

The Birth of the Organized Crime? The American Temperance Movement and Market-Based Violence

Emily G. Owens
Cornell University
emily.owens@cornell.edu

May 2011*

Abstract

Economic theory and anecdotal evidence suggest that the absence of formal contract enforcement increases systemic, or market-based, violence in illegal markets. Lack of substantial variation in market legality has prevented empirical evaluation of the strength of this association. Using a state-level panel of age-specific homicide rates between 1900 and 1940, I demonstrate that criminalization of alcohol markets led to a compression of the age distribution of homicide victims. Specifically, homicide rates for individuals between the ages of 20 and 30 increased relative to homicide rates for individuals under 20 and over 30. The compression of the age distribution of homicide victims was most evident in northern states and in states with large immigrant and urban populations. Using modern homicide data, I show that this age-specific change in homicide rates is consistent with an increase in systemic violence, supporting the argument that the temperance movement contributed to the rise of organized crime in the United States. Banning the commercial sale of alcohol appears to have had a protective effect for children and mature adults, but this came at the expense of increasing the rate of violence among young adults.

JEL Codes: K42, N42, I18

Keywords: Alcohol, Organized Crime, Homicide, Illegal Markets, Prohibition

* I would like to thank Jim Berry, Aaron Bodoh-Creed, Phil Cook, Matthew Freedman, Benjamin Hansen, and seminar participants at the University of Oregon and Cornell University for helpful comments, as well as Olivia Kates, Julie Ann Rosenberg, and Zoe Piccolo for outstanding research assistance. All errors are my own.

I. Introduction

In 2006, total criminal justice expenditure in the United States was approximately \$212 billion. The high cost of policing, adjudication, and incarceration has led academics and policy makers to call for more efficient provision of criminal justice at all levels (Cook and Ludwig 2011; Cuomo 2005). Two of the proposed strategies for reducing the both social cost of crime and government spending include increasing the cost of alcohol consumption (Cook and Ludwig 2011; Cook 2008; Cook and Moore 1993) and taking steps to legalize the production, sale and consumption of marijuana (Moskos 2008; Miron 1999, 2010). The argument for increasing the cost of alcohol stems from a long literature documenting a link between alcohol consumption and violent behavior, reviewed in Cook (2007) and Miczek et al. (1994). Legalizing the market for marijuana would free up police time, court dockets, and prison space; roughly 54% of all federal inmates and 36% of all state inmates are incarcerated because they participated in illegal drug markets. Further, if the cultivation and distribution of marijuana could be conducted legally, market participants could enjoy the protection of criminal and civil courts, reducing the need for violent dispute resolution currently observed in parts of Mexico.

To some extent, the purported benefits from legalizing criminal markets are based on theory rather than empirical evidence. To date there has been no large scale experiment where commercial cultivation and sale of marijuana has been fully legalized.² In the absence of modern empirical evidence, scholars and policy makers have turned to the American experience of alcohol prohibition as a test case of what might happen if large illegal markets were legalized and regulated (Boaz 2009, Keefer 2008, NORML 2003). The prevailing view of the American Temperance movement is one of utter failure; while alcohol consumption may have fallen (Dills and Miron 2004, Cook 2007), consumer demand for illegal alcohol fueled a violent underground market in which urban street gangs played an important role. Specifically, alcohol suppliers were willing to pay gang members to protect their distilleries and transportation routes, as well as provide protection from law enforcement officers. In both academic and popular literature, the underground market for illegal alcohol during the Temperance movement is viewed as the birthplace of the highly organized, geographically diffuse, criminal syndicate known as La Cosa Nostra, or the American Mafia.

² There have been evaluations of the impact of decriminalization of marijuana, primarily in Europe, finding that decriminalization increases drug use, and reduces crime (McConnell et al. 2010)

Comparisons between alcohol and marijuana markets are apt to the extent that both drugs are mild depressants, and are likely to be viewed as substitutes by consumers (Boyum and Kleiman 2002). At the same time, the criminalization of alcohol markets in the early 20th century took place against a backdrop of major social upheaval and before reliable survey and crime data existed.³ Indeed, Asbridge and Weerasinghe (2009) show that most of the homicides in prohibition-era Chicago were not related to alcohol markets, and Owens (2011) demonstrates that, conditional on measurable demographic variables like urbanization, immigration, and welfare spending, certain types of dry laws actually appear to have reduced state-level homicide rates. This is consistent with research on modern county level dry laws, which have been shown to reduce crime, although they tend to increase the abuse of other substances (Conlin et al. 2005).

Is it possible that criminalizing alcohol markets both reduced violence and contributed to the emergence of the American Mafia? Both ideas can be reconciled if the temperance movement changed the nature of crime in America. There is some evidence that this occurred. Bleakley and Owens (2011) present evidence that passing county-level dry ordinances reduced lynching in southern counties, but that the passage of such ordinances were not correlated with the rate of legal executions of blacks or whites. There is also qualitative evidence that social workers observed reduced rates of domestic violence in dry areas (Cook 2007).

In this paper, I show that the American Temperance Movement was associated with a substantial increase in systemic violence. Using modern data from the Supplemental Homicide Reports, I demonstrate a robust relationship between the age of homicide victims and the circumstances of their death. Homicide victims in their 20s are as much as 50% more likely to be killed in systemic violence than people under 20 or over 30. I show that the age distributions of those killed in other alcohol-related circumstances (being killed accidentally, by a family member, or in an intoxicated fight) is not similarly concentrated among young adults.

The relationship between the age of the murder victim and the circumstances of their death allows me to disentangle changes in systemic violence from other motives for murder. Using age specific death rates from the Census Death Registry between 1900 and 1940, I show that the

³ The lack of social science research on the Temperance movement is highlighted by Joseph Gusfield in his introduction to the second edition of Symbolic Crusade: Status Politics and the American Temperance Movement. “The amount written about Temperance is monumentally staggering to someone who tries to read it all. Claims, counterclaims, factual histories, and proceedings of organizations overwhelm us in their immensity. Despite this plethora of documents and analyses, we are left with either partisan writings, histories which preach, or analyses which fail to go beyond general remarks about moral perfectionism, rural-urban conflict, of the Protestant envy of the sinner.”

passage of a state-level temperance law was associated with a compression in the age distribution of homicide victims. While the net effect of temperance on homicides was negative, relative homicide rates for people in their 20s increased by 20 to 40% when alcohol markets were criminalized. This effect is most robust in states with large immigrant populations and in the north, which I define as states that were not in the confederacy. While not definitive proof, to the best of my knowledge this is some of the first empirical support for the folk wisdom that the origins of La Cosa Nostra are in Prohibition.

The paper proceeds as follows: In section II, I use existing research on alcohol and violent crime to connect drinking with murder rates, and provide a brief overview of what is known about the origins of La Cosa Nostra. Section III is a brief summary of the American Temperance Movement. I compare the available data on homicide rates in the early 20th century and today in Section IV, and I then use modern data to motivate the connection between the age of a homicide victim and the circumstances of their death in Section V. In Section VI, I present evidence that the timing of market criminalization is correlated with a compression in the age distribution on homicide victims, consistent with an increase in gang related violence. Section VII concludes with discussion and policy implications.

II. Alcohol, Violence, and Organized Crime

Alcohol consumption is highly correlated with criminal behavior. Roughly half of surveyed crime victims believe their attacker was drunk, and 40% of people under criminal justice supervision report consuming alcohol prior to committing crime. Consistent with these reports, a large literature in economics and public health has found evidence of a positive relationship between drinking and criminal behavior (Markowitz and Grossman, 2000; Joksch and Jones, 1993; Carpenter, 2008; Dobkin and Carpenter, 2008; Cook and Moore, 1993b). Further, controlled laboratory experiments have consistently shown that, at moderate levels, alcohol consumption increases both individual aggression and the perceived aggression of others (Miczek et al., 1994).

The finding that alcohol consumption increases the probability that an individual will engage in violent behavior is evidence of a psychopharmacological link between alcohol and crime. To the extent that the psychopharmacological effect of alcohol use on violence is large, policies that reduce drinking should lead to crime reductions. The conventionally accepted price

elasticity of demand for alcohol is around -0.29 in the short run and -0.65 in the long run (Grossman et al., 1998), implying that a 10% increase in the price of alcohol should reduce drinking by 3-6%. If consuming alcohol were to, for example, increase the propensity to engage in violence by 40% then we might expect crime to fall by 1.2 to 1.6%. There is limited empirical evidence that raising the price of alcohol actually reduces crime rates (Durrance et al., 2011).

Criminalizing the market for a certain good is theoretically equivalent to increasing the cost of the good that market provides. The producer must now bear the cost of avoiding law enforcement, shifting supply inward. Consumers also face legal risk of apprehension and, at a given sticker price, demand less alcohol. Further, the absence of formal contract enforcement in illegal markets increases the amount of uncertainty associated with each transaction, which may affect both consumers and producers. Both the reduction in supply and reduction in demand will unambiguously reduce the equilibrium quantity demanded. It follows that if alcohol consumption falls when alcohol markets are criminalized, the psychopharmacological violence associated with alcohol will also fall.

A reduction in psychopharmacological violence following market illegality does not necessarily translate into a reduction in overall violence. Market illegality itself can lead to a particular type of crime, which Goldstein (1985) calls “systemic violence.” In legal markets, the civil court system provides third-party contract enforcement that can be relied upon to resolve disputes. The presence of a credible efficient court system encourages market activity by reducing the uncertainty associated with transactions (North, 1981) and protecting the property rights of productive individuals (Hurst, 1956). By definition, disputes that arise during transactions in an illegal market do not fall under the jurisdiction of the civil court system.

Non-violent informal contract enforcement mechanisms may arise in the absence of a formal system. Venkatesh (1999) highlights the role that social pressure and repeated games play in Chicago underground economies. Leeson (1999) documents the existence of informal “constitutions” that outlined how disputes would be resolved in large pirate organizations. While such arrangements promote economic activity, to the extent that these informal contracts protect the property rights of parties that have stronger ties to a social network over those with higher productivity, these markets will not be as efficient as those where the participants have access to a system of formal contract enforcement (Hurst, 1956). Compounding the inefficiency due to reliance on personal ties is the potential for parties to resolve disputes through violence-

essentially a system where disputed property rights are assigned to the strongest party, rather than the most connected or most productive (Donohue and Levitt, 1998; North et al., 2006).

In the broadest sense, systemic violence is violence used to assign property rights in informal markets. Because the civil court does not recognize any property rights in, for example, black tar heroin, a black tar heroin merchant cannot sue his supplier in court if she fails to deliver an agreed upon amount of product. While it is plausible that the merchant could rely on informal networks to socially punish the supplier, it is also the case the physical force could be used to compel her to fulfill the terms of the contract. Further, while violence could plausibly be used in legal markets, legal sanctions against violence may be a stronger deterrent for people operating in legal markets- people engaged in illegal transactions are already violating the law in the first place (Reuter 1985). Finally, the role of physical force in contract enforcement means that individuals with a comparative advantage in violence are more likely to participate in illegal markets, a point highlighted by Reuter (1985) and Levitt and Venkatesh (2001). All three of these mechanisms imply that not only does the nature of the market lead to an increased rate of violent dispute resolution, but that participants in illegal markets are more likely to use violence to resolve any given dispute.

The absence of formal contract enforcement implies that, *ceteris paribus*, violence will be used to resolve disputes more often than in legal markets. Out of a total of 13,636 homicides described in the FBI's Supplemental Homicide Reports in 2009, 487 were reported as taking place in conjunction with a felony violation of narcotic drug laws, 6 involved prostitution, 5 involved gambling, and 180 were considered "gangland" killings. While systemic violence in illegal markets causes a small fraction of all homicides, that same year only 203 homicides were the result of an apparent dispute over money or property. Considering that roughly 3% of the US population was arrested in 2009, the fact that fatal disputes over legal property rights occur less than 1/3rd as often as fatal disputes over property that could not be resolved in court implies that the rate of violence per transaction in the illegal sector is much higher than the legal sector.

There is a long history linking gang activity to businesses that were excluded from formal contract enforcement. In his description of the connection between gangs and business, Abadinski (1994) argues that in late 19th century New York City immigrant-run businesses, especially saloons and brothels, turned to local street gangs for protection from both criminals and corrupt police officers. Members of street gangs were considered to have a comparative

advantage in violence, and therefore were sought out to protect property rights that were not expected to be enforced by the formal legal system. When state governments, and later the federal government, criminalized alcohol markets, this increased demand for informal contract enforcement among the market participants.⁴ Street gangs, particularly Italian and Jewish street gangs, are alleged to have stepped into this role. As the illegal market for alcohol grew, so did the influence of these street gangs.

In the early 1930s, five of these street gangs were forcibly merged into an organized, multi-level, hierarchical organization which became known as “La Cosa Nostra” or “The American Mafia” after what is known as the Castellammarese War (Jacobs and Panarella, 1998). La Cosa Nostra is distinguished from other gangs due to its level of organization and the scope of its operations (Reuter, 1985; Jacobs and Panarella, 1998). Typical street gangs tend to form on the peripheries of society, where reliance on formal contract enforcement is arguably weak (Thraser, 1927; Klein, 1998). The ability of La Cosa Nostra to resolve disputes became so effective that the gang was able to crowd out formal contract enforcement in otherwise legal markets (Jacobs and Panarella, 1998).

The exact history of La Cosa Nostra is still a source of some controversy among academics (Block, 1994), but the role of organized crime in the market for illegal alcohol during the temperance movement is not (Reuter, 1994). At the same time, the early 20th century was a time of rapid social and demographic change, which may also have led to a fundamental shift in the role of criminal gangs in society. What is unclear is the extent to which the existence of an illegal market for alcohol caused the transformation of Italian street gangs into La Cosa Nostra, or if the temperance movement simply occurred at approximately the same time as the rise of its precursory organizations. Research on organized crime has identified its involvement in a number of industries, including prostitution, gambling, and loan sharking (Reuter 1994). By increasing the scope of labor union activity, the 1935 Wagner Act also undoubtedly contributed to the growth of La Cosa Nostra.

III. A Brief History of the American Temperance Movement

⁴ High rates of taxation meant that some producers and consumers choose to forgo formal contract enforcement in favor of informal sales, even in “wet” areas (Cook, 2007).

On January 1st, 1920, the manufacture, sale, and transportation of intoxicating liquor within, into, and from the United States and its territories were prohibited by the 18th Amendment to the United States Constitution. The ban was in effect until December of 1933, when the 21st amendment was ratified. The passage of the 18th Amendment combined with the Volstead Act, which defined exactly what the Federal government considered intoxicating liquor to be, was the culmination of a nearly 70-year social movement aimed at limiting alcohol consumption in the United States.

The Temperance Movement can be roughly parsed into three waves. Social reformers inspired by the Second Great Awakening in the 1820s and 1830s were driven by their religious faith to improve society. In practice, these improvements included speaking out against slavery, advocating for prison reform, and promoting responsible and moderate (temperate) use of alcohol. At first, members of the Society for the Promotion of Temperance, one of the earliest anti-alcohol groups, were limited in their ability to coerce others to moderate their drinking. In the 1850s, roughly 89% of alcohol was consumed in the form of spirits (Hyman et al., 1980), and 85% of the hard alcohol consumed was produced in four states (Hamm, 1995). Prior to 1850, any attempt by local governments to regulate trade was assumed to be in violation of the Commerce Clause, and thus unconstitutional. However, the 1851 Supreme Court case *Cooley v. Board of Wardens of the Port of Philadelphia (1851)*, established that all state regulations that affected interstate trade, in the case in question a requirement that ships entering the Port of Philadelphia have pilots, were not necessarily an affront to Federal authority (Hamm, 1995). After *Cooley*, state legislatures were empowered to pass laws banning the commercial importation alcohol that would not necessarily be overturned by the Supreme Court.

Within five years, 13 states placed limitations on the importation and commercial sale of alcohol (Merz, 1969). Most of these states were in the north (Maine, New Hampshire, Vermont, Delaware, Michigan, Indiana, Iowa, Minnesota, and Nebraska), as the abolitionist leanings of the Society for the Promotion of Temperance limited its appeal in slave-owning states (Szymanski, 2003). The question of slavery also ended the first temperance wave in 1860; the onset of the Civil War sharply increased the demand for forgone revenue from alcohol taxes (Hamm, 1995). All states save Maine repealed their temperance laws by 1870 (Merz, 1969).

The short-lived second temperance wave began in the 1880s with the formation of the Woman's Christian Temperance Union (WCTU). Kansas, Iowa, Rhode Island, and North and

South Dakota became dry during this period (Merz, 1969). Georgia and Mississippi approved “local option” laws allowing counties to become dry via popular vote, and Maryland and Alabama approved dry ordinances in a large subset of counties (Cherrington, 1920). The Panic of 1893 simultaneously increased the desire for alcohol tax revenue and depleted the accounts of the WCTU (Hamm, 1995). The Panic of 1893 also contributed to the rise of the Populist movement, which shared many of the social reform themes of the Great Awakening groups. Populists were generally in favor of limiting alcohol consumption, but preferred the utopian Gothenburg Plan, where the distribution of alcohol was controlled by the state (Hamm, 1995). Further, alcohol distributors and saloon keepers in dry areas increasingly found ways around local regulations, in particular by exploiting the “original package” definition of interstate commerce.⁵

The beginning of the third and final temperance wave began in 1906. The temperament of the first two movements can be thought of as liberally religious, but the third wave was decidedly more aggressive. The Anti-Saloon League, founded in 1893 by Howard Hyde Russell, had been hiring lawyers to sue saloon keepers who violated local dry ordinances in at least seven states since 1898. The Anti-Saloon League’s efforts to enforce local dry laws reached a high point in 1906, when Theodore Roosevelt appointed Anti-Saloon League member William E. Johnson as a Special federal Agent to Suppress Liquor Traffic in the Indian Territory (Hamm 1995). Johnson, a former publisher, wrote stories of his daring night raids on liquor distributors, “capturing the Drys’ imagination” (Hamm 1995, pg 147).

Table 1 displays the timing of state-level dry laws that were in effect during the third wave. By this point, beer had replaced whiskey as the American drink of choice, and growing anti-German sentiment coupled with success of the Anti-Saloon League contributed to the passage of state temperance laws in Georgia and Oklahoma in 1907, Mississippi and North Carolina in 1908, Tennessee in 1909, and West Virginia in 1912. In 1913, the Webb-Kenyon Act declared that dry states were free to prohibit alcohol, in any form, from being imported. Eighteen additional states outlawed commercial alcohol sales between 1914 and 1917.

Three months after the United States entered World War I, the first version of the eventual 18th Amendment was debated in the House of Representatives, and four months later the Senate

⁵ States were free to prohibit intrastate commerce in alcohol, but alcohol traffic was considered interstate commerce, and outside of local jurisdictions, as long as the alcohol remained in the producers’ original packaging, which became increasingly small over time (Hamm, 1995).

voted to adopt the amendment, with little debate. Eight stories about the debate ran in the New York Times, and not one reader sent in a letter commenting on the progression of the law (Merz 1969, page 37). By January of 1919, 3/4s of US states ratified the amendment, which went into effect on the first day of 1920.

The popularity of Federal Prohibition was short lived. The overall social impact of banning the manufacture, sale, and transportation of alcohol is a question of some debate. On one hand, Dills and Miron (2004) present evidence that alcohol consumption fell in the US between 1920 and 1933, and Cook (2007) documents evidence from social workers that domestic violence among low socioeconomic status families may have fallen. At the same time, alcohol did not disappear from American life. Canadian exports of whiskey into the United States increased over the course of the 1920s (Schmeckebier, 1929). Medicinal alcohol use was permitted, and profit-minded doctors exploited this loophole- six months after the 18th Amendment went into effect over 72,000 physicians and pharmacists had applied for permits to distribute liquor (Merz 1969). Further, alcohol continued to be manufactured and sold on the black market. Gradually, high profile Drys turned against Federal Prohibition (Merz, 1969), and in 1933, the 18th Amendment was repealed by the 21st Amendment.

Two facts regarding the end of Federal Prohibition should be kept in mind. The 21st Amendment repealed Federal Prohibition, not local dry laws. Kentucky disallowed the sale of alcohol until 1939, and Kansas, Missouri, and Oklahoma all remained dry through the 1940s. Further, the demand for illegal alcohol did not disappear once consumers had the option of using the legal market. Legal alcohol was arguably of higher quality than that sold on the illegal market, but it was also subject to high rates of taxation.⁶ To some extent, bootleggers were still pursued by federal agents, only now the badges said “Internal Revenue Service” rather than “Federal Bureau of Investigation” (Cook 2007). It is unlikely that demand for illegal alcohol disappeared overnight, but due to combination of stringent tax enforcement and rising incomes as the economy recovered from the Great Depression, consumption of legal alcohol had returned pre-Prohibition levels by 1942 (Hyman et al. 1980).

The temperance movement reached its zenith in the 1920s, but the political struggle between the Drys and the Wets was only one of many social experiments. In 1921,

⁶ In the same way that modern street drugs are of inferior quality to pharmaceutical-grade versions, bootlegged alcohol was harsh, leading to the popularity of the American mixed drink (Young and Young, 2007).

approximately 800,000 immigrants entered the United States. The Immigration Act of 1924 placed country-specific caps on immigration, set at 2% of the respective population in the Census of 1890. Further by 1927 only 150,000 people would be allowed in each year, with spots allocated in proportion to the Census of 1890. The resulting shortage of unskilled labor in Northern cities, combined with a series of natural disasters, spurred the Great Migration of black Americans from the Southern United States to the industrial cities of the North, dramatically altering the demographic composition of Chicago, Detroit, Cleveland, New York, and Boston. The 19th amendment granted women the right to vote in March of 1920. Finally, military investments during World War I and the newly created federal income tax resulted in a dramatic increase in the size of the federal government; federal government revenue rose from 9% of GDP in 1913 to 21% by 1932, and expenditure grew from 8% to 18% over the same time period.

The end of Federal Prohibition also played out against a backdrop of major socioeconomic events. The stock market crash of 1929 crippled the financial system and led to the Great Depression. Poor agricultural techniques and a series of major droughts resulted in as much as 75% of the topsoil in the southern Great Plains literally being blown away in dust storms between 1933 and 1935, displacing over 2.5 million people. In response to these economic catastrophes, a New Deal of federally funded welfare programs fundamentally altered the relationship between individuals and the government. Any analysis of the impact of the Temperance movement on crime must take these contemporaneous changes into account.

IV. Measuring Crime

a. Early 20th Century America

Estimating the impact of the temperance movement on violence, especially systemic violence, is complicated by the relative quality of available data. Beginning in 1930, the Federal Bureau of Investigation (FBI) began compiling local law enforcement statistics into the Uniform Crime Reports (UCR). There were two important innovations of the UCR. First, the definitions of seven “index crimes” were standardized across regions and over time. Secondly, by 1968, almost all local law enforcement agencies contributed to the UCR, meaning that the FBI could produce a snapshot of national crime rates. Since 1976, the Federal Bureau of Investigation has collected additional detailed data on all homicides known to local police in the Supplemental Homicide Reports (SHR). As will be discussed in more detail later, the SHR includes

information on the circumstances of the murder in question, allowing a researcher to gain some insight into whether or not that murder was related to systemic violence.

Researchers seeking information on crime prior to the late 1960s have two options. Many local police agencies maintain crime records that pre-date the conventionally used UCR. This type of data is used in Asbridge and Weersinghe (2009) and Fishback et al. (2010), and has the advantage of precise measurement of crime incidence, but with limited geographic coverage. Alternately, proxies for crime rates can be found in annual historical vital statistics records collected by the US Census Bureau beginning in 1900.⁷

The census mortality statistics contain annual counts of the number of deaths, by cause, in the “death registration area.” Thus, the number of homicides in a given state is known from the time that state joins the death registry forward.⁸ In 1900, the death registration area consisted of 13 states, primarily New England, Michigan, and Indiana. States were subsequently added to the death registration area in the following years, and in 1933 the addition of Texas made the death registry complete.

One strength of the census mortality statistics is that while an individual homicide is an extreme act of violence, variation in homicide rates appears to track variation in other violent crime rates in the UCR quite well; between 1976 and 2006, the within-state correlation between homicide rates and the rate of all other violent crimes is 0.87. However, the important limitations of these data are that they are calculated at state-level, and as the states included in the death registry change over time, national homicide rates calculated from the census mortality statistics before 1933 are not comparable across years. This point was highlighted by Eckberg (1995), who used back casting to generate an “adjusted” time series of national homicide rates. Figure 1 plots the unadjusted national homicide rate against the adjusted Eckberg series. The difference between the unadjusted and Eckberg series reflects the fact that the timing of a states entry into the death registry was not orthogonal to its homicide rate; states that joined the registry earlier tended to have lower homicide rates than states that entered later.

⁷ The Ohio State University Criminal Justice Research Center also maintains a database of statistics related to violence, covering a wide range of time periods, and geographies, with particularly good coverage for New England.

⁸ Automobile accidents, also potentially affected by the temperance movement, are reported separately from “injuries by vehicles or horses” for the first time in 1906. Since the cause of death in the death registry is determined by medical professionals, I assume that deaths cause by drunk drivers are reported as automobile accidents rather than vehicular homicide.

Misinterpretation of the census mortality statistics as a true national time series has led to the false conclusions regarding the prevalence of crime during the American Temperance Movement. While researchers had previously found that homicide rates were higher during temperance (Miron 1999, Jenson 2000, Moskos 2008), accounting for the unbalanced-state panel nature of the census mortality data and controlling for contemporaneous demographic changes yields a marginally significant negative relationship between temperance and homicide rates (Owens 2011).

This paper uses additional data from the census mortality statistics in order to disentangle systemic and psychopharmacological violence. Specifically, in Table 7 of each mortality report, deaths in each state from each cause, including homicide, are reported by age of the decedent. For those dying before reaching 5 years old, deaths are disaggregated by year of age. The total number of decedents between the ages of 5 and 9 are reported each year, and until 1922 the number people dying at later ages were grouped into ten year age categories. From 1922 until 1929, the number of deaths occurring between the ages of 10 and 35 were broken into 5 year categories, and from 1933 onward all deaths over the age of 10 are reported in five year age categories. In three years (1930, 1931, and 1932) deaths are reported between the ages of 20 and 24, 25 and 34 and 35 and 44.⁹

By linking the census mortality data with state-level estimates of the age distribution from the IPUMS, it is possible to construct age-specific homicide rates at the state-level from 1900 to 1940. The 1930-1932 changes in the age categorization introduces some complication to the analysis, but it is possible to calculate homicide rates for at least three consistently defined age categories: people under 20, people in their 20s, and people over 30, with the exception of the final years of Federal Prohibition. Because I cannot isolate 20 year olds in those years, I exclude them from the current analysis. As I will show in the next section, even this coarse disaggregation of homicide rates provides important information about the probable amount of systemic violence in that state and year.

b. Late 20th to Early 21st Century America

⁹ A further limitation of the census data is that until 1922, the number of victims between the ages of 10 and 19 are reported in one category. Individuals over 14 might plausibly be involved in institutional violence, but 10 year olds are arguably more likely to be killed by a drunken parent.

Empirical support for the theoretical relationship between age and cause of death is found in the Uniform Crime Reports: Supplemental Homicide Reports (SHR). The SHR is intended to contain information on each murder known to the police, including the exact age of the victim, the suspected relationship between the victim and offender, and the suspected circumstances of death. Between 1976 and 2004, police descriptions of the circumstances of homicide were open ended, but generally fell into one of 32 categories. Important for this analysis, police were asked to identify whether or not they suspected the homicide to be related to illegal organizations—specifically a “gangland killing,” “youth gangland killing,” or a homicide resulting from a drug related transaction, gambling transaction, or to prostitution.

A large literature in criminology, beginning with Thrasher (1927), draws a bright line between youth gangs and organized crime.¹⁰ Because youth gangs are fundamentally different from organized crime, I exclude murders classified by police as related to youth gang violence from my definition of systemic murders. The police also identified homicides that were believed to be the result of an argument in which one or more parties was under the influence of alcohol, whether the homicide was believed to be accidental, and whether or not the victims was believed to be related to the offender. I classify all murders with these characteristics as psychopharmacological, as these types of murders are plausibly more likely to occur when the perpetrator is intoxicated.

I will use the richer data in the SHR to establish what the age of the homicide victim tells us about the likely circumstances of their death. In figure 2, I display a kernel density of the age distribution of homicide victims in the SHR, truncated at 65. Vertical lines indicate 20 and 30 year-olds, which I can identify in the census data.

With the exception of a small number of very young children, most homicide victims are between the ages of 19 and 30, and the distribution of ages is skewed right; there is a sharp increase in the density function between the ages of 13 and 19, and a fair amount of weight in the tail through age 60. The difference between ages in the 90th and 10th percentile of the age distribution, a commonly used measure of dispersion, is 37 years (18 to 57). This is consistent

¹⁰ For more recent reviews, see Decker and Van Winkle (2006) and Decker (1998). There are multiple competing definitions of a street gang, but classic definitions used by Klein and Thrasher highlight the absence of a clearly defined organizational structure. Some sort of formal organizational structure or hierarchy is generally considered necessary for a large criminal organization to be successful (Leeson 2006, Olson 1981, Reuter 1985).

with stylized facts about the relationships between age, risky behavior, and violence (Maxfield 1989).

In figure 3, I focus on the age distribution of four subsets of homicide victims- people killed by family members, people killed while intoxicated and fighting, people killed accidentally, and people killed in one of my four types of systemic violence.¹¹ A number of patterns are immediately apparent. First, the age distribution of people believed by the police to be killed by accident is lumpy, with local maximums around 5, 15, and 39, with a 90-10 difference of 45 years. The distribution of individuals killed by family members is bimodal, with local maximums at 5 and 35 and a 90-10 difference of 55 years. Individuals killed in fights involving alcohol are slightly older than homicide victims on average; perhaps not surprisingly, very few homicide victims under the age of 21 appear to be killed in drunken fights. A total of 34 years separate the 10th and 90th percentile of the age distribution for fatal drunken fights (21 and 55 years).

Individuals killed in homicides resulting from systemic, or market-based, violence are disproportionately concentrated between the ages of 21 and 33. Indeed, only 22 years separate the victims in the 90th percentile (41 years old) and the 10th percentile (18 years old). The tightening of the age distribution of systemic murder victims is primarily driven by the absence of older homicide victims. To put exact numbers on these figures, 47% of those killed as a result of systemic violence are in their 20s, 15% are under 20, and 37% are over 30. Roughly 16% of other types of murder victims are under 20, 33% are in their 20s and 50% are over 30.

I further divide victims of market-based violence into the four specific circumstances in figure 4. While 42% of victims of gangland killings are in their 20s, the peak of the distribution is at 19, outside of the scope of what I can measure. Turning to other violent disputes over illegal economic transactions, 48% of those killed in disputes over drugs are in their 20s, as are 39% of those killed in arguments about gambling and 47% of those killed as a result of their involvement with prostitution. While obviously not perfect measures of violence associated with La Cosa Nostra, there does appear to be a persistent relationship between the age of homicide

¹¹ In Appendix figures A2-A5, I replicate figure 3 for each decade in the SHR.

victims and market-based violence, which in both economics and criminology is an important component of organized criminal activity.¹²

V. Age Distribution of Homicide Rates and Circumstances of Death

a. Analytic Framework

In order to more formally establish the relationship between victim age and homicide circumstances, I use more of the information available in the SHR to replicate the relationship that I might see in the census data if I had information about the historic causes of death. Specifically, I estimate a model that relates the reported circumstances of death to victim's age, year, and state of death as follows:

$$(1) \quad P(\text{Circumstance}_{ast} = 1) = f(\alpha + \delta_s + \lambda_t + \beta_1(20 \leq \text{VictimAge}_{ast} < 30) + (30 \leq \text{VictimAge}_{ast}))$$

I model the probability that a homicide victim is categorized as a victim of market-based violence, family related violence, and accident, a fight, and a fight under the influence of alcohol simultaneously using linear probability models, allowing for arbitrary correlation in the dependent variable to vary within state of death. Since the regressors are the same in each equation, this is equivalent to estimating five separate OLS equations, but will allow me to easily test the equivalence of coefficients across models.

b. Results

Panel A of table 3 presents the results of these estimations. Knowing that a murder victim was in their 20s, rather than under 20, is associated with a 2.4 log percentage point (se=0.5) increase in the probability that they were killed in systemic violence, a 51% increase relative to the sample mean. Knowing that they are over 30 reduces the probability that they were killed as a result of systemic violence by 0.4 log percentage points (se=0.5). Consistent with figures 3 and 4, these coefficient estimates imply that the age distribution of systemic murder victims is tightly distributed around 20.

In the remaining four columns, I show that in no other homicide circumstance do the coefficients on age follow the same pattern. Relative to those under 20, people in their 20 are less likely to be killed in an accident or by a family member, but significantly more likely to be

¹² In addition to the use of violence to control market activity, organized criminal gangs also have to be durable (Reuter 1994). I cannot identify whether or not the same organization was responsible to homicides in either modern or historic data.

killed in a fight. Indeed, people in their 20s are 61% more likely to be killed in what the SHR classifies as a “brawl under alcohol” than people under 20.

The fact that a victim in their 20s is a positive predictor of being killed in a fight does not refute the idea that age is a positive predictor of market-based homicides. Instead, the probability that you are killed in an argument is generally increasing in age. People over 30 are also 57% more likely to be killed in an argument involving alcohol than people under 20. In fact, I cannot reject the null hypothesis that people in their 20s and over 30 are equally likely to be killed in an argument or drunken brawl at any conventional level of statistical significance.

An alternate way to think about the relationship between the cause of death and age of the victim is to try to predict the age category of the victim using the circumstance of their death. With this in mind, I estimate a simple linear probability model where the outcome of interest is whether or not the victim is in their 20s as a function of state and year fixed effects, and the reported homicide circumstances, as in equation 2:

$$(2) \quad P(20 \leq VictimAge_{ist} < 30) = f \left(\begin{array}{l} \alpha + \delta_s + \lambda_t + \theta_1 Systemic_{ist} + \theta_2 Accidental_{ist} + \theta_3 Family_{ist} \\ + \theta_4 Fight_{ist} + \theta_4 Fight_with_Alcohol_{ist} \end{array} \right)$$

The estimated parameters of this model, with standard errors that are clustered at the state-level, are reported in panel B of table 3. People killed in systemic violence are 13.7 percentage points more likely to be in their 20s. Knowing that the victim was killed accidentally, or by a family member, reduces the probability that they are in their 20s by 9.7 and 14.7 percentage points, respectively. If the homicide victim was killed after an argument, it is 7 percentage points more likely that the victim was in their 20s than not. Knowing that the fight involved alcohol does not help distinguish the relationship between homicide circumstances and age.

Applying the estimated relationship between age and homicide circumstance observed in the last 20th century to homicides the early 20th century would be problematic if my estimates of equation (1) were sensitive to the time period of analysis. I address the stability of the relationship between age and market-based violence in table 4. Here, I re-estimate equation (1), but separately identify the relationship between age of victim and cause in each of the four decades of the SHR. Depending on the time period of analysis, knowing the victim was in their 20s increases the probability that they were killed in systemic violence by between 1.8 and 2.8 log percentage points, and all estimates are statistically indistinguishable from each other. People over 30 are never more or less likely to be killed in market-based violence than 20 year

olds. Turning to my other measures of violence, the relationship between age and cause of death is slightly less stable over time, but the signs of the coefficients are generally consistent. The one exception to this is accidental homicides, which were almost never reported as a homicide circumstance prior to the 1990s.

Without making any claims to causality, coarse knowledge of the age of a homicide victim gives you some information about how they died, and in particular the likely role of alcohol in their death. People under 20 are more likely to be killed accidentally or by family members. People over 30 are more likely to be killed in arguments, which may or may not be fueled by alcohol consumption. However, relative to people under 20, people over 30 are actually less likely to be killed in systemic violence. Knowing that there are relatively more homicide victims in their 20s, but not over 30, suggests that there is more institutional violence.

VI. The Temperance Movement and Age Distribution of Homicide Rates

a. Analytic Framework

While the net effect of outlawing the commercial sale of alcohol on homicide rates in theoretically ambiguous, the effect of temperance on the age distribution of homicide victims is not. In states where commercial sale of alcohol was banned, increasing the price of alcohol at least, and forcing all alcohol sales underground at most, any decrease in the consumption of alcohol should reduce the number of homicides due to psychopharmacological causes- young children and older adults who are killed by intoxicated and aggressive drinkers, or individuals who are killed by accident- the result of careless and intoxicated behavior. At the same time, to the extent that restricting legal alcohol sales increases the amount of systemic violence, homicides resulting from disputes over illegal sales should rise- violence which is more likely to involve people in their 20s. To the extent that a growth in systemic violence is associated with profitable opportunities for criminal gangs, this would support the assertion that the Temperance movement contributed to the rise of organized crime in the early 20th century.

I therefore test whether or not market-based violence rose during the temperance movement by comparing the age-specific homicide rates across states between 1900 and 1940. Based on the observed patterns in the SHR, I will interpret a differential increase in the murder rates of 20 year olds as evidence of an increase in systemic violence. To the extent that a growth in the influence of gangs in market activity is associated with increase in systemic violence, the

shift in the age distribution would support the assertion that the temperance movement contributed to the rise of organized crime in the early 20th century.

I estimate three age-specific homicide rates for each state in each year: the homicide rate for those under 20, the rate for those in their 20s, and the homicide rate for those over 30. While this is a coarse measure of the age distribution of homicide victims, these three categories are consistently defined through my sample period, and a meaningful relationship between these three age categories and homicide circumstances was detectable in modern data.

In essence, I identify the impact of temperance on systemic violence using a differences-in-differences model, where I compare the change in homicide rates of 20-29 year olds to the changes in homicide rates of the other age groups when state-level dry laws are put in place.¹³ I model the state-year-age category death rate as follows

$$(3) \quad \text{Ln}(\text{Murder}_{ast} / \text{Population}_{ast}) = \alpha + \delta_{sa} + \lambda_{ta} + X_{st}\theta + \text{Temperance}_{st}\beta_1 + ((20 \leq \text{VictimAge}_a < 30) \times \text{Temperance}_{st})\beta_2 + \nu_{ast}$$

Where $\text{Murder}_{ast}/\text{Population}_{ast}$ is the number of homicide victims in age group a in state s in year t , divided by the estimated number of people in that age group in that state and year, and multiplied by 100,000. $20 \leq \text{VictimAge}_a < 30$ is a dummy variable equaling one if the age group a is people in their 20s, and Temperance_{st} equals one if the commercial sale of alcohol was illegal in state s in year t , due to either state or federal law. To the extent to which people in their 20s are generally more violent than people under 20, I expect that the first order relationship between homicide rates and being in your 20s will be positive, and this first order effect is subsumed by my age group specific state fixed effects, which allow for time invariant differences in the age distribution of murder victims across states. Consistent with Owens (2011), I anticipate that the first order relationship between temperance and homicide rates in all age groups will be weakly negative, as psychopharmacological violence will fall. The estimated value of β_2 is the change in homicide rate of people in their 20s during temperance relative to the change in homicide rates of

¹³ Alternately, I could estimate the fraction of all murder victims that are in their 20s as a function of temperance laws. I prefer equation (3) because it places more weight on changes in the murder rates of victims under 20, who make up a small fraction of homicide victims. That said, I find that conditional state fixed effects, temperance laws increase the fraction of murder victims in their 20s by about 2%, or 16% with a quadratic time trend, and 19% with a control for the fraction of all state residents in their 20s. The theoretical justification for including additional demographic controls is less clear, and as my controls are strong predictors of temperance, this significantly weakens the power of my model. On a full set of controls and state and year fixed effects, temperance laws passed in the North, and temperance laws passed earlier are associated with statistically precise increases in the fraction of murder victims that are in their 20s.

people at the tails of the age distribution. If an increase in systemic violence disproportionately affects people in their 20s, a positive value of β_2 will indicate an increase in market-based violence.

The first half of the 20th century was a period of major social change. To the extent that urbanization, changes in the demographic makeup of those cities, education levels, and welfare spending are correlated with both the passage of temperance laws and with homicide rates, a failure to control for these factors will bias estimates of β_2 and β_3 . Indeed, the literature has shown that these measures are predictors of both the timing of temperance laws (Lewis, 2008; Owens, 2011 ; Garcia-Jimeno, 2011), and with crime rates (Glaeser and Sacerdote, 1999; Fishback et al., 2007; Fishback et al., 2010). My measures of demographic and economic changes are drawn from two sources. State-level measures of the fraction of the population living in an urban area (with more than 2,500 residents); the fraction of the state that is black, foreign born, catholic, or between the ages of 6 and 20; and a measure of the education rate in the population are taken from the decennial census data compiled in Haines (2004), with linear interpolations between census years. I also include in X_{st} the number of dollars granted to the state government as part of the New Deal, scaled by state population and lagged one year.¹⁴ I will also test the sensitivity of my results to the functional form of time effects λ_{ta} , including year fixed effects, linear time trends, and leads of *Temperance_{st}*, all of which are allowed to be specific to each age category. I allow for arbitrary correlation in the remaining unexplained component of murder rates within each state by clustering v_{ast} at the state-level, and all equations are weighted by the state population.

Equation (3) will provide estimates of the average change in the age distribution of homicide rates across all temperance laws, which abstracts from the fact that not all temperance laws were the same. In particular, many of the early state-level temperance laws allowed individuals with a high willingness to pay for alcohol to acquire it via legal channels.

Of the 32 state-level temperance laws passed prior to 1919, 19 allowed manufacture or importation of limited quantities of alcohol for personal use. It was only under “bone-dry” temperance laws, where all importation and all manufacture was banned, that alcohol consumers were forced to engage in illegal transactions. Further, the state-level analysis ignores county-level dry ordinances, which were common in the South. Owens (2011) finds some suggestive

¹⁴ These data were generously provided to me by Price Fishback

evidence that both the popularity of temperance and urbanization affected the relationship between market legality and violence, and sociology has long connected immigration to gang activity, particularly in the early 20th century (Thrasher 1927). I therefore complement equation (3) with a series of estimates that allow for these types of heterogeneity, as follows:

$$\begin{aligned}
 \text{(4)} \quad \ln(\text{Murder}_{ast} / \text{Population}_{ast}) = & \alpha + \delta_s + \lambda_t + X_{st}\theta + \text{Het}_{st}\phi_1 + (20 \leq \text{VictimAge}_a < 30)\beta_1 \\
 & + \text{Temperance}_{st}\beta_2 \\
 & + ((20 \leq \text{VictimAge}_a < 30) \times \text{Het}_{st})\phi_2 \\
 & + (\text{Temperance}_{st} \times \text{Het}_{st})\phi_3 \\
 & + ((20 \leq \text{VictimAge}_a < 30) \times \text{Temperance}_{st})\beta_3 \\
 & + ((20 \leq \text{VictimAge}_a < 30) \times \text{Temperance}_{st} \times \text{Het}_{st})\phi_4 + v_{ast}
 \end{aligned}$$

where

$$\text{Het}_{st} \in (\text{BoneDry}_{st}, \text{WetVotes}_{st} / \text{DryVotes}_{st}, \text{Urbanization}_{st}, \text{South}_s, \text{ForeignBorn}_{st})$$

The values of Het_{st} are defined as follows: BoneDry_{st} equals one if the law in question prohibited importation and manufacture of alcohol for personal use. $\text{WetVotes}_{st}/\text{DryVote}_{st}$ reflects the number of votes for and against the most recent temperance law passed in state s in year t , which is found in Merz (1969). Urbanization_{st} is the fraction of state residents living in places with more than 2,500 people. Two possible sources of heterogeneity only vary on one dimension: South_s indicates that the state s was in the Confederacy (including the Confederate territories of New Mexico, Arizona, and Oklahoma), where local dry ordinances were common, and ForeignBorn_{st} is the fraction of adults living in state s in year t that were born outside of the US.

b. Results

Table 5 contains my central estimates of the relationship between market legality and age-specific homicide rates. In column 1 I establish that, without state fixed effects, there is a first order positive relationship between temperance and homicide rates and that, consistent with modern day violence, homicide rates are highest for people in their 20s (over four times as high), and are more than three times higher for people over 30 than for people under 20. The positive impact of temperance on violence is reduced by roughly 30% when the panel nature of the data is taken into account with age-specific state fixed effects.

< table 5 about here >

I next allow for temperance laws to have a different effect on homicide rates for those who, in the SHR, are more likely to be affected by systemic violence. In a model with only state fixed effects (column 3), temperance laws are associated with a 24% increase in homicide rates over all, but a 49% increase in homicide rates for people in their 20s. The 18 log point ($se = 0.04$) increase in homicide rates for people in their 20s, relative to people on the tails of the age distribution, is robust to the inclusion of demographic controls (column 4), and coincident with Owens (2011), the additional controls reverse the sign of the first order impact of temperance.

When I include age specific quadratic time trends, I estimate a statistically significant 15% increase in homicide rates for 20 year olds relative to the homicide rates of older and younger people, and including a one-year lead of temperance laws does not change this result. However, if I assume a nationwide change in the age distribution of homicide victims each year, I only observe an imprecise 5% relative increase in homicide rates for 20 year olds. In the final column of table 5, I allow for all of my demographic controls – urbanization, education, immigration, racial composition, young population, Catholicism, and New Deal grants- to have different effects on the homicide rates for those in their 20s. For sake of space I do not show these interactions, but urbanization appears to increase homicide rates of those in their 20s more than other age groups, and the relationship between the percent of the state that is Catholic, the percent born outside the US, and the lagged New Deal grants per capita and homicide rates is more negative for those in their 20s. Allowing for these interactions slightly reduces the magnitude of the impact of temperance.

The estimates in Table 5 compare homicide rates for 20 year olds to the average change in the tails of the distribution. I examine the impact of temperance on the all three sections of the age distribution in Table 6. As before, I estimate that homicide rates for people in their 20s increased by about 20% relative to people under 20 during temperance, but this result is not robust to age by year fixed effects, and is also sensitive to age-varying demographic controls. I find no evidence that homicide rates for people over 30 changed in dry states in any specification. That said, the size of the estimates always suggests a compression of the age distribution; note that the impact of temperance on homicide rates is 4 percentage points higher for those in their 20s in a model with year fixed effects, and 7 percentage points higher with age-varying demographic controls.

< table 6 about here >

Finally, in Tables 7 and 8, I examine how temperance laws affected homicide rates in different contexts. First, I differentiate between temperance laws that allowed for some legal consumption of alcohol and those that were “bone-dry.” I do not find evidence that, conditional on age specific year fixed effects, the strictness of the temperance law was related to the age distribution of murder victims.¹⁵ I also do not find evidence that temperance laws that barely passed resulted in more systemic violence than those with little opposition, although the magnitude of these statistically imprecise estimates are non-trivial. To put the estimates in Table 7 column (4) in words, in a state where temperance passed unanimously, murder rates for 20 years olds subsequently increased by 18% relative to those under 20, or 3% overall. When the Wet vote was 50% of the Dry vote, the relative increase in systemic violence was only 9% (or a net 1.5% change in the homicide rate of 20 year olds). To the extent that the number of Wets is a proxy for the demand for illegal alcohol, one might expect more systemic violence in those states. However, the higher levels of illegal alcohol consumption in state where the Dry laws were unpopular at the outset also imply more psychopharmacological violence, which would tend to flatten the age distribution.

< table 7 about here >

The compression of the age distribution under temperance laws is larger in states with large urban populations (columns 5 and 6), an effect which is statistically significant at the 90% level of confidence. Temperance laws appear to have reduced homicide rates for people under 20 and over 30 (column 6), but each percentage point increase in urbanization is associated with a 0.2% increase in homicide rates for people in their 20s relative to others. If everyone in the state lived in a city (meaning urbanization is equal to one), passing a temperance law would relative homicide rates for people in their 20s by 45%.

Temperance had the strongest impact on my proxy for systemic violence in the north and in state with large immigrant populations. I find that temperance is associated with a slight right shift in the age distribution of homicide rates in the South (note the negative coefficients on the

¹⁵ If I include only state and year fixed effects, I find a large and statistically precise positive relationship between bone-dry prohibition and homicide rates for those in their 20s. Allowing those effects to vary by age group swamps this result.

20 year old and over 30 interaction terms in column 8), but associated with a substantial compression of the age distribution in non-confederate states.¹⁶

A long literature in sociology links immigration to gang activity, and the census mortality data appear to confirm that link; on average, a one percentage point increase in the fraction of the state that was born outside the United States is associated with a 2% increase in the impact of temperance on the relative homicide rate for young adults, and a 1% increase in the relative homicide rate of those over 30.

< table 8 about here >

Table 8 replicates table 7, but allows for urbanization, racial composition, education levels, religious concentration, immigration, and New Deal grants to have different effects on the homicide rates of each age group. I still find no average impact of bone-dry, Outright Prohibition on the age distribution of homicide rates, and I also find a marginally precise relationship between the demand for alcohol and the compression of the age distribution (column 4). Unlike the aggregate results in tables 5 and, however, the relationship between temperance, urbanization, immigration, and geography are robust to these additional controls.

Specifically, for each 10 percentage point increase in urbanization, the relative 20 year old homicide rate increase by 6.4%, or 2.7% overall. The relative over 30 year old homicide rate also increase by 5%, or 1.2% overall. Young people clearly receive a disproportionate benefit from dry laws in urban states. The geographic patterns also support the folk wisdom that organized crime was more prevalent in the north, as the compression of the age distribution is significantly larger in states that were not part of the confederacy (columns 7 and 8). Finally, the strong relationship between immigration, temperance, and systemic violence is robust to these broad controls. Each 10 percentage point increase in the fraction of a dry state's population that was born outside the country increased the relative homicide rate for 20 year olds by 13% relative to the tails of the distribution (column 9), or 31% relative to those under 20 (column 10). Both of these estimates are statistically significant with at least 95% confidence.

VII. Conclusion

¹⁶ This is consistent with Bleakley and Owens (2011), who find that local dry laws reduced the incidence of lynching in southern counties, many of which involved young adult men.

The first order effect of the American Temperance Movement was the creation of a large and active market for illegal alcohol. Current policy debates about the wisdom of legalizing markets for marijuana and prostitution are often framed by folk wisdom about the Noble Experiment of the 1920s. Unfortunately, the paucity of data about the impact of the temperance movement on alcohol consumption and violence has led to the propagation of conflicting and incomplete “false lessons of Prohibition” (Cook 2007). In this paper, I provide some of the first empirical evidence in support of one of the popular claims made about the temperance movement- that the growth of illegal markets increased the scope of gang activity, which contributed to the rise of organized crime in the United States.

In modern homicide data that spans the years 1976 to 2004, I estimate that murder victims in their 20s are roughly 50% more likely to be killed in systemic violence than murder victims under 20 or over 30. To the extent that the relationship between age and homicide circumstances holds in the early 20th century, the census mortality data provide empirical support for the notion that temperance laws increased early 20th century gang activity in the United States. Using the age distribution of homicide rates in the United States between 1900 and 1940, I show that criminalizing the market for alcohol was associated with a roughly 20% increase in the homicide rate for 20 year olds relative to those at the tails of the age distribution. While the magnitude of this estimate is sensitive to the specification of aggregate time trends and the relationship between demographic change and the age of homicide victims, patterns of heterogeneity in the relationship between temperance and homicide are not. The impact of temperance on the age distribution of homicide rates was strongest in urban areas, in the North, and in areas with large immigrant populations. This is consistent with the folk wisdom that organized crime was most prevalent in northern cities with large immigrant populations; going dry compressed the age distribution of homicide victims in Chicago, Cleveland, New York, and Philadelphia, but not South Carolina and Florida. In the former areas in particular, banning the commercial sale of alcohol appears to have protected young people from homicide, but at the cost of exposing young adults to more violence.

References

- Abadinsky, Howard. 1994. Organized Crime. Fourth edition/ Chicago: Nelson Hall Incorporated.
- Asbridge, Mark. and Swarna Weerasinghe. 2009. "Homicide in Chicago from 1890 to 1930: prohibition and it's impact on alcohol and non-alcohol related homicides" *Addiction* 104: 355-364.
- Bleakely, Hoyt, and Emily Owens 2010. "Violence Beyond Reason: Temperance and Lynching in the Southern United States, 1890-1930" *mimeo*
- Block, Alan A. 1994. "Organized Crime: History and Historiography" in Robery Kelly, Ko-Lin Chin, and Rufus Schatzberg [Eds.]. Handbook of Organized Crime in the United States Westport: Greenwood Press. 39-74.
- Boaz, David. 2009. "The War on Drugs" in David Boas [ed.] Cato Handbook for Policymakers. Seventh edition Washington DC: Cato Institute.
- Boyum, David. and Mark Kleiman. 2002. "Substance Abuse Policy from a Crime Control Perspective" In: James Q. Wilson and Joan Petersilia, [Eds] Crime: Public Policies for Crime Control Oakland: ICS Press. 331-382.
- Carpenter, Christopher. 2008. "Heavy Alcohol Use and Crime: Evidence from Underage Drunk Driving Laws." *Journal of Law and Economics* 50: 539-557.
- Cherrington, Ernest H. 1920 The Evolution of Prohibition in the United States of America: A Chronological History of the Liquor Problem and the Temperance Reform in the United States from the Earliest Settlements to the Consummation of National Prohibition. Westerville: The American Issue Press.
- Cook, Philip, and Michael Moore. 1993. "Violence Reduction through Restrictions on Alcohol Availability." *Alcohol Health & Research World* 17: 151-156.
- Cook, Philip. 2007. Paying the Tab. Princeton: Princeton University Press: 26-33.
- Cook, Philip. 2008. "A Free Lunch" *Journal of Drug Policy Analysis* 11:1-5.
- Cook, Philip, and Jens Ludwig. 2011. "The Economist's guide to crime busting." *The Wilson Quarterly* 4: 62-66.
- Conlin, Mike, Stacy Dickert-Conlin, and John Pepper. 2005. "The Effect of Alcohol Prohibition on Illicit Drug Related Crimes: An Unintended Consequence of Regulation", (with Stacy Dickert-Conlin and Mike Conlin), *The Journal of Law and Economics*, April 2005, 215-234
- Cuomo, Andrew Prison Inmates, Republican Constituents Albany Times Union, January 19, 2005
- Decker, Scott and Barrik Van Winkle. 2006. "The History of Gang Research" in Arlen Egley, Jr. Cheryl L. Maxson, Jody Miller, and Malcolm W. Klein [Eds.] The Modern Gang Reader. 3rd Edition. Los Angeles: Roxbury Publishing Company.
- Dills, Angela, and Jeffrey Miron. 2004. "Alcohol Prohibition and Cirrhosis" *American Law and Economics Review* 62: 285-317.

- Dobkin, Carlos, and Christopher Carpenter. 2008. "The Drinking Age, Alcohol Consumption, and Crime." mimeo.
- Donohue III John. J., and Steven Levitt. 1998. "Guns, Violence, and the Efficiency of Illegal Markets" *The American Economic Review* 882: 463-467.
- Durrance, Christine Piette, Shelley Golden, Krista Perreira, and Philip Cook. 2011. "Taxing Sin and Saving Lives: Can Alcohol Taxation Reduce Female Homicides?" *mimeo*
- Eckberg, Douglas. 1995. "Estimates of Early Twentieth-Century U/S/ Homicide Rates: an Econometric Forecasting Approach" *Demography* 321.: 1-16.
- Glaeser, Edward and Bruce Sacerdote. 1999. "Why is There More Crime in Cities?" *Journal of Political Economy* 1076.:225-258.
- Fishback, Price, Michael Haines, and Shawn Kantor 2007. "Births, Deaths, and New Deal Relief During the Great Depression." *Review of Economics and Statistics* 89: 1-14
- Fishback, Price, Ryan Johnson, and Shawn Kantor 2010. "Striking at the Roots of Crime: The Impact of Social Welfare Spending on Crime During the Great Depression." *Journal of Law and Economics*.
- Goldstein, Paul. 1985. "The Drug/Violence Nexus: A Tripartite Concept Framework" *Journal of Drug Issues* 14:493-506.
- Haines, Michael R., and the Inter-university Consortium for Political and Social Research. HISTORICAL, DEMOGRAPHIC, ECONOMIC, AND SOCIAL DATA: THE UNITED STATES, 1790-2000 [Computer file]. ICPSR02896-v2. Hamilton, NY: Colgate University/Ann Arbor: MI: Inter-university Consortium for Political and Social Research [producers], 2004. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 2005-04-29. doi:10.3886/ICPSR02896
- Hamm, Richard. 1995. Shaping the Eighteenth Amendment: Temperance Reform, Legal Culture, and the Polity, 1880–1920. Chapel Hill: University of North Carolina Press.
- Hurst, J. Willard Law and the Conditions of Freedom in the Nineteenth-Century United States Madison: University of Wisconsin Press
- Hyman, M.; Zimmerman, M.; Gurioli, C.; and Helrich, A. Drinkers, Drinking and Alcohol-Related Mortality and Hospitalizations: A Statistical Compendium, 1980 edition. New Brunswick, NJ: Rutgers University, 1980.
- Jacobs, James B. and Christopher Panarella. 1998. "Organized Crime" in Micheal Tonry [Ed.] *The Handbook of Crime and Punishment*. Oxford: Oxford University Press. 159-177,
- Jensen, Gary. 2000. "Prohibition, Alcohol, and Murder: Untangling Countervailing Mechanisms" *Homicide Studies* 41.:18-36.
- Joksch, Hans, and Ralph Jones. 1993. "Changes in the Drinking Age and Crime." *Journal of Criminal Justice* 21: 209-221.
- Keefer, Philip, Norman Loayza, and Rodrigo Soares. 2008. "The development impact of the illegality of the drug trade" World Bank Policy Research working paper #4543
- Klein, Malcom W. 1998. "Street Gangs" in Micheal Tonry [Ed.] *The Handbook of Crime and Punishment*. Oxford: Oxford University Press. 111-132

- Leeson, Peter. 2007. "An-arrgh-chy: The Law and Economics of Pirate Organization" *The Journal of Political Economy* 115(6): 1049-1094.
- Levitt, Steven D. and Sudhir Venkatesh 2001. "'Growing Up in the Projects: The Economic Lives of a Cohort of Men Who Came of Age in Chicago Public Housing.'" *American Economic Review*, 91(2), pp. 79-84.
- Markowitz, Sara, and Michael Grossman. 2000. "The effects of beer taxes on physical child abuse." *Journal of Health Economics*. 192. 271-282.
- Maxfield, Michael G. 1989. "Circumstances in Supplementary Homicide Reports: Variety and Validity," *Criminology*, 27: 671-695.
- McConnell, Brendon, Jérôme Adda and Imran Rasul. 2010. "The Legalization of Cannabis and Crime: Evidence from a Localized Policing Experiment" mimeo
- Merz, Charles. 1969. The Dry Decade. Seattle: University of Washington Press.
- Miczek, Klaus. A., Joseph F. DeBold, Margaret Haney, Jennifer Tidey, Jeffrey Vivian, and Elise M. Weerts. 1994. "Alcohol, Drugs of Abuse, Aggression, and Violence" in A. Reiss, Jr. and J. Roth [Eds.] Understanding and Preventing Violence Volume 3: Social Issues. Washington, DC: National Academy Press. 377-570.
- Miron, Jeffrey. 1999. "Violence and the U.S. Prohibition of Drugs and Alcohol" *American Law and Economics Review* 11/2.: 78-114.
- Miron, Jeffrey 2010 "The Budgetary Implications of Drug Prohibition" mimeo
- Moskos, Peter. 2008. Cop in the Hood: My Year Policing Baltimore's Eastern District Princeton: Princeton University Press.
- The National Organization for the Reform of Marijuana Laws. 2003. "NORML Report on Sixty Years of Marijuana Prohibition in the U.S." http://norml.org/pdf_files/NORML_Report_Sixty_Years_US_Prohibition.pdf
- North, Douglass. 1980. Structure and Change in Economic History New York: Norton and Company.
- North, Douglass, John J. Wallis, and Barry Weingast. 2006. "A Conceptual Framework for Interpreting Recorded Human History" *NBER working paper* 12795
- Owens, Emily Greene. 2011. "Are Underground Markets Really More Violent? Evidence from Early 20th Century America" *American Law and Economics Review*, forthcoming
- Reuter, Peter. 1985. The Organization of Illegal Markets: An Economic Analysis Washington, DC: National Institute of Justice.
- Reuter, Peter. 1994. "Research on American Organized Crime" in Robery Kelly, Ko-Lin Chin, and Rufus Schatzberg [Eds.]. *Handbook of Organized Crime in the United States* Westport: Greenwood Press. 39-74.
- Schmeckebier, Lawrence. 1929. The Bureau of Prohibition: Its History, Activities, and Organization. Washington: Brookings Institution Press.
- Szymanski, Ann-Marie E. 2003. Pathways to Prohibition: Radicals, Moderates, and Social Movement Outcomes. Durham: Duke University Press.

- Thrasher, Frederic M. 1927. The Gang: A Study of 1,313 Gangs in Chicago Chicago: The University of Chicago Press.
- Venkatesh, Sudhir and Steven D. Levitt. 2000. “”Are we a family or a business?” History and disjuncture in the urban American street gang.” *Theory & Society*, 29(4): 427-462
- Venkatesh, Sudhir. 2000. Off the Books: The Underground Economy of the Working Poor
- Young, William H. and Nancy K. Young 2007. The Great Depression in America: A Cultural Encyclopedia: Volume 1. Westport: Greenwood Publishing Group.

Figures

Figure 1: Two Measures of Homicides in the United States

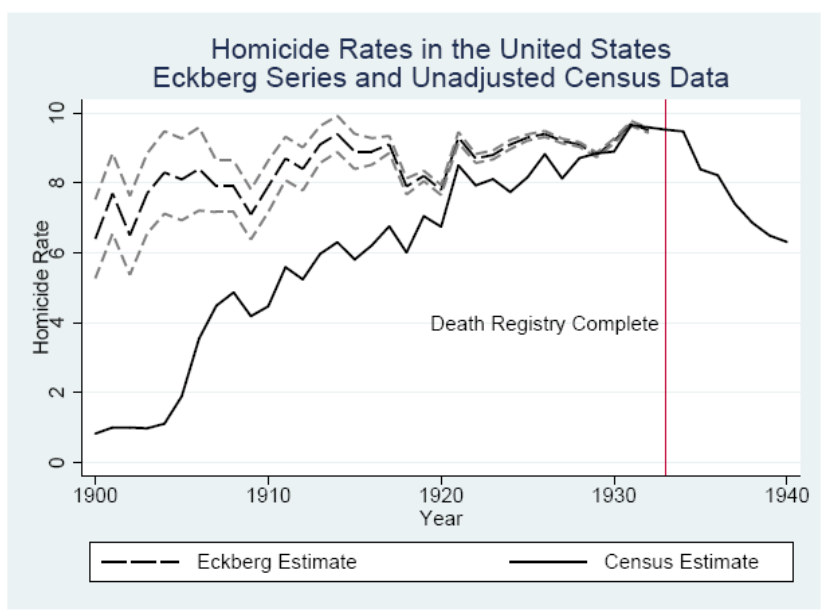


Figure 2: Age Distribution of Murder Victims, Full Sample

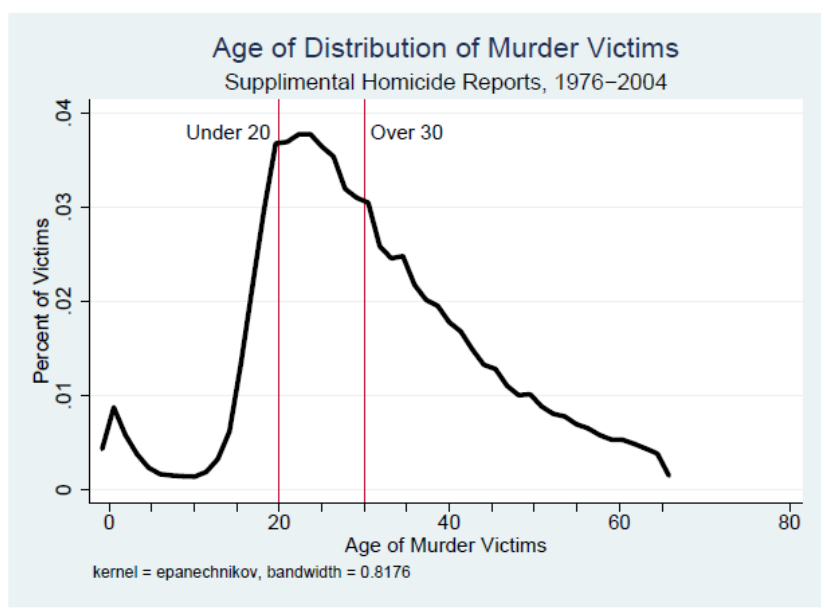


Figure 3: Age Distribution of Murder Victims, Alcohol Sample

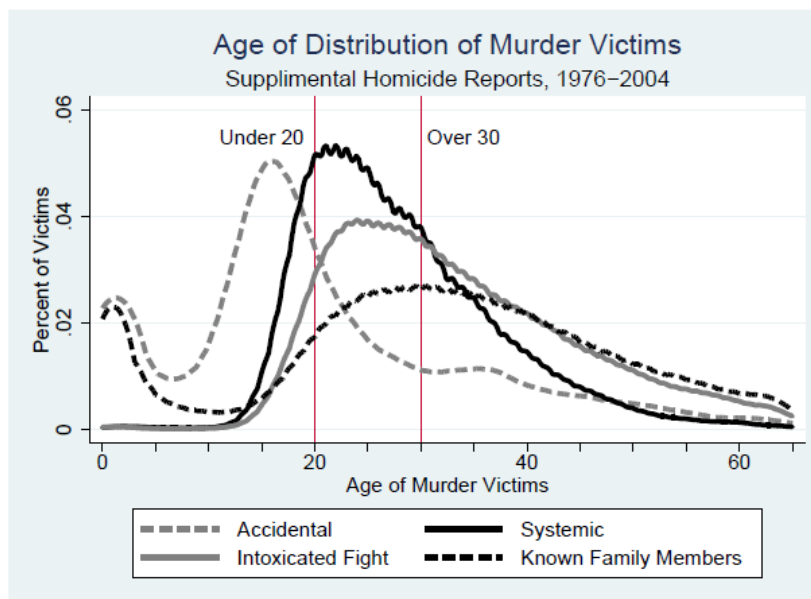


Figure 4: Age Distribution of Murder Victims, Systemic Sample

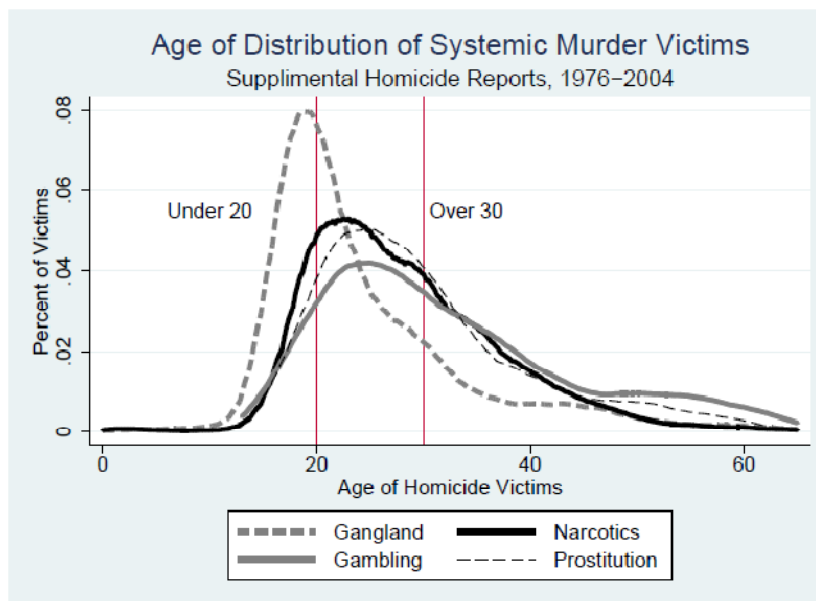


Figure 5: Age-Specific Murder Rates around the Passage of Temperance Laws



Table 1: Popularity of Temperance Laws by State (sources: Merz 1969; Dills and Miron 2004)

	A: State Law			B: 18 th Amendment			
	Year	For	Against	<i>Senate</i>		<i>House</i>	
	* = "Outright Prohibition"			For	Against	For	Against
Maine	1884	70,783	23,811	29	0	120	22
Kansas	1880*	92,302	84,304	39	0	121	0
North Dakota	1889	18,552	17,393	43	2	96	10
Georgia	1907*	-	-	35	2	129	24
Oklahoma	1907*	130,361	112,258	43	0	90	8
Mississippi	1908	-	-	29	5	93	3
North Carolina	1908	113,612	69,416	49	0	94	10
Tennessee	1909	-	-	28	2	82	2
West Virginia	1912	164,945	72,603	26	0	81	3
Virginia	1914	94,251	63,886	30	8	84	13
Oregon	1914*	136,842	100,362	30	0	53	3
Washington	1914*	189,840	171,208	42	0	93	0
Colorado	1914*	129,589	118,017	34	1	60	2
Arizona	1914*	25,887	22,743	18	0	29	3
Alabama	1908-1911, 1915	-	-	23	11	64	34
Arkansas	1915*	-	-	30	0	94	2
Iowa	1915	-	-	42	7	86	13
Idaho	1915/1916*	90,576	35,456	38	0	62	0
South Carolina	1915	41,735	16,809	34	6	66	28
Montana	1916*	102,776	73,890	34	2	79	7
South Dakota	1916*	65,334	53,360	43	0	86	0
Michigan	1916	353,378	284,754	30	0	88	3
Nebraska	1916*	146,574	117,132	31	1	98	0
Indiana	1917	-	-	41	6	87	11
Utah	1917/1918*	42,691	15,780	16	0	43	0
New Hampshire	1855-1903, 1917	-	-	19	4	222	131
New Mexico	1917	28,732	12,147	12	4	45	1
Texas	1918/1919	159,723	140,099	15	7	73	36
Ohio	1918	463,654	437,895	20	12	85	29
Wyoming	1918	31,439	10,200	25	0	53	0
Florida	1918	21,851	13,609	25	2	61	3
Nevada	1918	13,248	9,060	14	1	34	3
Kentucky	1918	208,905	198,671	27	5	67	11
Maryland		-	-	18	7	58	36
Delaware		-	-	13	3	27	6
Massachusetts		-	-	27	12	145	91
Louisiana		-	-	21	20	69	41
California		-	-	25	14	48	28
Illinois		-	-	30	15	84	66
Missouri		-	-	22	10	104	36
Wisconsin		-	-	19	11	58	39
Minnesota		-	-	48	11	92	36
Vermont		-	-	24	4	155	58
New York		-	-	27	24	81	66
Pennsylvania		-	-	29	16	110	93
New Jersey		-	-	12	2	33	24

Table 2: Age-Specific Murder Rates, Dry Laws, and Demographics in America, 1900-1929, 1933-1940

	Mean	Standard Deviation
Homicides / 100k pop, Under 20 years old ($n=1,149$)	2.01	(1.33)
Homicides / 100k pop, 20-29 years old ($n=1,149$)	13.2	(12.2)
Homicides / 100k pop, Over 30 years old ($n=1,149$)	9.29	(7.23)
Urbanization ($n=1,149$)	0.576	(0.20)
Education Rate ($n=1,149$)	0.922	(0.045)
% Black ($n=1,149$)	0.075	(0.114)
% Foreign born (white only) ($n=1,149$)	0.137	(0.093)
% Catholic ($n=1,149$)	0.177	(0.103)
% Population 6 – 20 y.o. ($n=1,149$)	0.266	(0.030)
New Deal Grant / pop (\$2005) ($n=336$)	404	(214)
% of State-Years under temperance ($n=1,149$)	0.434	
% of State-Years under outright prohibition ($n=1,149$)	0.407	

Mean and standard deviations weighted by state population. “Urbanization” is defined as the percent of the state population living in a place with more than 2,500 people. The “education rate” is estimated as adult literacy rate between 1900 and 1910, and the percent of 6-14 year olds in school between 1910 and 1940.

Table 3: Age and Circumstances of Death in the Supplemental Homicide Reports, 1976-2004

	j = Systemic	j = Accidental	j = Family	j = Fight	j = Alcohol
<i>A: DV= P(Circumstances of death = j)</i>					
20 ≤ Victim Age < 30	0.0237*** [0.00545]	-0.0170*** [0.00226]	-0.0984*** [0.00500]	0.125*** [0.0104]	0.0157*** [0.00357]
30 ≤ Victim Age	-0.00403 [0.00547]	-0.0174*** [0.00245]	-0.0128* [0.00608]	0.119*** [0.0161]	0.0147*** [0.00266]
Ln(Model Variance)	-3.144*** [0.0882]	-5.137*** [0.146]	-1.938*** [0.0544]	-1.530*** [0.0229]	-3.713*** [0.222]
P(Circumstances of death = j)	0.0461	0.006	0.183	0.346	0.0257
R ²	0.0195	0.0187	0.0362	0.0433	0.0271
F	49.36	39.46	381.7	133.6	25.61
<i>C: DV= P(20 ≤ Victim Age < 30)</i>					
Δ P(20 ≤ Victim Age < 30) / Δ Cause j	0.137*** [0.0049]	-0.097*** [0.0106]	-0.147*** [0.0059]	0.070*** [0.0039]	-0.0087 [0.0061]

Each column of Panel A reports the results of one equation, where the dependant variable is indicated at the top of each column. Panel B reports coefficients on one regression, where each column represents a separate coefficient from the same equation, which explains 2.31% of the variation in the probability that a victim is between 20 and 29 years old. All equations include 539,617 observations, and have state and year fixed effects. Standard errors in brackets clustered at the state-level.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 4: Age and Circumstances of Death in the Supplemental Homicide Reports by Decade, 1976-2004

	j = Systemic	j = Accidental	j = Family	j = Fight	j = Alcohol
20 ≤ Victim Age < 30, 1970s	0.0179*** [0.00223]	8.49E-05 [0.000123]	-0.0797*** [0.00831]	0.152*** [0.00893]	0.0330*** [0.00697]
20 ≤ Victim Age < 30, 1980s	0.0217*** [0.00550]	-3.3E-05 [0.000150]	-0.102*** [0.00719]	0.146*** [0.0141]	0.0198*** [0.00445]
20 ≤ Victim Age < 30, 1990s	0.0276*** [0.00791]	-0.0315*** [0.00390]	-0.0878*** [0.00557]	0.112*** [0.0119]	0.0110*** [0.00304]
20 ≤ Victim Age < 30, 2000s	0.0235*** [0.00364]	-0.0253*** [0.00470]	-0.143*** [0.0115]	0.0886*** [0.0102]	0.00573*** [0.00149]
30 ≤ Victim Age, 1970s	-0.0015 [0.00160]	-0.00012 [0.000235]	-0.0069 [0.00960]	0.141*** [0.0111]	0.0372*** [0.00667]
30 ≤ Victim Age, 1980s	-0.00421 [0.00343]	-0.00036 [0.000223]	-0.0284*** [0.00800]	0.118*** [0.0124]	0.0169*** [0.00352]
30 ≤ Victim Age, 1990s	-0.00596 [0.00868]	-0.0325*** [0.00421]	0.00553 [0.00635]	0.116*** [0.0229]	0.00947*** [0.00188]
30 ≤ Victim Age, 2000s	-0.00227 [0.00749]	-0.0249*** [0.00519]	-0.0335** [0.0129]	0.115*** [0.0236]	0.00532*** [0.00150]
P(Circumstances of death = j)	0.0461	0.006	0.183	0.346	0.0257
Ln(Model Variance)	-3.144*** [0.0882]	-5.142*** [0.145]	-1.938*** [0.0543]	-1.530*** [0.0228]	-3.713*** [0.222]
R ²	0.0196	0.0238	0.0366	0.0437	0.0276

Each column of Panel A reports the results of one of five simultaneously estimated equations, where the binary dependant variable is indicated at the top of each column. All equations include 539,617 observations, and have state and year fixed effects. Standard errors in brackets clustered at the state-level.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 5: Fixed Effects Estimates of State-level Murder Rates by Age Group, 1900-1929, 1933-1940

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Temperance x 20 ≤ Victim Age < 30			0.187*** [0.0383]	0.187*** [0.0383]	0.140* [0.0611]	0.193*** [0.0396]	0.0511 [0.182]	0.0478 [0.146]
Temperance	0.397*** [0.0699]	0.274*** [0.0446]	0.212*** [0.0403]	-0.0989 [0.0511]	-0.194*** [0.0468]	-0.114 [0.0600]	-0.00148 [0.0560]	-0.00036 [0.0556]
Urbanization				5.877*** [0.832]	3.882*** [0.874]	5.868*** [0.837]	3.442*** [0.977]	1.973* [0.956]
Education Rate				-2.337** [0.678]	-2.154** [0.657]	-2.340** [0.675]	-1.114 [0.666]	-0.947 [0.668]
% Black				2.17 [2.819]	-0.697 [1.948]	2.211 [2.831]	-0.966 [1.874]	-2.093 [3.049]
% Foreign Born				7.032*** [1.774]	8.183** [2.372]	6.971*** [1.775]	5.811** [2.057]	6.346* [2.674]
% Catholic				3.576 [2.546]	0.933 [1.650]	3.604 [2.544]	1.805 [1.288]	2.988 [2.156]
% 6-20				-8.008** [2.402]	3.73 [3.126]	-8.299** [2.579]	-1.721 [4.483]	2.461 [7.215]
Ln(New Deal Grant / capita t-1)				-0.0328*** [0.00811]	-0.0130* [0.00606]	-0.0345*** [0.00849]	-0.116 [0.107]	-0.0114 [0.176]
Age x State Fixed Effects		X	X	X	X	X	X	X
Full Interactions								X
Age x Year Effects					Quad. Trend	One Year Leads	Fixed Effects	Fixed Effects
R ²	0.385	0.734	0.735	0.772	0.784	0.772	0.798	0.799

The dependant variable in each regression is the natural log of the age-specific murder rate, +0.01, measured at the state-year level. The average murder rate is 8.51. All regressions contain 3,447 observations and are weighted by state population. Standard errors in brackets clustered at the state-level. Column 1 includes 20 ≤ Victim Age < 30 and Victim Age > 30 dummy variables. Column 8 includes interactions between all demographic controls and 20 ≤ Victim Age < 30 dummy

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 6: Fixed Effects Estimates of State-level Murder Rates by Age Group, with Variation in Over 30 Group, 1900-1929, 1933-1940

	(1)	(2)	(3)	(4)	(5)	(6)
Temperance x 20 ≤ Victim Age < 30	0.215*** [0.0512]	0.215*** [0.0512]	0.182* [0.0820]	0.217*** [0.0526]	0.0596 [0.219]	0.0217 [0.167]
Temperance x 30 ≤ Victim Age	0.055 [0.0424]	0.055 [0.0424]	0.0838 [0.0681]	0.0492 [0.0428]	0.0169 [0.109]	-0.052 [0.0906]
Temperance	0.184*** [0.0438]	-0.126* [0.0490]	-0.236*** [0.0668]	-0.139* [0.0597]	-0.049 [0.105]	0.0257 [0.0896]
Urbanization		5.877*** [0.832]	3.882*** [0.874]	5.868*** [0.837]	8.906 [4.979]	1.979* [0.960]
Education Rate		-2.337** [0.678]	-2.154** [0.658]	-2.340** [0.675]	6.91 [5.447]	-0.923 [0.671]
% Black		2.17 [2.820]	-0.697 [1.948]	2.211 [2.831]	46.33 [25.91]	-2.201 [3.027]
% Foreign Born		7.032*** [1.775]	8.183** [2.372]	6.971*** [1.775]	1.456 [7.532]	6.363* [2.679]
% Catholic		3.576 [2.546]	0.933 [1.650]	3.604 [2.545]	3.43 [1.842]	2.981 [2.152]
% 6-20		-8.008** [2.402]	3.73 [3.127]	-8.299** [2.579]	-18.28 [12.00]	2.602 [7.245]
Ln(New Deal Grant / capita t_{-1})		-0.033*** [0.00812]	-0.013* [0.00606]	-0.034*** [0.00849]	0.015 [0.117]	-0.012 [0.176]
Age x State Fixed Effects	X	X	X	X	X	X
Full Interactions						X
Age x Year Effects			Quad. Trend	One Year Leads	Fixed Effects	Fixed Effects
R ²	0.702	0.739	0.751	0.739	0.761	0.78

The dependant variable in each regression is the natural log of the age-specific murder rate, +0.01, measured at the state-year level. The average murder rate is 8.51. All regressions contain 3,447 observations and are weighted by state population. Standard errors in brackets clustered at the state-level. Column 8 includes interactions between all demographic controls and 20 ≤ Victim Age < 30 dummy

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 7: Fixed Effects Estimates of State-level Murder Rates by Age Group, Heterogenous Temperance Effects 1900-1929, 1933-1940

<i>Heterogeneity:</i>	Outright Prohibition		Wets / Drys		Urbanization		Confederacy		Immigration	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Temperance x Het x 20 ≤ Victim Age < 30	-0.0688 [0.264]	-0.0505 [0.303]	0.166 [0.134]	0.253 [0.161]	0.281 [0.172]	0.378 [0.198]	-0.335*** [0.0764]	-0.373*** [0.0945]	0.777 [0.396]	1.186** [0.389]
Temperance x Het x 30 ≤ Victim Age		0.0366 [0.158]		0.176 [0.102]		0.189 [0.163]		-0.075 [0.0849]		0.814** [0.238]
Temperance x 20 ≤ Victim Age < 30	0.0814 [0.285]	0.0818 [0.338]	-0.00599 [0.241]	-0.0564 [0.283]	-0.104 [0.242]	-0.155 [0.258]	0.111 [0.188]	0.126 [0.220]	-0.0338 [0.149]	-0.0836 [0.156]
Temperance x 30 ≤ Victim Age		0.000756 [0.153]		-0.101 [0.133]		-0.0974 [0.145]		0.0303 [0.104]		-0.101 [0.0984]
Temperance x Het	-0.0211 [0.0981]	-0.0394 [0.149]	-0.0482 [0.0923]	-0.134 [0.0960]	-0.161 [0.124]	-0.213 [0.152]	0.0353 [0.0607]	0.0728 [0.0746]	-0.449* [0.207]	-0.683** [0.221]
Temperance	0.00951 [0.0834]	0.00914 [0.129]	0.0297 [0.103]	0.0799 [0.138]	0.0892 [0.0992]	0.115 [0.133]	-0.0169 [0.0565]	-0.0321 [0.0925]	0.0542 [0.0631]	0.0814 [0.0876]
Age x State Fixed Effects	x	x	x	x	x	x	x	x	x	x
Age x Year Effects	x	x	x	x	x	x	x	x	x	x
R ²	0.798	0.798	0.798	0.798	0.798	0.806	0.799	0.799	0.798	0.806

The dependant variable in each regression is the natural log of the age-specific murder rate, +0.01, measured at the state-year level. The average murder rate is 8.51. All regressions contain 3,447 observations and are weighted by state population. Additional controls in each equation include state-level urbanization, education, percent between 6 and 20, percent black, percent catholic, percent foreign born, as well as dummy variables for first order effects of victim age category and second order interactions between age categories and relevant law heterogeneity. Standard errors in brackets clustered at the state-level.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 8: Fixed Effects Estimates of State-level Murder Rates by Age Group, Heterogenous Temperance Effects and Full Demographic Interactions 1900-1929, 1933-1940

<i>Heterogeneity:</i>	Outright Prohibition		Wets / Drys		Urbanization		Confederacy		Immigration	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Temperance x Het x 20 ≤ Victim Age < 30	-0.181 [0.230]	-0.113 [0.253]	0.172 [0.130]	0.295 [0.157]	0.29 [0.180]	0.495* [0.201]	-0.271* [0.110]	-0.353* [0.138]	0.845* [0.391]	1.418** [0.416]
Temperance x Het x 30 ≤ Victim Age		0.137 [0.132]		-0.228 [0.118]		0.406* [0.185]		-0.164 [0.0950]		1.084** [0.311]
Temperance x 20 ≤ Victim Age < 30	0.134 [0.238]	0.0757 [0.267]	-0.035 [0.191]	-0.149 [0.219]	-0.12 [0.202]	-0.258 [0.213]	0.0637 [0.150]	0.0426 [0.172]	-0.074 [0.115]	-0.175 [0.126]
Temperance x 30 ≤ Victim Age		-0.117 [0.110]		0.247* [0.116]		-0.290* [0.133]		-0.0423 [0.0925]		-0.210* [0.0895]
Temperance x Het	0.0163 [0.0991]	-0.0521 [0.142]	-0.0575 [0.0921]	-0.18 [0.104]	-0.164 [0.122]	-0.324* [0.152]	0.0139 [0.0586]	0.096 [0.0841]	-0.472* [0.203]	-0.850** [0.245]
Temperance	-0.00814 [0.0833]	0.0506 [0.113]	0.0408 [0.103]	0.155 [0.143]	0.0948 [0.0990]	0.214 [0.130]	-0.00117 [0.0557]	0.02 [0.0906]	0.0676 [0.0660]	0.148 [0.0925]
Age x State Fixed Effects	x	x	x	x	x	x	x	x	x	x
Age x Year Effects	x	x	x	x	x	x	x	x	x	x
Full Interactions	x	x	x	x	x	x	x	x	x	x
R ²	0.799	0.799	0.799	0.799	0.799	0.807	0.799	0.799	0.799	0.807

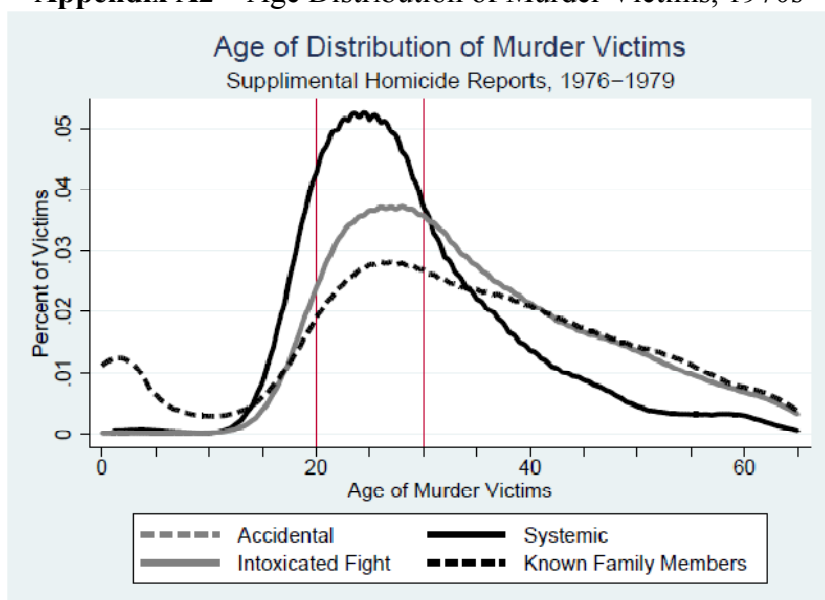
The dependant variable in each regression is the natural log of the age-specific murder rate, +0.01, measured at the state-year level. The average murder rate is 8.51. All regressions contain 3,447 observations and are weighted by state population. Additional controls in each equation include state-level urbanization, education, percent between 6 and 20, percent black, percent catholic, percent foreign born, as well as dummy variables for first order effects of victim age category and second order interactions between age categories and relevant law heterogeneity. All demographic controls are interacted with 20 ≤ Victim Age < 30 dummy in odd numbered columns, 20 ≤ Victim Age < 30 and 20 ≤ Victim Age < 30 dummies in even numbered columns. Standard errors in brackets clustered at the state-level.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

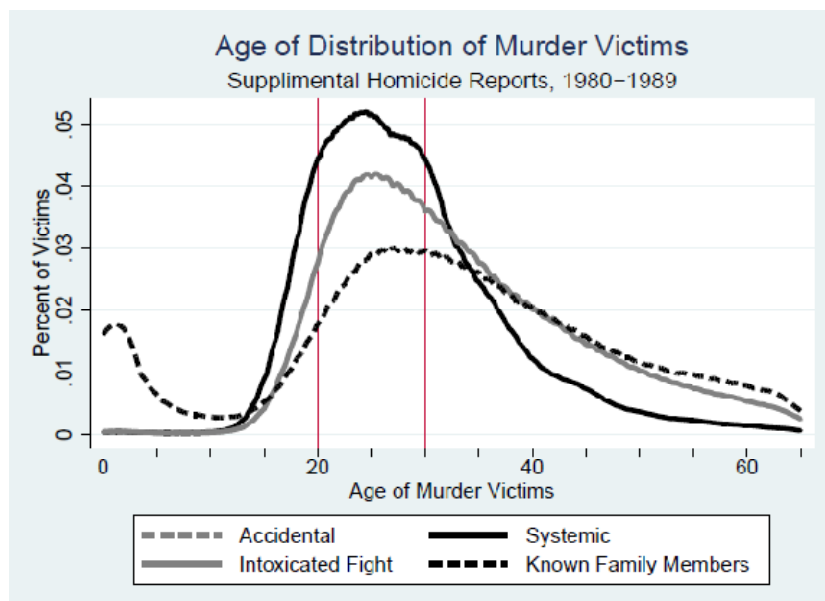
Appendix A1 – Age Specific Death Reporting in the Census Mortality Data

Year	States Added to Registry	Age Categories			
		20-29, 30-39, 40-49	20-24, 25-29, 30-34, 35-44	20-24, 25-34, 35-44,	20-24, 25-29, 30-34, 35-39
1900	CT, IN, MA, ME, MI, NH, NJ, NY, RI, VT	X			
1901		X			
1902		X			
1903		X			
1904		X			
1905		X			
1906	CA, CO, MD, PA, SD	X			
1907		X			
1908	WA, WI	X			
1909	OH	X			
1910	MN, MT, UT, <i>SD removed</i>	X			
1911	KY, MO	X			
1912		X			
1913	VA	X			
1914	KS	X			
1915		X			
1916	NC, SC	X			
1917	TN	X			
1918	IL, LA, OR	X			
1919	DE, FL, MS	X			
1920	NE	X			
1921		X			
1922	ID		X		
1923	GA, IA, WY		X		
1924	ND		X		
1925	AL, WV, <i>GA removed</i>		X		
1926	AZ		X		
1927	AR		X		
1928	GA		X		
1929	MN, NV, OK		X		
1930	SD			X	
1931				X	
1932				X	
1933	TX				
1934					X
1935					X
1936					X
1937					X
1938					X
1939					X
1940					X

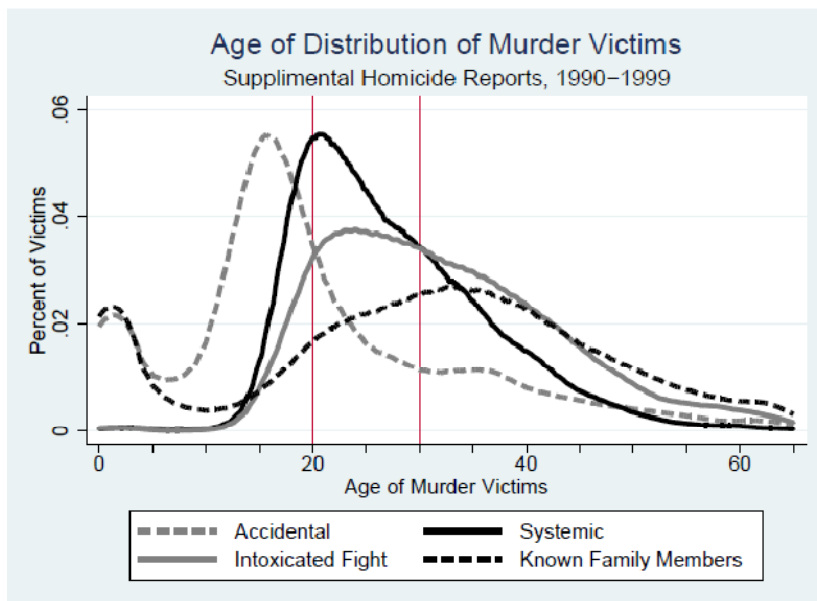
Appendix A2 – Age Distribution of Murder Victims, 1970s



Appendix A3 – Age Distribution of Murder Victims, 1980s



Appendix A4 – Age Distribution of Murder Victims, 1990s



Appendix A5 – Age Distribution of Murder Victims, 2000s

