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Abstract

This paper provides an economic analysis of underground gun markets drawing on interviews with gang members, gun dealers, professional thieves, prostitutes, police, public school security guards and teens in the city of Chicago, complemented by results from government surveys of recent arrestees in 22 cities plus administrative data for suicides, homicides, robberies, arrests and confiscated crime guns. We find evidence that transactions costs are considerable in the underground gun market in Chicago, and to some extent in other cities as well. The most likely explanation is that the underground gun market is both illegal and “thin” – relevant information about trading opportunities is scarce due to illegality, which makes search costly for market participants and leads to a market thickness effect on transaction costs.

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This paper provides an economic analysis of underground gun markets drawing on interviews with gang members, gun dealers, professional thieves, prostitutes, police, public school security guards and teens in the city of Chicago, complemented by results from government surveys of recent arrestees in 22 cities plus administrative data for suicides, homicides, robberies, arrests and confiscated crime guns. Systematic data on prices and quantities are generally lacking for underground markets, and ours is no exception. But we are able to provide a qualitative picture of how Chicago's underground gun market operates, and offer some tentative thoughts about what these results might imply for American gun markets and gun policy more generally.¹

This topic is of interest in part because of the prevalence of gun violence in the U.S. Despite a dramatic decline in crime during the 1990s, America still has a homicide rate that is about four times as high as in England and Wales (FBI, 2005, Home Office, 2006). Because firearms are involved in 70% of all American homicides but fewer than 10% of those in England and Wales, the difference in overall homicide rates across these countries is driven largely by gun homicides. The total social cost of gun violence in the U.S. was estimated to be on the order of \$100 billion per year in the mid 1990s (Cook and Ludwig, 2000).

Underground gun markets have developed in America in response to regulations that seek to prohibit ownership and possession by that sub-set of the population deemed to be at unacceptably high risk of misusing guns – primarily youth and adults with serious prior criminal records – while preserving easy access for everyone else. Whether

¹ Most of what is known about the underground gun market comes from interviews with incarcerated prisoners or inner-city youth (for example Wright and Rossi, 1994, Webster et al., 2002, Sheley and Wright, 1993, Callahan and Rivara, 1992). However such interviews can at best shed light on how a subset of the retail market operates, and are not informative about other aspects of market structure or conduct.

the gun market can be segmented in this way remains the topic of spirited debate in U.S. policy circles. In Section 1 we review this regulatory system and note that a few jurisdictions, including Chicago, go further and essentially prohibit the private possession of handguns, the type of gun most commonly used in crime and violence. The fact that Chicago has unusually restrictive regulations makes the city an interesting case study.

Economists and other skeptics like to point out that government prohibitions on transactions are difficult to enforce; the ingenuity of the marketplace, motivated by profit, will overcome whatever legal obstacles are put in place. If true for handguns in Chicago, then we would expect to find that youths and criminals are able to acquire them with little trouble (low transaction costs) at prices not that much higher from those in the legal market. As New York University law professor James Jacobs observes in this regard, “Some criminals claim that it is as easy to buy a gun on the streets as it is to buy fast food. One Chicago gang member stated, ‘It’s like going through the drive-through window. Give me some fries, a Coke, and a 9-millimeter’” (2002, p. 150).²

The first contribution of our paper is to establish the existence of substantial transaction costs in the underground gun market, based on a series of in-depth ethnographic interviews conducted in two high-crime neighborhoods on Chicago’s South Side by a member of our research team (Sudhir Venkatesh, hereafter SV). In Section 2 we document large mark-ups over legal prices, substantial search costs, a high rate of uncompleted transactions, and substantial physical risk and uncertainty about gun quality. Moreover a variety of administrative data and a separate government city-wide survey of arrestees suggests that high transaction costs may be characteristic of gun markets

² Jacobs’ quote is taken from Don Terry, “How Criminals Get Their Guns: In Short, All Too Easily,” *The New York Times*, March 11, 1992, p. A1.

throughout Chicago. This finding stands in stark contrast to both standard economic intuition and the prevailing common wisdom about gun markets in America.

We argue in Section 3 that the most likely explanation for these transaction costs is the fact that the gun market is both illegal and “thin,” that is, has few buyers and sellers. The illegality of the gun market increases search costs for prospective trading partners. Diamond (1982) notes that in this type of trading environment there can be a market “thickness effect” on transaction costs. But why are there not more buyers and particularly sellers in the gun market? In particular, why don’t drug-selling gangs take advantage of their existing connections to both gun sources and customers to diversify into the gun trade? One candidate explanation is anti-gun policing, which has long been a high priority for the Chicago Police Department. An alternative explanation is that gangs suppress any gun-trade activity on their turf to establish monopoly power over the capacity for lethal violence. We find that the first explanation is better supported than the second – the evidence indicates that gangs avoid selling guns for fear of jeopardizing the profits associated with the more lucrative drug trade, but do not actively suppress gun market activity.

In Section 4 we consider the degree to which the transaction costs we find in Chicago might be due to factors unique to that city, using survey data on arrestees in 22 cities. These data suggest that high transactions costs are the norm in underground gun markets. To the extent that exchanges are more difficult in Chicago’s gun market than elsewhere, it is because of the city’s historically low rate of household gun ownership and police emphasis on guns.

From a social welfare and policy perspective we are also (or perhaps especially) interested in the question of whether friction in the underground gun market winds up influencing gun involvement in crime. Section 7 reviews some evidence suggesting an affirmative answer. We discuss the limitations and implications of these findings, and directions for future research, in Section 8.

1. Background on Gun Markets in America

The underground market in the two neighborhoods studied by SV, and in Chicago more generally, is shaped by the legal framework that regulates gun ownership and transactions. The prevalence of guns in private hands is also relevant, since one source of guns to underground transactions is the existing stock.

1.1. Regulatory Framework

The 1968 Gun Control Act (GCA) requires everyone “engaged in the business” of selling guns to obtain a federal firearms license (FFL). Since 1994, all FFLs have been required by either the federal Brady Act or more restrictive state laws to conduct background checks to verify the eligibility of prospective gun buyers (Ludwig and Cook, 2000). Private owners who are not “engaged” in the gun business are not required to obtain a FFL. The only federal restriction on these sales is that the seller cannot knowingly provide a gun to someone prohibited by law from having one (Cook et al., 1995, Vernick and Hepburn, 2003).³

Under the regulatory system established by the GCA, states are allowed to impose additional restrictions on gun transactions beyond those required by federal law. For example several states require that all guns be registered with the authorities or that all

³ The federal Gun Control Act bans possession by a number of categories of individuals, including convicted felons, those under indictment, and those convicted of a domestic violence offense. Individuals under age 18 are barred from possession of a handgun unless under supervision.

gun owners obtain state licenses, or both (Vernick and Hepburn, 2003). These requirements are intended to provide officials with some way of tracking – and thus regulating – secondary market gun sales.

1.2. Diversions from Legal to Illegal Hands

Nationwide, few criminals get their guns directly from licensed gun dealers (Wright and Rossi, 1994). But the legal market for guns and legal ownership patterns affect supply in the underground market through theft. With somewhere between 200 and 250 million guns in private hands in the U.S., many of which are stored unlocked in order to be readily available for use against criminal intruders, it is not surprising that a large number of guns (over 500,000) are stolen each year (Cook and Ludwig, 1996).

Another source of guns for the underground economy consists of unregulated secondary market sales, estimated to be on the order of 2 to 3 million per year (Cook and Ludwig, 1996). Organized gun shows appear to account for just a small share of all secondary market transactions, including those involving criminals (Wright and Rossi, 1994; Cook and Ludwig, 1996). In addition to secondary market sales for cash, guns may be loaned out among friends and relatives.

A final way in which guns wind up in the hands of criminals is when a legal owner “converts” into a criminal. A very large share of all gun crime in the U.S. is accounted for by people not legally allowed to have guns (Cook and Laub, 1998, Cook, Ludwig and Braga 2005). However there is still a large amount of gun violence committed by adults who legally owned guns before using them in crime.

1.3. Chicago’s Regulatory Environment

Chicago provides a particularly interesting case study for understanding underground gun markets because the city has unusually restrictive firearm regulations by American standards. The city is located in the state of Illinois, which requires all gun owners to obtain a Firearm Owners ID card and bans private transfer of a gun to anyone lacking such a card. Chicago itself goes still farther, since 1982 essentially banning handguns except for those already in circulation that were then registered with the city. Furthermore, there are almost no legal firearms retailers operating in the city, so that a private citizen seeking to buy a firearm of any sort must travel outside of city limits.

2. Underground Gun Markets in the Chicago Ghetto

The underground gun market in the Chicago neighborhoods we study is characterized by substantial transaction costs, by which we mean large mark-ups over legal prices, substantial search times and uncompleted transactions, uncertainty about gun quality, and the physical risk associated with exchange. This finding stands in stark contrast to prevailing wisdom about how these markets operate.

2.1. Study Neighborhood

Our study draws on uniquely detailed data about underground gun markets derived from SV's intensive field interviews conducted in the high-crime community in South Side Chicago known as Grand Boulevard / Washington Park (hereafter GB/WP). The selection of this site is partly pragmatic, given the proximity to SV's initial academic home (the University of Chicago). However this area is also of particular interest given that gun crime in America is disproportionately concentrated in large cities, and within these cities occurs disproportionately in highly disadvantaged neighborhoods.

The target community is a large contiguous swatch of poor and working-class neighborhoods in the South Side of Chicago that forms the heart of the “Black Metropolis,” Chicago’s most historic African-American settlement. The community has become a space of considerable gentrification and economic development, thereby combining extremely poor city blocks – including the site of the notorious Robert Taylor Homes public housing project – with blocks of middle-class homeowners.⁴ Despite these recent changes, data from the 2000 Census show that residents of the community are still mostly African-American and much more disadvantaged than other residents of Chicago or the U.S. as a whole (Table 1). The homicide rate in the GB/WP area is about 75% higher than in the city of Chicago overall, and is about 6 times the national rate.⁵

SV’s interview samples are defined by age and criminal orientation, as well as people’s role in the underground gun market.⁶ The goal was to ensure that each “type” of neighborhood resident is represented in the study, but the particular set of individuals interviewed within each type is essentially a convenience sample. Interviews were conducted with around 190 non-gang affiliated youth (under 22 years of age), of whom 116 owned a gun, and around 75 gang-affiliated youth, whose gun ownership status is difficult to determine from these interviews directly since gangs strictly regulate access to

⁴ The physical infrastructure of the area is changing dramatically because of public housing demolition and heightened gentrification. Given these changes we focus only on gun markets outside of public housing, given that any in-depth findings on public housing-based gun use and trading would soon be outdated.

⁵ The Greater Grand Boulevard area consists of three “community areas,” the official administrative unit that sub-divides Chicago: Oakland, Grand Boulevard, and Washington Park, which in 2003 had 17 homicides and a population of 48,262 (Chicago PD Annual Report, 2003).

⁶ Sample size is a somewhat imprecise concept with ethnographic fieldwork, since for example some of these discussions might be held informally with a group of public in an apartment building hallway. We try to count “respondents” only as those with whom SV had a reasonably lengthy one-on-one discussion. There is also some ambiguity about people’s roles within the neighborhood; for example SV’s definitions of “gang affiliated” may not correspond to those used by the Chicago Police Department.

guns for youth.⁷ SV also interviewed around 90 non-gang affiliated adults, of whom half owned a gun; and 57 interviews with gang-affiliated adults (including 12 gang leaders), of whom 50 owned a gun. In addition SV interviewed 12 elite gun suppliers (importers or wholesalers), 11 retail brokers, 17 adults engaged actively with criminal associations, and 77 prostitutes.

SV's interviews about gun markets and experiences did not employ a standard survey questionnaire, but rather in the tradition of ethnographic research are less structured conversations designed to allow new ideas to flow from the respondent's remarks. The standard interview protocol was to review the goals of our study and the consent form, and then initiate a general conversation with a few lead-in questions (such as, "Let's talk a bit about how people acquire guns in the neighborhood...")

2.2. Characteristics of the Underground Gun Market

2.2.1. Gun Demand: What motivates the demand for guns in the GB/WP area? For many people the answer seems to be to show their guns rather than to shoot them.

The demand for guns can be partitioned into four groups, by age and degree of criminal involvement. SV's younger informants seek guns for the status they confer, rather than as inputs into a crime production function. With status goods economists sometimes refer metaphorically to "arms races," but in the market for guns among young people there seems to be a literal arms race at work. As one young gang member notes, in the absence of having a gun: "Who [is] going to fear me? Who [is] going to take me seriously? Nobody. I'm a pussy unless I got my gun."

Just showing rather than actually firing guns is usually sufficient for the purposes of achieving the desired result. As one youth noted, "You have to let [other people] see it

⁷ Note human subjects requirements prevented us from interviewing minors, so youth are 18 and older.

without letting them see it. See, it's all about them not messing with you." As another youth noted, "Like them slick flicks [pornographic movies], it's all about the bulge. It never even gets that far [explicitly showing other people the gun]." Another non-gang affiliated youth notes: "Thing is, see, it ain't really about fighting or nothing, because even if you have a group of guys and you see a group of guys, lot of times, it's just you show 'em you got one, they show you they got one, and you just be on your way. It's just like signifying that you prepared."

Even for older gang members and professional criminals who are regularly engaged in crime, gun use was typically limited to simply brandishing the weapon. For example of the 57 older gang members SV interviewed, only around 10% admitted to having fired their gun during a robbery.⁸

2.2.2. Gun Quality: Prevailing wisdom about the demand for gun quality in the underground market is nicely summarized by Wright and Sheley (1992, p. 33): "No military force willingly enters battle with inferior weapons, and likewise, no central city resident would willingly carry anything other than the best small arms available."⁹ We instead find that preferences for gun quality are heterogeneous, consistent with the findings noted above that many consumers seek guns for status or show rather than as inputs into a crime production function.

SV's younger informants tend to be quite ignorant about gun quality and general gun use. Fewer than one in ten of the 190 non-gang affiliated youth SV interviewed had

⁸ One notable exception is for robbing drug dealers. One informant described to SV his technique of firing a shotgun through the dealer's door in order to "buy yourself some time to steal their shit because it makes so much noise ... and they need to see you mean business."

⁹ Some criminologists, such as Kennedy et al. (1996), have observed that criminals may tend to acquire low quality guns in practice even though some express a desire for high-quality guns. ATF's top-ten crime-gun lists (e.g. ATF 2000b) have long noted the prevalence of cheap guns used in crime.

ever been taught how to use a gun.¹⁰ Older gang members and professional criminals tend to be more discerning. One older gang affiliate recounts his gun preferences for the purposes of robbing commercial establishments, especially for daytime robbery:

“When [cashiers] see that Glock [manufacturer of popular 9mm semi-automatic pistols] or that .38 [caliber handgun] – I mean, a .44 [caliber] would be better, but that’s hard to find around here – then you get that cash quick. You don’t want to be keeping one of them sissy weapons.”

The presence of buyers who are indifferent to whether a gun works helps explain how the market handles the problem that guns are “experience goods” – sellers for obvious reasons discourage buyers from test-firing the gun during the transaction. The same information problem that faces buyers – working and non-working guns are often observationally equivalent – means that youth can “produce” the ultimate services of interest (status, intimidation) with a broken gun as easily as with a working gun.

2.2.3. Gun Prices: Interviews by SV with 116 gun-owning non-gang affiliated youth (under 22 years) reveal prices paid that range between \$250 and \$400. Interviews with 11 local gun brokers, who handle a large share of retail transactions on behalf of importers, found that most of their guns are sold for between \$150 and \$350. The street prices for guns reported to SV seem high given that many of these guns are of low quality, manufactured by companies such as Lorcin, Raven and Bryco. These names are often mentioned to SV in interviews and as noted above also show up frequently in administrative data on confiscated crime guns maintained by ATF. While SV’s interviews do not include information on the condition of the gun, it is noteworthy that

¹⁰ For example one youth, “Tony,” narrated a common learning experience. SV: “So, how did you know what to do with the .38?” T: “I took it, started putting bullets in. Hell, I even put a rock in there and tried to fire it! You know, I just fiddled with it.” SV: “Did it fire?” T: “I’m not sure. I think it did.” SV: “Well, that’s kind of like saying ‘I might be pregnant.’ Either it fired or it didn’t.” T: “I mean it made a noise.” SV: “Um, hmm. A noise. So, you really don’t know anything about guns except possibly how to kill yourself.” T: “Listen, it’s not like we get taught that in school.”

most pistols from these manufacturers listed on websites (such as gunsamerica.com) sell for between \$50 and \$100 (with a \$10 mailing / transaction fee), even for those used guns that are reported to be in “excellent condition.”¹¹

Thus the price markup in the underground market appears to be substantial. The street markup for illicit drugs such as heroin and cocaine is higher (Koper and Reuter, 1996; Miron, 2003). But the closer analogy is with prescription drugs that are diverted into illicit transactions, such as with Oxycontin or Ritalin.

2.2.4. Volume of Transactions: The underground market in firearms is a small part of the overall underground economy. We estimate that there are no more than 1,400 gun sales per year in the GB/WP area,¹² or about 1 sale per year for every 30 people living in this very high-crime neighborhood. By comparison there would probably be at least 200,000 and perhaps as many as 1 million cocaine sales in this community every year – a difference of up to three orders of magnitude. Total revenue in this community for gun sales would be on the order of \$200,000 to \$500,000, compared to perhaps \$10 or \$20 million in the market for cocaine.¹³ Our findings in this sense are quite consistent with those reported by Koper and Reuter (1997).

¹¹ Under federal law guns can only be sent by mail to licensed dealers, so these web sites require some FFL to broker the sale.

¹² SV interviewed five gun “brokers,” discussed in more detail below, who report an average number of gun transactions during the past year of 16. We knew of 24 brokers working during the 15 month period of our fieldwork, and believe there were no more than 5 or 10 additional brokers not known to us, so we conservatively assume 34 total brokers in operation in the GB neighborhood, who (if our group of 5 interviewees is representative) would have facilitated a total of 544 sales. Gun suppliers report that 60-80% of their sales are negotiated through brokers (we assume the 80% figure) and by our own estimates gun suppliers account for around half of all gun sales in the GB community, implying a total of around 1,360 gun sales per year. There are about 48,000 residents in the combined GB neighborhoods.

¹³ Our thanks to Peter Reuter for these drug market calculations. He notes that each year in the U.S. there are perhaps 250 tons of pure cocaine, sold in pure units of 250 milligrams, suggesting around 1 billion sales nationwide each year. If we assume the national rate applies in the South Side GB/WP neighborhood then there would be around 200,000 transactions, but given that this area is unusually disadvantaged there could plausibly be as many as 500,000 or even a million sales per year.

2.2.5. *Search Costs*: SV's interviews provide three types of evidence for substantial search costs in the underground gun market in the GB/WP area:

- A system of local brokers has developed to facilitate market exchange and typically charge \$30 to \$50 per transaction, a large percentage of the sales price. These brokers capitalize on the information they have about the local underground economy – of the 11 brokers SV interviewed, all were over 30 and long-time residents of the area, and most were either participants in or closely connected to suppliers in the illegal markets for sex, gypsy cabs, or unregulated car repair or hairstyling.
- Even local gun brokers report that a large share of their transaction attempts goes unfulfilled – around 30-40%. Reasons included the inability to get a gun from a supplier; the customer and broker could not agree on the location for the transaction; and the broker either did not trust the customer's intentions or thought he or she was an undercover police officer.¹⁴
- Interviews with 17 young adults who consider themselves “regular” thieves, self-defined as deriving a substantial share of income from crime and engaging in at least four thefts per year, further support the general finding. Of the 17 interviewees in this group, only one person said they could find a gun in less than a week.

The search process in this market is further complicated by the fact that participants now also require information about prospective trading partners to engage in exchange.¹⁵ In this market, reliable “connections” appear to be scarce. The underground market for guns in Chicago does not involve large amounts of money, but executing transactions with strangers is surely a risky business. The buyer may be an undercover police officer or potential informant, or simply dangerous. One gun dealer explained his preference for relying on brokers rather than dealing directly with customers:¹⁶

¹⁴ In other cases, the transaction failed because the customer failed to bring enough cash to the transaction or tried to negotiate down the price.

¹⁵ In an analysis of drug law-enforcement strategy, Mark Moore points out that “...what is consistently difficult about drug trafficking is the process of reliably executing large financial transactions in a crooked world with no police or courts to enforce the contracts (Moore 1990, p. 138).”

¹⁶ The account suggests part of the broker's fee is rent on broker information, and part is compensation for the unavoidable risks associated with selling guns.

“You never know who these niggers are that need these things. Sometimes they just act crazy on you, ‘cause you know, if I want a gun, then usually you pissed off. And, I don’t like messing with these fools, ‘cause they sometimes don’t pay, they steal your shit. And, you know, they could be working for the cops, too, so I got to trust the folks I’m working with.”

Why do people tolerate these search costs when any Chicago resident can identify the location of numerous licensed suburban gun dealers with a quick search of the local phone directory or the Internet? These dealers are not prohibited from selling guns to Chicago residents. Even those people who are themselves ineligible to buy a gun from a licensed gun dealer can get someone else, usually a wife or girlfriend, to make a “straw purchase” on their behalf if she obtained an Illinois Firearm Owners ID (FOID) card. The answer is in part that the residents of SV’s neighborhoods are very parochial, perhaps because gang turf increases the costs associated with traveling to other areas.¹⁷

One gang leader notes:

“Most of us, we never been outside these four or five blocks, our neighborhood. Now, how can you bring the guns here if you don’t even know how to get to other places? ... Even if we go to jail, we really spend most of our time around where we live, where we work.”

Table 2 presents the results of our analysis of administrative data on confiscated crime guns that were traced by the ATF. Chicago submits all confiscated crime guns for tracing during our study period, although of course only a small fraction of the crime guns are confiscated (see Cook and Braga, 2001, and our data appendix). With this caveat in mind, the first column of Table 2 shows that guns recently purchased in the Chicago suburbs of Cook County account for only around one-tenth of the crime guns in

¹⁷ Another possible explanation is that federally licensed firearm dealers (FFLs) are by law required to record the identity of the official purchaser, which increases the legal risk associated with buying a gun from a dealer (even if one’s girlfriend or wife makes a straw purchase).

the GB/WP community, with only about a fifth of these guns (2 percent of the total) first purchased by a female.¹⁸

2.2.6. *Gun “Rentals”*: SV’s interviews suggest that guns are often loaned out or shared in the GB/WP neighborhood. However most of these exchanges occur outside of the market context and occur among people within the same social network, and so do not conform to what we would think of as a normal “rental market.” In SV’s 116 interviews with non-gang affiliated youth who had owned a gun, 40% reported obtaining their gun from a relative.¹⁹ (The importance of family sources for this group is consistent with previous surveys of criminally active youth (Koper and Reuter, 1996).) Youths often share guns and even join together to purchase a gun collectively.²⁰

2.2.7. *Ammunition*: Ammunition (like handguns) is exchanged in the underground market in Chicago.²¹ Most people interviewed by SV have trouble securing ammunition and faced considerable price markups compared to the legal market. Waits of 1 to 4 weeks for ammunition were not unusual. As one respondent noted, “You really don’t have someone who sells ammo around here, I mean its like you have to hope you can get

¹⁸ Our finding that straw purchasing is rare in Chicago’s underground gun market is consistent with results from interviews with incarcerated juveniles in Maryland, who also report rarely leaving their communities to get guns (Webster et al., 2002). It is possible that increased enforcement by Chicago Police Department and ATF over the course of the 1990s made it less attractive for gun traffickers to use females as straw purchasers of new guns at nearby licensed dealers.

¹⁹ In addition, 35% obtained their gun from someone affiliated with a gang; 17% from a licensed security guard; 6% from a broker; and 2% from some other source.

²⁰ The fact that youth sometimes pool resources to buy a gun collectively poses some methodological problems because “gun ownership” in the conventional sense (of a gun owned by an individual) may not always apply in inner city contexts. Thus, a researcher interviewing all members of a peer group may hear reports of the existence of several guns, whereas only one exists. Wherever possible, SV tried to ensure that this over-count did not occur during interviews, but we can’t be certain every instance was eliminated.

²¹ Chicago law forbids the possession of ammunition except if the individual “is the holder of a valid registration certificate for a firearm of the same gauge or caliber as the ammunition possessed, and has the registration certificate in his possession while in possession of the ammunition,” or “is a licensed weapons dealer ... or [runs] a licensed shooting gallery or gun club.” Put differently, anyone found in illegal possession of a gun will also by definition be in illegal possession of ammunition if the gun is loaded. Secondary sales of either guns or ammunition are illegal by private parties in Chicago.

it from [the organization] or maybe [a gun broker]. But you never know, so, lots of times its just a waiting thing, where you hope that someone who you got the gun from might have some bullets. But that really never happens, usually it's the gang that sells it or you just know somebody.” One non-gang affiliated youth reported that he spent \$50 to get 10 bullets for a Beretta semi-automatic for which he had paid \$300. By contrast, for \$50 in the legal market one can purchase a box of 500 rounds of 9 millimeter ammunition. The ratio of street to legal prices in this case is on the order of 50 to 1.²²

While older professional thieves often have more reliable sources of ammunition, even this group carefully rations bullets. One professional criminal reports to SV: “I’m stealing a lot of car radios right now, and sometimes, if I get really brave I may try to take a purse. For that shit, I keep the gun, but I never use it, you know. I don’t even load it, I keep the bullets I got for the bigger shit I do.” Because most people rarely if ever fire their guns is essentially a durable good.

2.3 Characteristics of Crime Guns in the Rest of Chicago

As it turns out, the neighborhoods studied by SV are not unique, but rather quite typical of the city as a whole with respect to the underground gun market. Compare for example the first and second columns in Table 2 on the proportion of confiscated crime guns traced by ATF that show the hallmarks of having been “straw purchased” in suburban gun stores. Appendix Tables A1 through A4 show crime guns found in SV’s study area are similar to those from the rest of Chicago along many other dimensions as well. The similarity between these administrative data and SV’s interviews of course also enhances our confidence in the reliability of the latter.

²² http://www.ammunitionstore.com/pricelist_ammo4.htm#9mm

Table 3 suggests SV's findings are also consistent with the reports of 1,194 arrestees interviewed in Chicago in 1996-7 as part of the U.S. Department of Justice's Drug Use Forecasting (DUF) system (see data appendix). For example, the distributions of prices paid are quite similar: Of the 20% of DUF arrestees who ever owned a gun, more than two-thirds report having paid between \$100 and \$499 for their most recent gun, with a median price of \$150. DUF respondents also report high transaction costs. Of those arrestees who never owned a gun but indicated they might want one someday (just under one-quarter of those who never had a gun), fully 61% indicated that it would take them more than one week to get a gun.

The apparent similarity of gun markets in SV's neighborhoods to those in the rest of Chicago means that when we turn to explaining the source of these transaction costs, neighborhood-specific factors – such as distance to suburban gun stores or community attitudes towards guns or gun violence – cannot play a very important role.

2.4 Conclusions

Based on SV's interviews and other sources, it is clear that the underground market for guns and ammunition in south side of Chicago is rather small, whether measured in terms of the number or the value of transactions. More surprising are the high transactions costs in this market. Transaction prices tend to be substantially elevated relative to the licit market for used guns. Even so, the information required to arrange a reliable purchase or sale is scarce, resulting in long search times. Some buyers turn to brokers, who charge a substantial fee for their services and earn it, given the risks and uncertainties involved. While there are social networks of family members or friends that sometimes share a gun, that possibility is not generally available to youths and criminals.

There is some evidence that underground gun markets in other Chicago neighborhoods are quite similar.

3. Explaining Transaction Costs in the Underground Gun Market

Why do the high transaction costs documented in the previous section exist and persist in the underground gun market on the South Side of Chicago? Existing research in economics suggests that in market environments where search for trading opportunities is costly and information is scarce, there can be a market “thickness” effect in which transaction costs decline as the number of buyers and sellers increases. This seems like a potentially promising explanation for the high transaction costs we find in the gun market, since illegality makes search more costly. But that leaves unanswered the question of why the gun market is so thin. In the second sub-section below we consider the role played by policing and gangs. In Section 4 we turn to factors that might be unique to the city of Chicago, with an eye toward understanding the generalizability of our Chicago findings and identifying policy levers to further reduce the efficiency of these markets (Schelling, 1967).

3.1. Theory

The illegality of the gun market in Chicago creates information problems in matching prospective buyers and sellers. Neither side of the market can legally advertise, and the illegality of the market means that participants do not have recourse to the courts if defrauded in a transaction. The risk of theft, arrest, injury or even death associated with exchange means that buyers and sellers will want to be selective about whom they do business with and obtain additional information about the characteristics of their trading partners. Given the information requirements and scarcity associated with

exchange in the underground gun market, economic models that emphasize search costs are a natural starting point for understanding the source of the transaction costs that we document in the previous section.

The stochastic matching model developed by Diamond (1982) provides one way to understand transaction costs in the gun market. The prohibition on gun sales in Chicago introduces trade frictions, and moves us away from what Diamond (1982) describes as the “fictional Walrasian auctioneer” that is usually assumed to facilitate exchange. Illegality makes it difficult to advertise, and so trade requires search effort by both buyers and sellers with some probability of failure that is inversely related to overall market activity. In this type of environment economic activities can create trading externalities and positive feedback effects: “The externality comes from the plausible assumption that an increase in the number of potential trading partners makes trade easier. The positive feedback is that easier trade, in turn, makes production more profitable” (Diamond, 1982, p. 882). That is, there will be a market “thickness” effect where search costs decline with an increase in the number of market participants.

Similarly, Gan and Zhang (2005, 2006) develop models with heterogeneity in products and buyer preferences, where search costs lead to a market thickness effect on match quality. Since match quality is relevant to our definition of transaction costs – product uncertainty and risk of injury or arrest should be lower when buying or selling a gun to someone about whom more is known – this type of model provides another complementary explanation for why there would be a market thickness effect on transaction costs in the gun market. An increase in the number of market participants

increases the odds of encountering a buyer or seller that one knows or is at least known within one's social network.

Note this literature suggests it is in large part the *combination* of illegality and “market thinness” that drives the transaction costs we document in the underground gun market. In “thin” but legal markets, trading institutions can develop to reduce the costs to buyers and sellers of finding trading partners. For example, eBay has special sections of its website devoted to the markets for antique dolls (pre-1930), Annette Funicello bears, imitation pearl pins and brooches, and game-used Major League Baseball memorabilia.²³ If the market were illegal but with strong demand, as for narcotics, then sellers would find it worthwhile to make the product more readily available (Koper and Reuter, 1997; Venkatesh, 2006).²⁴

3.2. Sources of Market “Thinness”

Why is the gun market so “thin”? The descriptive results presented in Section 2 suggest that the durability of guns (and ammunition) play a role in limiting the number of would-be purchasers, as does the possibility of shared ownership of guns by groups of youth. Less obvious is why there is such limited entry into this market on the supply side.²⁵ One basic explanation is that the prevalence of gun ownership in Chicago is relatively low, so that the usual diffuse sources of guns to criminals – theft, casual

²³ See www.ebay.com

²⁴ For example drug-selling corners have developed in that market and seem to change locations easily in response to law-enforcement pressures, given that buyers and sellers are closely connected and so information about changes in trading locations is easily transmitted back and forth. In contrast in the underground gun market some white ethnic street gangs or gun importers help organize fist-fighting events in the city's warehouses, but these occur only every 3-4 months. The coordination costs of moving these fighting events in response to legal or other threats is greater than with relocating a drug corner, and so these events are advertised only among a selected clientele.

²⁵ On the demand side, many owners loan their guns out and never get them back, lose them, or sell them when cash is tight (Cook et al., 1995). In addition many youth in SV's neighborhoods seem to have trouble finding suitable places to store their guns, which further increases the probability of theft or loss (Cook et al., 2005).

exchanges with acquaintances – have limited scope. Even so, drug dealers and drug-dealing gangs in particular could fill the gap, since they do have access to guns and they regularly come into contact with many of the people who would at least periodically want to purchase one. In what follows we explain the limited role of the gangs in terms of their concern for protecting their main business interests in the face of police pressure. In Section 4 we then go on to discuss the underlying issue of gun prevalence in Chicago in comparison with other cities.

3.2.1. Police and gangs: A drive through Chicago’s South Side highlights the limited ability of police to control the underground markets for drugs and sex services; street corners populated by drug dealers or prostitutes are a common sight, even in the middle of the day.²⁶ And yet we find that the police activity does seem to substantially discourage participation in the gun trade. Police pressure against guns adds some fixed costs to selling guns by jeopardizing gang profits from the more lucrative drug trade. In fact, the Chicago Police Department (CPD) has had an exceptional and long-standing emphasis on taking guns off the street. Starting in the 1950s the CPD has emphasized a policy of “making your presence felt,” which involves getting patrolmen out into the community to interact with the public, make vehicle or other stops and search for guns as appropriate. At least during the 1950s and 1960s officers who confiscated illegal guns were provided with departmental citations.²⁷ During the period 1999-2003, the Chicago

²⁶ Previous research finds evidence that increased police resources can reduce violent or property crimes (Levitt, 1997, 2002; Sherman, 2002; Machin and Marie, 2005). Policing may be less effective in disrupting underground economic activity given the greater potential for replacement effects (Cook, 1986).

²⁷ Personal communication of Philip Cook with Herman Goldstein, August 18, 2004.

Police Department averaged over 10,000 firearms confiscations per year, far in excess of other large cities.²⁸

While historically gangs were often organized for defensive or social purposes (Klein, 1995),²⁹ over time gangs have undergone a process of “corporatization” (Taylor, 1990, Levitt and Venkatesh, 2000). The most important income-generating activity of the gangs studied by SV on the South Side of Chicago is the distribution of illegal drugs (Levitt and Venkatesh, 2000). Given the police interest in guns, it is simply bad business to diversify from drugs to guns.

As one gang leader explained to SV about why his organization does not sell guns: “It’s really not worth it because not that many people buying.” Another gang leader notes: “Police don’t like [guns] moving around here, man. We stay away from that shit, see, ‘cause we already got enough trouble with them [police].”³⁰ Police typically assume that gang members or alumni caught in possession of a gun obtained the weapon from the gang and so crack down on the gang accordingly.³¹ These remarks are consistent with what one police officer explained to SV:

“Look, I’ll be honest with you. There will always be drugs, drug dealing and drug dealers. The reason we get tight on guns is that it’s better that there be drugs and no one gets killed than if someone gets killed. We love guns! We love getting

²⁸ Chicago Police Department, *Annual Report: 2003 Year in Review*. By comparison, from 1999-2001 a total of around 12,000 guns of all types were confiscated each year in New York State as a whole (Council of the City of New York, Office of Communications, September 12, 2003, “Committee Hears Testimony on Proposals to Stem the Flow of Illegal Guns Into the City”).

²⁹ Akerlof and Kranton (2000) provide another explanation for gangs – the utility from identity.

³⁰ Another gang leader expressed his frustration about gun use by gang alumni: “It’s like these niggers get stupid after they leave. I mean, they know not to keep a gun on them when they do this [engage in income-generating crime], ‘cause the cops hate that shit. I mean, they could use a knife or something. Why the gun? That just brings down [the police] on us really, I mean, that’s the thing that happens all the time, [the gang] gets blamed and we get shut down.”

³¹ During SV’s fieldwork on the GB / WP neighborhood, 43 gang members exited out of the 2 largest street gangs in the area, of which 37 continued to work in some capacity in the local underground economy (such as selling drugs, committing burglars, fencing, or providing off-the-books services as day laborers or security guards). Of this group, 11 were arrested and in every case a gun was confiscated. In 7 of these cases, the police confronted the gang leaders about whether they had provided the suspect his gun.

them because it makes the job easier on the street. So, when we find one, yes, we really go after them [gang leaders] because they know the rules. They know the agreement, and if we get a gun, that means they broke it.”

The DUF survey reports in Chicago also confirm SV’s field data about the surprisingly limited involvement of drug dealers with gun sales. Only 40% of the arrestees interviewed in Chicago as part of the DUF system agree with the statement that “if you want a gun, drug dealers will be able to get one for you.” Moreover very few people arrested in Illinois from 1990-2001 for drug dealing were in possession of guns.³²

3.2.2. Gangs and the Local Gun Market: It is an intriguing possibility that the gangs could play the reverse role, and actually suppress gun selling by independent operators. There are obvious incentives to the gang to maintain a monopoly over the capacity to inflict lethal violence in the neighborhood. Yet SV’s interviews do not find that gangs expend much effort in suppressing gun markets. Gang leaders are interested in knowing who is selling guns on their turf, and charge the standard “tax” applied to other forms of underground exchange, but do not take any unusual actions to reduce the number of sellers in the gun market.

SV’s interviews suggest that gangs do have access to guns which are made available to members. For members, a gang creates a social network within which gun transactions can be accomplished with relatively little risk. The gang leadership has information about the reliability of its members and can make a credible threat to punish misbehavior. Many respondents to SV’s interviews on the South Side of Chicago report that they joined or stay in the gang to preserve access to guns – another bit of evidence on

³² We find that only a very small share of all drug arrestees are also charged with weapons offenses as part of the same arrest event, and that only a small share of those arrested for weapons offenses are charged with drug offenses. This evidence is obviously imperfect in part because conglomerates could keep their drug and gun inventories separate, and so apprehension for the illegal sale of one good need not involve police discovery of the seller’s inventory of the complementary good.

the difficulty of obtaining one in the underground market. As one former gang member notes, “You never leave [the gang] before you got the gun, because after you leave, they don’t really have no reason to help you get one.”

In practice access to guns within the gang is regulated, with most transactions in the form of loans or rentals with strings attached. The general rule is that members can only own guns if authorized by gang leaders. These gang leaders in turn ration gun ownership in part on the basis of statistical discrimination by age. “Shorties,” young rank-and-file members who often want guns for social status, are typically authorized to access guns during gang wars (though even then many shorties are only allowed to carry knives), drug sales (at least for one member of the 4-6 member drug selling team assigned to provide security), and drug pick-ups and drop-offs outside the gang’s own turf. These constraints are motivated by the gang’s other economic interests, including the fact that gun violence induces police crack downs on gang drug-selling activities, and also may scare away customers.

Sometimes gang leaders actually enlist the police as agents in controlling gun use by notifying the police about unauthorized gun possession by rank-and-file shorties. In this scenario the police usually confiscate the gun but do not make an arrest, which helps to reduce enforcement costs to both gangs and the police. As one police officer notes:

“Yes, I suppose I’ll admit that on occasion, we will act on a call from [the gang leaders]. We prefer to have the guns off of the street. That is our first priority. It’s hard, we cannot stop guns from coming through here, but these kind of arrangements help us to control who gets hurt. That’s not good policing some would say, but they are not seeing what I see every day.”

Older gang members are less likely to use guns in ways that are contrary to the gang's economic interests both because age may reduce impulsivity and because many older members stay in the gang primarily for economic reasons.³³

4. The Chicago Difference

We now turn to a comparison of Chicago with other cities in an effort to further identify factors that may be important in creating the high transactions costs in Chicago's underground gun market, and to determine just how different Chicago may be in this respect from other cities. Guns appear to be somewhat more difficult for criminals to get in Chicago than other cities. To the extent to which Chicago's gun market "works" less well than in other places, the most likely explanations seem to be the city's low rate of household gun ownership together perhaps with the police emphasis on guns.

The sort of detailed ethnographic information that SV collected on underground gun markets in Chicago is not available for other cities. However the 1996-7 interviews of arrestees in 22 cities conducted by the Drug Use Forecasting (DUF) project included an addendum of questions about gun ownership and use. The DUF data are limited by the fact that the study is not intended to provide a representative sample of arrestees in participating cities, and for at least a few cities in the sample the DUF results are inconsistent with what is known from other data sources. Nevertheless the DUF data provide one of the best (albeit imperfect) ways to compare gun markets across cities.

The top panel of Figure 1 shows that the fraction of arrestees interviewed in the Chicago DUF site who report that they ever owned a gun, 21% (measured along the

³³ Gang leaders also value the human capital developed by experienced members and so are more likely to formally or informally waive the gang's rules on gun ownership for older members. As one gang official notes, "The way we do it is that we just don't write down that [the older guys] are carrying something." Gang leaders sometimes use access to guns as an incentive for performance; for example, in some gangs the custom is to provide a gun to members who successfully execute authorized drive-by shootings.

vertical axis) is much lower than the mean and median values for DUF cities (31% and 33%, respectively). The figure also suggests that these surveys are not necessarily reliable – specifically, the rates of gun ownership reported by arrestees in two of the Texas cities in the sample, Dallas and San Antonio, are implausibly low. For that reason we should be cautious drawing strong inferences from the pattern of findings across individual DUF sites. But the fact that only around one-third of arrestees across DUF sites have ever owned a gun – despite the substantial returns to using a gun in crimes like robbery (Cook, 1976) – is striking, and suggests that transaction costs may be high in other cities as well.

Several other measures available from these DUF arrestee interviews also suggest that guns may be difficult for a high proportion of criminals to access across cities. Of the 18% of Chicago arrestees who had never owned a gun but thought they might want one someday, about 70% report that it would take them at least a week (which includes those who say they think they would be unable to get a gun at all), while only around 15% say they could get a gun within a day. In the other DUF sites about 60% of arrestees who had never owned a gun but might want one think getting a gun would require at least a week, while only around 20% think they could get a gun in a day. These extended search times reported by DUF respondents are quite consistent with the interviews conducted by SV in the GB/WP neighborhood on Chicago’s South Side.

The top panel of Figure 1 also provides at least suggestive evidence that a contributing factor to Chicago’s relatively low rate of gun ownership among interviewed arrestees may be the relatively low rate at which Chicago households in general own guns. We find a positive relationship between DUF reports of gun ownership by

interviewed arrestees and the best available county-level proxy for household gun ownership, the fraction of suicides that involve firearms (FSS). The slope for this regression relationship is equal to $+0.310$ ($se=0.155$, $p=0.06$).³⁴

The bottom panel of Figure 1 shows the same basic pattern when we adjust for arrestee and offense characteristics for DUF respondents to account for differences across cities in the survey samples. We first regress the individual DUF responses about lifetime gun ownership against a detailed set of arrestee and offense characteristics.³⁵ We then replace our measure for actual DUF gun ownership on the vertical axis with the DUF site means for the regression residuals, and continue to find a positive relationship between this measure and FSS (slope= $+0.364$, $se=0.151$, $p=0.03$).

To what extent does gun policy contribute to scarcity of guns to criminals? One intriguing pattern in Figure 1 is that the three DUF cities with the most stringent restrictions on private handgun ownership (Chicago, New York City and Washington, DC) are all clustered together with low rates of household gun ownership and low rates of lifetime gun ownership reported by arrestees in the DUF study. But the available evidence does not support a conclusion that the imposition of handgun bans has reduced FSS. Figure 2 shows that Cook County, which is dominated by Chicago, experienced a temporary dip in our proxy for household gun ownership rates, the ratio of firearm

³⁴ The U.S. does not maintain administrative data on gun ownership and most surveys are not representative at the local level. The fraction of suicides committed with guns has been shown to be highly correlated with survey-based estimates of household gun ownership at the state or region level in both the cross section and within jurisdictions over time (Azrael et al., 2004; Kleck, 2004; Cook and Ludwig, 2006a).

³⁵ These characteristics include interactions between gender and race / ethnicity, age (using separate indicators for two-year age categories from 15 through 30, then 5 year age groups through age 60, with a catch-all category of 60 and over), indicators for whether the arrestee self-reports having used drugs in the past year, an indicator for self-reported sold drugs in past year, whether the respondent tested positive for various drugs in the urinalyses tests administered to arrestees as part of the DUF, and whether the respondent self-reports having ever used marijuana, cocaine, or heroin. We also condition on a rich set of indicator variables for the specific criminal charge for which the arrestee was arrested.

suicides to total suicides, or FSS, following the city's handgun ban in 1982. (We present 5 year averages for FSS to reduce measurement error). However a simple difference-in-difference estimate suggests this is not due to the ban, since from 1979-82 to 1983-87 the dip in FSS in Cook County (-4.3 percentage points) is actually smaller than in surrounding counties unaffected by the ordinance (-8.8 percentage points) or in the rest of Illinois (-6.0 points).³⁶ Similarly, household gun ownership rates did not decline in the District of Columbia following the city's handgun ban in 1978, either absolutely or compared to the nearby city of Baltimore over this period (Cook and Ludwig, 2006b, p. 710). The fact that Chicago and DC have low gun ownership rates, now and in the past, may be more cause than consequence of restrictive local gun laws.³⁷

We should note that it is possible that handgun bans affect gun availability to criminals in ways other than by reducing household gun ownership rates, as might occur if owners are now less likely to resell their guns through unregulated secondary market transactions. Our FSS measure would not be informative about these types of effects, and more direct measures of gun access to criminals (such as those in the DUF) are not available for multiple points in time. At the very least Chicago's handgun ban may have helped reduce criminal access to guns by preventing the location of licensed gun dealers

³⁶ Not surprisingly this simple difference-in-difference estimate has weak power: the difference in trends for Cook County FSS versus the other areas is equal to +2.1 percentage points with a standard error of 6.4 percentage points. A common specification test with difference-in-difference estimates is to examine whether trends are similar across treatment and control jurisdictions before the jurisdiction goes into effect, and here we also have weak power: When we estimate a difference-in-difference using our data through 1983 and define the 1978-82 data point as our pseudo-“treatment” period, we get a point estimate for the difference in the Cook County FSS trend versus our other two data series equal to -6.3 percentage points but with a standard error of 10.2 percentage points.

³⁷ It is also possible that the gun licensing and registration law enacted by Illinois in 1968 may have contributed to reducing FSS throughout the state, including in Chicago, but here again we have weak power to detect impacts: The difference-in-difference in FSS trends around 1968 for Illinois versus either nearby states (Wisconsin and Indiana) or the rest of the US is around -3 percentage points, but the standard error is at least as big as the point estimate (see also Figure 2 in Cook, Ludwig, Venkatesh and Braga, 2005).

in high-crime neighborhoods, as suggested by SV's interviews. Yet the trend in the fraction of homicides that involved guns in Cook County over this time period was also quite similar to what was observed in neighboring counties.³⁸

Table 4 shows that Chicago together with Los Angeles are outliers in the DUF sample with respect to gang activity, with around 20% of arrestees in these cities reporting membership in a gang at the time of their arrest, about eight times the median value in the DUF sample and about twice as high as the rate reported in the next-highest city, Birmingham. Chicago and LA continue to have unusually high rates of gang membership if we try to account for differences in DUF arrestee characteristics across cities by focusing on just adult males (last three columns of Table 4) or regression-adjust for a more elaborate set of arrestee and offense characteristics (not shown).

Consistent with SV's interview reports, among DUF arrestees in Chicago we find that the proportion who report ever having owned a gun is much higher for those in gangs compared to other respondents (30% vs 19%). The same differential between gang and non-gang members is found in other DUF cities, although the absolute levels of gun ownership are much higher for both groups (58% and 29%). Interestingly, the ratio of those who report ever having owned a gun to those who report owning a gun at the time they were arrested is higher for gang members compared to arrestees not in gangs, consistent with SV's reports that gangs facilitate access to guns when it serves the gang's interests, but for the same reason also try to restrict general gun ownership by members.³⁹

³⁸ The share of homicides with guns in Cook County was 64.2 in 1978-82, 58.0 in 1983-87, and 65.2 in 1988-92. In neighboring counties the fraction over this time period was 55.9, 51.7, then 56.7.

³⁹ In the Chicago DUF site, the ratio of the share ever owned a gun to the share who owned a gun at the time of arrest is equal to $(.305/.194)=1.57$ for gang members and $(.189/.146)=1.29$ for arrestees not in gangs. In the other DUF sites the ratio is $(.584/.324)=1.80$ for gang members and $(.292/.205)=1.42$ for those not in gangs.

5. Gun Availability and Gun Use in Crime

The previous sections of the paper present evidence that the underground gun market appears to have persistent frictions in high-crime parts of Chicago's South Side, in the rest of the city as well, and to some extent in other cities across the U.S. The key question for social welfare is whether these frictions have any meaningful implications for what really matters for social welfare – gun use in crime. This question is not settled by evidence that a small share of all arrestees interviewed as part of the DUF have ever owned a gun, since it remains possible that the most serious criminals can get guns even most arrestees cannot. The results presented in this section indicate that frictions in the underground gun market do have some impact on gun use in crime.

Suggestive evidence that gun market frictions affect gun use in crime comes from the fact that guns are used surprisingly rarely in crime in the U.S. as a whole, despite the apparent benefits of doing so. For example, Cook (1976) finds that the value of items taken in completed robberies is over twice as high in gun robberies as for other armed robberies. Yet in a country with 200-250 million guns in private circulation, victim reports to the National Crime Victimization Survey (NCVS) indicate guns are used in only around 27% of robberies and 8% of assaults (Perkins, 2003, p. 2). The prevalence of gun involvement in robberies and assaults is a bit higher in data collected by the FBI's Uniform Crime Reports (UCR) system on crimes reported to the police (around 40% and 20%, respectively; *Sourcebook*, 1998, p. 274), presumably because a larger share of non-gun than gun crimes go unreported to law enforcement authorities.⁴⁰

⁴⁰ The relative rarity of gun use in crime by "serious" criminals might be due in part to the extra prison penalties associated with gun involvement, rather than the difficulty to criminals of accessing guns. However previous research yields mixed results on the practical importance of increasing gun sentence enhancements (McDowall et al. 1992, Marvell and Moody, 1995, Raphael and Ludwig, 2003).

The patterns of gun involvement in crime across jurisdictions within the U.S. are also consistent with the idea that guns are used less often in crime in gun markets with more friction. Detailed data on gun markets collected by SV in Chicago are not available for other areas, and even the less-detailed survey data on guns collected by the DUF are available for just 22 cities. So we instead take advantage of the fact that household gun ownership rates (proxied by FSS) are correlated with other measures of gun availability to criminals, as suggested for example by the DUF results shown in Figure 1. We consider the relationship between FSS and gun involvement in crime using data for the 200 counties with the largest populations in the U.S. in 2000. We measure gun involvement in crime using data on the share of homicides and robberies with guns as reported in the UCR.⁴¹ It should be noted that that UCR data are known to have considerable measurement error at the county level (Maltz, 1999). The data that describe gun involvement in these UCR crimes seem even noisier.

The first column of Table 5 shows the cross-sectional relationship between household gun ownership rates and gun involvement in crime: A one percentage point increase in FSS increases the share of homicides (top panel) and robberies (bottom panel) that involve guns by about one-third of a percentage point. We estimate this model pooling three years of data to reduce measurement error in our FSS proxy for household gun ownership rates (Cook and Ludwig, 2006a); given how slowly FSS changes over time within areas, almost all of the variation will be cross-sectional. We focus on the years 1994-96 because these are the last years for which data on gun involvement in robbery are available for Cook County, Illinois, which contains the city of Chicago.

⁴¹ We do not consider the fraction of aggravated assaults that involve guns because this offense is more susceptible to differences across areas and over time in definitional problems about the distinction between aggravated and simple assault.

We initially account for possible confounding factors by conditioning on the percent of the county that is urban and African-American (both powerful predictors of crime), the county's population (in thousands) and population squared to account for the well-documented relationship between crime *rates* and overall city size (see for example Blumstein, 2000). To account for unmeasured criminogenic factors we also condition on the county's burglary rate. The second column of Table 5 shows our analysis is not very sensitive to excluding these covariates, and the third column shows that our cross-section results are also not sensitive to whether we weight by county population or not in the analysis.⁴²

The last four columns of Table 5 demonstrate that the positive relationship between FSS and gun involvement in violent crime is generally robust to conditioning on county and year fixed effects in an analysis of repeated cross-sections for each county over the period from 1979 through 1999. The fourth column shows that a 1 percentage point increase in FSS within a county leads to an increase in the share of homicides that involve guns equal to .16 percentage points (significant at the usual 5% cutoff), with an effect for gun involvement in robbery that is equal to .04 percentage points ($p=.2$).⁴³

Of course without a clear source of plausibly exogenous identifying variation in household gun ownership rates, these estimates may be biased. To explore the issue of causality a bit further, we note that much of the variation in household gun ownership

⁴² We also find that all of the estimates shown in Table 9 are qualitatively similar when we focus on just the 100 or 50 largest counties in the U.S., although the estimates particularly for gun involvement in robbery are usually much less precisely estimated when we employ less data. We cannot focus on all counties in the U.S. because the Vital Statistics system only makes county-level data on suicide mortality available for the larger counties.

⁴³ Bertrand et al. (2004) discuss the problems of incorrectly accounting for serial correlation in difference-in-differences analysis, many of which are relevant for our estimates since our key explanatory variable of interest (FSS) is also highly serially correlated. We present robust standard errors that allow for an arbitrary correlation in error terms over time within each county.

across counties over time in the U.S. over this period results from a general convergence in gun prevalence between the traditionally high-gun regions in the South and West with the region where guns have traditionally been less common, the Northeast (Cook and Ludwig, 2006a). It is thus interesting that when we also condition on county-specific linear trends (last column of Table 5) the positive relationship between FSS and gun involvement in crime remains, at least for homicide, strengthening the case for a causal interpretation.

Finally, it is interesting to consider how gun use in crime in Chicago compares to other places. Once we control for the basic set of county characteristics described above (race and urbanicity, population and the burglary rate) the proportions of homicides and robberies that involve guns were each about 6 percentage points lower in 1994-96 in Cook County (dominated by Chicago) compared to the other 200 largest counties in the country. Those differences are highly significant in a statistical and substantive sense, but unfortunately quite sensitive to which covariates are utilized.⁴⁴

6. Discussion

Our findings about the presence of substantial transaction costs and price mark-ups in Chicago's underground gun market stand in stark contrast to conventional wisdom in the sociology and criminology literatures. One candidate explanation is that previous

⁴⁴ In the cross-section reversion model that includes that burglary rate as a covariate, the standard error for the prediction of the regression model is equal to 1.45 for percent homicides with guns (compared to a Chicago residual of -5.78), and for percent robbery with gun is equal to 0.89 compared to a Chicago residual of -6.36. These findings are quite similar when we do not control for the burglary rate, or if the sample is restricted to just the largest 50 or 100 counties. The regression adjustment matters a great deal, since the raw (unadjusted) differences in fraction homicide and robbery that involve guns for Cook County versus the 200 largest counties are both equal to around +8 percentage points. The regression-adjusted comparison is arguably a more meaningful indicator, because of the documented relationship between city size and both the gun homicide rate and share of homicides that involve guns (see Blumstein, 2000, p. 37-38).

research has sometimes relied on answers to questions that were too vague to provide a measure of actual prices or transaction costs.⁴⁵

Of course one might be inclined to question the reliability of our data. We rely in large part on the unusually detailed interviews and field observations of Sudhir Venkatesh, which is to say that we rely on reports from people who regularly engage in criminal or anti-social activities. However SV's interviews are generally quite consistent with the variety of other data sources that are available to us, including those that do not rely on self-reports by criminals.⁴⁶

So why does the gun market in the Chicago South Side neighborhood studied by SV have such high transaction costs? Our results suggest the answer is some combination of illegality and market thinness. Handgun acquisition has been illegal in Chicago since 1982, and there are no licensed gun dealers in the city. Illegality generates search costs for buyers and sellers in the market, which can generate market "thickness" effects on search costs, match quality and other characteristics of exchange that are relevant for transaction costs in the gun market (Diamond, 1982, Gan and Zhang, 2005, 2006). The fact that there are fewer buyers, sellers and exchanges in the underground market for guns compared to drugs helps explain why transaction costs seem to be much greater in the market for guns.

⁴⁵ Our results on search costs and prices contrast with common interpretation of the results of Sheley and Wright's (1998) survey of youth in other parts of the U.S. In their survey of 16-18 year old high school students drawn from a convenience sample of 53 schools, 50% reported that obtaining a gun would be "little" or "no" trouble if they desired one, while the other half of the sample indicated that getting a gun would be "a lot of trouble" or "impossible." Yet these questions are quite ambiguous; what is a "little" trouble? How would a youth who could get a gun in 1-4 weeks answer?

⁴⁶ For example SV's field interviews about gun quality, prices, transaction costs and the relative rarity of gun purchases from suburban Chicago gun dealers are all consistent with data from ATF data on confiscated crime guns. Reports to SV about the scarcity of ammunition and the limited role of drug dealers in the distribution of guns match up closely with data on all arrests made in Chicago during the 1990s obtained from the Illinois State Police.

But this explanation itself raises the question of why the underground gun market is so thin. Even if there are relatively few buyers in this market, owing in part to the durability of guns, why don't drug dealers and drug-selling gangs diversify into the gun trade, given that they already come into regular contact with most of the people who would be interested in obtaining a gun and cannot access licit sources? SV's interview data indicate that police emphasis on guns seems may be an important contributing factor, since gangs are reluctant to jeopardize the profits associated with the more lucrative drug trade. While gangs are not actively involved in gun selling, they do provide an important mechanism for solving some of the information problems found in the gun market, in the sense that some youths report joining a gang for access to guns.

The existence and reasons for these high transaction costs do not seem to be unique to the underground gun market in the high-crime South Side Chicago neighborhood studied by SV. While we do not have data for other jurisdictions that are as detailed as the results of SV's intensive ethnographic fieldwork, administrative data sources and a 22-city survey of arrestees suggest that high transaction costs are common to other parts of Chicago and, indeed, are characteristic of underground gun markets more generally in American cities. These cross-city comparisons in transaction costs are limited by the fact that the arrestee samples are not necessarily intended to be representative of all criminals or even all arrestees in the participating cities; better data on criminal reports about underground gun markets across cities seems like an important priority for future research in this area.

With this caveat in mind, we conclude that the apparently high transaction costs in Chicago's gun market are due to the city's low overall rate of household gun ownership

and relatively intensive anti-gun policing emphasis. One policy implication of our findings is that law enforcement efforts targeted at reducing gun availability at the street level are promising.⁴⁷ If “thinness begets thinness” in markets with non-trivial search costs, as suggested by Diamond (1982), then the impact of stepped-up enforcement activities may be subject to multiplier effects. Of course this virtuous cycle becomes vicious if reversed, which is of some concern given recent cuts in federal funding for law enforcement in general and for gun-oriented activities in particular (Donohue, 2004, Lichtblau, 2004). Our results also provide general support for police strategies that hold the gang as a whole accountable for gun possession or misuse by individual members, thus creating an incentive for gang leaders to regulate gun access among members. This collective-deterrence strategy seeks to leverage gang cohesion together with the economic motivations of gang leaders and was a key feature of Boston’s Operation Ceasefire (Braga et al., 2001, Piehl et al., 2003).

While the public safety gains from local restrictions on gun ownership beyond those imposed by the federal Gun Control Act may be modest, efforts to reduce the rate at which households in general own guns are more promising. The fact that household gun ownership rates in Chicago have been relatively low historically, even before the city’s handgun ban went into effect in 1982, appears to contribute to the friction in the city’s gun markets. In principle widespread household gun ownership can have positive as well as negative externalities, by generating a general deterrent threat to criminal

⁴⁷ The possibility of buy-and-bust or sell-and-bust operations by undercover police officers further erodes trust in the underground gun market and increases the information requirements for successful exchange. Similarly, offering rewards for information about gun sellers and possessors, either in the form of cash or leniency for the informant’s own legal difficulties, should further inhibit the flow of information in the underground market, which consists primarily of word-of-mouth within social networks. Providing informants with incentives might also reduce the value of guns to youth for social status, since public display of a firearm would now entail additional legal risk. This type of reward program has been employed in New York but has to date not been rigorously evaluated (Golden and Almo, 2004).

predation (Lott, 2000). However in practice higher gun density leads to higher rates of homicide, burglary and perhaps suicide as well (Duggan, 2001, 2003, Cook and Ludwig, 2003b, 2006a; Hemenway 2004; Miller et al., 2006), and the dollar value of the negative externality may be considerable –\$600 per year per gun-owning household by one estimate (Cook and Ludwig, 2006a). Hence there is a straightforward case for increased taxes on guns and ammunition, or even licensing systems with annual permit fees for gun ownership.

References

- Akerlof, George (1970) "The Market for Lemons" Quarterly Journal of Economics
- Azrael, D, PJ Cook, and M Miller (2004) "State and Local Prevalence of Firearms Ownership: Measurement, Structure, and Trends" Journal of Quantitative Criminology 20(1) March: 43-62.
- Arrow, Kenneth J. (1969) "The Organization of Economic Activity: Issues Pertinent to the Choice of Market versus Nonmarket Allocation." In The Analysis and Evaluation of Public Expenditures: The PPB System, Volume 1. Washington, DC: Joint Economic Committee. pp. 47-64.
- Bennett, William J., John J. DiIulio and John P. Walters (1996) Body Count: Moral Poverty ... And How to Win America's War Against Crime and Drugs. New York: Simon and Schuster.
- Bertrand, Marianne, Esther Duflo and Sendhil Mullainathan (2004) "How much should we trust differences-in-differences?" Quarterly Journal of Economics. 119(1): 249-275.
- Block, Richard, Darryl Brice, and Aneta Galary. 2003. *Traced Firearms and Criminal Violence in Chicago: Final Report to the Joyce Foundation*. Chicago: Loyola University of Chicago.
- Blumstein, Alfred (2000) "Disaggregating the Violence Trends." In The Crime Drop in America, Edited by Alfred Blumstein and Joel Wallman. NY: Cambridge University Press. pp. 13-44.
- Braga, Anthony A. and Glenn L. Pierce. 2005. "Disrupting Illegal Firearms Markets in Boston: The Effects of Operation Ceasefire on the Supply of New Handguns to Criminals." *Criminology and Public Policy*, 4 (4): 201 - 233.
- Braga, Anthony A., David M. Kennedy, Elin J. Waring and Anne M. Piehl (2001) "Problem-Oriented Policing, Deterrence, and Youth Violence: An Evaluation of Boston's Project Ceasefire." *Journal of Research in Crime and Delinquency*. 38(3):195-225.
- Braga, Anthony A. and Glenn L. Pierce. 2005. "Disrupting Illegal Firearms Markets in Boston: The Effects of Operation Ceasefire on the Supply of New Handguns to Criminals." *Criminology and Public Policy*, 4 (4).
- Bureau of Alcohol, Tobacco and Firearms (ATF). 1999. *Crime Gun Trace Analysis Reports (1998): The Illegal Firearms Market in 27 Communities*. Washington, DC: Bureau of Alcohol, Tobacco and Firearms.

Bureau of Alcohol, Tobacco and Firearms. 2000a. *Following the Gun: Enforcing Federal Laws Against Firearms Traffickers*. Washington, DC: Bureau of Alcohol, Tobacco and Firearms.

Bureau of Alcohol, Tobacco and Firearms. 2000b. *Crime Gun Trace Analysis (1999): National Report*. Washington, DC: Bureau of Alcohol, Tobacco and Firearms.

Callahan, Charles M. and Frederick P. Rivara (1992) "Urban High School Youth and Handguns: A School Based Survey." Journal of the American Medical Association. 267.

Chicago Police Department (2003) *2003 Murder Analysis*. Chicago. egov.cityofchicago.org/webportal/COCWebPortal/COC_EDITORIAL/03MurderRpt.pdf

Coughlin, Brenda C. and Sudhir A. Venkatesh (2003) "The Urban Street Gang After 1970." Annual Review of Sociology. 29: 41-64.

Cook, Philip J. (1976) "A Strategic Choice Analysis of Robbery." In Sample Surveys of the Victims of Crimes, Edited by Wesley Skogan. Cambridge, MA: Ballinger.

Cook, Philip J. (1986) "The Demand and Supply of Criminal Opportunities," in M. Tonry and N. Morris, eds., *Crime and Justice: An Annual Review of Research* (Chicago: University of Chicago Press), 1-27.

Cook, Philip J. and Anthony A. Braga. 2001. "Comprehensive Firearms Tracing: Strategic and Investigative Uses of New Data on Firearms Markets." *Arizona Law Review*, 43 (2): 277-309.

Cook, Philip J. and Anthony A. Braga (2003) "New Law Enforcement Uses for Comprehensive Firearms Trace Data." In Guns, Crime and Punishment in America. Edited by Bernard E. Harcourt. New York: NYU Press. pp. 163-190.

Cook, Philip J. and Jens Ludwig (1996) Guns in America. Washington, DC: Police Foundation.

Cook, Philip J. and Jens Ludwig (2000) Gun Violence: The Real Costs. New York: Oxford University Press.

Cook, Philip J. and Jens Ludwig (2003a) "Pragmatic Gun Policy." In Evaluating Gun Policy. Jens Ludwig and Philip J. Cook, Eds. Washington, DC: Brookings Institution Press. pp. 1-40.

Cook, Philip J. and Jens Ludwig (2003b) "Guns and Burglary." In Evaluating Gun Policy. Jens Ludwig and Philip J. Cook, Eds. Washington, DC: Brookings Institution Press. pp. 74-120.

- Cook, Philip J. and Jens Ludwig (2004a) “Does Gun Prevalence Affect Teen Gun Carrying After All?” Criminology. 42(1): 27-54.
- Cook, Philip J. and Jens Ludwig (2004b) “Principles for Effective Gun Policy” Fordham Law Review 73(2), November, 589-613.
- Cook, Philip J. and Jens Ludwig (2006a) “The Social Costs of Gun Ownership” Journal of Public Economics. 90: 379-391.
- Cook, Philip J. and Jens Ludwig (2006b) “Aiming for Evidence-Based Gun Policy.” Journal of Policy Analysis and Management. 25(3): 691-736.
- Cook, Philip J., Jens Ludwig, and Anthony A. Braga (2005) “Criminal Records of Homicide Offenders.” Journal of the American Medical Association. 294(5): 598-601.
- Diamond, Peter (1982) “Aggregate demand management in search equilibrium.” Journal of Political Economy. 90(5): 881-94.
- Donohue, John J. (2004) “Clinton and Bush’s Report Cards on Crime Reduction: The Data Show Bush Policies are Undermining Clinton Gains.” The Economist’s Voice. 1(1).
- Duggan, Mark (2001) “More Guns, More Crime.” Journal of Political Economy. 109: 1086-1114.
- Duggan, Mark (2003) “Guns and Suicide.” In Evaluating Gun Policy, Jens Ludwig and Philip J. Cook, Eds. Washington, DC: Brookings Institution Press. pp. 41-73.
- Fagan, Jeffrey and Deanna L. Wilkinson (1998) “Guns, Youth Violence and Social Identity in Inner Cities.” In Crime and Justice, Volume 24, edited by Michael Tonry and Mark H. Moore. Chicago: University of Chicago Press. pp. 105-188.
- Fryer, Roland G., Paul S. Heaton, Steven D. Levitt and Kevin M. Murphy (2005) “Measuring the Impact of Crack Cocaine.” Cambridge, MA: NBER Working Paper 11318.
- Gan, Li and Qi Li (2004) “Efficiency of Thin and Thick Markets.” Cambridge, MA: NBER Working Paper 10815.
- Gan, Li and Qinghua Zhang (2005) “The Thick Market Effect on Local Unemployment Rate Fluctuations.” Cambridge, MA: NBER Working Paper 11248.
- Golden, Megan and Cari Almo (2004) “Reducing Gun Violence: An Overview of New York City’s Strategies.” NY, NY: Vera Institute of Justice.

- Granovetter, Mark (2005) 'The Impact of Social Structure on Economic Outcomes' Journal of Economic Perspectives 19(1), Winter: 33-50.
- Harcourt, Bernard E. (2003) "'Hell No, you can't jack that fool. He stays strapped. He's strapped all the time': Talking about guns at an all-boy correctional facility in Tucson, Arizona." In Guns, Crime and Punishment in America, edited by Bernard E. Harcourt. New York: NYU Press. pp. 68-90.
- Hemenway, D. (2004). Private guns, public health. Ann Arbor, MI: University of Michigan Press.
- Kennedy, David M., Anne M. Piehl, and Anthony A. Braga. 1996. "Youth Violence in Boston: Gun Markets, Serious Youth Offenders, and a Use-Reduction Strategy." Law and Contemporary Problems, 59 (1): 147-196.
- Kleck, G. (2004). Measures of gun ownership levels for macrolevel crime and violence research. Journal of Research in Crime and Delinquency 41(1), 3-36.
- Klein, Malcolm W. (1995) The American Street Gang: Its Nature, Prevalence, and Control. New York: Oxford University Press.
- Koper, Christopher S. and Peter Reuter (1996) "Suppressing Illegal Gun Markets: Lessons from Drug Enforcement." Law and Contemporary Problems. 59(1): 119-146.
- Levitt, Steven D. (1997) "Using Electoral Cycles in Police Hiring to Estimate the Effect of Police on Crime." American Economic Review. 87(3): 270-290.
- Levitt, Steven D. (2002a) "Using Electoral Cycles in Police Hiring to Estimate the Effects of Police on Crime: Reply." American Economic Review. 92(4): 1244-50.
- Levitt, Steven D. (2002b) "Deterrence." In James Q. Wilson and Joan Petersilia. Crime: Public Policies for Crime Control. Oakland, CA: Institute for Contemporary Studies Press.
- Levitt, Steven D. (2004) "Understanding Why Crime Fell in the 1990s: Four Factors that Explain the Decline and Six that Do Not." Journal of Economic Perspectives. 18(1): 163-190.
- Levitt, Steven D. and Sudhir A. Venkatesh (2000) "An Economic Analysis of a Drug-Selling Gang's Finances." Quarterly Journal of Economics. 115(3): 755-790.
- Lichblau, Eric (2004) "Key antigun program loses direct financing." The New York Times. December 2, 2004, p. A32.
- Machin, Stephen and Olivier Marie (2005) "Crime and Police Resources: The Street Crime Initiative." Center for Economic Performance Discussion Paper 0680.

Maltz, Michael (1999) Bridging Gaps in Police Crime Data. U.S. Department of Justice, Bureau of Justice Statistics (NCJ 176365).

Marvell, Thomas and Carlisle Moody (1995) "The Impact of Enhanced Prison Terms for Felonies Committed with Guns." Criminology. 33(2): 247-281.

McDowall, David, Colin Loftin and Brian Wiersema (1992) "A Comparative Study of the Representative Effect of Mandatory Sentencing Laws for Gun Crimes." Journal of Criminal Law and Criminology. 83(2): 378-394.

Mieczkowski, Tom (2002) "Does ADAM Need a Haircut? A Pilot Study of Self-Reported Drug Use and Hair Analysis in an Arrestee Sample." Journal of Drug Issues. (Winter): 97-118.

Miller Matthew, Deborah Azrael, Lisa Hepburn, David Hemenway, and S Lippmann (2006) "The Association Between Changes in Household Firearm Ownership and Rates of Suicide in the United States, 1981-2002" Injury Prevention 12(3):178-82.

Miron, Jeffrey A. (2003) "The Effect of Dru Prohibition on Drug Prices: Evidence from the Markets for Cocaine and Heroin" Review of Economics and Statistics 85(3): 522-530.

Moore, Mark H. (1981) "Keeping Handguns from Criminal Offenders" *Annals of the American Academy of Political and Social Science* 455, May: 92-109.

Moore, Mark H. (1990) "Supply Reduction and Law Enforcement." In Crime and Justice, Volume 13, edited by Michael Tonry and James Q. Wilson, pp. 109-157.

Piehl, Anne M., Suzanne J. Cooper, Anthony A. Braga and David M. Kennedy (2003) "Testing for Structural Breaks in the Evaluation of Programs." Review of Economics and Statistics. 85(3): 550-558.

Pierce, Glenn L., Anthony A. Braga, Raymond R. Hyatt, and Christopher S. Koper. 2004 "The Characteristics and Dynamics of Illegal Firearms Markets: Implications for a Supply-Side Enforcement Strategy." *Justice Quarterly*, 21 (2): 391- 422.

Raphael, Steven and Jens Ludwig (2003) "Prison Sentence Enhancements: The Case of Project Exile." In Evaluating Gun Policy, Edited by Jens Ludwig and Philip J. Cook, Washington, DC: Brookings Institution Press. pp. 251-286.

Richter, Linda and Patrick B. Johnson (2001) "Current Methods of Assessing Substance Use: A Review of Strengths, Problems and Developments." Journal of Drug Issues. 31(4): 809-832.

Schelling, Thomas C. (1967) "Economics and Criminal Enterprise" The Public Interest. Spring: 61-78.

- Sheley, Joseph F. and James D. Wright (1993) Gun Acquisition and Possession in Selected Juvenile Samples. Washington, DC: National Institute of Justice.
- Sheley, Joseph F. and James D. Wright (1998) High School Youths, Weapons, and Violence: A National Survey. Washington, DC: National Institute of Justice. NCJ 172857.
- Sherman, Lawrence W. (2002) "Fair and Effective Policing." In Crime: Public Policies for Crime Control. Edited by James Q. Wilson and Joan Petersilia. Oakland, CA: ICS Press. pp. 383-412.
- Venkatesh, Sudhir A. (2006) Off the Books: The Underground Economy of the Urban Poor. Cambridge, MA: Harvard University Press. (forthcoming)
- Vernick, Jon S. and Lisa M. Hepburn (2003) "State and Federal Gun Law: Trends for 1970-1999." In Evaluating Gun Policy. Jens Ludwig and Philip J. Cook, Eds. Washington, DC: Brookings Institution Press. pp. 345-411.
- Webster, Daniel W., Lorraine H. Freed, Shannon Frattaroli, and Modena H. Wilson (2002) "How Delinquent Youths Acquire Guns: Initial Versus Most Recent Gun Acquisitions." Journal of Urban Health. 79(1): 60-69.
- Williamson, Oliver E. (1975) Markets and Hierarchies: Analysis and Antitrust Implications. New York: Free Press.
- Wright, James D. and Peter H. Rossi (1994) Armed and Considered Dangerous: A Survey of Felons and their Firearms, 2nd Ed. NY: Aldine de Gruyter.

Data Appendix

Our analysis of Chicago's underground gun market draws on data from 6 main sources: intensive field interviews and observations conducted in high-crime neighborhoods on the city's South Side by one member of our team (Sudhir Venkatesh), discussed in the text; data on crime gun traces from Chicago collected by the Bureau of Alcohol, Tobacco and Firearms (ATF); a census of all arrests made in the state of Illinois from 1990 to 2001 recorded by the Illinois State Police (ISP); city- and state-level data on crime rates and gun ownership from the FBI's Uniform Crime Report (UCR) system; the census of all death certificates in the U.S. maintained as part of the Vital Statistics (VS) system; and data from the Drug Use Forecasting (DUF) system of arrestee interviews, specifically data from the 1996-7 gun addendum to DUF. In what follows we discuss each of the last 5 sources in turn.

A. Crime Gun Traces

We also draw on data from the Bureau of Alcohol, Tobacco and Firearms (ATF) on crime guns confiscated by the Chicago Police Department between 1999 and 2003 submitted to ATF for tracing. By using serial numbers that are unique to a given gun (conditional on manufacturer), ATF tries to identify the first legal purchaser of the firearm by accessing the commercial transactions records maintained by law by dealers, distributors and manufacturers.

Between 1999 and 2003 the Chicago PD submitted all confiscated crime guns to the ATF for trace requests, as part of ATF's Youth Crime Gun Intervention Initiative (YCGII). A total of 43,413 guns were submitted for tracing over this period, of which 23,237 (53.5%) were successfully traced. This tracing success rate is quite similar for our study area of GB / WP and for the rest of Chicago. This tracing success rate is also quite similar to national data for 1999 (54%). Nationwide in 1999, 10% of guns could not be traced because the guns were too old, while others could not be traced because of problems with the serial number or errors in the paperwork and the like. It is important to note that even when guns are successfully traced this process can only identify the first purchaser from a FFL, and provides no information on subsequent transactions in the underground distribution chain (see Cook and Braga, 2003 for more on the trace process and limitations of the ATF data).

B. Arrest Data

Our third source of data consists of a census of all arrests made in the state of Illinois from 1990 to 2001 reported to the ISP. These data provide information on the date of each arrest, the arresting agency (so that we can distinguish arrests in Chicago versus elsewhere in the state, but cannot determine where within Chicago a crime was committed), all criminal charges filed against the suspect as part of the arrest, and (albeit with some additional measurement error) the disposition of these charges.

C. UCR Crime Data

To measure gun involvement in crime in Chicago and other cities we use standard data from the FBI's Uniform Crime Report (UCR) system. These data capture crimes voluntarily reported by victims to the police and then voluntarily submitted by police to the FBI. Problems with the UCR data in terms of variation across areas and time in victim reporting to police and police reporting to the FBI are well known (see for example Maltz, 1999). However the UCR data are generally believed to be more reliable for more-serious than for less-serious offenses.

D. Vital Statistics

To measure gun ownership rates we use data from the Vital Statistics (VS) census of all deaths to construct a measure of the fraction of suicides within a jurisdiction that is committed with firearms (firearm suicides divided by suicides, or FSS). While the VS is generally thought to capture most deaths that occur in the U.S., one source of measurement error comes from the fact that coroners or medical examiners report the cause of death on the death certificate, which may disagree with the results of subsequent police investigations and more generally can be subject to some ambiguity. (For example, when the beat-era writer William S. Burroughs famously tried to shoot an apple off of his wife's head but missed and killed her instead the medical examiner handling the case may plausibly have had some doubts about whether to classify this as an accident, homicide or, from the perspective of Burroughs' wife, suicide at least in a probabilistic sense). The fraction of suicides that involve a firearm has been shown to be strongly correlated with survey-based measures of household gun ownership rates in the cross-section (Azrael, Cook and Miller, 2004) and within states or regions over time as well (Cook and Ludwig, 2005).

E. Drug Use Forecasting data

The Drug Use Forecasting (DUF) system is administered by the U.S. Department of Justice and has collected survey information on arrestees from 1987 through 1997. (The successor to the DUF is called the ADAM, which was itself recently discontinued). Usually the sample includes arrestees from 24 different U.S. cities, although sites vary somewhat from year to year. Within participating cities, first a set of selected booking facilities are selected and then arrestees within these booking facilities are asked to be interviewed. In Chicago and 10 other DUF sites (Atlanta, Cleveland, Denver, Detroit, Houston, Kansas City, Omaha, Philadelphia, St. Louis and Washington, DC) the catchment area for selecting booking facilities was the city. In the other DUF sites (Dallas, Ft. Lauderdale, Indianapolis, Miami, New Orleans, Manhattan, Phoenix, Portland, San Antonio, and San Jose) booking facilities were selected from catchment areas defined by borough, county, or parish. Each site attempts to collect data from around 225 adult males per quarter and 100 adult females. Some (but not all) sites also attempt to collect data from 100 juvenile males and 100 juvenile females.

Typically around 90 percent of arrestees asked to participate agree to answer survey questions about drug use and involvement with crime, while 80 percent agree to

provide urine samples for drug testing. These sources of data are complemented by administrative data from police arrest records regarding the arrestee's demographics (age, race) and the crime for which the person was arrested.

In 1995, 1996 and 1997 the DUF survey included a gun addendum that asked survey respondents to report on their experiences with guns, including ownership, gun use in the most recent crime, acquisitions, victimization experiences and general availability in the community. Because these data were collected for only the second half of 1995 we focus our analysis on data from 1996 and 1997. The DUF data used in our analyses are restricted-use and obtained under a special agreement with ICPSR. For more information about the dataset see the documentation for ICPSR study number 9477.

Table 1: Selected Demographic Characteristics for Grand Boulevard / Washington Park Field Site Neighborhoods versus Chicago and U.S.

	Grand Boulevard / Washington Park*	Chicago	United States
Percent under age 20	39.8	29.0	28.6
Race:			
% White	0.6	42.0	75.1
% Black	98.2	36.8	12.3
% Asian	0.1	4.3	3.6
% Hispanic (any race)	0.9	26.0	12.5
Schooling attainment of adults ages 25 and over:			
% high school plus	61.0	71.8	80.4
% BA plus	8.7	25.5	24.4
Marital status of people 15 and over:			
Never married	50.9	40.9	27.1
Divorced	10.4	8.8	9.7
Percent adults 16 and over in labor force	48.4	61.3	63.9
Percent people poor	48.5	19.6	12.4
2003 homicide rate per 100,000	35.2	20.5	5.7

NOTES: * = Grand Boulevard consists of census tracts 3801-3820, while Washington Park consists of census tracts 4001-4008. Demographic and housing characteristics from 2000 Census. 2003 Homicide rate calculated for Chicago and GB / WP neighborhoods from Chicago PD (2003), and for U.S. from the FBI's Crime in the United States report.

Table 2
Markers for Straw Purchases for Guns Confiscated in Field Site and Rest of Chicago

	<u>Grand Blvd/Wash Park</u>	<u>Rest of Chicago</u>
Confiscated within 3 years of initial purchase	25.5%	27.6%
Confiscated within 3 years of initial purchase and first purchased in Cook County	10.6%	11.8%
Confiscated within 3 years of initial purchase and first purchased in Cook County by a female	2.1%	1.8%

Table 3
Gun Acquisition and Gang Membership in Chicago Arrested

	Full sample	Adult males only
Sample size (N)	1,194	1,074
Ever own handgun?		
Yes	20.8%	20.4%
<i>Gun acquisitions (for those ever owned)</i>	%	%
Stole	6.1	6.9
Rented / borrowed	10.4	10.3
Bought	61.9	59.6
Gift / other	21.6	23.2
Total	100.0	100.0
<i>Amount paid if bought:</i>	%	%
\$ 0-50	5.7	6.8
\$ 50-99	20.5	24.7
\$100-199	34.1	34.2
\$200-499	33.0	26.0
\$500 or more	6.8	8.2
Total	100.0	100.0
(Median paid)	(\$150)	(\$100)
<i>Might want gun? (of those never owning)</i>		
	17.6%	17.4%
<i>How long to get gun? (those who want one)</i>		
More than a week	61.4%	60.4%
<i>Gang member?</i>		
Current	21.1%	19.8%
Current or Past	44.3%	43.6%

Source: Author calculations from Drug Use Forecasting System data for 1996 and 1997 (ICPSR 9477).

**Table 4:
Gang Membership among Arrestees in DUF Sample**

	Full sample			Adult Males		
City	Sample (N)	Currently in gang	Currently or ever in gang	Sample (N)	Currently in gang	Currently or ever in gang
Chicago	2,216	20.5	44.9	2,077	20.3	44.2
Los Angeles	3,076	18.9	33.6	1,161	12.3	27.1
Birmingham	3,630	10.8	20.3	1,816	4.9	14.6
Denver	5,589	8.4	22.8	2,336	3.6	17.9
Phoenix	1,555	7.8	19.5	677	5.3	16.5
St. Louis	2,331	6.3	23.3	1,352	5.0	25.2
Indianapolis	4,313	5.4	18.3	1,836	5.3	21.5
Portland	495	5.3	13.5	239	1.3	10.0
San Antonio	4,040	5.1	17.1	2,127	3.0	14.2
San Jose	1,370	5.1	16.6	721	2.2	12.2
Cleveland	2,733	3.2	17.5	1,258	1.4	15.4
Omaha	2,750	2.8	13.8	1,936	3.5	16.2
Houston	2,360	2.5	12.3	1,505	3.3	14.6
Miami	1,360	2.1	9.8	1,299	2.0	9.5
Dallas	3,274	1.9	11.2	2,056	2.5	12.9
Fort Lauderdale	2,783	1.5	10.2	1,816	1.9	12.9
New York	2,189	1.1	11.1	1,456	1.2	14.1
Detroit	2,238	1.0	8.0	1,549	0.9	9.3
Philadelphia	2,371	0.8	10.9	1,452	1.3	14.7
New Orleans	2,838	0.7	6.4	1,887	1.1	7.3
Atlanta	7,285	0.7	6.5	5,511	0.7	7.3
Washington, DC	2,735	0.4	4.2	1,538	0.4	5.1
Median						

Source: DUF samples of arrestees, 1996 and 1997. (See appendix for details.)

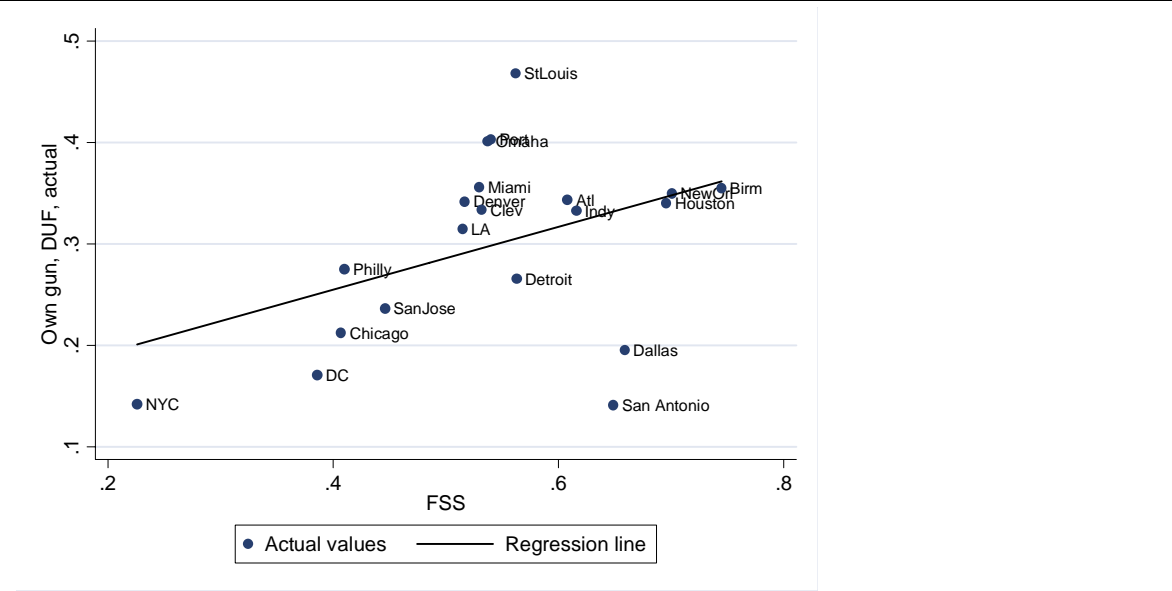
Table 5:
**Relationship Between Household Gun Ownership Rates with Gun Use in Crime in
200 Largest U.S. Counties**

% homicides with guns	“Cross-section” model (1)	“Cross-section” model (2)	“Cross-section” model (3)	Panel model (4)	Panel model (5)	Panel model (6)	Panel model (7)
Coefficient for HH gun ownership (FSS)	.354** (.041)	.323** (.042)	.320** (.050)	.157** (.036)	.165** (.036)	.128** (.041)	.083** (.036)
Covariates?	Y		Y	Y		Y	Y
Weight by population?	Y	Y		Y	Y		Y
County and year fixed effects?				Y	Y	Y	Y
County-specific linear trend?							Y
Sample years	94-96	94-96	94-96	79-99	79-99	79-99	79-99
N	557	572	557	3924	3987	3924	3924
R-squared	.365	.095	.223	.557	.552	.430	.615
% robbery with guns	“Cross-section” model (1)	“Cross-section” model (2)	“Cross-section” model (3)	Panel model (4)	Panel model (5)	Panel model (6)	Panel model (7)
Coefficient for HH gun ownership (FSS)	.316** (.028)	.369** (.033)	.257** (.029)	.036 (.028)	.066** (.031)	.041** (.019)	.010 (.017)
Covariates?	Y		Y	Y		Y	Y
Weight by population?	Y	Y		Y	Y		Y
County and year fixed effects?				Y	Y	Y	Y
County-specific linear trend?							Y
Sample years	94-96	94-96	94-96	79-99	79-99	79-99	79-99
N	538	541	538	3620	3634	3620	3620
R-squared	.561	.187	.528	.630	.614	.675	.711

Notes: Parentheses contain robust standard errors that are adjusted to account for within-county correlation in error terms. ** = Statistically significant at 5% level. Analytic sample consists of data for 200 largest counties in the U.S. for the period 1979-1999, where gun involvement in homicide and robbery is measured using data from the FBI’s Uniform Crime Reporting system and our proxy for household gun ownership is measured using the fraction of suicides involving firearms collected from the Vital Statistics system. Our “cross-section” estimator pools together data from three years to reduce measurement error in FSS (see Cook and Ludwig, 2006); we focus on 1994-96 for the cross-section because these are the last years for which data on gun involvement in robbery are available for Cook County, Illinois, the county that contains the city of Chicago. Covariates included in the regression models include percent county black, the county’s burglary rate from the UCR, county population (in thousands) and population squared, and (in the cross-section models) percent of the county living in an urban area in the 2000 census.

Figure 1: Lifetime gun ownership rates among arrestees interviewed in 22 cities by DUF vs. household gun ownership rate proxy (fraction suicides with gun, FSS)

Panel A: Actual lifetime gun ownership reports by DUF arrestees



Panel B: Lifetime gun ownership reports by DUF arrestees, regression-adjusting for offender and offense characteristics

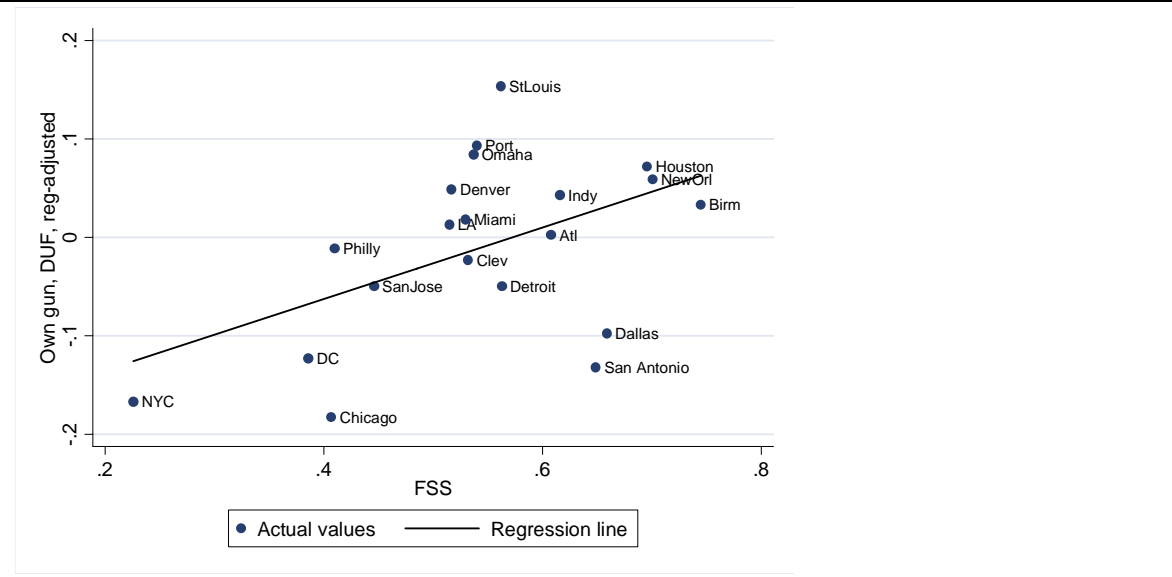
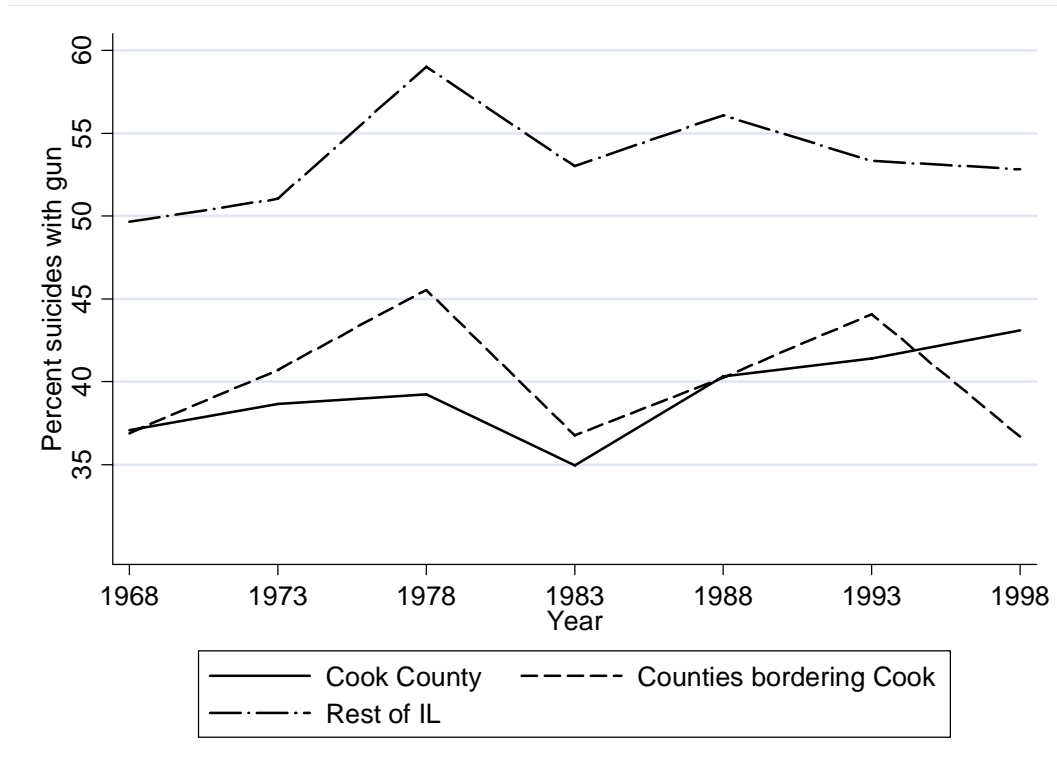


Figure 2: Trends in % Suicides with Guns (Proxy for Gun Ownership) for Cook County, Neighboring Counties and the Rest of Illinois



Appendix Table A1

Type of Crimes Leading to Gun Confiscation in Chicago, by age of Possessor

<i>Recovery crime type</i>	Grand Boulevard / Wash Park			Other Chicago Neighborhoods		
	<i>Juvenile</i> (<18) %	<i>Youth</i> (18-24) %	<i>Adult</i> (25+) %	<i>Juvenile</i> (<18) %	<i>Youth</i> (18-24) %	<i>Adult</i> (25+) %
Firearms offense	50.0	39.4	37.0	57.8	51.1	51.0
Narcotics crime	43.6	50.6	49.6	24.8	33.8	33.1
Violent crime	5.1	8.3	11.1	13.7	11.6	10.8
Other crime	1.3	1.7	2.3	3.6	3.6	5.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
(Number)	(78)	(348)	(395)	(548)	(2432)	(3252)

Source: See Table 1

Violent crime = homicide, robbery, assaults, kidnapping, sex crimes (i.e. rape / assault);
 Narcotics crime = drug offenses not distinguished by possession, sales, or type of drug;
 Other crime = burglary, theft, fraud, explosives, vice crimes, integrity crimes, etc.;
 Firearms offense = illegal carrying or possession of a firearm (carrying and possession are not distinguished in the data).

Appendix Table A2

Source States of Guns Confiscated in Chicago

	<u>Grand Blvd. / Wash Park</u>	<u>Rest of Chicago</u>
	(<u>%</u>)	(<u>%</u>)
<u>State</u>		
Illinois	46.2	48.3
Indiana	11.5	11.6
Mississippi	10.9	9.6
Wisconsin	3.4	2.8
Georgia	2.4	1.8
Arkansas	2.3	1.8
Kentucky	2.3	2.5
Alabama	2.0	1.8
Texas	1.9	2.0
Tennessee	1.7	2.2
Other	15.4	15.6
Total	100.0	100.0
Source: See Table 1		

**Appendix Table A3
Type and Caliber of Guns Confiscated in Chicago**

	<u>Grand Blvd. / Wash Park</u> (%)	<u>Rest of Chicago</u> (%)
Number	4,483	38,930
<u>Type of firearm</u>		
Semiautomatic Pistol	49.0	50.2
Revolver	34.6	33.0
Shotgun	7.7	7.9
Rifle	7.2	7.0
Derringer	1.5	1.6
Other	0.1	0.2
Total	100.0	100.0
<u>Caliber / Gauge</u>		
9mm	18.7	18.0
.38	15.9	15.5
.22	11.4	12.9
.380	10.4	11.2
.32	7.5	6.7
.25	7.2	8.4
.357	6.9	6.5
.45	5.5	4.7
12 gauge	5.4	5.7
.40	2.5	2.1
Other	8.7	8.3
Total	100.0	100.0

Source: Authors' calculations of guns submitted by Chicago Police Department to ATF for tracing in 1999-2003 (see appendix).

Appendix Table A4

Retail Price and Age of Guns Confiscated in Chicago

	Grand Blvd/ Wash Park			Rest of Chicago		
	Juveniles (under 18)	Youth (18-24)	Adults (25+)	Juveniles (under 18)	Youth (18-24)	Adults (25+)
<i>Number</i>	72	301	293	484	2,055	2,525
<i>Retail Price</i>						
Mean	\$294	\$312	\$326	\$297	\$316	\$350
Median	\$173	\$311	\$400	\$269	\$303	\$410
<i>Price Distrib</i>	%	%	%	%	%	%
<\$150	43.1	28.9	30.0	35.5	30.5	23.7
\$150-300	11.1	20.9	16.0	17.9	19.4	17.2
\$300-450	15.2	23.5	23.5	19.4	21.7	25.0
\$450-600	29.2	24.9	29.4	26.2	26.3	31.2
>\$600	1.3	1.7	1.0	0.8	2.1	2.9
Total	100.0	100.0	100.0	100.0	100.0	100.0
<i>Age of gun</i>	%	%	%	%	%	%
<=3 years	18.2	22.3	25.6	18.4	25.7	24.0
4-7 years	27.3	19.8	20.2	23.2	20.4	23.3
8-12 years	10.9	17.8	15.5	17.6	17.1	16.7
13-19 years	10.9	11.6	6.2	10.1	11.2	9.1
20+ years	32.7	28.5	32.5	30.7	25.6	26.9
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: See Table 1. “Retail price” is estimated price of gun sold new at retail from Blue Book figures, and does not account for actual condition of gun, which is not available in the ATF data.