The Role of Gun Supply in 1980s and 1990s Youth Violence*

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Abstract

Youth violence, particularly among young black males in urban areas, increased radically in the late 1980s and early 1990s and then began to fall. One explanation for this has been the expansion of crack markets in the 1980s; to the degree that increased gun access among young black males was believed to play a role, the implicit assumption was there was a demand shock in gun markets. We provide a range of novel evidence that instead there was a positive supply shock in the market for guns, particularly those in the lowest price range (under \$250 in 2018 dollars). Local proxies of gun access can predict changes in local violence as well or better than measures of crack market activity, while proxies for crack are more closely correlated with other measures of disorder. JEL Classifications: K42

Keywords: Illegal Behavior, Murder

1   Introduction

It was only a matter of time before we started posing for album covers. Not one from innocent '85, but one from a few years later, after the music had changed from this:
> *Rhymes so def*
> *Rhymes rhymes galore*
> *Rhymes that you've never even heard before*
> *Now if you say you heard my rhyme*
> *We gonna have to fight*
> *'Cause I just made the motherfuckers up last night*

to this:
> *"Hey yo, Cube, there go that motherfucker right there."*
> *"No shit. Watch this . . . Hey, what's up, man?"*
> *"Not too much."*
> *"You know you won, G."*
> *"Won what?"*
> *"The wet T-shirt contest, motherfucker!"*
> *[*sounds of gunfire*]*

*Lyrics from the aforementioned "Here We Go" and "Now I Gotta Wet 'Cha," copyright 1992, by Ice Cube, born the same year as me, who grew up on Run-D.M.C. just like we all did. "Wet 'cha," as in "wet your shirt with blood." Something happened in those nine years. Something happened that changed the terms, and we went from fighting (*I'll knock that grin off your face*) to annihilation (*I will wipe you from this earth*). How we got from here to there is a key passage in the history of young black men that no one cares to write.*

<div align="right">

- Colson Whitehead, "The Gangsters"

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The passage by novelist Colson Whitehead powerfully conveys the sea change in violence between the mid-1980s and 1993. Gun homicide rates for young black men doubled in a very short period. We estimate that 10,000 more young black men were killed between 1986 and 2000 than would have been had the (already extremely high) gun homicide rates of 1980-1985 prevailed. The surge in violence had powerful impacts across the breadth of American society. The story is still only poorly understood.

Whitehead's concluding thought seems too pessimistic, however. The radical increase in gun violence in American cities in the late 1980s and early 1990s has been the subject of numerous inquiries, beginning with discussions at the time, and continuing with scholarly articles. A few examples of analysis of the issues include Goldstein et al. (1989); Blumstein (1995); Wintemute (1994); Blumstein and Cork (1996); Cook and Laub (1998) while the epidemic was in full flow, Grogger and Willis (2000); Blumstein (2002); Cook and Laub (2002); Ellen and ORegan (2010)

after the decline and Fryer et al. (2013), Evans et al. (2012) (and OFlaherty and Sethi (2015a)) more recently. There are a number of open questions and theories regarding the epidemic.[1]

While a range of explanations have been proposed for the violence epidemic, most discussion has centered on the role of crack cocaine. The explanation is roughly as follows (further discussion below): Because dealing crack was a low-skill job that offered reasonable payment in urban areas (Levitt and Venkatesh, 2000; Reuter et al., 1990; MacCoun and Reuter, 1992) young black men were disproportionately drawn into crack dealing early on. Selling crack also required significant "retail presence", with open-air markets developing in central cities. The combination of disputes over territory and over illegal transactions increased the overall rate of violence.

This paper proposes instead that while crack markets did exacerbate issues of crime and disorder in cities, they were not the major reason for the epidemic in violence. The violence was instead largely driven by a positive supply shock in the retail market for handguns, particularly at the bottom part of the market. This in turn greatly increased access and ownership rates for guns among at-risk young black males.[2]

This supply shock has received little attention in previous literature on gun markets and the 1980s and 1990s violence because it was entirely concentrated in one part of the handgun market - autoloaders.[3] The most commonly used index (Bice and Hemley, 2002; Cook, 1993), the handgun PPI maintained by the Bureau of Labor Statistics, appears to be based predominately or even exclusively on revolver production by established firms; researchers tracking general gun prices have used that measure or self-constructed indices heavily weighted towards revolvers. Garen Wintemute and others have documented the rise of the "Ring of Fire" producers of cheap

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[1]For some general discussions of crime and violence linking the crack epidemic to broader issues, see Kennedy (2011) and OFlaherty and Sethi (2015b).

[2]It is important to note that only a minority of young black men participated in these illegal markets or violence; our highest estimates for the most extreme point, circa 1993, suggest that at most 20% of all young urban black men had access to guns or were at-risk of engaging in violence and many or most of these may have been acting purely defensively. An excellent discussion of how fear can drive rates of homicide upwards in a community is OFlaherty and Sethi (2010).

[3]Handguns can be generally compartmentalized into revolvers and autoloaders, both of which fire a single shot per trigger pull (unlike automatic weapons, which will fire continuously). Revolvers have been in existence for much longer. They generally use heavier metals (like steel) that must be forged and impacted at high pressures to form the handgun components. Historically, this type of manufacturing process has involved higher fixed costs and expertise. Autoloaders are a more recent design that utilized improvements in machining and stamping technology (in steel and aluminum) to create a handgun manufacturing process that could be less capital intensive and needed fewer economies of scale. That is probably even more true today with the expanded use of cheaper synthetic polymer materials for much of the handgun components. The autoloader design also incorporated the use of magazines to hold ammunition which increased the firing capacity of handguns before reloading.

autoloaders, including ATF data showing increases in production quantity, but did not trace out the fall in prices that demonstrates a positive supply shock.

Figure 1 outlines the split pattern in price development. As can be seen, the handgun PPI and revolver prices are stable over this period, while median autoloader prices fall.

By the mid-1980s several calibers of autoloaders were not only being offered at lower and lower prices but were being produced in large numbers. We document that low-cost 25 ACP, 380 ACP and 9mm autoloaders were offered in increasing quantities in the late 1980s and early 1990s. The production of autoloaders, in general but particularly at the low end of the market, was very large relative to estimates of the existing stock of guns.

This led to a surge in the quantity of cheap handguns produced and sold in the United States. This was coincident with an increase in reported gun access for young black men, in proxies for access such as gun suicides among young black men, and with increasing gun homicides of young black men.

After 1993 the supply shock ended and the process partially reversed itself: quantities sold fell while prices stabilized. Proxies for gun access and ownership among young black men fell, and gun homicides fell; however, gun production, gun access and gun homicides all remained above their 1980-1985 average.

Our argument has two particularly important components: First, the increase in gun supply and production was associated with a fall in price, thus eliminating any change in demand as an important channel - the increase in gun access was supply driven and exogenous. Second, local measures of gun access and ownership, in particular gun suicide rates, show a strong relationship with measures of violence - the increase in gun supply shows a strong effect at the local level.[4]

This paper proceeds as follows.

In Section 2 we review the literature on the violence epidemic as well as documenting developments in crack markets.

In Section 3 we present an overview of the 1985-1993 supply shock in cheap guns and increased access to guns among at-risk young black men, using a mix of established and novel data. We compile ATF production data and a novel data set of gun prices from the magazine *Gun Digest* to document the expansion in production and sale of cheap guns. We use existing data sets and

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[4]Although the work is not shown here, we also find that weapons arrests have a similar relationship.

publications to document the increase in access to cheap guns from the early 1980s to 1990-1995 among at-risk and criminally active youth.

In Section 4 we run a number of regressions using MSA-level data, comparing how local measures of (a) crack market activity and (b) gun access for young black men do in explaining measures of violent crime and property crime. We utilize crack measures from three prominent papers in this literature, specifically Grogger and Willis (2000); Evans et al. (2012); Fryer et al. (2013). We find that gun access measures consistently perform well in explaining violent crime, while crack measures are stronger in explaining nonviolent property crime.

We summarize our argument in Section 5 and discuss open issues and potential policy implications.

2   The Violence Epidemic of the 1980s and 1990s

As discussed in the introduction, there was a remarkable epidemic in violence in the United States focused largely but not exclusively on young urban-dwelling black males. The most popular explanation is the spread of crack markets.[5] This runs roughly as follows (Fryer et al., 2013; Evans et al., 2012): the development of crack cocaine processing and sale in the Caribbean quickly led to its distribution in the coastal cities (Los Angeles, Miami and New York in particular) in the early 1980s. By the late 1980s it could be seen in virtually all US metro areas (Grogger and Willis, 2000). Crack was different from previous drugs in that it was (a) popular among a wide class of users (b) fairly expensive but (c) affordable on a "per-hit" basis. For the first time, this meant there was a drug with a substantial "retail presence" requiring large open-air drug markets. Being able to sell in a particular area became worth a significant amount of money, and so pushing for territory became important. More generally, by increasing the amount and size of illegal transactions in an area, crack led to an increase in the frequency of extralegal

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[5]One important discussion regarding the violence epidemic is that of period vs cohort issues; that is to say, to what degree was the epidemic a result of the specific time period (say, 1985 vs 2000) and to what degree was the epidemic the result of specific attributes of the cohorts of males who were entering adolescence and young adulthood (say males born in 1970 vs males born in 1985). Cohort explanations include the legalization of abortion (Donohue and Levitt, 2001) and the removal of lead from gasoline (Reyes, 2007); period explanations are largely focused on crack markets but some look at gun availability issues as well. Cook and Laub (2002) argue persuasively that with regard to the 1985-1995 epidemic the period explanations are more likely. Both before and after the epidemic the specific age cohorts showed much lower levels of violence. This is not to say that cohort explanations do not help to explain overall shifts in violence from the 1970s to the present day, simply that they are not helpful in explaining the 1993-2000 fall.

resolution of commercial conflict. Crack market explanations tend to assume that illegal markets are inherently violent, a proposition which Owens (2011) and others have thrown into question.[6]

While dealing crack was generally not very remunerative, it offered a source of income for low-skill individuals in urban areas, and young black men were disproportionately drawn into it early on, and hence into the violence believed to be associated with it (Levitt and Venkatesh, 2000; Reuter et al., 1990; MacCoun and Reuter, 1992). As noted earlier, only a minority of young black men participated in these illegal markets or violence.

Within the crack epidemic framework, there are two potential explanations for how crack markets led to increased gun violence. The one that seems most popular, the **increased conflict** version, would suggest that there was an increase in conflict over illegal transactions, thus increasing levels of violence and homicide for any given level of gun ownership, leading dealers to purchase guns for defense. Alternatively, the **increased income** version would suggest that crack dealing increased the income of individual dealers and they therefore spent money on various accessories, including handguns, and this then led to higher violence.

Regardless of the exact machinery, explanations of the violence epidemic that point to crack markets are inherently assuming a demand shock in gun markets - specifically, a positive demand shock. Such an increase in demand would most likely lead to an increase in both the quantity of guns sold and the average purchase price. In the sections that follow we document, first, that in fact handguns show a strong positive supply shock during this period with falling prices and, second, gun access measures are better predictors of changes in murder rates than crack measures.

3 Cheap Guns, Production and Access, 1980-2000

We now move to documenting the developments in the market for cheap handguns in the 1980-2000 period, and how this changed access to guns for at-risk young black males.

We build on work by previous researchers, particularly Garen Wintemute and Alfred Blumstein, who have presented substantial documentation of the development of gun markets, gun

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[6]Using data from Statistics Canada, available on request, we find that crack arrived in Canada at roughly the same time as it did in the United States, but while (on a per capita basis) Canada suffered roughly 30-40% of the American crack epidemic, it experienced 0% of the violence epidemic.

manufacture and gun supply (Wintemute, 2000; 1994; Blumstein, 1995; 2002; Blumstein and Cork, 1996), focused on the "Ring of Fire" manufacturers in Southern California.

3.1 Handgun Price Development, 1980-2000

We begin by referring again to Figure 1 which shows prices (as listed in the *Gun Digest* Gundex, without any quantity weighting) for three categories of handguns as well as the Handgun PPI series. All four series are adjusted to control for inflation.

It can be seen that price development in the handgun market followed two distinct trajectories: revolver prices (and with them the Handgun PPI) mildly increase, while autoloader prices fell.

As was discussed in Cook (1993) the Handgun PPI shows a slow increase in real terms during this period. Specifically, the PPI for handguns increases more quickly than the PPI in the late 1980s and 1990s, seen in the moderate move upwards in the solid black line. The price for 357 revolvers shows no major shift up or down in this period. In contrast, median prices for the two autoloader calibers included - 22 LR and 9mm - show a substantial descent over the two decades.

This graph presents the core of our argument - while the supply for revolvers in the United States was relatively unchanged, the supply of autoloaders, particularly cheap autoloaders, increased substantially, leading to a fall in prices. This change is lost in indices that focus on revolver prices, which we believe is true of the handgun PPI. Having corresponded with the BLS regarding the handgun PPI, we understand them to be more likely to use price data from established manufacturers (which in this period was largely revolver manufacturers), and are likely mainly using data on 357 revolvers.

The bifurcation in the handgun market, particularly in the bottom half for each caliber, can be clearly seen when comparing prices across popular autoloader and revolver categories. Figure 2 shows it for the 380 ACP category of autoloaders; graphs for 22 LR, 25 ACP and 9mm vary somewhat in timing and movement but show the same broad pattern.[7] Beginning in the early 1980s with the cheapest and lower caliber autoloader categories, we see a substantial "race to the bottom" in price.

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[7]Figures computed with and without quantity weighting, for major autoloader and revolver categories, are available on request.

3.2 Documenting the Supply Shock in Autoloaders

While our focus in this paper is establishing the exogenous shift in supply and not on proving its cause, we suspect two developments played a role, each of which favored the entry of a number of new autoloader manufacturers in the market, competing on price.

The first development appears to be a general improvement in small-scale metal good manufacturing. Anecdotal evidence from Wintemute (1994) and Barrett (2012) suggest that machining autoloaders became easier for new entrants over this period.

The second development was a steady reduction in ATF activity and resources in the late 1970s and early 1980s, combined with an increase in the number of federal licensed gun dealers over the same period.[8]

Regardless of the cause, there is substantial evidence of aggressive market entry by new firms with substantial production volumes in exactly the 1985-1993 period (Brauer, 2013: Table A1). Figure 3 shows Herfindahl-Hirschman Index (HHI, the common measure of market concentration) for autoloaders in 22 LR, 25 ACP, 380 ACP and 9 mm calibers. Production numbers at the firm level come from the ATF Annual Firearms Manufacturing and Exportation Report (AFMER) data.[9] Note that all caliber markets show a substantial decline in concentration from 1986 to the mid-1990s, generally from heavy concentration to low concentration. There was a significant increase in the level of entry and the level of market competition.

This increase in competition among producers is coincident with an increase in quantity and a fall in price.

Major autoloader calibers (22 LR, 25 ACP, 380 ACP and 9mm) all show an increase in production and a decrease in prices in the lower half of the market through the late 1980s and early 1990s. The combination of an increase in quantity and a fall in price in this part of the market is a classic MICRO 101 supply shock.[10]

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[8]This can be seen in both published ATF reports and official United States budgets over this period.

[9]Much of the original ATF data on gun production before 1986 appears to have been lost or corrupted - for some years before 1986 there is only reliable data for total handgun production and only one-half to three-quarters the specific manufacturer production counts. From 1986 to 1998 the company-level data covers at least 80% and 94% of autoloader and revolver production, respectively, and on average 85% and 97%, respectively. We work with post-1985 company data or aggregated data as much as possible, marking pre-1986 data when it is necessary to use it.

[10]While it is not a focus of this analysis, it should be said that sales of autoloaders increased at the high end of the market as well. The late 1980s and early 1990s were the time of the "Glock Revolution", when the high end Austrian-manufactured 9mm became very popular.

Using data from Zawitz (1995) and Cook and Ludwig (1996) combined with the AFMER data we estimate domestic United States gun production flows from 1986 to 1994, and combine them with estimates of the existing gun stock in 1994. We find that total US autoloader production from 1986 to 1994 was equivalent in volume to half the estimated stock of autoloaders in 1994.

Moreover, cheap producers comprised a substantial part of this. Out of the 12.7 million autoloaders produced from 1986-1994, 4.3 million, or 34%, were produced by the six firms identified by Wintemute as the "Ring of Fire" producers: AMT, Bryco, Davis, Lorcin, Phoenix, and Sundance (as with Wintemute, we include related FFLs, in our case Jennings and Calwestco). That is to say, a small group of manufacturers in Southern California, specializing in a class of extremely cheap handguns, highly involved with crime (Wintemute, 1994: page 12 and passim), had a total production from 1986-1994 equivalent to 6.6% of the total US stock of handguns, and 16.5% of the total stock of autoloading handguns. While research into gun markets has shown that links between new gun production and young males of any background are complex and frequently indirect (Cook et al., 2007), the substantial increase in the stock of new and cheap handguns cannot but have had spillover effects.

This burst of production in cheap handguns can be seen in Figure 4. Handguns costing less than $250 ($100 in 1982-1984 dollars) surged in production to 1993, even as production of more expensive guns was relatively flat.

3.2.1   Demand Elasticity

Focusing on three important calibers - 25 ACP, 380 ACP and 9mm, we now check how price and quantity moved together. Looking at Figure 5 we can see the "supply-shock" effect, particularly for 380 ACP. The general visual pattern is supported by panel data regression of ln(Quantity) on ln(Price) by caliber in Table 1. The negative relationship between price and quantity, particularly for 380 ACP and 9mm, is all but impossible to reconcile with a demand shock explanation for increased gun sales and gun access.

3.3 Documenting Increased Gun Access among Criminally Active and At-Risk Young Men

The increase in the production of cheap guns radically changed gun availability for at-risk young men, including young black men. Two surveys carried out with prisoners, Sheley et al. (1991) and Wright and Rossi (1983) show a radical shift in access to guns in a mere eight years. In 1983, the majority of inmates surveyed reported never owning a handgun before incarceration, and of those who had owned one, most had stolen it. By 1991, only 16% of inmates reported never owning a handgun and of those who had owned one, nearly 50% had purchased it for cash, as summarized in Figure 6.

Figure 7 shows reported prices of guns for those black male inmates ages 15-22 reporting having purchased a handgun.[11] In 1983 the median price across all values is $142.50 (in 1982-1984 dollars), while in 1991 the median (after we exclude 22 values below $20, potentially in error) is $62.42 (1982-1984 dollars), a 56% fall.

Many of the purchases by the inmates in these studies were presumably in illegal markets (Cook et al., 2007), not so much from licensed firearms dealers (dealers with Federal Firearms Licenses, or FFLs). Additionally, the original source for some of them may have been theft from households. However, the huge increase in availability and collapse in price seems hard to explain from some other source than from the legal markets, and there is no evidence that theft plays a major role as a source of crime guns.[12] The actual production from 1986-1994 for handguns in total, and autoloaders in particular, is very large in relation to the existing stock; it is hard to tell a story about the increase that does not track back to the AFMER data.

Local proxies for gun access support this story of a major increase in gun ownership and access among young black men. The standard proxy for gun ownership (Blumstein, 2002; Azrael et al., 2004; Cook and Goss, 2014)- the ratio of firearm suicides to all suicides, or FS/S - for black men ages 15-24 increased significantly to 1993 and then falls after that.

In the analysis of Section 4, we work with both (a) the gun suicide rate and (b) firearms

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[11]The questions are slightly different across the two survesy. For 1991, this is the cost to the inmate, while in 1983 it is the general value, what the gun would have cost if purchased in a store.

[12]Data from the FBI National Crime Information Center shows no significant pattern in reported thefts after 1975, with fluctuations between about 250,000 reported thefts to 310,000 to 1995 (Zawitz, 1995: page 3). Wachtel (1998: page 224 and passim) reviews a number of data sources and suggests that theft seems to have been the source of at most 20% of crime guns, more likely around 5%.

suicides as a percentage of all suicides for young black men as proxies for local gun access and ownership (for both, we use two-year average to smooth out noise).[13]

4   Linking Gun Access Measures to Violence and Disorder

In this section we use panel data for the 27 US MSAs used by Grogger and Willis (2000) to test the empirical link between gun access for central city young black males, and measures of violence and disorder. We compare the explanatory power of these measures with measures of crack cocaine use and market activity, specifically following the papers Grogger and Willis (2000), Fryer et al. (2013) and Evans et al. (2012). We find that proxies for access to guns for young black men is strongly predictive of measures of the most violent crime, but at best weakly related with nonviolent crime.

4.1   Data

We use a number of data sources to explore this issue. The data appendix lists and describes all relevant sources; here we summarize the most important sources.

For gun homicide and gun suicide rates we make use of the NBER Vital Statistics Multiple Causes of Death data, combined with US Census Bureau population estimates. As discussed gun suicides as a percentage of all suicides are considered the strongest general proxy for gun access and ownership (Blumstein, 2002; Azrael et al., 2004; Cook and Goss, 2014). We generally alternate between using firearms suicides as a fraction of all suicides for young black males (the standard proxy) and the gun suicide rate for young black men.

For measures of crimes generally, we use FBI Uniform Crime Report Data, both arrests and offenses known to police.

For crack use, we use several measures, including the timing estimates from Grogger and Willis (2000), the crack index developed by Fryer et al. (2013), and also the measures of cocaine deaths used by (Evans et al., 2012).

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[13]Analysis using weapons arrest per capita among all young men also shows a strong relationship.

4.2 Results

4.2.1 Replicating Grogger and Willis

Grogger and Willis (2000) was an essential early paper, systematically checking links at the city level between the arrival of crack and crime rates. In this section we replicate their findings, and then add gun access proxies to compare the relative strength.

Grogger and Willis (2000) use two sources of information to identify the year of arrival of crack in a major city. The first is a survey of police that they conducted in 1991, supplemented with congressional testimony. The second is DAWN emergency room data. They specify three periods - a *before crack* period, an *uncertain* period where only one source suggests crack has arrived, and an *after crack* period, where all available sources agree that crack has reached the city in question (page 522).

As they describe their work on page 524, the basic specification they use is

$$Y_{ijt} = A_{ijt}\gamma + U_{ijt}\beta + \alpha_c + \mu_i + \delta_t + \epsilon_{ijt}$$

where i indexes 27 American cities, j indexes whether the data is for the core or the suburbs of these cities, and t indexes the years 1979 to 1991. Their analysis uses two dummy variables A_{ijt} and U_{ijt}; the first is one for core city-year observations where crack is definitely believed to have arrived, and the second is one for core city-year observations where one source suggests crack has arrived but another disagrees. They additionally have year and city fixed effects and a dummy variable for all core cities.

Their dependent variables are rates per 100,000 for seven different crimes: murder, rape, robbery, aggravated assault, burglary, larceny and motor vehicle theft (they refer to this as auto theft, but the numbers appear to be all motor vehicles).[14]

We also show the results of re-running this regression with the crack arrival dates of Evans et al. (2012) and the crack index of Fryer et al. (2013).

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[14]They used the FBI UCR Offenses Known To Police data, apparently using the FBI publications *Crime In America* for years 1979 to 1991. The total sum of counts divided by CPS population counts give the rates, and they divide agencies within the center city and agencies in the suburbs as two observations for each city. In theory this would make 702 observations, but they are forced to drop some due to lack of data (Chicago does not report rapes after 1985, for example). Since we were not able to find *Crime In America* publications for the relevant years, we use the NACJD data sets for ICPSR Study 9028, specifically 01, 05, 09, 13, 17, 26, 35, 50, 55, 59, 63, 67 and 71. Instead of CPS data we use the relevant population estimates in the FBI data itself.

Evans et al. (2012) use an increase in cocaine deaths (specifically, the first two years in a row with at least one cocaine death) to proxy for the arrival of crack in an MSA. Fryer et al. (2013) use an index that combines multiple measures of cocaine and crack use, with a strong emphasis on (a) arrests for cocaine sales or possession and (b) cocaine deaths.

Table 2 begins by showing the original coefficients and standard errors given in Table 4, panel A of Grogger and Willis (2000). The second panel shows our replication, following their methods, using the NACJD data sets. Overall we believe the two sets of regressions match well, although the burglary coefficients are not quite as good a fit as the other six offense categories.[15]

Table 2 continues with the results of re-running this regression with the crack arrival dates of Evans et al. (2012). As would be expected given that the dates are similar, but not identical, we see similar results. Using the index developed by Fryer et al. (2013) we again re-run the replication. Since the central 50% of observations show crack index values between 0.14 to 1.87, relatively similar to the 0 to 1 range the timing dummy variables show, the similarity in coefficients across both measures shows a solid agreement.

We now test using gun access measures. The next panel uses two-year averages of two proxies: (a) the gun suicide rate for young black men and (b) firearm suicides as a percentage of all suicides for young black men. Following the lead of Grogger and Willis (2000) we first use the default, non-robust (Observed Information Matrix or OIM) standard errors. We then use clustered standard errors (clustered for each city-core).

As might be expected, the gun access proxies show a particularly strong relationship for murder, but also show connections with rape, aggravated assault, burglary and larceny.

We then put both the crack and the gun access measures in the same regression, in Table 3. Focusing on the last three panels, with clustered standard errors, we see that it presents an interesting pattern: gun access is particularly strong at predicting murder, but continues to be predictive of rape, aggravated assault, burglary and larceny; while crack is particularly strong at predicting aggravated assault, larceny and motor vehicle theft.

Focusing in particular on murder rate, we see that the coefficient of 0.4 on the gun suicide rate suggests that an increase of 1 gun suicide per 100,000 young black men[16] would lead to an

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[15]We have in fact replaced the NACJD data with data directly obtained from the FBI for the burglary data, which mildly improved the fit.

[16]Computations based on the ownership data in Cook and Ludwig (1996) and gun suicides for the same period

increase in the murder rate of 0.4 per 100,000 residents. With a standard deviation of 7.7 per 100,000, this means a one standard deviation increase would lead to an increase of 3 murders per 100,000 residents.

The coefficient on the FS/S measure is an order of magnitude higher, as the FS/S ratio goes between 0% and 100%, with an average of 55% (0.55) and a standard deviation of 35% (0.35). Thus, a move of one standard deviation would lead to an increase in murder of 2 per 100,000 residents. The lower effect size is consistent with the fact that FS/S is a noisier measure than GSR.

The average gun suicide rate among young black men for the 27 cities averaged 10.4 per 100,000 after 1985, compared to 8.3 in 1979. Mechanically multiplying the change in gun suicide rate by the coefficient we get an increase of .84 homicides per 100,000. Multiplying by the overall population in the 27 center cities (29.4 million), we get 1,456 additional homicides from 1986 to 1991.

The combination suggests that disorder in American cities was metastasizing in two distinct directions in the late 80s and early 90s. The increase in supply of cheap guns triggered an increase of disorder, particularly murder, but the crack epidemic contributed as well, particularly to greater property crime. The fact that both were occurring together made an effective response that much more difficult, even as it made life in central cities particularly noxious and dangerous.

5   Discussion

Using a range of existing and novel data and analysis, we have shown that there is strong evidence of a positive supply shock in gun markets in the 1985-1993 period, with substantial new entrants to the market, and an increase in quantity and fall in price, in particular for 25 ACP, 380 ACP and 9mm autoloaders. This increase in supply seems to have substantially increased gun availability among at-risk young black men, as measured in several ways: self-reported gun access among imprisoned young black men, and gun suicide rates across the country.

We argue that this increase in the supply of cheap guns and gun access for at-risk urban black men was a major cause of the violence epidemic of the late 1980s and early 1990s. Two

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suggest that there is one suicide for every 1,500 young males who own or have immediate access to guns. This would imply that gun ownership/access in the population of young males had gone up by 1.5%.

points are absolutely critical in this. First, the increase in gun access among young black men was coincident with falling prices for cheap guns, strong evidence of an exogenous supply shock. Second, local proxies for gun access, in particular gun suicide rates and weapons arrests for young men, are closely related to local measures of violent crime.

While the increase in gun supply was exogenous, it does not seem to have been uncontrollable. Increases in law enforcement activity in the 1990s are associated with a rapid fall in the number of dealers, a reduction in the sales of cheap guns, and a decrease in proxies for access among young black men, including fraction of all suicides committed with a firearm, per capita firearms suicides, and weapons arrests for young men in urban areas.

References

Azrael, D., P. J. Cook, and M. Miller (2004). State and local prevalence of firearms ownership measurement, structure, and trends. *Journal of Quantitative Criminology 20*(1), 43–62.

Barrett, P. M. (2012). *Glock: the rise of America's gun.* Broadway Books.

Bice, D. C. and D. D. Hemley (2002). The market for new handguns: An empirical investigation. *The Journal of Law and Economics 45*(1), 251–265.

Blumstein, A. (1995). Youth violence, guns, and the illicit-drug industry. *Journal of criminal law and criminology*, 10–36.

Blumstein, A. (2002). Youth, guns, and violent crime. *The future of children*, 39–53.

Blumstein, A. and D. Cork (1996). Linking gun availability to youth gun violence. *Law and contemporary problems*, 5–24.

Brauer, J. (2013). 14 the us firearms industry production and supply.

Cook, P. J. (1993). Notes on the availability and prevalence of firearms. *American Journal of Preventive Medicine 9*(3), 33–38.

Cook, P. J. and K. A. Goss (2014). *The Gun Debate: What Everyone Needs to KnowRG.* Oxford University Press.

Cook, P. J. and J. H. Laub (1998). Unprecedented epidemic in youth violence, the. *Crime Just. 24*, 27.

Cook, P. J. and J. H. Laub (2002). After the epidemic: Recent trends in youth violence in the united states. *Crime and justice*, 1–37.

Cook, P. J. and J. Ludwig (1996). *Guns in America: results of a comprehensive national survey on firearms ownership and use.* Police Foundation Washington, DC.

Cook, P. J., J. Ludwig, S. Venkatesh, and A. A. Braga (2007). Underground gun markets*. *The Economic Journal 117*(524), F588–F618.

Donohue, J. J. and S. D. Levitt (2001). The impact of legalized abortion on crime. *The Quarterly Journal of Economics 116*(2), 379–420.

Ellen, I. G. and K. ORegan (2010). Crime and urban flight revisited: The effect of the 1990s drop in crime on cities. *Journal of Urban Economics 68*(3), 247–259.

Evans, W. N., C. Garthwaite, and T. J. Moore (2012). *The white/black educational gap, stalled progress, and the long term consequences of the emergence of crack cocaine markets*.

Fryer, R. G., P. S. Heaton, S. D. Levitt, and K. M. Murphy (2013). Measuring crack cocaine and its impact. *Economic inquiry 51*(3), 1651–1681.

Goldstein, P. J., H. H. Brownstein, P. J. Ryan, and P. A. Bellucci (1989). Crack and homicide in new york city, 1988: A conceptually based event analysis. *Contemp.Drug Probs. 16*, 651.

Grogger, J. and M. Willis (2000). The emergence of crack cocaine and the rise in urban crime rates. *Review of Economics and Statistics 82*(4), 519–529.

Kennedy, D. M. (2011). *Don't shoot: one man, a street fellowship, and the end of violence in inner-city America*. Bloomsbury Publishing.

Levitt, S. D. and S. A. Venkatesh (2000). An economic analysis of a drug-selling gang's finances. *Quarterly Journal of Economics 115*(3), 755–789.

MacCoun, R. and P. Reuter (1992). Are the wages of sin $30 an hour? economic aspects of street-level drug dealing. *Crime Delinquency 38*(4), 477.

OFlaherty, B. and R. Sethi (2010). Homicide in black and white. *Journal of Urban Economics 68*(3), 215–230.

OFlaherty, B. and R. Sethi (2015a). *Urban crime*, Volume 5 of *Handbook of regional and urban economics*, pp. 1519–1621. Elsevier.

OFlaherty, B. and R. Sethi (2015b). *Urban crime*, Volume 5 of *Handbook of regional and urban economics*, pp. 1519–1621. Elsevier.

Owens, E. G. (2011). Are underground markets really more violent? evidence from early 20th century america. *American Law and Economics Review 13*(1), 1–44.

Reuter, P., R. MacCoun, P. Murphy, A. Abrahamse, and B. Simon (1990). *Money from Crime: A Study of the Economics of Drug Dealing in Washington, DC.* Santa Monica, CA: RAND.

Reyes, J. W. (2007). Environmental policy as social policy? the impact of childhood lead exposure on crime. *The BE Journal of Economic Analysis Policy 7*(1), 51.

Sheley, J. F., J. D. Wright, and M. D. Smith (1991). Firearms, violence, and youth in california, illinois, louisiana, and new jersey, 1991. Technical Report 6484, Tulane University, Department of Sociology.

Wachtel, J. (1998). Sources of crime guns in los angeles, california. *Policing: An International Journal of Police Strategies Management 21*(2), 220–239.

Wintemute, G. (1994). *Ring of Fire–The Handgun Makers of Southern California: A Report From the Violence Prevention Research Program.* The Program (Sacramento, CA).

Wintemute, G. (2000). Guns and gun violence. *The crime drop in America*, 45–96.

Wright, J. D. and P. Rossi (1983). Armed criminals in america: A survey of incarcerated felons, 1983. Technical Report 8357.

Zawitz, M. W. (1995). Guns used in crime. *Washington, DC: US Department of Justice: Bureau of Justice Statistics Selected Findings, publication NCJ-148201*.

	25 ACP			380 ACP			9mm		
Estimated Demand Elasticities, Autoloaders									
Key Caliber, 1986-2000									
	1986-2000	1986-1993	1993-2000	1986-2000	1986-1993	1993-2000	1986-2000	1986-1993	1993-2000
Estimate	-0.014	0.819	-0.942	-3.416*	-5.376	-5.184	-2.262+	-1.300	-0.461
(t-statistic)	(-0.02)	(0.74)	(-1.00)	(-1.99)	(-1.53)	(-1.85)	(-1.95)	(-1.16)	(-0.16)
No. Obs.	65	31	39	64	28	43	85	41	50
No. Groups	10	8	7	10	8	9	12	9	10
D.f.	15,40	8,15	8,24	15,39	8, 12	8, 26	15,58	8,24	8,32
F value	6.33	2.15	6.93	5.33	1.46	9.45	3.06	5.69	2.83
Prob	0.000	0.0959	0.0001	0.000	0.2665	0.0000	0.0011	0.0004	0.0171
+ p<0.10, * p < 0.05, ** p < 0.01, *** p < 0.001									

Table 1

Estimates are coefficients on ln(Price) in fixed effects panel regression (by manufacturer-caliber, i.e. Ruger-9mm or Phoenix-25 ACP) of ln(Quantity) on ln(Price) and year fixed effects. Note that out of nine coefficient values, all but one are negative. Price is the real value of the median price by manufacturer-caliber-year. Quantity from AFMER. Manufacturer-caliber-year observations with production quantities below 100 are dropped.

Original Table 4, Panel A from Grogger & Willis

	Murder	Rape	Robbery	Agg Assault	Burglary	Larceny	Motor Vehicle
After	3.5**	2.4	67.7*	257.3***	9.9	328.2***	385.8***
	(1.1)	(3.3)	(30.7)	(29.6)	(59.8)	(93.9)	(62.4)
Uncertain	2.4	14.5**	25.5	142.5**	156.2+	-65.0	250.2***
	(1.7)	(5.2)	(48.2)	(46.6)	(93.9)	(147.6)	(98.0)
R-squared	0.75	0.77	0.81	0.76	0.80	0.81	0.74

Replications

Using OIM (default) Standard Errors

	Murder	Rape	Robbery	Agg Assault	Burglary	Larceny	Motor Vehicle
Replication Linear Regressions, Grogger and Willis (2000) Table 4, Panel A							
After	3.2**	2.7	74.4*	249.6***	32.6	345.0***	429.8***
	(1.1)	(2.9)	(30.6)	(29.6)	(59.3)	(88.7)	(62.0)
Uncertain	2.1	11.1*	38.6	112.3*	159.0+	8.7	405.8***
	(1.8)	(4.7)	(48.9)	(47.2)	(94.5)	(141.4)	(98.9)
R-squared	0.71	0.74	0.78	0.71	0.78	0.80	0.72
Replication Using Evans et al. (2012) Arrival Dates							
After - EGM Dates	3.3**	1.8	68.2*	170.6***	-92.1+	92.4	259.2***
	(1.1)	(2.7)	(28.4)	(28.2)	(55.0)	(83.2)	(58.9)
R-squared	0.71	0.74	0.78	0.69	0.78	0.79	0.70
Replication Using Fryer et al. (2013) Crack Index							
FHLM Crack Index	1.6***	-1.1	41.5***	83.5***	-30.1	128.7***	207.4***
	(0.4)	(1.1)	(11.4)	(11.2)	(22.3)	(33.3)	(22.8)
R-squared	0.71	0.74	0.79	0.70	0.78	0.80	0.73

Using Two-Year Averages of Gun Suicide Rate and FS/S Ratios, Young Black Men

	Murder	Rape	Robbery	Agg Assault	Burglary	Larceny	Motor Vehicle
Using OIM (default) Standard Errors							
Gun Suicide Rate, Young Black Males							
Two-year GSR YBM	0.4***	0.7***	3.6	9.0***	28.0***	10.2	8.8+
	(0.1)	(0.2)	(2.2)	(2.2)	(4.1)	(6.4)	(4.6)
R-squared	0.72	0.75	0.78	0.69	0.80	0.79	0.70
Firearms Suicides as a Fraction of Suicides, Young Black Males							
Two-year avg FS/S YBM	6.8***	5.5	-43.0	147.6**	300.4**	507.0***	-135.1
	(1.8)	(4.5)	(48.1)	(48.6)	(92.2)	(139.6)	(101.1)
R-squared	0.72	0.74	0.78	0.68	0.79	0.80	0.70
Using Clustered Standard Errors							
Gun Suicide Rate, Young Black Males							
Two-year GSR YBM	0.4*	0.7+	3.6	9.0*	28.0***	10.2	8.8
	(0.2)	(0.4)	(3.9)	(4.2)	(6.4)	(11.7)	(9.6)
R-squared	0.72	0.75	0.78	0.69	0.80	0.79	0.70
Firearms Suicides as a Fraction of Suicides, Young Black Males							
Two-year avg FS/S YBM	6.8*	5.5	-43.0	147.6+	300.4*	507.0*	-135.1
	(2.7)	(8.9)	(79.8)	(81.9)	(133.9)	(210.7)	(204.4)
R-squared	0.72	0.74	0.78	0.68	0.79	0.80	0.70

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Table 2

Replication of (a) Grogger and Willis (2000) with original dating, (b) with Evans et al. (2012) dates, (c) with Fryer et al. (2013) index, and finally (d) with our gun access proxy for young black men (2-year gun suicide rates). Absent any head-to-head comparison, we see that both crack cocaine and gun access show a link to crime.

	Murder	Rape	Robbery	Agg Assault	Burglary	Larceny	Motor Vehicle
Comparison of Gun Access Measure vs. Crack Cocaine							
Following Grogger and Willis (2000)							
Using OIM (default) Standard Errors							
Gun Suicide Rate, Young Black Males							
After	2.0+	0.8	66.7*	233.2***	-54.3	329.3***	422.8***
	(1.2)	(2.9)	(31.4)	(30.2)	(58.6)	(90.8)	(63.5)
Uncertain	1.4	12.9**	34.4	103.1*	110.7	0.0	401.9***
	(1.8)	(4.7)	(49.0)	(47.2)	(91.5)	(141.8)	(99.2)
Two-year GSR YBM	0.4***	0.7**	2.6	5.5*	28.8***	5.2	2.3
	(0.1)	(0.2)	(2.2)	(2.1)	(4.2)	(6.4)	(4.5)
R-squared	0.72	0.75	0.78	0.71	0.80	0.80	0.72
Firearms Suicides as a Fraction of Suicides, Young Black Males							
After	2.3+	1.8	75.1*	234.1***	-13.6	288.5**	460.4***
	(1.2)	(2.9)	(31.4)	(30.5)	(60.4)	(90.8)	(63.6)
Uncertain	1.2	13.4**	39.2	99.3*	114.4	-47.3	434.2***
	(1.8)	(4.8)	(49.2)	(47.7)	(94.5)	(142.0)	(99.5)
Two-year avg FS/S YBM	6.1***	3.7	-66.8	74.8	298.8**	425.5**	-290.1**
	(1.8)	(4.5)	(49.1)	(47.6)	(94.3)	(141.6)	(99.3)
R-squared	0.72	0.75	0.79	0.71	0.79	0.80	0.72
Using Clustered Standard Errors							
Gun Suicide Rate, Young Black Males							
After	2.0	0.6	66.7+	233.2***	-54.3	329.3*	422.8**
	(1.8)	(4.2)	(38.2)	(46.8)	(87.3)	(129.7)	(130.8)
Uncertain	1.4	9.9	34.4	103.1	110.7	0.0	401.9
	(2.0)	(6.4)	(75.8)	(67.1)	(121.2)	(167.5)	(240.3)
Two-year GSR YBM	0.4*	0.7+	2.6	5.5	28.8***	5.2	2.3
	(0.2)	(0.4)	(4.0)	(3.9)	(6.7)	(10.9)	(10.5)
R-squared	0.72	0.75	0.78	0.71	0.80	0.80	0.72
Firearms Suicides as a Fraction of Suicides, Young Black Males							
After	2.3	1.6	75.1+	234.1***	-13.6	288.5*	460.4***
	(1.7)	(4.0)	(39.8)	(46.4)	(95.6)	(135.5)	(130.2)
Uncertain	1.2	10.2	39.2	99.3	114.4	-47.3	434.2+
	(2.0)	(6.5)	(74.0)	(65.2)	(119.8)	(171.1)	(231.8)
Two-year avg FS/S YBM	6.1*	4.6	-66.8	74.8	298.8*	425.5*	-290.1
	(2.5)	(8.6)	(81.2)	(74.7)	(140.2)	(205.3)	(227.4)
R-squared	0.72	0.75	0.79	0.71	0.79	0.80	0.72
Gun Access vs. Evans et al. (2012) Crack Measures							
Using Clustered Standard Errors							
Gun Suicide Rate, Young Black Males							
After - EGM Dates	2.7*	0.7	63.6+	159.0***	-137.1*	77.8	249.1**
	(1.3)	(3.3)	(36.2)	(36.4)	(67.4)	(108.7)	(87.8)
Two-year GSR YBM	0.4*	0.7+	3.0	7.6+	29.3***	9.5	6.6
	(0.2)	(0.4)	(3.8)	(3.9)	(6.5)	(11.4)	(9.7)
R-squared	0.72	0.75	0.78	0.70	0.80	0.79	0.70
Firearms Suicides as a Fraction of Suicides, Young Black Males							
After - EGM Dates	2.8*	1.4	73.3+	162.5***	-117.8	54.1	276.1**
	(1.2)	(3.3)	(38.1)	(36.8)	(75.7)	(108.8)	(92.5)
Two-year avg FS/S YBM	6.1*	5.2	-59.8	110.4	327.4*	494.7*	-198.3
	(2.6)	(8.7)	(80.3)	(78.5)	(135.0)	(209.4)	(216.0)
R-squared	0.72	0.74	0.79	0.70	0.79	0.80	0.71
Gun Access vs. Fryer et al. (2013) Crack Index							
Using Clustered Standard Errors							
Gun Suicide Rate, Young Black Males							
FHLM Crack Index	1.5	-1.2	40.8*	81.7*	-36.2	126.8	205.9**
	(0.9)	(2.1)	(20.1)	(30.7)	(37.7)	(76.2)	(65.8)
Two-year GSR YBM	0.4*	0.7+	3.3	8.4*	28.3***	9.2	7.2
	(0.2)	(0.4)	(3.7)	(3.8)	(6.6)	(10.8)	(8.8)
R-squared	0.73	0.75	0.79	0.71	0.80	0.80	0.73
Firearms Suicides as a Fraction of Suicides, Young Black Males							
FHLM Crack Index	1.6	-1.2	39.2+	82.7*	-29.6	133.0+	204.3**
	(1.0)	(2.1)	(19.8)	(31.7)	(43.5)	(79.4)	(63.4)
Two-year avg FS/S YBM	7.0**	5.4	-38.6	157.0+	297.1*	522.1*	-111.9
	(2.6)	(8.9)	(75.4)	(79.2)	(134.3)	(207.4)	(182.0)
R-squared	0.72	0.75	0.79	0.71	0.79	0.80	0.73

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Table 3

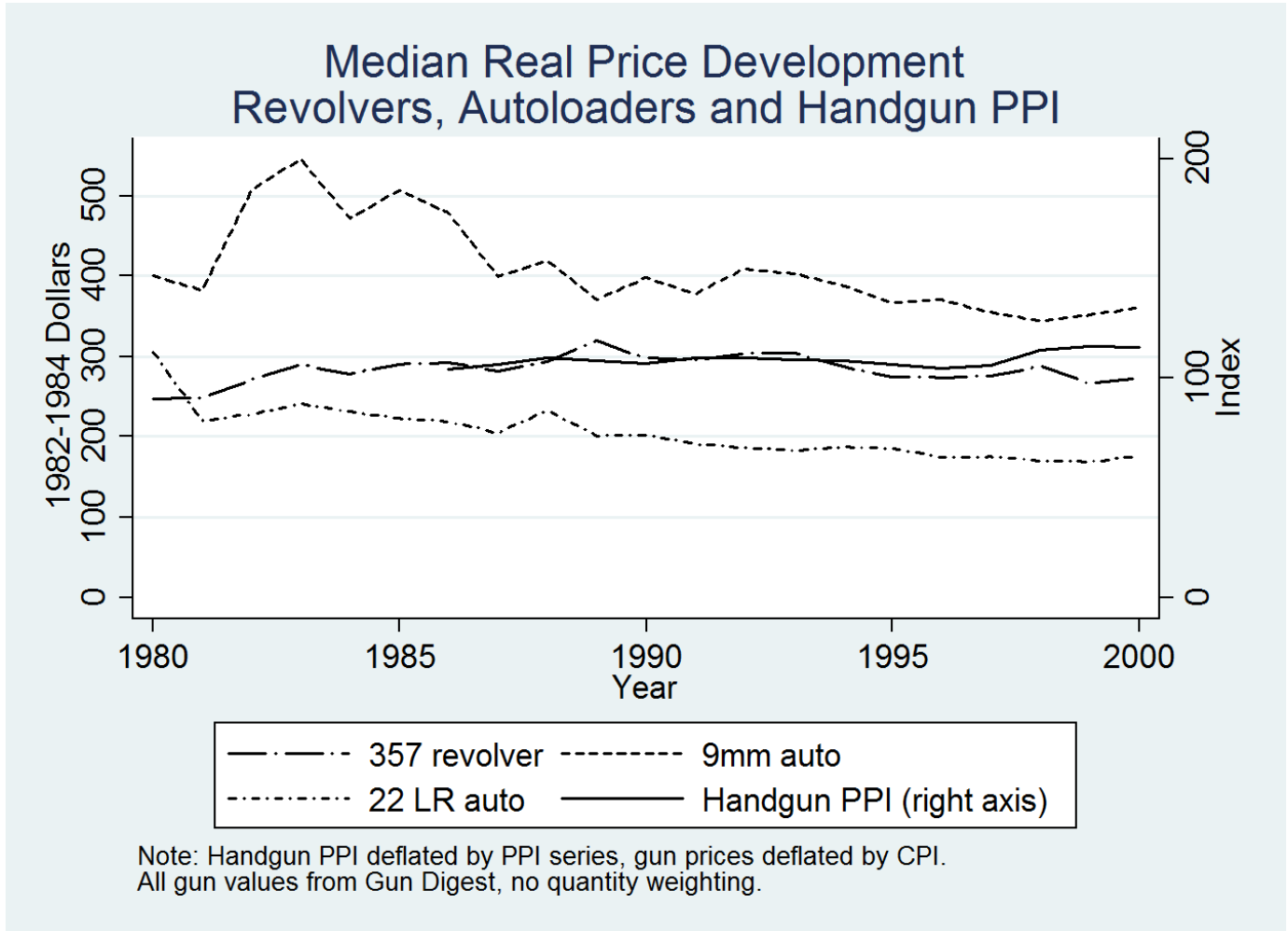Comparison of Grogger and Willis (2000), Evans et al. (2012), and Fryer et al. (2013) crack proxies,

Figure 1.
The development of median prices for (a) 357 revolvers, (b) 22 autoloaders and (c) 9mm autoloaders, combined with (d) the PPI series for handguns. Notice that the PPI index matches closely the 357 median (steady and slightly increasing) but is very different from the two autoloaders series.
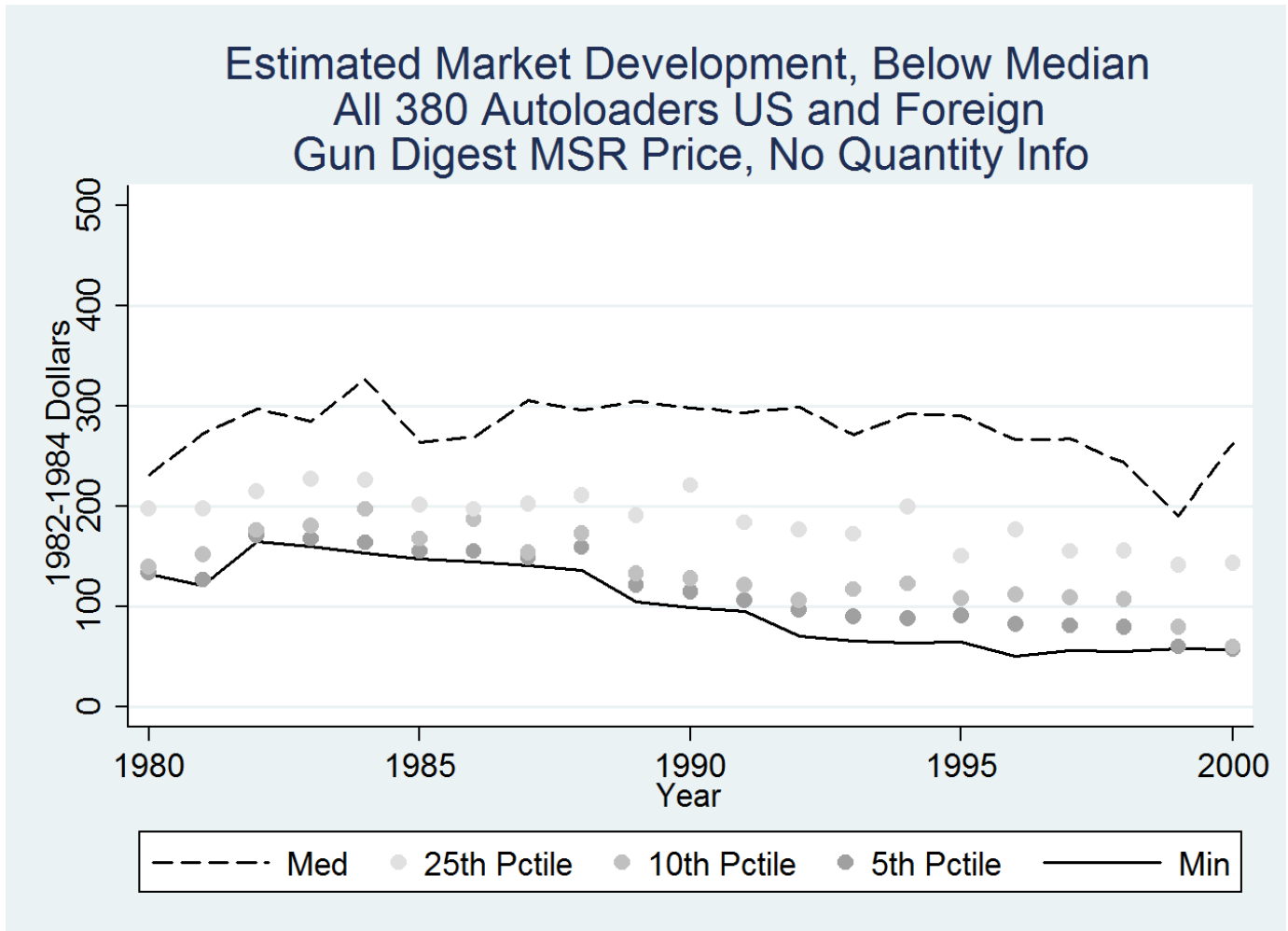
Figure 2.
Estimated movements of real prices (1982-1984 dollars) in the bottom half of the market for 380
ACP autoloaders from 1980 to 2000. Note that the prices for the lowest quartile fall through most of
the 1980s and 1990s. Source: Authors calculations, based on Gun Digest Gundex 1980-2000 only
(no effort to weight by quantity).
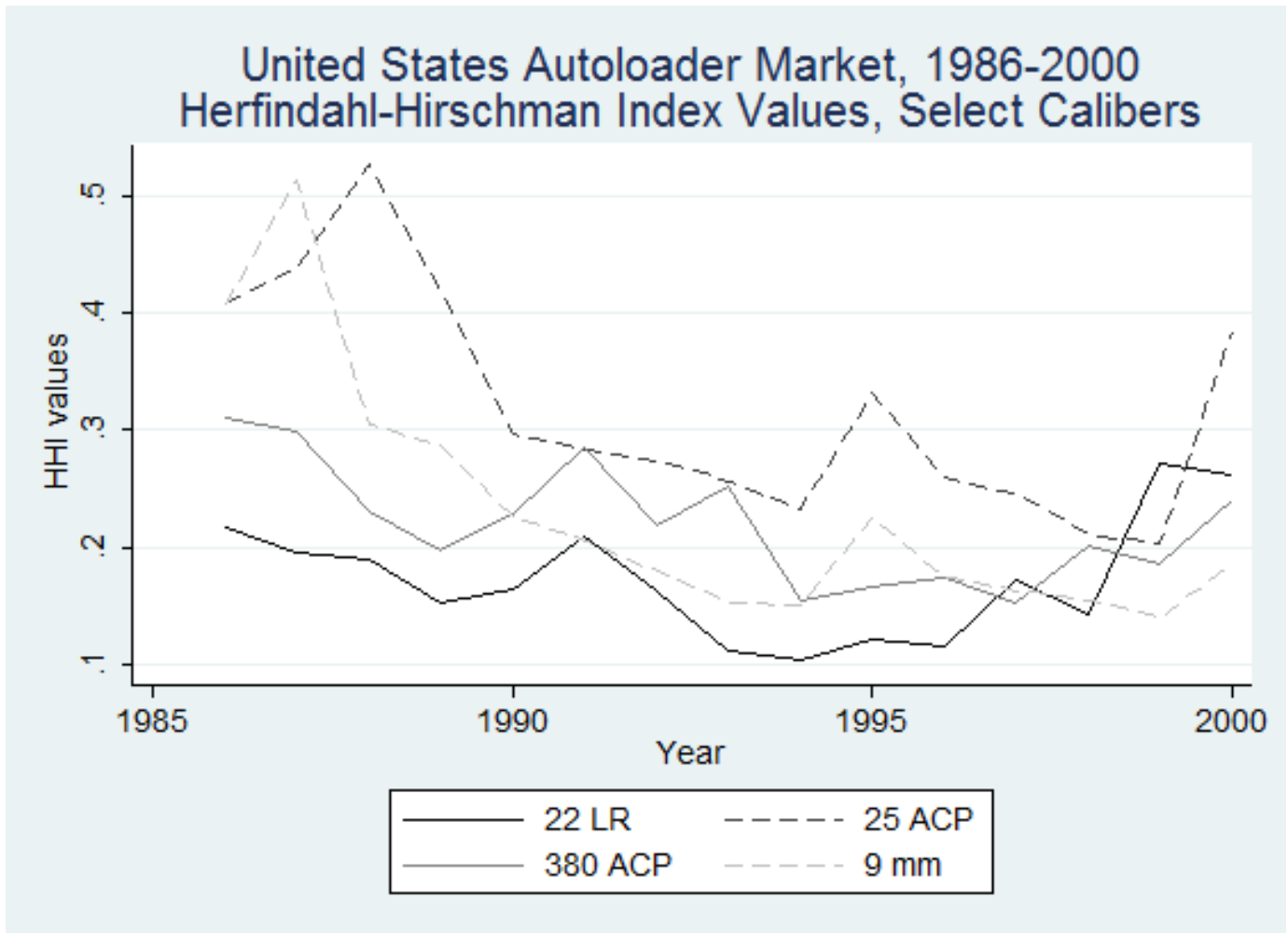
Figure 3.
Development of the Herfindahl-Hirschman Index (HHI) for markets in 22 LR, 25 ACP, 380 ACP and 9 mm autoloaders from 1986 (first year of reliable AFMER data) to 2000. Note the significant decline in concentration from 1986 onwards, at the same time of overall price decline, and that all but 22 LR start with high contentration but fall to moderate concentration or lower. Source: Authors calculations, based on ATF AFMER.
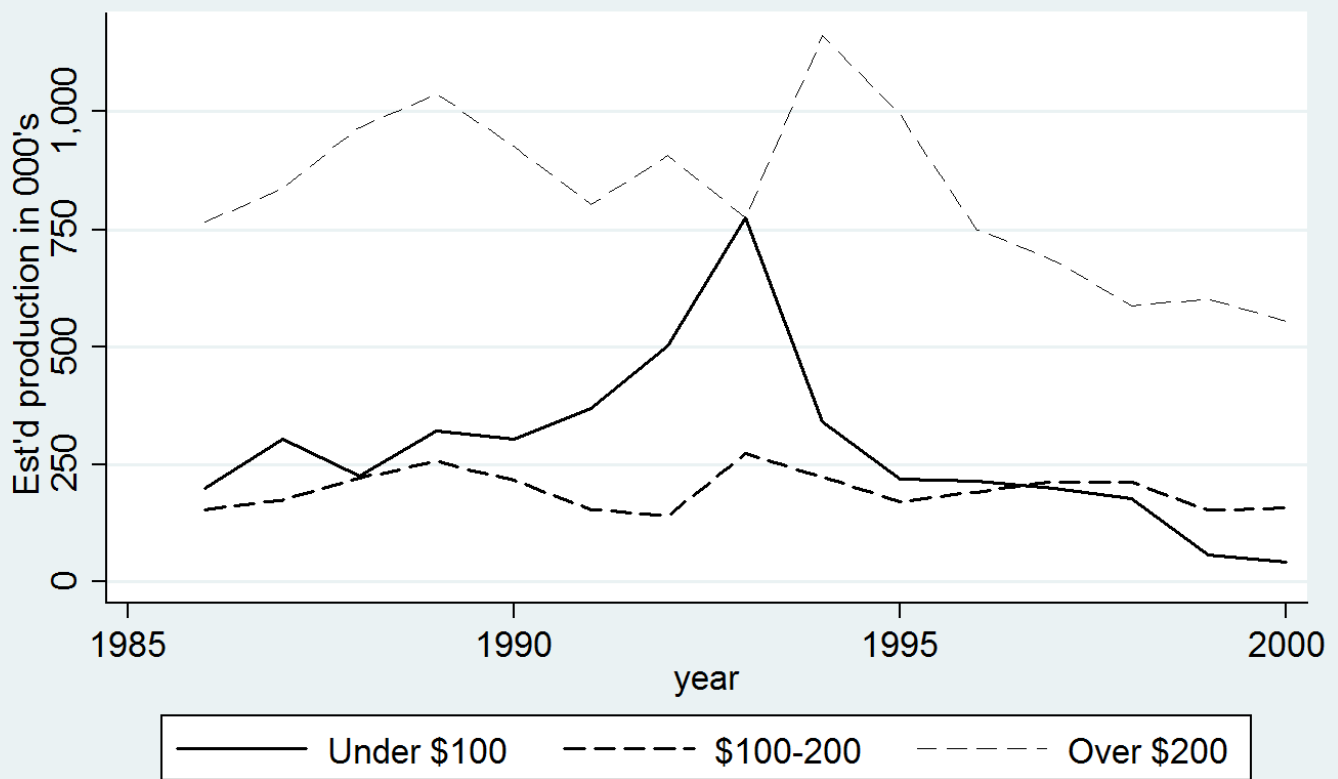
Figure 4.
Estimated changes in US domestic production of all handguns (revolvers and autoloaders) in three pricing tiers: (a) under $100 in 1982-1984 dollars (less than about $250 in today's dollars), (b) between $100 and $200 ($250-500 in today's dollars), (c) above $200 (above $500 in today's dollars). As is clear, both the "mid-range" and "high-end" gun show fluctuations but no major change over the period, while the "entry-level" handguns surge in production to 1993.
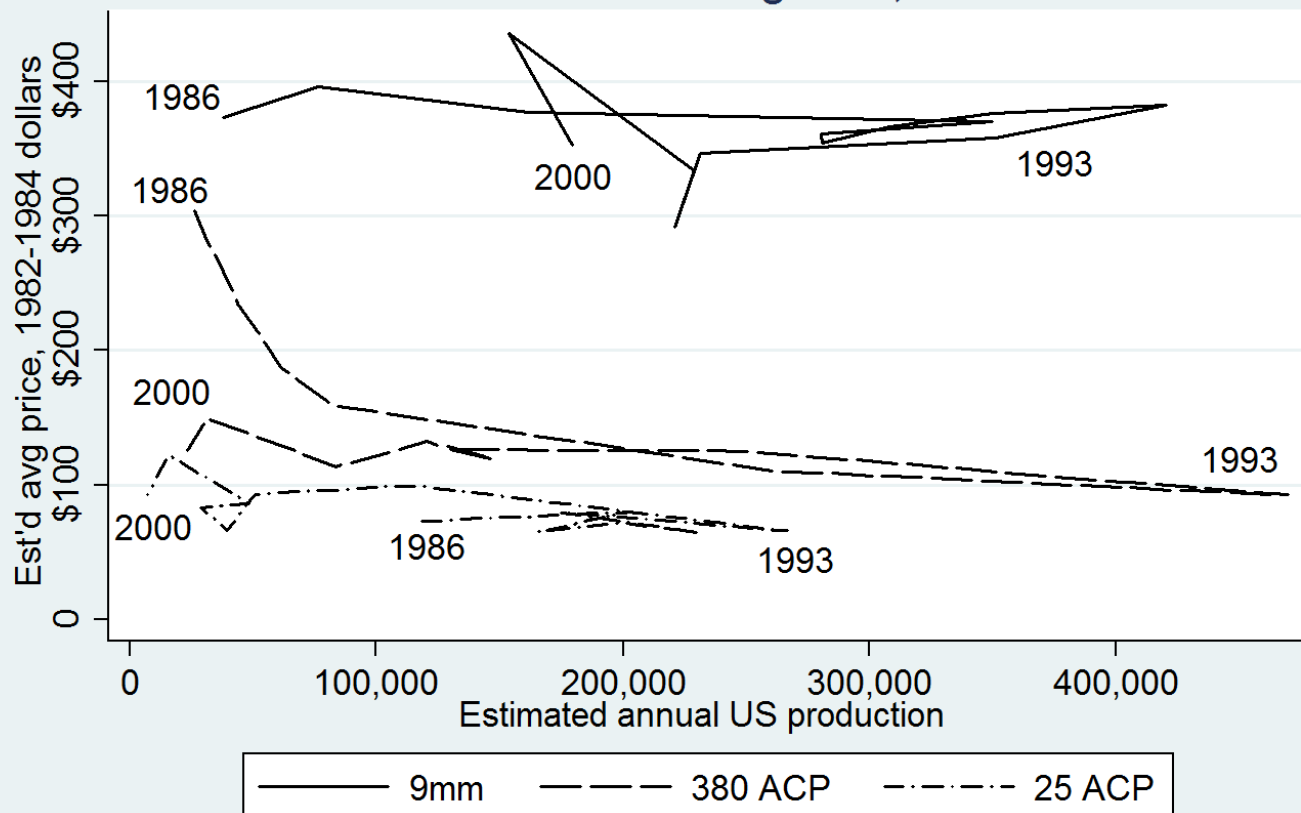
Figure 5.

The movement of prices and quantities for the three critical calibers of 25 ACP, 380 ACP and 9mm autoloaders from 1986 to 2000. Notice that for all three calibers production increases considerably, while in no case do prices increase; for the 380 ACP, prices fall precipitously. Demand elasticities computed from fixed effects panel regressions shown in Table 1 are negative for all three calibers, greater than unit elastic and significant for 380 ACP and 9mm. As discussed, this matches the MICRO 101 supply shock pattern.

Reported Source of Handguns
Black Male Inmates, Ages 15-22

1983

Gift
Bought for cash
Traded
Borrowed
No handgun
Stolen, taken or found

1991

Gift
No handgun
Stolen, taken or found
Borrowed
Bought for cash
Traded
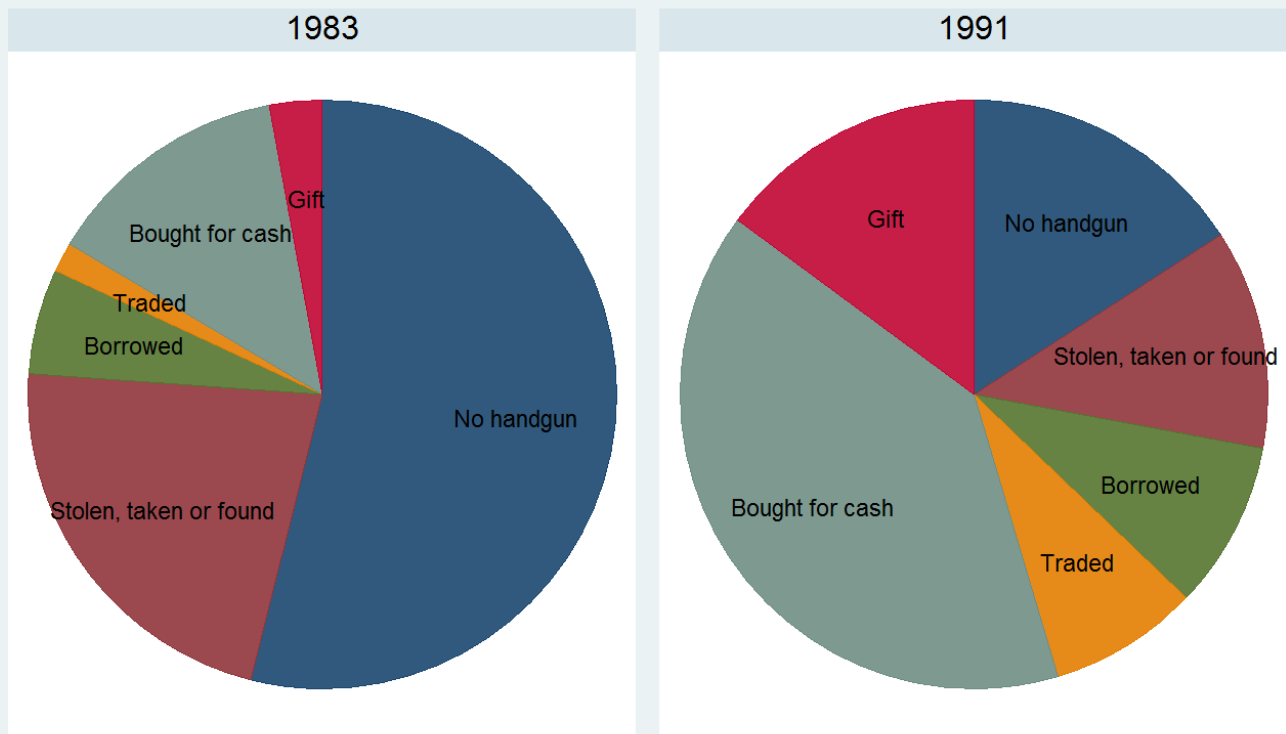
Source: Rossi & Wright 1983 and Sheley, Wright & Smith 1991.
There are 243 respondents for 1983 and 315 for 1991.

Figure 6.
Summary of surveys of black male inmates, aged 15-22, on handgun ownership and access before imprisonment in 1983 and 1991. Notice that not only does ownership of guns increase, but the ability to purchase a gun (via either formal or informal markets) is the largest component of this. Source: Authors' analysis of the ICPSR datasets of Sheley et al. (1991); Wright and Rossi (1983)

Figure 7.
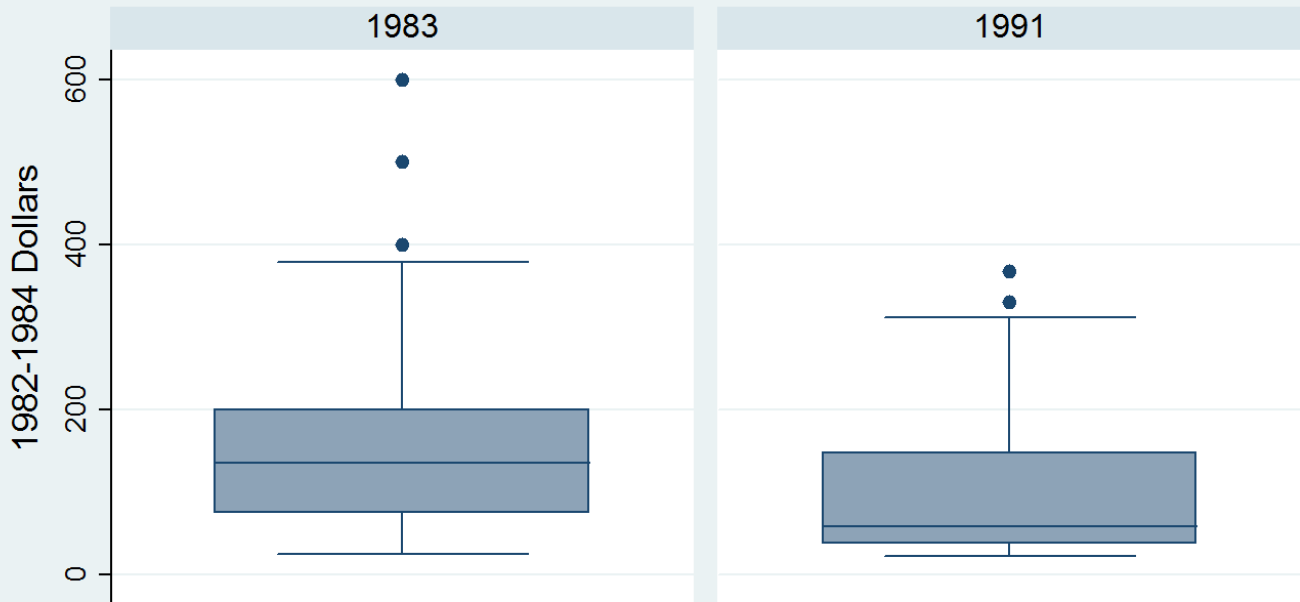
Summary of surveys of black male inmates, aged 15-22, on handgun costs before imprisonment in 1983 and 1991. The 1983 data asks the value of a gun if purchased in a store, while the 1991 survey simply asks the cost to the respondent, so there are limits to how these can be compared. However, the direction and magnitude of change matches the other data. Source: Authors' analysis of the ICPSR datasets of Sheley et al. (1991); Wright and Rossi (1983). There were three values above $600, two for 1983 and one for 1991, that were dropped. For 1991, 22 observations (out of 125 total) were below $20, potentially in error, and dropped for the above graphic.

A   Data Appendix

We have used data from multiple sources for this research.

A.1   Gun Quantity Data

A.1.1   Annual Firearms Manufacturing and Export Report (AFMER)

This data is compiled annually by the US Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) for statistical purposes and is obtained by mandatory reporting from US firearms manufacturers. Each manufacturer lists the number of pistols, revolvers, rifles, shotguns and miscellaneous firearms produced each year, including the different calibers of pistols and revolvers.

We have obtained such production data for US firearms manufacturers for the 1990-2013 time period from the ATF website and through a Freedom of Information Act (FOIA) request to the ATF for earlier time periods. This data gives us new handgun production/sales annually for the various firearm quantity measures used within the paper. Most of the data received from the FOIA request (for years 1984 to 2000) was in scanned PDF form, and has been entered

A.1.2   Violence Policy Center Data

We are told by the ATF (and separately, by Jurgen Brauer) that there no extant copies of the AFMER reports for 1980-1983. We use the Violence Policy Center report *Firearms Production in America 2000 Edition* (available at http://www.vpc.org/graphics/prodcov.pdf) for those years.

For price/quantity measurements made within the paper, we use this quantity data combined with price data from the Gun Digest source described below.

A.2   Gun Price Data

A.2.1   Gun Digest

This annual publication (since 1946) provides a manufacturer suggested retail price (MSRP) for current production of different models of handguns (autoloaders and revolvers), rifles, shotguns and miscellaneous firearms. We have obtained physical copies of these publications for the 1980-2000 time period. This data gives us new firearm prices for each year of production for the

various price measures used within the paper. We have handgun prices for the entire 1980-2000 time period by manufacturer, brand and caliber. Each unique listing of a caliber/price/magazine size/style is entered as a separate data point. For instance, in the 1983 Gun Digest, the Iver Johnson PP22 Auto Pistol has a 7-shot magazine and a standard style, with a price of $183.24, but can be purchased either 22 LR or 25 ACP. This is two observations in our data set.

The handgun price data is being manually connected to producers from the AFMER data by manufacturer. Most of the AFMER production data has been directly linked (approximately 75-80%) to specific autoloader prices, although we have not been able to link the remaining production yet due to some manufacturers not selling their production directly through retail outlets.

A.3   Gun Price-Quantity Mapping Information

A.3.1   Blue Book of Gun Values

Mapping between gun brands (from the Gun Digests) to gun manufacturers (by AFMER identifier or country) is a nontrivial enterprise.

We make use of the Blue Book of Gun Values. We use both the online directory and hard copies of 1990 and 2000 directories. To learn more about this resource, go to:

http://bluebookofgunvalues.com/

A.4   Crack Measures

A.4.1   Grogger Willis Arrival Dates

We make use of the estimated arrival dates of crack in 27 large cities, as well as dates of uncertainty, provided in Grogger and Willis (2000: Table 1).

A.4.2   Fryer, Heaton, Levitt and Murphy Crack Index

We use the "Crack Index" developed by Fryer et al. (2013), accessed via:

http://scholar.harvard.edu/fryer/publications/measuring-crack-cocaine-and-its-impact

For different parts of the analysis we use both state and city data, both adjusted and unadjusted. For the MSA analysis we combine averages for all cities within an MSA, weighted by

1990 city population, using the Census data, Population Estimates for Cities with Populations of 100,000 and Greater, found at:

http://www.census.gov/population/estimates/metro-city/SC100K-T1.txt

A.4.3 Evans Garthwaite Moore Arrival Dates

We use the arrival dates for crack provided by Evans et al. (2012). We use the estimates based on two years in a row of cocaine deaths in each MSA.

A.5 Mortality Data

A.5.1 NBER Vital Statistics Multiple Causes of Death Data

For MSA and state-level firearms suicides, firearms homicides, and cocaine deaths, we use the public use data set on mortality data made available on the NBER website.

http://www.nber.org/data/vital-statistics-mortality-data-multiple-cause-of-death.html

A.5.2 CDC Data Sources

For national analysis we sometimes use CDC data sources, specifically the Web-based Injury Statistics Query and Reporting System (WISQARS) and Vital Statistics Reports

http://www.cdc.gov/injury/wisqars/index.html

http://www.cdc.gov/nchs/products/vsus/vsus_1980_2003.htm

A.5.3 StatCan Data

For comparisons of cocaine-related and gun deaths between the United States and Canada, we relied on a custom report provided for us by Statistics Canada. For more information about StatCan the website is:

http://www.statcan.gc.ca/

A.6   Regional Population, Economic Data and Other Controls

A.6.1   BEA Local Area Personal Income and Employment Data

In some regressions we use income and employment data as controls. These are accessed from the BEA at:

http://bea.gov/regional/index.htm

A.6.2   County Population by Population Characteristics

Gun homicide rate, gun suicide rate, and some controls employ county or state population levels by gender, five-year age cohort and ethnicity. These are pulled from the Census website.

Specifically, for 1980-1989 we use Intercensal County Estimates by Age, Sex, Race: 1980-1989, found at:

http://www.census.gov/popest/data/counties/asrh/1980s/PE-02.html

For 1990-1999 we use the State and County Intercensal Estimates by Demographic Characteristics (1990-1999) found at:

http://www.census.gov/popest/data/intercensal/st-co/characteristics.html

For 2000 we use Intercensal Estimates of the Resident Population by Five-Year Age Groups, Sex, Race, and Hispanic Origin for Counties: April 1, 2000 to July 1, 2010 found at:

http://www.census.gov/popest/data/intercensal/county/CO-EST00INT-alldata.html

A.6.3   Linking County FIPS and MSA

For work replicating Evans, Garthwaite and Moore at the MSA and state level (not shown here) we uses a crosswalk between county FIPS and MSAS found at:

http://www.census.gov/population/estimates/metro-city/99mfips.txt

A.7   FBI UCR Data

We make use of FBI Uniform Crime Report data for several issues.

A.7.1 Offenses Known To Police

To replicate Grogger and Willis (2000), since we were not able to find Crime In America publications for the relevant years, we use the NACJD data sets for ICPSR Study 9028, specifically 01, 05, 09, 13, 17, 26, 35, 50, 55, 59, 63, 67 and 71. Instead of CPS data we use the relevant population estimates in the FBI data itself. For burglary, we have used both NACJD data as well as the FBI UCR master files from FBI Criminal Justice Information Services Division, based in Clarksburg, West Virginia.

The datasets can be found at:

https://www.icpsr.umich.edu/icpsrweb/content/NACJD/guides/ucr.html

A.7.2 Arrest Data

To look at how local arrests relate to violence and other measures we make use of the FBI Uniform Crime Reports arrest data. We use the master files, provided to us on digital media by the FBI Criminal Justice Information Services Division, based in Clarksburg, West Virginia. These were also used for burglary data for the replication of Grogger and Willis (2000).

A.8 Price Level Data

To adjust nominal prices to a real basis, we use the Consumer Price Index for All Urban Consumers: All Items, seasonally adjusted, (CPIAUCSL) series, annual average, and the Gross Domestic Product: Implicit Price Deflator (GDPDEF), both accessed via the Federal Reserve Economic Data (FRED2) website:

http://research.stlouisfed.org/fred2/series/CPIAUCSL/

https://research.stlouisfed.org/fred2/series/GDPDEF/

A.9 ATF Resources and Activities

A.9.1 United States Budgets

The archived budgets of the United States of America, for 1975-2002 provide data on ATF budgets, headcounts and activities. We used the actual information (for $t-2$, given a budget

from year t). Usually these were in the appendix, within the discussion of budgets for the Department of the Treasury.

https://fraser.stlouisfed.org/title/54

A.9.2   ATF Publications

We also consulted ATF reports on firearms commerce, particularly the 2011 report:

https://www.atf.gov/file/56646/download

A.10   Gun Access Data, 1983 and 1991

To analyze access to handguns for criminally active young black men we used two studies, one from 1983 and one from 1991. We retrieved them from the ICPSR website. The studies, ICPSR 8357 and ICPSR 6484, can be found at:

http://www.icpsr.umich.edu/icpsrweb/NACJD/studies/8357

http://www.icpsr.umich.edu/icpsrweb/NACJD/studies/6484