indicators are assessed when stage one variables first enter the model. When dealer-related indicator and control variables first enter the regression model three of the four indicator variables (the natural log of traces from a specific dealer to a recovery location, the natural log of number of multiple sale firearms sold by a given dealer, and the shelf life of a crime gun) are significant predictors of time-to-crime controlling on other variables in stage 1. The natural log of 13-day request letters to a dealer is not a significant predictor of time-to-crime controlling for the other dealer level indicator variables. This result may indicate that 13-day letter requests by ATF to a dealer are perhaps more indicative of sloppy dealer paperwork than of a dealer's desire to obscure or hide potentially illegal transactions. The analysis of stage 1 results indicates that three (see variables 1, 2, and 3 in Table 5.3) of four original indicators of dealer-related sources of trafficking remain significant predictors of time-to-crime. Importantly the dealer-related indicators remain significant even while controlling for the level of criminally involved customers frequenting a dealer (i.e., the log of the number of NICS check denials by a dealer), the type of dealer that originally sold the firearm (i.e., a pawnshop), and whether states have restrictive state gun laws that make it more difficult to obtain firearms for illegal purposes from the retail system. Restrictive state gun purchaser laws were statistically associated with a longer time-to-crime.

Purchaser-related indicator variables enter the model in stage 2. Both individual level and neighborhood level purchaser-related indicators are significant predictors of time-to-crime controlling for the other variables in stages one and two. Interestingly, the neighborhood level purchaser variable, natural log of the number of traces from a purchaser's home zip code, remains a significant predictor of time-to-crime along with purchasers associated with two or more traces. This suggests that neighborhood level factors (perhaps through the operation of a network of traffickers) may have an effect on the illegal diversion of firearms to prohibited persons that is, at least partially, independent of the individuals who are gun purchasers and reside in the community.

Purchaser/possessor-related indicator variables enter the model in stage 3. The natural log of the absolute difference between a purchaser and possessor's age, the natural log of the distance between a purchaser and possessor's home residence, a dummy variable indicating that the possessor has an associate that was the purchaser, and a dummy variable indicating an associate of the possessor lives within 5 miles of the home residence of the purchaser are significant predictors of time-to-crime controlling for all the variables in stages 1 through 3. Only the variable that identified whether a possessor had the same last name as a purchaser of a crime gun was not significantly related to time-to-crime.

Stages 4 and 5 in the Cox regression analysis examine potential possessor and firearm related indicators and control variables. Stage 4 examines the natural log of the number of traces associated with the home zip code of a possessor were included (based on the residential location of crime gun purchaser) and dummy variables for possessor's age. Of the variables entered into the analysis in stage 4, only the natural log of traces associated with a possessor's home zip code is not a significant predictor of time-to-crime, thus this variable is not a significant neighborhood level predictor of time-to-crime as is the case for the number of traces associated with a purchaser's home zip code. The other variables that enter the analysis in stage 4 (dummy variables for possessor's age) are significant predictors of time-to-crime with the dummy variable of the age group 18 to 24 being the strongest predictor. For the variables entered into the Cox regression in stage 5, the type of weapon traced (i.e., is the weapon a pistol) is a significant predictor of time-to-crime, while whether the weapon was reported stolen to NCIC is not a significant predictor.

Examination of all variables entered into the Cox regression in stage five shows that the dealer level variables remain statistically significant predictors of time-to-crime although their effects have been somewhat reduced by the mediating effects of the subsequent individual and relational indicators control variables. This pattern is also true for the variable measuring restrictive state gun laws entered in stage 1; firearm purchase laws remain a statistically significant predictor of time-to-crime in the final Cox regression model, although the effects have been mediated to some extent by the intervening variables. Purchaser/possessor relationship variables also remain statistically significant predictors of time-to-crime in the final Cox regression model (i.e., stage 5) and for the most part their effects remain fairly constant even after subsequent stage variables are added to the analysis. This latter finding is useful because it helps clarify interpretation of the purchaser/possessor indicator variables derived from tracing data. These variables are

intended to be measures of potentially cooperative relationships between crime gun purchasers and possessors. It is possible that these indicators may also measure the ability of individuals to steal weapons of those close to them and if these individuals also happen on average to be younger then the time-to-crime of their firearms would also be on average shorter (i.e., younger purchasers by definition have had less opportunity to buy older first time retail sale gun). The fact that the purchaser/possessor indicator variables remain largely unchanged statistically, significant predictors of time-to-crime after purchaser age, possessor age, whether the weapon was stolen, and type of weapon (younger purchasers are more likely to purchase pistols) have entered into the estimation model provides support for the argument that the purchaser/possessor variables are providing indicators of potentially cooperative relationships between crime gun purchasers and possessors.

In developing our crime-gun indicators we began with a simple table of bivariate correlations and progressed to a multivariate analysis of variables grouped by likely availability of information. The multivariate models serve two purposes. First, these models confirm the findings in the bivariate analysis. Second, they demonstrate that potential crime-guns indicators hold up even when adjusted for covariation with other significant variables. From a policy perspective the availability of information and consequent measurability of indicators is an important consideration in implementing any potential investigation scheme.

As we added additional variables to our multivariate model, beginning with the gun dealer characteristics and adding information about both the purchaser and the purchaser/possessor relationship, we observed that the effects of dealer characteristics remained statistically significant, but were reduced in magnitude. This behavior was anticipated in as much as the purchaser and possessor information is likely to track more closely with crime gun usage. The assessment of the total effect of a particular attribute's can best be interpreted at the stage the attribute enters the model (assuming the temporal sequence we propose is an accurate characterization). Thus in the case of the dealer attribute, the number of traces from a dealer to a recovery city/location, we can interpret the total effect of that variable as 1.067, which is the  $\text{Exp}(B)$  coefficient in the stage 1 model.

### **5.3. Revised Indicators of Illegal Gun Trafficking Based on the Multivariate Analysis and on Feedback from Law Enforcement Investigators**

Drawing on the multivariate analysis of time-to-crime (where the retail purchaser and crime gun possessor are different individuals), we can identify those indicators of potential gun market dynamics that remain statistically significant predictors while controlling for the other independent variables (see Table 5.3). We restrict ourselves to statistically significant predictors for the purpose of not over estimating the presence of these such indicators among traced crime guns. Thus, we dropped the indicator "possessor and purchaser have the same last name (but are different people)" identified in the bivariate analysis (see Table 4.18) from the revised list of indicators (see list below) because it does not retain a statistically significant effect when other variables are controlled. Similarly, the indicator "2 or more 13-day request letters" was also not included because the predicted effect (although significant) was in the opposite direction of what

was expected and in the opposite direction from that found in the bivariate analysis (see Table 4.3). Of the original 11 indicators identified in the bivariate analysis, 9 were retained after the multivariate analysis and included in the set of revised indicators of trafficking.

In addition to the indicators identified in the multivariate analysis, we have also included one additional indicator considered by law enforcement investigators and analysts to be a valuable sign of potential firearms trafficking, specifically crime guns that were originally part of a multiple gun sale purchase. As noted, with the data available for the present study, we could not include multiple sale crime guns in the time-to-crime analyses because multiple gun sale records have only been required since 1994 and as a result, this indicator would be biased towards shorter time-to-crime guns for guns recovered in 1999. Nevertheless, we have included this variable in the revised list of indicators of trafficking, as an example of a purely law enforcement investigator generated gun trafficking indicator. The only empirical analysis employed for the multiple gun sale indicator, was to assess whether or not it was highly correlated with the other indicators of trafficking. The highest bivariate correlation of the multiple gun sale indicator with any of the other gun trafficking indicator was .209 (with “more than 1 trace to a specific purchaser”), and seven of the bivariate correlations were under .1.

Clearly, other indicators can be identified and derived by drawing on law enforcement expertise (for example, investigators state that short time-to-crime guns from dealers that are distant from a crime gun’s recovery location are good candidates for guns that may have been illegally diverted from the retail system). In addition, further statistical analyses based on perhaps different aspects of illegal gun markets can produce other potential indicators of gun trafficking. For the purposes of the present study, however, the analyses we have conducted along with extensive consultation with law enforcement experts provides a basis for examining the distribution of indicators among firearms trafficking among crime gun traces nationally and also their distribution across different geographic locations. These analyses are presented in the next section. Below is the final set of indicators identified in the present study.

## **Revised Indicators of Trafficking**

### **Dealer-level Indicators**

1. 11 or more traces to a particular city in a year
2. 51 or more multiple gun sales in a year
3. Any gun sold with a shelf life greater than 2 years

### **Purchaser-level Indicators**

4. More than 1 trace to a specific purchaser
5. More than 25 traces originated from the purchaser’s home zip code
6. Firearm was part of a multiple gun sale at time of first retail purchase

### **Purchaser/Possessor-level Indicators**

7. Possessor lives within 5 miles of purchaser
8. Possessor’s age is within 4 years of the purchaser’s age

9. Possessor has a known associate that is the purchaser
10. Possessor has a known associate that is not the purchaser, but lives within 5 miles of the purchaser

#### **5.4 The Distribution of Gun Trafficking Indicators at the National Level**

Table 5.4 summarizes the number of federally licensed dealer-level gun trafficking indicators for each of the 82,737 traced crime guns in 1999. Slightly more than 18% of the traced firearms have only 1 dealer-level indicator, a little more than 9% have 2 dealer-level indicators, and .3% have 3 dealer-level indicators.

These suspicious sales patterns suggest that these firearms should receive enhanced law enforcement scrutiny. While these data do not confirm that the federally licensed dealers associated with these behavior patterns are engaging in criminal behavior, the sales patterns suggest that these guns may be originating from dealers that are violating criminal regulations designed to prevent trafficking and/or are engaging poor business practices. It is important to look at these potential point sources of firearms closely so law enforcement can have a better chance of shutting down these direct illegal supply lines of guns to violent offenders and prohibited persons.

Table 5.5 presents the number of purchaser-related gun trafficking indicators for 1999 traced crime guns. Nearly 30% of the traced guns had one purchaser-level indicator and 4.9% had two purchaser-related indicators (representing 4,029 traced firearms), and .7% were associated with 3 purchaser-related indicators.

Gun trafficking indicators based on possessor-purchaser relationships are presented in Table 5.6. Nearly 19% of the traced guns were associated with 1 purchaser-possessor indicator, 4.3% of the traced guns were associated with 2 possessor-purchaser indicators, and .5% were associated with 3 possessor-purchaser indicators.

As with the dealer indicators, these suspicious purchasing patterns may represent point sources of illegal guns that deserve enhanced law enforcement scrutiny. Investigations launched based on these data could uncover large-scale straw purchasers or straw purchasing rings that are illegally diverting guns into the wrong hands. These suspicious patterns may also represent diffuse sources of new firearms that law enforcement could address through developing appropriate problem-solving strategies. For example, a particular community could have a large number of small-scale or one-time straw purchasers who do not realize the potential harm of buying a gun for someone else. Law enforcement agencies, community groups, and the firearms industry could educate these potential straw purchasers about the harms associated with their actions and also educate federally licensed gun dealers on spotting and halting these illegal transactions.

These dealer, purchaser, and purchaser-possessor indicators were aggregated into a total indicators index to provide a general indicator of illegal gun trafficking. In a gun trafficking

assessment system, potential leads would be generated based on all indicators with a supporting report that provides the details of why a particular gun or set of guns are worthy of further law enforcement scrutiny. Table 5.7 presents the distribution of the aggregated total gun trafficking index for 1999 crime gun traces showing that 15.9% of all firearm traces had 2 or more gun trafficking indicators (representing 24,130 traced crime guns). Nearly 5% had 4 or more indicators.

Table 5.8 presents the total gun trafficking index for all 1999 crime gun traces by time-to-crime. Some 15.7% (i.e.,  $15.7\% = 7.3\% + 4.8\% + 3.6\%$ ) of all firearms traced to a purchaser in 1999 were fast time-to-crime guns with 2 or more gun trafficking indicators. These guns clearly have the greatest investigative and regulatory potential. Law enforcement agencies should focus their limited resources on closing down these rapid supply lines to the pool of guns in the wrong hands.

### **5.5 The Distribution of Gun Trafficking Indicators at the City Level**

As Braga and his colleagues (2002) posit, the importance of point sources of illegal firearms may vary across cities according to the tightness of state-level controls on legitimate firearms commerce. We tested this observation by looking at the distribution of the total gun trafficking index across the seven selected cities (Table 5.9). Boston and New York City are located in states known for having relatively tight gun controls (see Webster, Vernick and Hepburn 2001). As Table 5.9 shows, these cities have the highest percentage of firearms traces without any indicators of firearms being rapidly diverted from legitimate retail commerce (Boston, 57.9%; New York City, 55.0%). Only 12.5% of the Boston traces and 15.6% of the New York City traces have two or more gun trafficking indicators. The stringency of state-level laws makes it more difficult to exploit easy opportunities for trafficking firearms from in-state licensed dealers. Boston and New York City are also known for having a large number of crime guns imported from dealers residing in states with less strict gun control laws (Cook and Braga 2001). However, both cities have well-publicized firearms trafficking programs in place that actively focus on guns recently diverted from in-state and out-of-state retail outlets (Kennedy et al. 1996; ATF 1997). This increased focus on close-to-retail diversions of guns may have discouraged some gun traffickers from acquiring new firearms at gun stores. Given the patterns in the data, we could speculate that the effect of these efforts may have been to make criminals seek guns from other illegal gun market sources such as point sources in the largely unregulated secondary market or more diffuse sources such as theft.

In contrast with Boston and New York, the other five cities had a much higher percentage of guns with two or more gun trafficking indicators (Table 5.9). Milwaukee and Philadelphia had the highest percentages of crime guns with two or more trafficking indicators (59.4% and 58.7%, respectively), followed by Baltimore (46.9%), Memphis (41.1%), and San Antonio (31.6%). These data suggest that firearms recently trafficked from retail outlets comprise significant portions of illegal markets in firearms through which criminals and youth acquire firearms in these cities. As such, strategic analyses of firearms trace data could be used to good effect in identifying point sources of illegally trafficked guns and developing appropriate problem-solving

interventions to shut down these supply lines. Milwaukee (45.5%) and Philadelphia (39.5%) had significant numbers of traces with 3 or more gun trafficking indicators. A supply-side gun market disruption strategy focused on quick diversions of guns from federally licensed dealers may prove to be particularly fruitful in these cities.

## 5.6 Summary

The gun trafficking indicators developed in this research allow law enforcement to assess the investigative potential of particular gun traces so they can focus their limited resources on the parts of the illegal gun market comprised of direct supply lines of guns from retail sources to criminals and youth. These indicators essentially focus investigators on gun sales and purchasing patterns that should receive closer scrutiny. The nature of the illegal gun markets varies across states and metropolitan areas and, as such, local law enforcement agencies partnered with ATF Field Divisions will want to tailor these indicators appropriately. Once an investigation is launched, law enforcement will determine whether these suspicious patterns represent new guns being illegally diverted through point sources (such as a scofflaw dealer or semi-organized straw purchasing ring), new guns being illegally diverted through diffuse sources (such as a one-time or small-scale straw purchaser), or new guns that are being legitimately sold and purchased that happen to follow a suspicious pattern appropriate enforcement actions can be taken.

These data also allow local jurisdictions to understand the nature of their illegal gun market problems in a way that facilitates the development of strategic interventions. By analyzing the nature of particular gun trafficking problems, law enforcement can develop a systematic plan to shut down supply lines rather than simply pursuing ad-hoc enforcement actions on specific individuals. For example, these analyses could reveal that a particular community suffers from a large number of unrelated small-scale straw purchases. Due to limited enforcement resources, pursuing enforcement actions against a large number of individual straw purchasers may not be feasible. However, after this problem has been identified, alternative approaches can be crafted. A priori, it is difficult to specify what such an approach would look like. It may be fruitful for law enforcement to focus prosecutions on those straw purchasers whose guns were recovered in serious circumstances, identify straw purchasers of guns recovered with no serious consequences and educate them on the risks involved in making illegal transfers, and explicitly communicate the problem and associated law enforcement actions to the entire community. Whatever form such a problem-solving response takes, strategic analyses of firearms trace data, supported by the working knowledge of front-line law enforcement agents, can go far in developing an appropriate and effective plan.

This research suggests that focused supply-side enforcement can be used to good effect on point and diffuse sources of new guns originating from retail outlets. Almost a third of traceable crime guns are fast time-to-crime guns and a nearly a third of all traced crime guns have two or more indicators of gun trafficking. This does not suggest that, at best, supply-side interventions could only influence about one third of the guns that enter into criminal hands. These data analyses simply observe that a significant share of guns that are recovered from criminals could be

affected by supply-side interventions that focus on guns recently diverted from retail sources.

## **Chapter 6. The National Crime Gun Information Infrastructure as A Platform for Continual Law Enforcement Improvement**

Law enforcement has always been a data intensive activity. Investigating federal or local crime, implementing problem-oriented policing, and/or managing basic patrol operations are all heavily dependant on information and intelligence for their successful operation. Until recently, however, implementing integrated information/intelligence systems to enhance the management of available data has typically been beyond the technical and fiscal reach of most law enforcement organizations. Today, the technical and fiscal, barriers to implementing integrated information/intelligence systems are falling dramatically. Both hardware and application software costs continue to decline, provide greater performance and become easier to manage. Equally important, *defacto* standards have emerged over the last decade that have significantly reduced the fiscal and technical management costs of data communications (e.g. TCP/IP, HTML), operating systems (e.g. UNIX, Windows) and applications software (U.S. Department of Commerce 2000). All these factors are converging to offer new opportunities for the technical development and integration crime analysis and intelligence systems in law enforcement.

Progress is not automatic. The structure and geographic organization of the criminal justice system has an independent and profound effect on the development of information/intelligence systems in law enforcement. Today's United States criminal justice system is divided along local, county, metropolitan, state, and federal jurisdictional lines. At each level of government, criminal justice agencies are further divided typically along functional lines, e.g. police, courts, prosecution and defense, corrections, probation and parole. As a result, significant organizational disjunctures exist within the criminal justice system by level of government, agency function, geography, and legal structure. These organizational disjunctures or fault lines represent significant barriers to developing integrated information/intelligence systems (Pierce and Griffith, 2002).

The Firearms Tracing System (FTS) of ATF represents a major exception to the more general pattern in law enforcement of poorly integrated crime intelligence/information systems. Currently, ATF's National Tracing Center Division (NTC) receives approximately 200,000 requests per year from law enforcement agencies to trace crime-related firearms. In any given year, these requests come from thousands of different law enforcement agencies. Once a request to trace a firearm is received, NTC then initiates the trace process as outlined in Chapter 2. This process typically requires contacting the manufacturer of the firearms being traces and then the subsequent wholesale and retail dealers who have transferred the firearm prior to its first retail sale. Thus the standard firearm tracing process involves transactions with both private and public sector actors and over the course of a year means that ATF has contact with tens of thousands of different organizations to acquire necessary information for firearms traces. Through advances outlined in Chapter 2, ATF has greatly streamlined the tracing process.

Along with the acquisition of firearms trace information ATF has also made progress on the computerization and integration of these data. As a result, ATF has designed and implemented a national system to acquire, integrate and manage data on crime-related firearms recovered by

law enforcement agencies. This type of system, which collects and integrates information from many different agencies and enterprises, across different levels of government and sectors of the economy, and on a relatively timely basis represents a unique approach to managing crime intelligence information. Some improvements are possible in the short and medium term. First, ATF currently provides trace request data to requesting law enforcement agencies. In order for law enforcement to take more complete advantage of firearm trace information, ATF needs to develop a method to routinely provide feedback from firearms trace analyses to inform local and regional law enforcement authorities on the dynamics of illegal gun markets in their local communities. By providing information back to local law enforcement on potential gun trafficking in their regions ATF will have implemented a violent crime intelligence feedback system.

Second, indicators of the type we have suggested here need to be used and re-examined on an ongoing basis by federal state, and local law enforcement. We focused on one aspect of the illegal markets in guns that holds the most immediate promise for focused enforcement based on strategic analyses of firearms trace data—close-to-retail diversions of guns. We understand that the important pathways of gun trafficking for particular types of offenders at any given moment may not be important in a year's time. For example, if law enforcement shuts down the supply of new, trafficked guns to youth and their demand for firearms remains constant, we recognize that another source of guns, perhaps stolen firearms, may absorb much of the demand and existing interventions focused on close-to-retail diversions may not have a net reduction in the availability of guns to youth. This is precisely the reason that developing new crime intelligence methodologies to analyze local gun markets is key to improving the capacity of local jurisdictions to respond to illegal gun trafficking. If proven methodologies exist to identify pathways of gun trafficking, law enforcement agencies can reassess the situation, diagnose the alternate supply channel, and implement a response to reduce the flow of guns to the street. This fits well with the problem-oriented policing philosophy and advances a key component of the process—the analysis of problems. Police officers need better-developed technologies to analyze complex crime problems and this research provides a vehicle for law enforcement agencies to think strategically about a very difficult problem—the illegal gun trade.

Third, as other research has indicated (see Chapter 1) and our analyses of ATF investigation data confirm, there are multiple sources of illegal guns that need to be addressed. We believe that this research shows the potential of collecting and analyzing information to prevent guns from getting into the wrong hands. Policy makers should consider developing more complete and accurate information on crime guns to help reduce the great social burden of gun violence. Data on firearm re-sales could be used to good effect in identifying illegal diversions of guns re-sold by federally licensed dealers and from the largely unregulated secondary firearms market. Currently, only three states (California, Maryland, and Massachusetts) have computerized records of all in-state firearm sales and purchases. Improved reporting of firearms theft could be useful in identifying gun thieves and fences that deal in stolen guns. Improved identification requirements on the purchase form, such as thumb fingerprints, could help prevent identity fraud in purchasing firearms. Improved data on criminal associates of illegal gun possessors could be used to good effect in unraveling street-level social networks through which guns are illegally

sold, traded, and bartered. With improved information resources, there is great potential to craft supply-side interventions that could significantly disrupt the illegal access to guns in troubled communities.

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## Endnotes

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<sup>1</sup> The definition of a dealer for this research project is any persons, including a partnership, corporation, or business entity, holding a valid license issued by ATF that allows them or their employees to engage in the business of dealing/selling firearms at the retail level. This corresponds to ATF's definition of a federally firearms licensee (FFL) with the exception that we only include FFLs that sell firearms on a retail level whereas the ATF definition also includes FFLs that sell firearms on a wholesale level, manufacture firearms, import firearms and/or repair firearms (see ATF, 2002).

<sup>2</sup> See 18 U.S.C. Sec. 922 for these and other restrictions on transfers by FFLs and other persons.

<sup>3</sup> Some states, for example, require that would-be handgun purchasers obtain a license from state authorities prior to purchasing their handguns.

<sup>4</sup> In most jurisdictions, sales records are maintained solely by FFLs, and FFLs provide this information to authorities only if asked during the course of a criminal investigation. FFLs are required to submit business records to ATF when they go out of business, but ATF uses these records only when necessary for investigative purposes. Prior to the Brady Act, therefore, convicted felons could buy guns in jurisdictions without background checks by providing false information on their sales applications. Such persons would face little risk of detection unless law enforcement authorities later confiscated their guns.

<sup>5</sup> See Chapter 2 discussion of tracing data and their limitations.

<sup>6</sup> Throughout this chapter, the figures we present from the Boston study of end-to-end traces are based on those cases for which a clear distribution path could be determined.

<sup>7</sup> It is possible that some of these chains might have involved straw purchases, in which case one could argue that the guns were diverted straight from the primary market into illicit channels.

<sup>8</sup> Fifty-three percent of Wright and Rossi's gun-owning respondents reported obtaining their most recent handgun from a friend, family member, or "other" source. However, some of these guns were stolen. After making adjustments for thefts, only 34% of the respondents obtained their guns from such sources in non-theft transactions. The BJS study (Beck, et al. 1993) did not crosstabulate sources by acquisition methods, but only 36% of gun-owning respondents indicated obtaining their most recent gun from family, friends, or "other" sources.

<sup>9</sup> Straw purchases may occur in the primary or secondary gun market, but here we focus on them as primary market transactions because in most places only primary market transactions involve paperwork and background checks.

<sup>10</sup> These results from the Sheley and Wright (1993) survey suggest that studies that do not distinguish carefully between gun sources and methods of acquisition may mask a substantial

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number of straw purchases. To illustrate, note again that 32% of the inmate respondents had asked someone to purchase a gun for them from a retail outlet. The majority of these respondents (63%) had asked a family member or friend to make the purchase. Thus, 20% (32% \* 63%) of the inmates had asked a family member or friend to buy a gun from a store on their behalf. It is not clear if these responses were applicable to or can be generalized to the respondents' most recent gun acquisitions, but, if so, they imply that straw purchases could have accounted for nearly half of the guns which the respondents obtained from family, friends, or a gun store. (Forty three percent of the gun-owning inmates had obtained their most recent gun through family, friends, or a gun store.)

<sup>11</sup> This calculation is based on gun manufactures plus imports minus exports.

<sup>12</sup> Since September 1994, the federal government has required FFLs to report thefts and inventory losses to ATF.

<sup>13</sup> Although there are grounds for suspecting that this number underestimates thefts, it could also overstate thefts somewhat considering that crime has continued to drop since the mid-1990s.

<sup>14</sup> Twenty-three percent of the offenders who had possessed long guns indicated having stolen their most recent long gun. The 32% figure reported in the text is based upon the gun-owning respondents' most recent handgun acquisitions. Note also, that a total of 47% of Wright and Rossi's (1986) respondents reported ever having stolen guns (p. 198).

<sup>15</sup> Ash et al. reported that 9.4% of their convenience sample of incarcerated offenders in the Atlanta area had stolen their first gun (1996, p. 1756). However, they also noted that an additional 5% had obtained their guns by chance during a burglary or robbery. This suggests that 14.4% of the offenders overall had stolen their first gun.

<sup>16</sup> A similar figure can be tentatively derived from a study of incarcerated juveniles in New Mexico (New Mexico Criminal Justice Statistical Analysis Center 1998). In that study, 4.6% of the offenders had obtained their first gun from a gun or pawnshop (1998, p. 15). Sixty two percent of these offenders had stolen their guns from the retail outlet. This implies that about 2.9% of the offenders had stolen their guns from a retail outlet.

<sup>17</sup> Twenty nine percent of the respondents in this study reported stealing their first gun (New Mexico Criminal Justice Statistical Analysis Center 1998, p. 15). However, it also appears that offenders stole at least 4% of their guns overall from illegitimate possessors. To illustrate, respondents obtained 17.4% of their guns from drug dealers, and they reported stealing 22.4% of these guns (17.4% \* 22.4% = 3.9%) (1998, pp. 15-16).

<sup>18</sup> An additional 24% believed that his or her guns were "probably stolen" by someone else.

<sup>19</sup> One can argue that thefts may represent as few as 10% of the annual flow of crime guns based on the BJS finding that 10% of gun-owning state prisoners had obtained their most recent gun

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through theft (Harlow, 2001). If gun acquisitions from different sources tend to involve the same number of guns, then such an inference would be justified. Accordingly, this would suggest that criminals acquire nearly 7.2 million guns a year from all sources. We suspect, however, that the 10% figure understates the prevalence of stolen guns because the average gun theft involves multiple guns. The average number of guns procured in other types of transactions is not known.

<sup>20</sup> One can also cite sentence enhancements for firearms crimes as a gun control measure. However, our discussion here focuses upon laws intended to affect the supply and flow of guns.

<sup>21</sup> Guns fired in crimes may sell at substantial discounts on the street because ballistic “fingerprints” may incriminate the subsequent owner. In addition, drug addicts who find and steal guns during burglaries may sell or trade them for drugs at prices far below market.

<sup>22</sup> The State of Maryland requires background checks for handguns buyers. Citizens wishing to purchase handguns or other regulated firearms (i.e., assault weapons) must submit an application to Maryland State Police. The applications contain information about the purchaser, the seller, and the firearm. A computerized database was created to record these applications in 1985. Prior to October 1996, applications were required only for acquisitions from FFLs. Since October 1996, however, Maryland law has required that secondary purchasers also file applications with MSP.

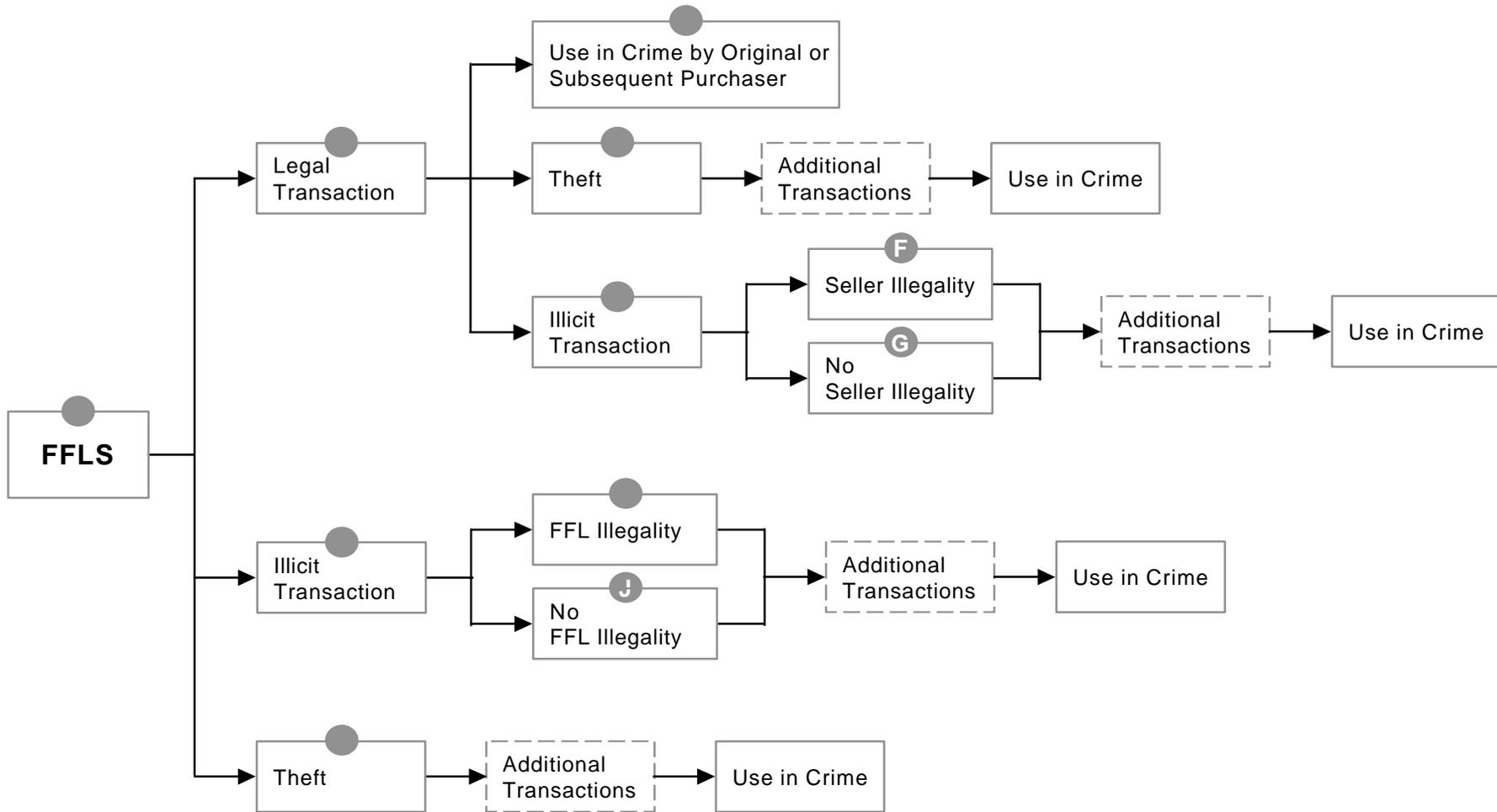
<sup>23</sup> It was not possible to use NICS denials as a percentage of NICS transactions per dealer because we did not have transactions information available to the project.

**Figures 1-1 through 3-1**

**and**

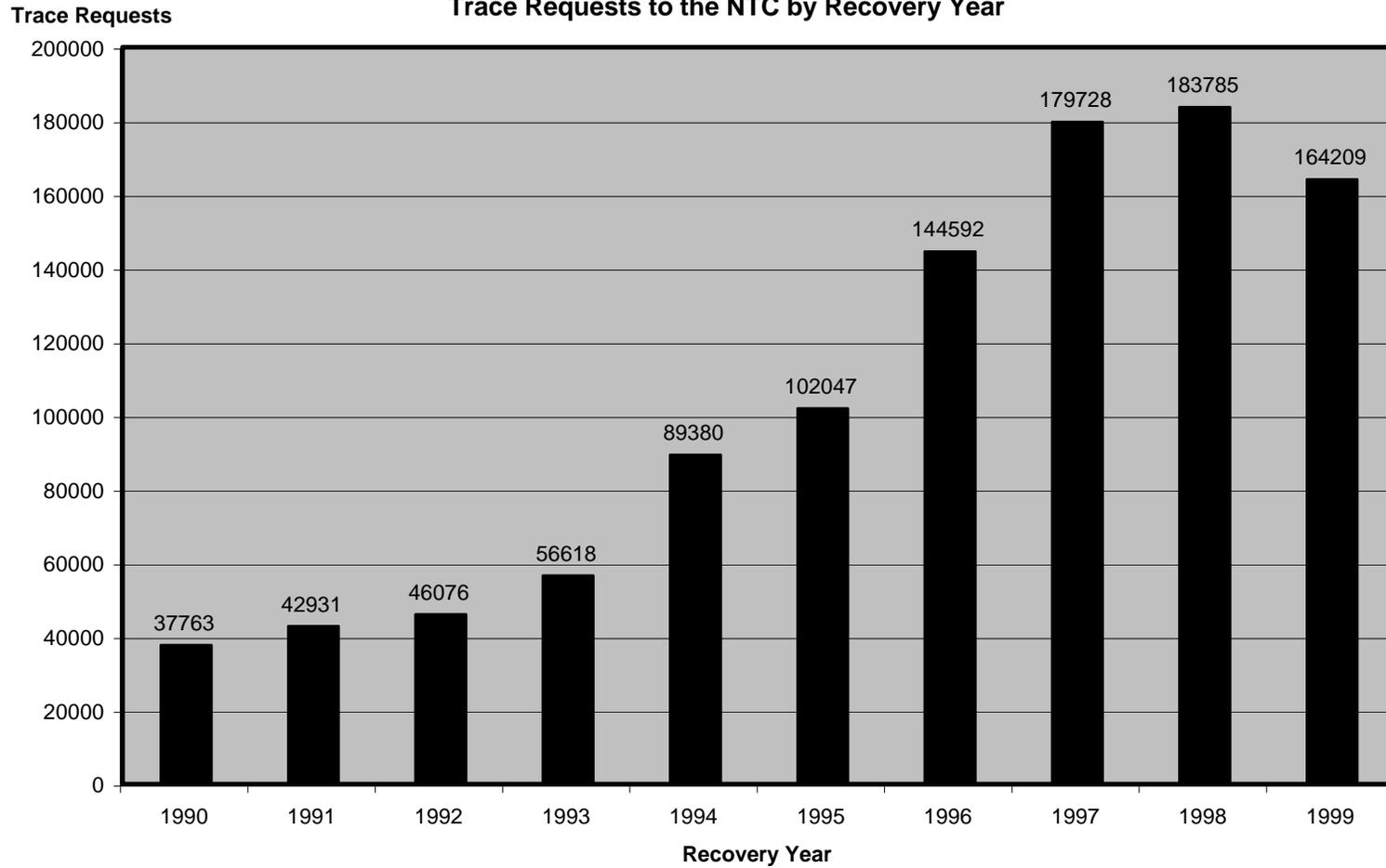
**Tables 2.2 through 5.9**

**Figure 1-1. Gun Leakage Channels**



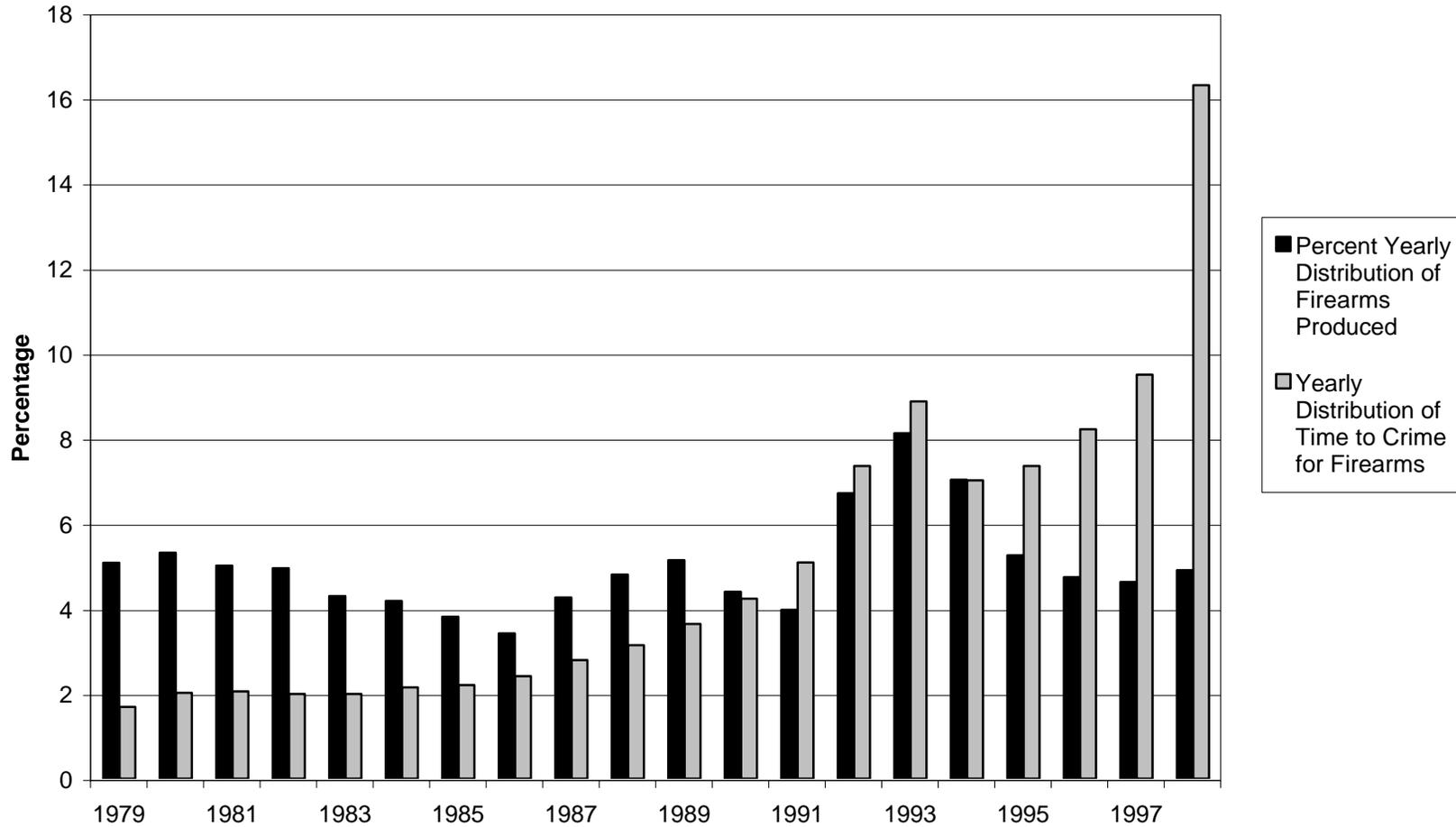
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**Figure 2.1.**  
**Trace Requests to the NTC by Recovery Year**



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**Figure 3.1.**  
**Percent Yearly Distribution of Firearms Produced for the US Market Between 1979 and 1998 and**  
**Yearly Distribution of Time-to-Crime for Firearms Recovered in 1999**



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**Table 2.2**  
**Completion Code Status of Firearms Trace Requests Based on Non-**  
**duplicates for Recovery**

<u>Completion Code Status</u>		<u>Frequency</u>	<u>Percent</u>
Valid	1 Purchaser Identified	85511	52.1
	2 Purchaser Not Identified/Gun too old to trace	15750	9.6
	3 Purchaser Not Identified/Not Firearm	915	0.6
	4 Purchaser Not Identified/Info only request	3420	2.1
	5 Manufacturer - insufficient information to trace	5145	3.1
	6 Importer - insufficient information to trace	10586	6.4
	7 Serial Number - insufficient information to trace	17776	10.8
	8 Insufficient Information Unspecified	168	0.1
	9 Stolen - previously reported	865	0.5
	10 No Response	769	0.5
	11 FFL no longer required to maintain records	2392	1.5
	12 FFL can not be found	2373	1.4
	13 FFL Records for specific gun unavailable	12245	7.5
	14 Stolen - reported upon trace request	678	0.4
	15 Terminated at request of law enforcement	2357	1.4
	16 Disposition Pending	475	0.3
	17 Special Condition	2778	1.7
99 Unknown	6	0	
Total Trace Requests		(164209)	100.0

**Table 2.3**  
**Summary Completion Code Status of Firearms Traces for 1996 through 1999**

Summary Completion Code Status	Recovery Year			
	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>
Firearms too old to trace	26.3%	30.1%	21.7%	9.6%
Trace not initiated (special conditions)	7.5%	5.1%	5.2%	6.1%
Trace not initiated (insufficient info)	22.0%	22.3%	21.8%	20.5%
Firearm reported stolen	1.0%	0.9%	1.1%	0.9%
Problem with dealer or dealer records	5.8%	4.8%	5.8%	10.8%
Purchaser Identified	37.3%	36.8%	44.5%	52.1%
Total Percent	100.0%	100.0%	100.0%	100.0%
Total Firearms Trace Requests	(144592)	(179728)	(183785)	(164209)

**Table 2.4**  
**Reporting Status of Additional Firearms Trace Data Elements for 1996 to 1999**

Data Attributes	Recovery Year			
	<u>Percent reported by Law Enforcement Agencies</u>			
	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>
Possessor Name Present	65.0%	58.2%	61.5%	64.8%
Possessor Age Present	38.5%	41.4%	50.9%	55.5%
Recovery City Present	71.1%	79.5%	76.7%	80.5%
Recovery Date Present	65.4%	64.1%	87.5%	96.1%
Total Percent	100.0%	100.0%	100.0%	100.0%
Total Firearms Trace Requests	(144592)	(179228)	(183785)	(164209)

**Tables 3.1a-d**  
**Characteristics of Firearms Associated with**  
**Crime Gun Traces for 1999**

**a. Distribution Type of Weapon for Crime Gun Trace Requests**  
**1999**

Type of Weapon	Frequency	Percent
Semi Automatic Pistol	75320	45.9%
Derringer	2204	1.3%
Revolver	43216	26.3%
Rifle	24249	14.8%
Shotgun	18699	11.4%
Other Type	449	0.3%
Total	164137	100.0%

**b. Distribution of Caliber for Handguns for Crime Gun Trace**  
**Requests for 1999**

Handgun Caliber	Frequency	Percent
Low	34132	28.3%
Medium	62512	51.8%
High	22716	18.8%
Not Identified	1380	1.1%
Total	120740	100.0%

**c. Distrubution of Caliber for Rifles for Crime Gun Trace**  
**Requests for 1999**

Rifle Caliber	Frequency	Percent
Low	8778	37.4%
Hunting	5240	22.4%
Military	7256	31.0%
Not Identified	2166	9.2%
Total	23440	100.0%

**d. Distrubution of The Cost of Firearms in Crime Gun Trace  
Requests for 1999**

<b>Firearm Cost</b>	<b>Frequency</b>	<b>Percent</b>
\$0-\$199	62321	42.9%
\$200-\$499	54467	37.5%
\$500 plus	28497	19.6%
Total	(145288)	100.0%

## Tables 3.2 a-c

### Characteristics of Crime Gun Purchasers and Possessors

#### a. Crime Gun Purchaser/Possessor Relationship

	<u>Frequency</u>	<u>Percent</u>
Purchaser/Possessor Different Person	50720	88.8%
Purchaser/Possessor Same Person	6403	11.2%
Total	57123	100.0%

#### b. Age Distribution of Crime Gun Possessor

<u>Age</u>	<u>Frequency</u>	<u>Percent</u>
11-17 years	5622	6.2%
18-24 years	26054	28.7%
25-29 years	13091	14.4%
30-39 years	19251	21.2%
40+ years	26813	29.5%
Total	90831	100.0%

#### c. Age Distribution of Crime Gun Purchaser

<u>Age</u>	<u>Frequency</u>	<u>Percent</u>
18-24 years	18564	23.8%
25-29 years	14833	19.1%
30-39 years	21461	27.6%
40+ years	22985	29.0%
Total	77843	100.0%

**Table 3.3.a**

**Distance Between First Retail Dealer and Recovery Location for Crime Guns**

<u>Distance From Dealer to Recovery Location</u>	<u>Number of Traces</u>	<u>Percentage of Traces</u>
0-5	11,208	18.4%
6-10	8,178	13.1%
11-25	8,376	13.9%
26-50	3,807	6.5%
51-100	3,042	5.6%
101-500	8,981	18.3%
500+	9,112	24.2%
Total	(52,704)	100.0%

**Table 3.3.b**

**Crime Guns Recovered in the Same State of First Retail Purchase or Different State**

	<u>Number of Traces</u>	<u>Percentage of Traces</u>
Same State	53,350	65.1
Different State	28,627	34.9
Total	(82,737)	100.0%

**Table 3.4**  
**Distribution of Traces Among Current Dealers, 1999**

	Number of Traces to a Dealer	Dealers		Traces	
		Percent	Number	Percent	Number
All Retail Dealers (Retail Gun Dealers and Pawnbrokers)	0 or more	100.0	80,523	...	...
	1 or more	14.5	11,684	100.0	51,640
	2 or more	7.4	5,959	88.9	45,915
	5 or more	2.7	2,184	69.8	36,036
	10 or more	1.2	964	54.6	28,201
	25 or more	0.4	296	35.8	18,498
	50 or more	0.2	124	24.7	12,752
Retail Gun Dealers	0 or more	100.0	70,400	...	...
	1 or more	12.1	8,547	100.0	37,493
	2 or more	5.9	4,131	88.2	33,077
	5 or more	2.1	1,473	69.8	26,173
	10 or more	1.0	672	56.2	21,060
	25 or more	0.3	223	38.9	14,568
	50 or more	0.0	96	27.7	10,387
Pawnbrokers	0 or more	100.0	10,123	...	...
	1 or more	31.0	3,137	100.0	14,147
	2 or more	18.1	1,828	90.8	12,838
	5 or more	7.0	711	69.7	9,863
	10 or more	2.9	292	50.5	7,141
	25 or more	0.7	73	27.8	3,930
	50 or more	0.3	28	16.7	2,365

**Table 3.5****Annual Distribution of Firearms Produced for The U.S. Market and Annual Distribution of Firearms Recovered in Crime over The Past 20 Years**

Year	Annual Number of Firearms Produced for US Market	Annual Number of Firearms Produced/ Adjusted for Depreciation	Percent Distribution of Firearms Produced/ Adjusted for Depreciation	Percent Distribution of Firearms Recovered (1980-1999) in Crime
1979	5,691	4,610	5.08	1.69
1980	5,882	4,823	5.32	2.02
1981	5,475	4,544	5.01	2.05
1982	5,349	4,493	4.95	1.99
1983	4,581	3,894	4.29	1.99
1984	4,411	3,793	4.18	2.15
1985	3,974	3,457	3.81	2.20
1986	3,524	3,101	3.42	2.41
1987	4,345	3,867	4.26	2.79
1988	4,840	4,356	4.80	3.14
1989	5,123	4,662	5.14	3.64
1990	4,334	3,987	4.39	4.23
1991	3,873	3,602	3.97	5.08
1992	6,479	6,090	6.71	7.35
1993	7,759	7,371	8.12	8.87
1994	6,641	6,375	7.03	7.02
1995	4,911	4,764	5.25	7.35
1996	4,391	4,303	4.74	8.22
1997	4,242	4,200	4.63	9.50
1998	4,445	4,445	4.90	16.30

The annual number of firearms produced for U.S. markets equals the total of the number of firearms produced by U.S. manufacturers, minus the number of firearms exported by U.S. manufacturers to foreign countries, plus the number of firearms imported to the U.S. by foreign manufacturers for a given calendar year.

Numbers are reported in the thousands.

Adjustment for depreciation assumes that the number of firearms produced in a given year is reduced at a rate of 1% annually due to physical breakage or permanent loss.

**Table 3.6**

<b>Time-to-Crime</b>	<b>Frequency</b>	<b>Percent</b>	<b>Cumulative Percent</b>
Under 4 years	25800	31.2%	31.2%
4-6 years	17480	21.1%	52.3%
7+ years	39457	47.7%	100.0%
Total	(82737)	100.0%	

**Table 3.7**

**Distribution Traces for Guns with Time-To-Crime of Three Years or Less  
Among Current Dealers, 1999**

	Number of traces to a dealer	Dealers		Traces	
		Percent	Number	Percent	Number
All Retail Dealers (Retail Gun Dealers and Pawnbrokers)	0 or more	100.0	80,523	...	...
	1 or more	7.5	6,022	100.0	22,205
	2 or more	3.4	2,774	85.4	18,957
	5 or more	1.1	913	63.7	14,134
	10 or more	0.5	390	48.5	10,769
	25 or more	0.2	126	30.7	6,825
	50 or more	0.1	48	19.1	4,231
Retail Gun Dealers	0 or more	100.0	70,400	...	...
	1 or more	6.0	4,212	100.0	15,649
	2 or more	2.7	1,902	85.2	13,339
	5 or more	0.9	622	64.1	10,024
	10 or more	0.4	262	49.4	7,735
	25 or more	0.1	91	33.1	5,176
	50 or more	0.1	37	21.6	3,387
Pawnbrokers	0 or more	100.0	10,123	...	...
	1 or more	17.9	1,810	100.0	6,556
	2 or more	8.6	872	85.7	5,618
	5 or more	2.9	291	62.7	4,110
	10 or more	1.3	128	46.3	3,034
	25 or more	0.3	35	25.2	1,649
	50 or more	0.1	11	12.9	844

**Table 3.8**

**Relationship of First Time Retail Purchaser to Possessor By  
Time-to-Crime**

<b>Relationship or Purchaser to Possessor</b>	<b>Time-to-Crime</b>			
	<u>0 - 3 years</u>	<u>4 to 6 Years</u>	<u>7+ Years</u>	<u>Total</u>
Diff/ Person %	79.90%	91.0%	94.4%	88.8%
Same Person %	20.10%	9.0%	5.6%	11.2%
Total Percent	100.00%	100.0%	100.0%	100.0%
Total Cases	(19,017)	(11,883)	(25,546)	(56,446)

**Table 3.9**

**Time-to-Crime for Crime Guns with One Known Retail Sale and  
Crime Guns with More Than One Known Retail Sale in Maryland**

Time to Crime	Crime Guns With One Retail Sale	Crime Guns With Two or More Sales	
		First Time Retail Sale	Last Known Sale
0 - 3 years	37.0%	24.5%	37.3%
4 - 6 years	23.6%	25.3%	24.7%
7+ years	39.4%	50.2%	38.0%
Total Percent	100.0%	100.0%	100.0%
Total Cases	(3,425)	(1,037)	(926)

**Table 3.10**

<u>Type of Firearm</u>	<u>Recovery City</u>							<u>Total</u>
	<u>Baltimore</u>	<u>Boston</u>	<u>Memphis</u>	<u>Milwaukee</u>	<u>New York City</u>	<u>San Antonio</u>	<u>Philadelphia</u>	
Semi Automatic Pistol	43.3%	43.9%	49.3%	51.3%	53.1%	45.2%	63.0%	51.3%
Derringer	.8%	1.1%	1.9%	.8%	1.4%	2.1%	.5%	1.2%
Revolver	29.8%	28.2%	29.0%	20.5%	28.3%	21.9%	24.6%	26.8%
Rifle	11.9%	15.2%	8.3%	14.1%	8.9%	17.5%	5.3%	10.1%
Shotgun	14.1%	11.3%	11.2%	13.2%	7.9%	13.3%	6.6%	10.3%
Other type	.1%	.3%	.3%	.0%	.2%	.1%	.0%	0.2%
Total Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Number	(3783)	(611)	(3617)	(2480)	(7334)	(1563)	(3293)	(22681)

**Table 3.11**

<u>Handgun Caliber</u>	<u>Recovery City</u>							<u>Total</u>
	<u>Baltimore</u>	<u>Boston</u>	<u>Memphis</u>	<u>Milwaukee</u>	<u>New York City</u>	<u>San Antonio</u>	<u>Philadelphia</u>	
Low	31.2%	32.7%	29.7%	29.9%	32.4%	32.5%	22.1%	29.9%
Medium	50.0%	48.3%	53.0%	50.1%	53.5%	45.1%	58.4%	52.7%
High	17.9%	16.8%	16.6%	18.5%	13.2%	21.0%	18.8%	16.5%
Other	.9%	2.2%	.7%	1.4%	.9%	1.4%	.6%	0.9%
Total Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Number	(2794)	(447)	(2899)	(1801)	(6080)	(1081)	(2899)	(18001)

**Table 3.12**

**Cost of Firearm in Crime Gun Trace by Recovery City**

<u>Cost of Firearm</u>	<u>Recovery City</u>							<u>Total</u>
	<u>Baltimore</u>	<u>Boston</u>	<u>Memphis</u>	<u>Milwaukee</u>	<u>New York City</u>	<u>San Antonio</u>	<u>Philadelphia</u>	
\$0 - \$199	44.7%	44.4%	50.3%	47.8%	51.1%	45.1%	41.1%	47.5%
\$200 - \$499	38.1%	36.9%	34.2%	34.3%	34.5%	35.9%	39.7%	35.9%
\$500+	17.2%	18.7%	15.5%	17.9%	14.4%	19.1%	19.3%	16.6%
Total Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Number	(3363)	(502)	(3272)	(2119)	(6442)	(1416)	(2893)	(20007)

**Table 3.13**

**Crime Gun Purchaser/Possessor Relationship by Recovery City**

<u>Relationship</u>	<u>Recovery City</u>							<u>Total</u>
	<u>Baltimore</u>	<u>Boston</u>	<u>Memphis</u>	<u>Milwaukee</u>	<u>New York City</u>	<u>San Antonio</u>	<u>Philadelphia</u>	
Different Person	89.8%	96.9%	97.3%	84.2%	94.6%	87.6%	87.2%	90.8%
Same Person	10.2%	3.1%	2.7%	15.8%	5.4%	12.4%	12.8%	9.2%
Total Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Number	(1454)	(130)	(1513)	(1142)	(1808)	(831)	(1618)	(8496)

**Table 3.14**

<u>Age of Possessor</u>	<u>Recovery City</u>							<u>Total</u>
	<u>Baltimore</u>	<u>Boston</u>	<u>Memphis</u>	<u>Milwaukee</u>	<u>New York City</u>	<u>San Antonio</u>	<u>Philadelphia</u>	
11 - 17	12.0%	15.1%	8.6%	12.3%	12.4%	7.1%	8.9%	10.5%
18 - 24	33.0%	45.9%	34.2%	34.0%	37.5%	31.0%	41.0%	35.9%
25 - 29	15.4%	8.9%	19.9%	14.4%	13.9%	17.4%	16.4%	16.0%
30 - 39	21.7%	11.6%	19.8%	16.3%	17.8%	21.0%	17.7%	18.8%
40+	17.9%	18.5%	17.5%	23.0%	18.4%	23.5%	15.9%	18.8%
Total Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Number	(2503)	(259)	(2677)	(2100)	(3574)	(1538)	(3013)	(15664)

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**Table 3.15**

<u>Age of Purchaser</u>	<u>Recovery City</u>							<u>Total</u>
	<u>Baltimore</u>	<u>Boston</u>	<u>Memphis</u>	<u>Milwaukee</u>	<u>New York City</u>	<u>San Antonio</u>	<u>Philadelphia</u>	
18 - 24	24.8%	25.9%	25.3%	28.0%	25.3%	25.2%	24.2%	25.4%
25 - 29	17.9%	19.2%	20.5%	20.4%	20.1%	14.0%	20.8%	19.4%
30 - 39	27.3%	26.3%	25.9%	25.3%	27.0%	25.9%	28.1%	26.7%
40+	30.0%	28.6%	28.2%	26.4%	27.6%	34.8%	26.9%	28.5%
Total Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Number	(1935)	(224)	(1835)	(1267)	(2872)	(856)	(1655)	(10644)

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**Table 3.16**

**Distance Between First Time Retail Dealer and Recovery Location of Crime Gun by Recovery City**

<u>Distance in miles</u>	<u>Recovery City</u>							<u>Total</u>
	<u>Baltimore</u>	<u>Boston</u>	<u>Memphis</u>	<u>Milwaukee</u>	<u>New York City</u>	<u>San Antonio</u>	<u>Philadelphia</u>	
0 - 10 miles	39.8%	17.3%	36.8%	51.3%	9.1%	32.3%	47.2%	33.4%
11 - 25 miles	12.7%	14.1%	12.3%	8.9%	4.9%	18.2%	16.1%	11.3%
26 - 50 miles	5.4%	7.2%	1.5%	4.6%	5.2%	3.3%	3.3%	4.5%
50+ miles	42.1%	61.4%	49.4%	35.3%	80.9%	46.3%	33.4%	50.8%
Total Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Number	(2216)	(249)	(326)	(1514)	(2482)	(1128)	(1673)	(9588)

**Table 3.17**

<u>Relationship</u>	<u>Recovery City</u>							<u>Total</u>
	<u>Baltimore</u>	<u>Boston</u>	<u>Memphis</u>	<u>Milwaukee</u>	<u>New York City</u>	<u>San Antonio</u>	<u>Philadelphia</u>	
Same State	57.4%	33.6%	54.3%	70.8%	17.4%	79.2%	70.4%	49.9%
Different State	42.6%	66.4%	45.7%	29.2%	82.6%	20.8%	29.6%	50.1%
Total Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Number	(2512)	(307)	(2504)	(1532)	(4027)	(1154)	(1980)	(14016)

**Table 3.18**

<u>Time-to-Crime</u>	<u>Recovery City</u>							<u>Total</u>
	<u>Baltimore</u>	<u>Boston</u>	<u>Memphis</u>	<u>Milwaukee</u>	<u>New York City</u>	<u>San Antonio</u>	<u>Philadelphia</u>	
Under 4 years	27.9%	21.9%	34.6%	46.1%	20.7%	24.4%	44.9%	31.4%
4 - 6 years	21.4%	19.7%	23.7%	16.6%	20.4%	23.8%	18.1%	20.6%
7+ years	50.7%	58.4%	41.7%	37.3%	58.9%	51.8%	37.0%	48.0%
Total percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total number	(2039)	(233)	(1941)	(1307)	(3113)	(903)	(1738)	(11274)

**Table 4.1**

**Time-to-Crime by Total Number of Traces to a Dealer from a *Given* Recovery City for Active Dealers in 1999**

Time-to-Crime	Number of Traces to an Active Dealer							<u>Total</u>
	<u>1</u>	<u>2</u>	<u>3-5</u>	<u>6-10</u>	<u>11-25</u>	<u>25-50</u>	<u>51+</u>	
Under 4 years	34.0%	42.5%	47.8%	51.8%	53.6%	53.0%	54.4%	43.0%
4 to 6 years	24.7%	24.7%	23.4%	22.0%	20.6%	19.1%	20.3%	23.1%
7+ years	41.3%	32.8%	28.8%	26.2%	25.8%	27.9%	25.3%	33.9%
Total Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Number	(19631)	(4064)	(4833)	(3167)	(4224)	(2787)	(4956)	(43662)

**Table 4.2**

**Time-to-Crime by Number of Multiple Sale Firearms Sold by an Active Dealer in 1999**

Time-to-Crime	Number of Multiple Sales							Total
	<u>0</u>	<u>1-10</u>	<u>11-25</u>	<u>25-50</u>	<u>51-100</u>	<u>101-250</u>	<u>251+</u>	
Under 4 years	33.9%	43.5%	43.7%	48.0%	48.9%	50.1%	54.4%	43.3%
4 to 6 years	24.8%	24.3%	22.0%	22.5%	22.2%	22.2%	19.7%	23.1%
7+ years	41.3%	32.2%	34.3%	29.5%	29.0%	27.7%	25.8%	33.5%
Total Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Number	(16737)	(7457)	(5108)	(5191)	(5845)	(7532)	(4113)	(51983)

**Table 4.3**

**Time-to-Crime by Number of 13 Day Request Letters to An Active Dealer in 1999**

Time-to-Crime	Number of Request Letters						<u>Total</u>
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3,4</u>	<u>4-9</u>	<u>10+</u>	
Under 4 years	41.2%	42.3%	43.9%	48.7%	44.2%	58.6%	43.3%
4 to 6 years	23.5%	23.9%	22.1%	23.1%	21.6%	20.7%	23.1%
7+ years	35.4%	33.8%	34.0%	28.2%	34.2%	20.7%	33.5%
Total Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Number	(29007)	(8525)	(3941)	(4913)	(3080)	(2517)	(51983)

**Table 4.4**

**Time-to-Crime by Number of NICS Denials by an Active Dealer in 1999**

Time-to-Crime	Number of NICS check denials					<u>Total</u>
	<u>0</u>	<u>1-5</u>	<u>6-10</u>	<u>11-25</u>	<u>26+</u>	
Under 4 years	41.6%	39.2%	44.3%	49.0%	46.5%	43.4%
4 to 6 years	23.0%	23.7%	24.5%	22.9%	22.4%	23.2%
7+ years	35.4%	37.1%	31.2%	28.1%	31.1%	33.5%
Total Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Number	(24479)	(7077)	(5983)	(8559)	(5729)	(51827)

**Table 4.5**

**Time-to-Crime By The Shelf Life of A Firearm Sold By Active Dealers**

Time-to-Crime	Shelf Life in Days							Total
	<u>0-10</u>	<u>11-30</u>	<u>31-90</u>	<u>91-182</u>	<u>183-365</u>	<u>365-730</u>	<u>731+</u>	
Under 4 years	39.7%	39.8%	40.5%	38.9%	40.2%	42.6%	57.4%	40.8%
4 to 6 years	23.8%	24.9%	24.1%	24.5%	25.5%	23.3%	14.4%	24.0%
7+ years	36.5%	35.2%	35.4%	36.5%	34.3%	34.1%	28.2%	35.2%
Total Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Number	(7987)	(9682)	(12948)	(7214)	(5065)	(2947)	(2067)	(47910)

**Table 4.6**

Time-to-Crime	Type of Dealer			
	<u>Retail</u>	<u>Pawnshop</u>	<u>Other</u>	<u>Total</u>
Under 4 years	42.2%	46.8%	35.8%	43.3%
4 to 6 years	22.9%	23.8%	21.9%	23.1%
7+ years	34.9%	29.4%	42.2%	33.5%
Total Percent	100.0%	100.0%	100.0%	100.0%
Total Number	(37115)	(14006)	(862)	(51983)

**Table 4.7**

**Distribution of Crime Gun Traces for Recovery Cities by Total Number of Traces to An Active Dealer from The Recovery City**

Total Traces to a Dealer	Recovery City							Total
	<u>Baltimore</u>	<u>Boston</u>	<u>Memphis</u>	<u>Milwaukee</u>	<u>New York City</u>	<u>San Antonio</u>	<u>Philadelphia</u>	
1 trace	25.3%	62.7%	22.7%	23.1%	43.7%	33.3%	22.2%	29.9%
2 - 5 traces	15.4%	28.2%	14.6%	12.5%	38.3%	29.3%	14.0%	21.6%
6 - 10 traces	4.9%	9.2%	13.4%	4.9%	7.3%	7.7%	7.0%	7.6%
11 - 25 traces	11.2%	0	21.7%	8.0%	5.8%	19.2%	8.7%	11.3%
26+ traces	43.3%	0	27.6%	51.6%	4.9%	10.4%	48.1%	29.5%
Total Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Number	(1361)	(142)	(1276)	(898)	(1813)	(556)	(1248)	(7294)

**Table 4.8**

**Distribution of Firearms By Number of Multiple Sale Firearms in 1999 from An Active Dealer Associated with A Firearms Trace**

Number of Multiple Sales	Recovery City							Total
	<u>Baltimore</u>	<u>Boston</u>	<u>Memphis</u>	<u>Milwaukee</u>	<u>New York City</u>	<u>San Antonio</u>	<u>Philadelphia</u>	
0	26.4%	29.6%	29.6%	18.9%	45.0%	28.8%	17.5%	29.4%
1 - 25	26.7%	30.3%	26.9%	10.6%	22.5%	30.0%	11.1%	21.3%
26 - 100	36.0%	17.6%	19.5%	15.3%	18.5%	16.4%	55.7%	27.7%
101+	10.9%	22.5%	24.0%	55.2%	14.0%	24.8%	15.7%	21.0%
Total Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Number	(1361)	(142)	(1276)	(898)	(1813)	(556)	(1248)	(7294)

**Table 4.9**

**Distribution of Firearms Trace for Study Recovery Cities By Number of 13 Day Demand Letters from ATF to An Active Dealer**

Number of 13-Day Demand Letters	Recovery City							Total
	<u>Baltimore</u>	<u>Boston</u>	<u>Memphis</u>	<u>Milwaukee</u>	<u>New York City</u>	<u>San Antonio</u>	<u>Philadelphia</u>	
0	49.8%	54.9%	46.3%	27.8%	61.0%	78.4%	34.3%	48.9%
1 - 4	47.0%	36.6%	47.9%	23.2%	28.8%	21.0%	31.4%	34.9%
5 - 9	2.6%	7.0%	4.2%	2.8%	6.1%	.2%	25.1%	7.5%
10+	.6%	1.4%	1.6%	46.2%	4.0%	.4%	9.2%	8.7%
Total Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Number								

**Table 4.10**

**Distribution of Firearms By Number of NICS Denials for The Purchase of Firearms in 1999 for Active Dealers**

Number of NICS Denials	Recovery City							Total
	<u>Baltimore</u>	<u>Boston</u>	<u>Memphis</u>	<u>Milwaukee</u>	<u>New York City</u>	<u>San Antonio</u>	<u>Philadelphia</u>	
0	22.9%	40.1%	74.1%	17.7%	52.2%	15.6%	88.5%	49.5%
1 - 5	13.9%	28.2%	7.1%	14.9%	12.7%	21.4%	3.1%	11.5%
6 - 10	26.1%	12.7%	4.5%	15.7%	10.1%	14.4%	1.7%	11.7%
11 +	37.1%	19.0%	14.4%	51.7%	25.1%	48.6%	6.7%	27.3%
Total Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Number	(1355)	(142)	(1276)	(898)	(1802)	(556)	(1248)	(7277)

**Table 4.11**

**Distribution of Firearms for Study Recovery Cities By Shelf Life of Firearms Sold for Active Dealer**

Shelf Life	Recovery City							Total
	<u>Baltimore</u>	<u>Boston</u>	<u>Memphis</u>	<u>Milwaukee</u>	<u>New York</u>	<u>San Antonio</u>	<u>Philadelphia</u>	
0 - 90 days	62.8%	60.2%	56.4%	70.1%	66.5%	65.4%	69.6%	64.7%
91 - 365 days	27.1%	27.8%	32.7%	21.6%	24.5%	23.4%	22.7%	25.8%
366 - 730 days	5.2%	5.3%	7.1%	4.8%	5.4%	6.8%	4.7%	5.6%
731+ days	4.9%	6.8%	3.8%	3.6%	3.5%	4.4%	2.9%	3.9%
Total Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Number	(1278)	(133)	(1188)	(778)	(1663)	(517)	(1140)	(6697)

**Table 4.12**

**Distribution of Firearms By Type of First Time Retail Dealer for Active Dealer**

Type	Recovery City							Total
	<u>Baltimore</u>	<u>Boston</u>	<u>Memphis</u>	<u>Milwaukee</u>	<u>New York City</u>	<u>San Antonio</u>	<u>Philadelphia</u>	
Other Retail	76.6%	76.1%	52.7%	91.4%	67.5%	61.3%	81.0%	71.6%
Pawnshop	23.4%	23.9%	47.3%	8.6%	32.5%	38.7%	19.0%	28.4%
Total Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Number	(1361)	(142)	(1276)	(898)	(1813)	(556)	(1248)	(7294)

**Table 4.13**

<b>Time-to-Crime By Total Traces to Purchaser Home Zip Code</b>						
<u>Total traces to zip of purchaser home zip code</u>						
<u>Time to Crime</u>	<u>1-5</u>	<u>6-10</u>	<u>11-25</u>	<u>26-50</u>	<u>51+</u>	<u>Total</u>
Under 4 years	24.0%	27.8%	32.1%	36.8%	49.5%	32.2%
4 to 6 years	22.1%	22.2%	22.7%	20.7%	19.2%	21.6%
7+ years	53.8%	50.0%	45.2%	42.5%	31.3%	45.7%
Total Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Number	(23059)	(14094)	(19398)	(10997)	(11598)	(79137)

**Table 4.14**

<u>Time-to-Crime</u>	<u>Purchaser Age</u>				<u>Total</u>
	<u>18 - 24</u>	<u>25 - 29</u>	<u>30 - 39</u>	<u>40+</u>	
Under 4 years	42.5%	34.2%	28.3%	26.4%	32.3%
4 - 6 years	20.2%	20.0%	22.1%	22.6%	21.4%
7+ years	37.3%	45.8%	49.7%	51.0%	46.4%
Total percent	100.0%	100.0%	100.0%	100.0%	100.0%
Total number	(18551)	(14819)	(21422)	(22955)	(77747)

**Table 4.15**

**Time-to-Crime By The Number of Traces Associated with A Given Purchaser**

<u>Time to Crime</u>	<u>Number of Traces to a Purchaser</u>		<u>Total</u>
	<u>1</u>	<u>2+</u>	
Under 4 years	28.7%	54.6%	31.2%
4 - 6 years	21.3%	19.6%	21.1%
7+ years	50.1%	25.8%	47.7%
Total percent	100.0%	100.0%	100.0%
Total number	(74655)	(8082)	(82737)

**Table 4.16**

**Time-to-Crime By Purchaser/Possessor Residential Location Proximity**

<u>Time-to-Crime</u>	<u>Residential Proximity in Miles</u>							<u>Total</u>
	<u>0-5 miles</u>	<u>6 - 10 miles</u>	<u>11 - 25 miles</u>	<u>26 - 50 miles</u>	<u>51 - 100 miles</u>	<u>101 - 500 miles</u>	<u>500+ miles</u>	
Under 4 years	43.9%	32.9%	29.7%	22.7%	22.8%	20.3%	18.5%	30.4%
4 - 6 years	20.2%	23.4%	24.7%	25.5%	22.8%	22.7%	21.0%	22.3%
7+ years	35.8%	43.7%	45.6%	51.9%	54.4%	57.0%	60.6%	47.3%
Total percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total number	(10275)	(4447)	(4984)	(2401)	(1797)	(5302)	(5031)	(34237)

**Table 4.17**

<b>Time-to-Crime By Purchaser/Possesor Age Proximity</b>					
<u>Time-to-Crime</u>	<u>Age Proximity in Years</u>				
	<u>0 - 4 years</u>	<u>5 - 9 years</u>	<u>10 - 19 years</u>	<u>20+ years</u>	<u>Total</u>
Under 4 years	43.8%	29.5%	22.9%	23.5%	30.2%
4 - 6 years	21.2%	23.6%	22.3%	22.3%	22.3%
7+ years	34.9%	46.9%	54.8%	54.2%	47.5%
Total percent	100.0%	100.0%	100.0%	100.0%	100.0%
Total number	(10713)	(8294)	(10527)	(9229)	(38763)

**Table 4.18**

**Time-to-Crime By Potential Family Relationship of Purchaser and Possessor**

<u>Time-to-Crime</u>	<u>Last Name of Purchaser/Possessor</u>		<u>Total</u>
	<u>Not Same Last Name</u>	<u>Same Last Name</u>	
Under 4 years	29.5%	44.5%	30.3%
4 - 6 years	21.6%	20.4%	21.6%
7+ years	48.9%	35.1%	48.1%
Total percent	100.0%	100.0%	100.0%
Total number	(47294)	(2847)	(50141)

**Table 4.19**

**Time-to-Crime By Relationship Status of Purchaser and Associate(s) of Possessor**

<u>Time-to-Crime</u>	<u>Associate Status</u>		<u>Total</u>
	<u>Associate not Purchaser</u>	<u>Associate is Purchaser</u>	
Under 4 years	34.1%	73.8%	36.1%
4 - 6 years	20.6%	11.2%	20.2%
7+ years	45.2%	15.0%	43.7%
Total percent	100.0%	100.0%	100.0%
Total number	(7750)	(412)	(8162)

**Table 4.20**

<b>Time-to-Crime By Purchaser to Associate of Possessor Residential Proximity</b>						
<u>Time-to-Crime</u>	<u>Residential Proximity in Miles</u>					<u>Total</u>
	<u>0 miles</u>	<u>1 - 5 miles</u>	<u>6 - 10 miles</u>	<u>11 - 25 miles</u>	<u>26+ miles</u>	
Under 4 years	58.9%	45.1%	33.2%	28.5%	24.4%	34.1%
4 - 6 years	14.9%	21.5%	21.3%	25.5%	22.3%	21.5%
7+ years	26.1%	33.4%	45.4%	46.0%	53.3%	44.4%
Total percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total number	(750)	(867)	(722)	(748)	(2390)	(5477)

**Table 4.21**

**Time-to-Crime By Total Traces from Possessor Home Zip Code**

	Total traces to zip of possessor home location						
<u>Time-to-Crime</u>	<u>0</u>	<u>1-5</u>	<u>6-10</u>	<u>11-25</u>	<u>26-50</u>	<u>51+</u>	<u>Total</u>
Under 4 years	33.8%	32.7%	32.7%	32.6%	36.3%	34.9%	33.6%
4 to 6 years	21.0%	21.2%	22.1%	21.1%	21.6%	19.2%	21.1%
7+ years	45.2%	46.1%	45.3%	46.4%	42.1%	45.9%	45.3%
Total Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Number	(32493)	(8899)	(4058)	(5412)	(3626)	(2697)	(57185)

**Table 4.22**

**Time-to-Crime By Possessor's Age**

<u>Time-to-Crime</u>	<u>Possessor Age</u>					<u>Total</u>
	<u>11 - 17</u>	<u>18 - 24</u>	<u>25 - 29</u>	<u>30 - 39</u>	<u>40+</u>	
Under 4 years	27.1%	41.0%	40.0%	31.5%	22.0%	33.3%
4 - 6 years	20.6%	20.8%	24.1%	22.3%	19.5%	21.3%
7+ years	52.4%	38.2%	35.9%	46.2%	58.4%	45.4%
Total percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total number	(2972)	(15431)	(8030)	(10609)	(12079)	(49121)

**Table 4.23**

**Time-to-Crime By Type of Firearm**

<u>Time-to-Crime</u>	<u>Type of Offense</u>					<u>Total</u>
	Pistol	Revolver	Rifle	Shotgun	<u>Other</u>	
Under 4 years	39.5%	14.3%	24.9%	25.5%	23.4%	31.2%
4 - 6 years	24.2%	12.7%	22.8%	17.8%	25.6%	21.1%
7+ years	36.3%	73.0%	52.3%	56.7%	51.0%	47.7%
Total percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total number	(47804)	(16955)	(9319)	(7371)	(1256)	(82705)

**Table 4.24**

**Time-to-Crime By Type of Offence Associated with Crime Gun**

<u>Time-to-Crime</u>	<u>Type of Offense</u>					
	<u>Crime Against Person</u>	<u>Crime Against Property</u>	<u>Narcotics Related</u>	<u>Firearms Offence</u>	<u>Other</u>	<u>Total</u>
Under 4 years	32.1%	27.8%	32.9%	31.3%	28.1%	31.2%
4 - 6 years	20.8%	21.4%	21.9%	21.1%	20.8%	21.1%
7+ years	47.2%	50.8%	45.2%	47.6%	51.1%	47.7%
Total percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total number	(11352)	(2146)	(9515)	(50935)	(8789)	(82737)

**Table 4.25**

<u>Time-to-Crime</u>	<u>NCIC Stolen Gun Match</u>		
	Not Matched	Matched	<u>Total</u>
Under 4 years	31.4%	22.3%	31.2%
4 - 6 years	20.8%	34.0%	21.1%
7+ years	47.8%	43.7%	47.7%
Total percent	100.0%	100.0%	100.0%
Total number	(80798)	(1939)	(82737)

**Table 5.4 Cox Regression Results for Purchaser/Possessor Different Person**

Variables	<u>Block 1</u>			<u>Blocks 1, 2</u>			<u>Blocks 1, ,2, 3</u>			<u>Blocks 1, 2, 3, 4</u>			<u>Blocks, 1, 2, 3, 4, 5</u>		
	B	Sig.	Exp(B)	B	Sig.	Exp(B)	B	Sig.	Exp(B)	B	Sig.	Exp(B)	B	Sig.	Exp(B)
LNDLCACT	0.065	0.000	1.067	0.036	0.000	1.037	0.014	0.001	1.014	0.010	0.012	1.010	0.013	0.001	1.013
LN99MACT	0.063	0.000	1.065	0.056	0.000	1.057	0.058	0.000	1.059	0.056	0.000	1.058	0.036	0.000	1.037
LND13ACT	-0.010	0.159	0.990	-0.027	0.000	0.974	-0.024	0.001	0.976	-0.026	0.000	0.975	-0.022	0.003	0.978
LNNICDEN	0.028	0.000	1.028	0.029	0.000	1.030	0.030	0.000	1.031	0.030	0.000	1.031	0.038	0.000	1.039
PAWNACT	0.214	0.000	1.239	0.199	0.000	1.220	0.213	0.000	1.237	0.205	0.000	1.227	0.118	0.000	1.125
SHLFACT	0.222	0.000	1.248	0.230	0.000	1.259	0.218	0.000	1.243	0.226	0.000	1.254	0.294	0.000	1.342
PURLAW	-0.208	0.000	0.812	-0.164	0.000	0.849	-0.191	0.000	0.827	-0.190	0.000	0.827	-0.124	0.000	0.884
PUR1824				0.207	0.000	1.230	0.112	0.000	1.119	0.086	0.000	1.090	0.053	0.000	1.055
PUR2529				0.086	0.000	1.090	0.006	0.683	1.006	-0.009	0.534	0.991	-0.041	0.006	0.959
PUR3039				0.058	0.000	1.060	-0.013	0.307	0.987	-0.017	0.207	0.983	-0.032	0.014	0.968
RPUKY_CN				0.554	0.000	1.741	0.507	0.000	1.661	0.522	0.000	1.686	0.518	0.000	1.679
LNTRZIP				0.068	0.000	1.070	0.052	0.000	1.054	0.049	0.000	1.050	0.043	0.000	1.044
LNAPPDP							-0.148	0.000	0.862	-0.131	0.000	0.877	-0.118	0.000	0.889
LNPUPODP							-0.056	0.000	0.945	-0.060	0.000	0.942	-0.066	0.000	0.936
SAMEFMDP							-0.008	0.710	0.992	0.021	0.336	1.021	0.075	0.001	1.078
ASSPURDP							0.441	0.000	1.554	0.488	0.000	1.629	0.462	0.000	1.588
PURASDDP							0.105	0.000	1.111	0.070	0.012	1.073	0.062	0.027	1.064
POS17										0.202	0.000	1.224	0.073	0.002	1.076
POS1824										0.355	0.000	1.427	0.249	0.000	1.282
POS2529										0.295	0.000	1.343	0.204	0.000	1.226
POS3039										0.163	0.000	1.177	0.125	0.000	1.133
LNPOSZIP										-0.008	0.036	0.992	-0.001	0.722	0.999
APISTOL													0.653	0.000	1.920
STOLEN													0.016	0.596	1.016

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**Table 5.4**

<b>Dealer-Related Gun Trafficking Indicators Index for All Crime Guns Recovered in 1999 with Time-to-Crime Information</b>		
<u>Number of Indicators Present in a Given Crime Gun Trace</u>	<u>Number of Traces</u>	<u>Percentage of Traces</u>
0	59,357	71.7
1	15,502	18.7
2	7,649	9.2
3	229	.3
Total	(82,737)	100.0%

**Table 5.5**

<b>Purchaser-Related Gun Trafficking Indicators Index for All Crime Guns Recovered in 1999 with Time-to-Crime Information</b>		
<u>Number of Indicators Present in a Given Crime Gun Trace</u>	<u>Number of Traces</u>	<u>Percentage of Traces</u>
0	53,663	64.9%
1	24,438	29.5%
2	4,029	4.9%
3	607	.7
Total	(82,737)	100.0%

**Table 5.6**

**Purchaser/Possessor-Related Gun Trafficking Indicators Index for All Crime Guns Recovered in 1999 with Time-to-Crime Information**

<u>Number of Indicators Present in a Given Crime Gun Trace</u>	<u>Number of Traces</u>	<u>Percentage of Traces</u>
0	63,329	76.5%
1	15,454	18.7%
2	3,580	4.3%
3	374	.5%
Total	(82,737)	100.0%

**Table 5.7**

**Total Gun Trafficking Indicators Index for All Crime Guns Recovered in 1999 with Time-to-Crime Information**

<u>Number of Indicators Present in a Given Crime Gun Trace</u>	<u>Number of Traces</u>	<u>Percentage of Traces</u>
0	34,106	41.2%
1	24,501	29.6%
2	13,145	15.9%
3	6,927	8.4%
4+	4,058	4.9%
Total	(82,737)	100.0%

**Table 5.8**

**Percent of Total Traces By The Total Gun Trafficking Index  
and Time-to-Crime**

(Percent of Total Traces)

<u>Time to Crime</u>	<u>Total Gun Trafficking Index - Number of Indicators</u>					<u>Total</u>
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4+</u>	
Under 4 years	7.0%	8.4%	7.3%	4.8%	3.6%	
4 to 6 years	8.5%	6.8%	3.5%	1.7%	.7%	
7+ years	25.7%	14.4%	7.3%	1.9%	.6%	
Total Number of Guns Traced to Purchasers						(82,732)

**Table 5.9**

**Distribution of Traces by Total Trace Indicators Index By Recovery Ctiy**

<u>Total Index</u>	<u>Recovery City</u>							<u>Total</u>
	<u>Baltimore</u>	<u>Boston</u>	<u>Memphis</u>	<u>Milwaukee</u>	<u>New York City</u>	<u>San Antonio</u>	<u>Philadelphia</u>	
0 Indicators	29.4%	57.9%	27.0%	22.8%	55.0%	37.4%	21.9%	35.3%
1 Indicator	23.7%	29.6%	31.9%	17.8%	29.4%	31.0%	19.4%	26.1%
2 Indicators	22.2%	8.2%	21.2%	13.9%	10.8%	18.4%	19.2%	16.9%
3 + Indicators	24.7%	4.3%	19.9%	45.5%	4.8%	13.2%	39.5%	21.7%
Total percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total number	(2,039)	(233)	(1,941)	(1,307)	(3,113)	(903)	(1,738)	(11,274)

## Appendix

### Appendix Tables 1 through 13

## Appendix Table 1

### Annual Distribution of Handguns Produced for The U.S. Market and Annual Distribution of Handguns Recovered in Crime over The Past 20 Years

Year	Annual Number of Handguns Produced for U.S. Market <sup>1</sup>	Annual Number of Handguns Produced/ Adjusted for Depreciation <sup>2,3</sup>	Percent Distribution of Handguns Produced - Adjusted for Depreciation	Percent Distribution of Handguns Recovered (1980-1999) in Crime
1979	2,171	1,759	4.29	1.54
1980	2,449	2,008	4.90	1.88
1981	2,591	2,151	5.25	1.92
1982	2,708	2,275	5.55	1.84
1983	2,219	1,886	4.60	1.80
1984	1,905	1,638	4.00	1.94
1985	1,684	1,465	3.57	1.97
1986	1,538	1,353	3.30	2.23
1987	1,842	1,639	4.00	2.60
1988	2,236	2,012	4.91	2.97
1989	2,353	2,141	5.22	3.60
1990	2,110	1,941	4.74	4.27
1991	1,941	1,805	4.40	5.29
1992	2,803	2,635	6.43	7.63
1993	3,881	3,687	9.00	9.01
1994	3,324	3,191	7.79	6.86
1995	2,199	2,133	5.20	7.30
1996	1,821	1,785	4.35	8.36
1997	1,773	1,755	4.28	9.70
1998	1,727	1,727	4.21	17.30

<sup>1</sup>The annual number of handguns produced for U.S. markets equals the total of the number of handguns produced by U.S. manufacturers, minus the number of firearms exported by U.S. manufacturers to foreign countries, plus the number of handguns imported into the U.S. by foreign manufacturers for a given calendar year.

<sup>2</sup>Numbers are reported in the thousands.

<sup>3</sup>Adjustment for depreciation assumes that the number of handguns produced in a given year is reduced at a rate of 1% annually due to physical breakage or permanent loss.

## Appendix Table 2

### Annual Distribution of Rifles Produced for The U.S. Market and Annual Distribution of Rifles Recoverd in Crime over The Past 20 Years

Year	Annual Number of Rifles Produced for U.S. Market <sup>1</sup>	Annual Number of Rifles Produced/ Adjusted for Depreciation <sup>2,3</sup>	Percent Distribution of Rifles Produced/ Adjusted for Depreciation	Percent Distribution of Rifles Recovered (1980-1999) in Crime
1979	1,965	1,592	5.37	2.30
1980	1,947	1,597	5.39	2.54
1981	1,722	1,429	4.82	2.63
1982	1,711	1,437	4.85	2.53
1983	1,283	1,091	3.68	2.91
1984	1,271	1,093	3.69	2.91
1985	1,368	1,190	4.01	2.89
1986	1,203	1,059	3.57	2.74
1987	1,378	1,226	4.14	3.34
1988	1,374	1,237	4.17	3.87
1989	1,627	1,481	4.99	3.65
1990	1,288	1,185	4.00	3.77
1991	1,103	1,026	3.46	4.05
1992	2,335	2,195	7.40	6.08
1993	2,659	2,526	8.52	9.90
1994	2,090	2,006	6.77	8.39
1995	1,504	1,459	4.92	7.63
1996	1,612	1,580	5.33	7.84
1997	1,533	1,518	5.12	8.18
1998	1,719	1,719	5.80	11.84

<sup>1</sup>The annual number of rifles produced for U.S. markets equals the total of the number of rifles produced by U.S. manufacturers, minus the number of firearms exported by U.S. manufacturers to foreign countries, plus the number of rifles imported into the U.S. by foreign manufacturers for a given calendar year.

<sup>2</sup>Numbers are reported in the thousands.

<sup>3</sup>Adjustment for depreciation assumes that the number of rifles produced in a given year is reduced at a rate of 1% annually due to physical breakage or permanent loss.

### Appendix Table 3

#### Annual Distribution of Shotguns Produced for The U.S. Market and Annual Distribution of Shotguns Recovered in Crime over The Past 20 Years

Year	Annual Number of Shotguns Produced for U.S. Market <sup>1</sup>	Annual Number of Shotguns Produced/ Adjusted for Depreciation <sup>2,3</sup>	Percent Distribution of Shotguns Produced/ Adjusted for Depreciation	Percent Distribution of Shotguns Recovered (1980-1999) in Crime
1979	1,555	1,260	6.26	2.33
1980	1,485	1,218	6.06	2.63
1981	1,164	966	4.80	2.60
1982	931	782	3.89	2.68
1983	1,080	918	4.57	2.68
1984	1,236	1,063	5.29	3.19
1985	922	802	3.99	3.47
1986	783	689	3.43	3.63
1987	1,125	1,001	4.98	3.84
1988	1,231	1,108	5.51	3.82
1989	1,142	1,039	5.17	4.04
1990	937	862	4.29	4.34
1991	826	768	3.82	4.42
1992	1,341	1,261	6.27	6.23
1993	1,220	1,159	5.76	6.29
1994	1,226	1,177	5.85	6.85
1995	1,209	1,173	5.83	7.51
1996	957	938	4.66	7.42
1997	936	927	4.61	9.37
1998	998	998	4.96	12.68

<sup>1</sup>The annual number of shotguns produced for U.S. markets equals the total of the number of shotguns produced by U.S. manufacturers, minus the number of firearms exported by U.S. manufacturers to foreign countries, plus the number of shotguns imported into the U.S. by foreign manufacturers for a given calendar year.

<sup>2</sup>Numbers are reported in the thousands.

<sup>3</sup>Adjustment for depreciation assumes that the number of shotguns produced in a given year is reduced at a rate of 1% annually due to physical breakage or permanent loss.

## Appendix Table 4

### Annual Distribution of Bryco Pistols Produced for The U.S. Market and Annual Distribution of Bryco Pistols Recovered in Crime over The Past 20 Years

Year	Annual Number of Bryco Pistols Produced for U.S. Market	Annual Number of Bryco Pistols Produced/ Adjusted for Depreciation <sup>1,2</sup>	Percent Distribution of Bryco Pistols Produced/ Adjusted for Depreciation	Percent Distribution of Bryco Pistols Recovered (1989- 1999) in Crime
1979				
1980				
1981				
1982				
1983				
1984				
1985				
1986				
1987				
1988	12,523	11,271	1.02	0.07
1989	7,744	7,047	0.64	0.43
1990	38,193	35,138	3.17	1.84
1991	202,510	188,334	17.01	5.02
1992	204,883	192,590	17.39	7.77
1993	251,633	239,051	21.59	12.39
1994	227,924	218,807	19.76	7.57
1995	56,727	55,025	4.97	7.07
1996	47,316	46,370	4.19	9.32
1997	47,688	47,211	4.26	14.48
1998	66,329	66,329	5.99	34.03

<sup>1</sup>Numbers are reported in the thousands.

<sup>2</sup>Adjustment for depreciation assumes that the number of Bryco Pistols produced in a given year is reduced at a rate of 1% annually due to physical breakage or permanent loss.

## Appendix Table 5

### Annual Distribution of Colt Pistols Produced for The U.S. Market and Annual Distribution of Colt Pistols Recoverd in Crime over The Past 20 Years

Year	Annual Number of Colt Pistols Produced for U.S. Market	Annual Number of Colt Pistols Produced/ Adjusted for Depreciation <sup>1,2</sup>	Percent Distribution of Colt Pistols Produced/ Adjusted for Depreciation	Percent Distribution of Colt Pistols Recovered (1987- 1999) in Crime
1979				
1980				
1981				
1982				
1983				
1984				
1985				
1986	67,987	59,829	5.49	3.61
1987	80,654	71,782	6.59	5.13
1988	91,745	82,571	7.58	5.61
1989	106,771	97,162	8.92	6.75
1990	94,876	87,286	8.02	7.89
1991	70,080	65,174	5.98	6.65
1992	94,881	89,188	8.19	8.17
1993	94,551	89,823	8.25	9.03
1994	140,078	134,475	12.35	9.03
1995	118,462	114,908	10.55	8.65
1996	66,942	65,603	6.02	7.32
1997	69,110	68,419	6.28	8.56
1998	62,757	62,757	5.76	13.59

<sup>1</sup>Numbers are reported in the thousands.

<sup>2</sup>Adjustment for depreciation assumes that the number of Colt Pistols produced in a given year is reduced at a rate of 1% annually due to physical breakage or permanent loss.

**Appendix Table 6**

**Annual Distribution of Colt Revolvers Produced for The U.S. Market and Annual Distribution of Colt Revolvers Recovered in Crime over The Past 20 Years**

Year	Annual Number of Colt Revolvers Produced for U.S. Market	Annual Number of Colt Revolvers Produced/ Adjusted for Depreciation <sup>1,2</sup>	Percent Distribution of Colt Revolvers Produced/ Adjusted for Depreciation	Percent Distribution of Colt Revolvers Recovered (1987-1999) in Crime
1979				
1980				
1981				
1982				
1983				
1984				
1985				
1986	14,145	12,448	3.05	6.05
1987	34,594	30,789	7.54	7.01
1988	41,636	37,472	9.18	6.69
1989	31,298	28,481	6.98	7.96
1990	12,121	11,151	2.73	4.14
1991	36,180	33,647	8.24	7.01
1992	45,658	42,919	10.52	7.96
1993	52,217	49,606	12.15	11.46
1994	52,672	50,565	12.39	7.64
1995	40,085	38,882	9.53	9.24
1996	27,682	27,128	6.65	7.32
1997	20,805	20,597	5.05	7.01
1998	24,468	24,468	5.99	10.51

<sup>1</sup>Numbers are reported in the thousands.

<sup>2</sup>Adjustment for depreciation assumes that the number of Colt Revolvers produced in a given year is reduced at a rate of 1% annually due to physical breakage or permanent loss.

## Appendix Table 7

### Annual Distribution of Davis Pistols Produced for The U.S. Market and Annual Distribution of Davis Pistols Recoverd in Crime over The Past 20 Years

Year	Annual Number of Davis Pistols Produced for U.S. Market	Annual Number of Davis Pistols Produced/ Adjusted for Depreciation <sup>1,2</sup>	Percent Distribution of Davis Pistols Produced/ Adjusted for Depreciation	Percent Distribution of Davis Pistols Recovered (1987- 1999) in Crime
1979				
1980				
1981				
1982				
1983				
1984				
1985				
1986	33,380	29,374	2.53	1.41
1987	64,398	57,314	4.93	2.63
1988	86,433	77,790	6.69	3.18
1989	104,249	94,867	8.16	5.75
1990	143,252	131,792	11.34	8.64
1991	171,076	159,101	13.69	12.31
1992	187,779	176,512	15.18	13.98
1993	178,271	169,357	14.57	11.92
1994	85,124	81,719	7.03	6.49
1995	45,171	43,816	3.77	7.10
1996	39,093	38,311	3.30	6.43
1997	36,625	36,259	3.12	7.68
1998	66,329	66,329	5.71	12.47

<sup>1</sup>Numbers are reported in the thousands.

<sup>2</sup>Adjustment for depreciation assumes that the number of Davis Pistols produced in a given year is reduced at a rate of 1% annually due to physical breakage or permanent loss.

**Appendix Table 8**

**Annual Distribution of Lorcin Pistols Produced for The U.S. Market and Annual Distribution of Lorcin Pistols Recoverd in Crime over The Past 20 Years**

Year	Annual Number of Lorcin Pistols Produced for U.S. Market	Annual Number of Lorcin Pistols Produced/ Adjusted for Depreciation <sup>1,2</sup>	Percent Distribution of Lorcin Pistols Produced/ Adjusted for Depreciation	Percent Distribution of Lorcin Pistols Recovered (1990-1999) in Crime
1979				
1980				
1981				
1982				
1983				
1984				
1985				
1986				
1987				
1988				
1989	15,710	14,296	1.33	0.37
1990	30,216	27,799	2.59	1.06
1991	53,459	49,717	4.63	3.13
1992	187,761	176,495	16.42	12.45
1993	341,243	324,181	30.16	14.60
1994	151,208	145,160	13.51	9.53
1995	83,463	80,959	7.53	9.45
1996	87,497	85,747	7.98	10.68
1997	92,033	91,113	8.48	13.47
1998	79,250	79,250	7.37	25.26

<sup>1</sup>Numbers are reported in the thousands.

<sup>2</sup>Adjustment for depreciation assumes that the number of Lorcin Pistols produced in a given year is reduced at a rate of 1% annually due to physical breakage or permanent loss.

## Appendix Table 9

### Annual Distribution of Phoenix Pistols Produced for The U.S. Market and Annual Distribution of Phoenix Pistols Recoverd in Crime over The Past 20 Years

Year	Annual Number of Phoenix Pistols Produced for U.S. Market	Annual Number of Phoenix Pistols Produced/ Adjusted for Depreciation <sup>1,2</sup>	Percent Distribution of Phoenix Pistols Produced/ Adjusted for Depreciation	Percent Distribution of Phoenix Pistols Recovered (1993-1999) in Crime
1979				
1980				
1981				
1982				
1983				
1984				
1985				
1986				
1987				
1988				
1989				
1990				
1991				
1992	67,824	63,755	16.25	12.24
1993	99,621	94,640	24.13	17.13
1994	61,609	59,145	15.08	9.79
1995	48,381	46,930	11.96	10.31
1996	41,643	40,810	10.40	12.15
1997	43,086	42,655	10.88	15.12
1998	44,295	44,295	11.29	23.25

<sup>1</sup>Numbers are reported in the thousands.

<sup>2</sup>Adjustment for depreciation assumes that the number of Phoenix Pistols produced in a given year is reduced at a rate of 1% annually due to physical breakage or permanent loss.

## Appendix Table 10

### Annual Distribution of Smith & Wesson Pistols Produced for The U.S. Market and Annual Distribution of Smith & Wesson Pistols Recovered in Crime over The Past 20 Years

Year	Annual Number of Smith & Wesson Pistols Produced for U.S. Market	Annual Number of Smith & Wesson Pistols Produced/ Adjusted for Depreciation <sup>1,2</sup>	Percent Distribution of Smith & Wesson Pistols Produced/ Adjusted for Depreciation	Percent Distribution of Smith & Wesson Pistols Recovered (1980-1999) in Crime
1979	62,467	50,598	1.92	1.05
1980	71,662	58,763	2.22	1.22
1981	75,066	62,305	2.36	1.28
1982	70,796	59,469	2.25	1.00
1983	15,842	13,466	0.51	1.17
1984	51,838	44,581	1.69	1.39
1985	44,688	38,879	1.47	1.42
1986	63,497	55,877	2.12	1.65
1987	138,834	123,562	4.68	2.82
1988	171,940	154,746	5.86	3.99
1989	283,269	257,775	9.76	4.24
1990	225,884	207,813	7.87	3.79
1991	169,087	157,251	5.95	3.53
1992	166,475	156,487	5.92	4.90
1993	187,993	178,593	6.76	5.89
1994	269,549	258,767	9.79	7.26
1995	241,906	234,649	8.88	8.28
1996	179,899	176,301	6.67	11.93
1997	220,780	218,572	8.27	13.27
1998	133,477	133,477	5.05	19.93

<sup>1</sup>Numbers are reported in the thousands.

<sup>2</sup>Adjustment for depreciation assumes that the number of Smith & Wesson pistols produced in a given year is reduced at a rate of 1% annually due to physical breakage or permanent loss.

## Appendix Table 11

### Annual Distribution of Smith & Wesson Revolvers Produced for The U.S. Market and Annual Distribution of Smith & Wesson Revolvers Recoverd in Crime over The Past 20 Years

Year	Annual Number of Smith & Wesson Revolvers Produced for U.S. Market	Annual Number of Smith & Wesson Revolvers Produced/ Adjusted for Depreciation <sup>1,2</sup>	Percent Distribution of Smith & Wesson Revolvers Produced/ Adjusted for Depreciation	Percent Distribution of Smith & Wesson Revolvers Recovered (1980-1999) in Crime
1979	565,580	458,120	7.24	4.35
1980	611,765	501,647	7.93	5.22
1981	662,937	550,238	8.70	5.41
1982	679,861	571,083	9.03	5.53
1983	170,224	144,690	2.29	5.95
1984	487,855	419,555	6.63	5.72
1985	449,683	391,224	6.19	5.58
1986	461,966	406,530	6.43	5.61
1987	402,940	358,617	5.67	5.08
1988	347,338	312,604	4.94	4.29
1989	275,891	251,061	3.97	4.60
1990	262,155	241,183	3.81	4.35
1991	256,077	238,152	3.77	4.68
1992	246,964	232,146	3.67	4.66
1993	246,068	233,765	3.70	4.71
1994	255,216	245,007	3.87	3.84
1995	258,223	250,476	3.96	5.05
1996	225,491	220,981	3.49	4.68
1997	159,433	157,839	2.50	4.26
1998	139,583	139,583	2.21	6.42

<sup>1</sup>Numbers are reported in the thousands.

<sup>2</sup>Adjustment for depreciation assumes that the number of Smith & Wesson revolvers year is reduced at a rate of 1% annually due to physical breakage or permanent loss.

## Appendix Table 12

### Annual Distribution of Sturm, Ruger Pistols Produced for The U.S. Market and Annual Distribution of Sturm, Ruger Pistols Recovered in Crime over The Past 20 Years

Year	Annual Number of Sturm, Ruger Pistols Produced for U.S. Market	Annual Number of Sturm, Ruger Pistols Produced/ Adjusted for Depreciation	Percent Distribution of Sturm, Ruger Pistols Produced/ Adjusted for Depreciation	Percent Distribution of Sturm, Ruger Pistols Recovered (1987-1999) in Crime
1979				
1980				
1981				
1982				
1983				
1984				
1985				
1986	98,553	86,727	3.80	1.05
1987	100,208	89,185	3.91	0.70
1988	152,922	137,630	6.04	1.75
1989	208,384	189,629	8.32	2.99
1990	209,594	192,826	8.46	3.46
1991	170,384	158,457	6.95	5.14
1992	227,778	214,111	9.39	7.49
1993	280,305	266,290	11.68	9.71
1994	299,647	287,661	12.62	8.24
1995	197,489	191,564	8.40	9.71
1996	134,791	132,095	5.79	12.19
1997	174,627	172,881	7.58	13.96
1998	161,058	161,058	7.06	23.60

<sup>1</sup>Numbers are reported in the thousands.

<sup>2</sup>Adjustment for depreciation assumes that the number of Sturm, Ruger pistols produced in a given year is reduced at a rate of 1% annually due to physical breakage or permanent loss.

### Appendix Table 13

#### Annual Distribution of Sturm, Ruger Revolvers Produced for The U.S. Market and Annual Distribution of Sturm, Ruger Revolvers Recovered in Crime over The Past 20 Years

Year	Annual Number of Sturm, Ruger Revolvers Produced for U.S. Market	Annual Number of Sturm, Ruger Revolvers Produced/ Adjusted for Depreciation	Percent Distribution of Sturm, Ruger Revolvers Produced/ Adjusted for Depreciation	Percent Distribution of Sturm, Ruger Revolvers Recovered (1987-1999) in Crime
1979				
1980				
1981				
1982				
1983				
1984				
1985				
1986	155,526	136,863	7.93	8.55
1987	157,594	140,259	8.13	6.69
1988	201,786	181,607	10.52	6.51
1989	185,335	168,655	9.77	7.99
1990	119,181	109,647	6.35	7.16
1991	85,257	79,289	4.59	7.62
1992	105,671	99,331	5.75	9.11
1993	141,861	134,768	7.81	9.20
1994	136,394	130,938	7.59	6.97
1995	148,439	143,986	8.34	7.53
1996	166,123	162,801	9.43	6.04
1997	118,736	117,549	6.81	4.93
1998	120,417	120,417	6.98	11.71

<sup>1</sup>Numbers are reported in the thousands.

<sup>2</sup>Adjustment for depreciation assumes that the number of Sturm, Ruger revolvers produced in a given year is reduced at a rate of 1% annually due to physical breakage or permanent loss.