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Taxing Sin and Saving Lives: Can Alcohol Taxation Reduce Female Homicides?

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Abstract

With costs exceeding $5.8 billion per year, violence against women has significant ramifications for victims, their families, the health care systems that treat them, and the employers who depend on their labor. Prior research has found that alcohol abuse contributes to violence against both men and women, and that stringent alcohol control policies can reduce alcohol consumption and in turn some forms of violence. In this paper, we estimate the direct relationship between an important alcohol control measure, excise taxes, and the most extreme form of violence, homicide. We use female homicide rates as our measure of severe violence, as this measure is consistently and accurately reported across multiple years. Our results provide evidence that increased alcohol taxes reduce alcohol consumption and that reductions in alcohol consumption can reduce femicide. Unfortunately, a direct test of the relationship does not have the power to determine whether alcohol taxes effectively reduce female homicide rates. We conclude that while alcohol taxes have been shown to effectively reduce other forms of violence against women, policy makers may need alternative policy levers to reduce the most severe form of violence against women.

Keywords

female homicide; violence; domestic violence; intimate partner violence; alcohol use; substance use; policy; taxes; consumption

Introduction

Violence against women and girls has significant ramifications for victims, their families, the health care systems that treat them, and the employers who depend on their labor. In the United States, nearly 1 in 4 women become victims of assault or rape by an intimate partner . Female victims of sexual and intimate partner violence face a myriad of health consequences, including increased risk of injury, depression, anxiety, drug and alcohol abuse, sexually transmitted diseases and poor self-reported health . The National Center for Injury Prevention and Control estimates that the social costs of intimate partner rape, physical assault, and stalking exceed $5.8 billion each year .

Despite a significant body of literature investigating violence against women, its determinants are not well-understood . Few large, representative surveys collect information

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about domestic violence. Most researchers depend on convenience samples of women who seek assistance from shelters or the healthcare system . Others rely on police and crime reports . As a result, common study designs underestimate the prevalence of violence, resulting in the estimation of biased relationships with key risk factors .

Most studies focus on the characteristics of women and their households that increase women's risk for exposure to domestic violence. But results have been inconsistent. Some indicate positive associations between violence and young age, non-white race, household size, and unmarried status; others find no association between these factors, especially when measures of education, income, and employment are included in the empirical model .

One consistently important individual and household risk factor for violence, however, is alcohol consumption (Charles & Perreira, 2007; Caetano, Schafer, & Cunradi, 2001; Coker, 2000; Cunradi, Caetano, & Schafer, 2002). Alcohol consumption is also an important risk factor when considering the most severe form of violence, intimate partner femicide (Sharps, et al, 2001; Bailey et al, 1997; Campbell et al, 2003; Smith, Moracco, & Butts, 1998; Moracco, Runyan, & Butts, 1998). Alcohol consumption can increase violence by pharmacologically stimulating aggression in the perpetrator, providing criminals with legal or social excuses for their behavior, creating physical and social opportunities for crime, or increasing the risk of victimization (Reiss, 1993). Yet the relationship between alcohol use and violence is likely complex . Individuals who are prone to violence may also be prone to alcohol use, while victims of violence may self-medicate through alcohol use. In addition, a common set of factors may determine both alcohol consumption and violence. In this case, alcohol consumption is an endogenous variable in analyses of violence and any direct estimates of its effects on violence may be biased.

Prior research has identified a strong empirical relationship between alcohol control policies (e.g., prices, taxes, minimum drinking age laws) and reductions in alcohol consumption . Additionally, several studies have identified associations between alcohol control policies and overall violence (Cook & Moore, 1993; Sloan et al, 1994) as well as violence towards children . These studies find that, by raising the price of alcohol, alcohol taxation reduces the prevalence of some forms of violence (e.g., rape, assault, and robbery) but has no effect on the prevalence of more extreme forms of violence such as homicide. Markowitz (2005), however, finds that beer taxes reduce assault and alcohol-related assault, but have no impact on rape or robbery. Other studies have used alternative reduced form approaches to study the impact on alcohol consumption on violence. Carpenter (2007) finds no effect of zero tolerance laws on violent crime, while Carpenter & Dokbin (2009) find large effects for violent crime arrests in the presence of minimum legal drinking age laws. Because alcohol consumption is sensitive to changes in price , alcohol taxes are promising policy levers for reducing crime and violence .

In this study, we evaluate the relationship between alcohol consumption and violence towards women by utilizing state-level alcohol taxes as policy levers aimed at reducing alcohol consumption. Additionally, we focus on a well-measured form of violence towards women – state-level femicide data – which is subject to less reporting biases than other, less-severe forms of violence . Our study improves on the existing literature by both examining the relationship between alcohol use and violence in a causal way, as well as considering the potential effectiveness of one particular policy lever – taxes -- at reducing violence. According to the Federal Bureau of Investigation (FBI), nearly 60 percent of female homicide victims between 1990 and 2004 were killed by a male family member or acquaintance . Thus, femicide is strongly related to domestic violence including intimate partner violence. Moreover, a strong vital records system in the US ensures complete and accurate measurement of female homicides in all states over time.

While the use of femicide reduces potential measurement bias in the identification of violence against women, the use of alcohol taxation reduces the risk of identifying a spurious relationship between alcohol consumption and violence if both are caused by a common set of unobserved variables. Assuming state alcohol taxes strongly influence alcohol consumption but are not correlated with other unobservable factors influencing alcohol consumption (e.g., unobserved individual characteristics such as the propensity to engage in risky behavior), we can obtain an unbiased estimate of the relationship between alcohol consumption and violence. Moreover, we can evaluate whether alcohol taxes can be utilized as policy levers to reduce the prevalence of violence, specifically female homicide.

Methods

Data

The data used in these analyses contain state-level measures of homicide rates; alcohol taxes, consumption, and prices; socioeconomic characteristics; and a gun prevalence proxy for 1990-2004. In what follows, we construct an alcohol tax index using alcohol taxes and consumption by state and over time. For states that control the sale of liquor, we impute a liquor tax using data on liquor prices (described in detail in the Appendix). ACCRA, the primary source of data on alcohol prices in the US, stopped collecting these data in 2004. Our state-level panel, therefore, ends in 2004. Although a total of 765 observations were possible (i.e., 50 states and DC observed across 15 years), a few states and state-year observations were removed from the data for our analysis. Alcohol price data were unavailable for all years for Maine. In addition, New Hampshire, Pennsylvania, and Utah control the sale of both wine and liquor through state-run agencies and do not tax these alcoholic beverages. Thus, the alcohol tax index could not be computed for these states and these observations were dropped from the analysis. Alcohol price data were also missing for 2002 in Vermont; and homicide rates in New York and New Jersey peaked significantly in 2001 due to the attacks on the World Trade Center. Thus, these three state-year combinations were dropped from the analysis. The final dataset includes 702 observations over 15 years (1990 through 2004) for 46 states and the District of Columbia. Table 1 provides means of all variables for the analysis sample.

Measures

Female homicide victimization rates were drawn from the Centers for Disease Control and Prevention's (CDC) Web-based Injury Statistics Query and Reporting System (WISQARS), which are collected from state vital records. A homicide rate is calculated as the number of homicides in state s in year y divided by the relevant population (population aged 15 to 50) in hundred thousands. Most female deaths due to homicides occur between the ages of 15 and 50. Therefore, we restrict our estimation to this age group and conduct our analysis at the state-level where both homicides and taxes can be identified. Results of our analysis were fundamentally unchanged when we relaxed this restriction and use homicide rates for females aged 18 and over. Additionally, we log homicide rates to adjust for the skew of its distribution. To understand further the impact of alcohol policy on violence, we also explore the effects of alcohol taxation on male and total homicide rates for the same age band in our final analysis. Figure 1 illustrates the trends in female, male, and total homicide rates (age 15-50) between 1990 and 2004. This depiction shows national homicide rates falling during the 1990s, but remaining somewhat stable since 1998.

The primary alcohol control policy of interest is state alcohol taxes. Between 1990 and 2004 there were numerous changes in state and federal level alcohol tax policy. At the state-level, there were 35 changes in state beer taxes, 28 changes in state wine taxes, and 25 changes in state liquor taxes. At the federal-level, beer, wine, and liquor taxes were raised in 1991.

Because alcohol is taxed by alcohol type, with different rates for beer, wine, and liquor, and because consumption of alcohol type differs by state, we follow the procedure described by Cook, Ostermann, & Sloan (2005) and Cook & Peters (2005) to create an alcohol tax index. This index is a composite of taxes for different types of alcohol, weighted by the relative consumption of different alcohol types in a particular state averaged across all years of analysis. Because some states control the sale of liquor, we impute the tax rates for those state-year cells. Details of the alcohol tax index and imputation calculations are contained in the Appendix.

In our analyses, we also control for state-level gun ownership. Using household-level data, Kellermann et al. (1993) found that gun ownership is associated with higher levels of family violence. But consistently measuring gun ownership at the state-level is challenging. Building on research by Azrael, Cook, and Miller (2004), we use data from WISQARS on the fraction of suicides committed with a firearm as a proxy variable for gun prevalence. Because the fraction of suicides committed with a firearm is well-reported on death certificates and highly correlated with gun prevalence survey data (Azrael, Cook, and Miller, 2004), previous research has indicated that it provides a valid longitudinal measure of gun-prevalence. State administrative data on gun ownership are not available longitudinally.

Finally, we control for a variety of state-level economic and demographic characteristics which can influence the amount or severity of violence against women, homicide, consumption of alcohol, and/or legislative actions on taxes or alcohol , and have been included in other research . These additional control variables include state per capita income, unemployment rate, and the percent of the population of African American race. Data on these variables were obtained from Bureau of Economic Analysis, Bureau of Labor Statistics, and Census Bureau, respectively. Additionally, we evaluated the influence of alcohol outlet density, a measure of the availability of alcohol in the state, using the Statewide Availability Data System II: 1933 – 2003, National Institute on Alcohol Abuse and Alcoholism (NIAAA) (Ponicki, 2004) and the number of law enforcement officers per capita using data available from FBI's Uniform Crime Reports. However, alcohol outlet data suffer from severe reporting inconsistencies and may be endogenous. Therefore, we chose instead to control for population density as a proxy for alcohol outlet density. Because the presence of law enforcement is potentially endogenous, we also omitted this variable in our final models as well. Nevertheless, results were fundamentally unchanged with its inclusion or the inclusion of a one-period lag.

Analysis

Our empirical strategy relies on changes in alcohol taxes (beer, wine, and liquor) to explain changes in homicide rates. First, we demonstrate the relationship between alcohol taxes and alcohol consumption. Then, we model the potentially endogenous relationship between alcohol consumption and female homicide rates. Finally, we employ the alcohol tax index and explore the reduced form relationship between alcohol taxes and homicide rates, assuming that alcohol taxes affect violence through their impact on alcohol consumption. In contrast to alcohol consumption, the alcohol tax index is exogenous to homicide rates. Thus, this final analysis is expected to produce our best, unbiased estimate of the relationship between alcohol consumption and violence.

We estimate the following reduced form model using ordinary least squares (OLS) regression, while employing state and year fixed effects:

$$\mathbf{V}_{sy}=\alpha_0+\mathbf{A}_{sy}\quad\alpha_2+\mathbf{N}_{sy}\quad\alpha_3+\theta_s+\delta_y+\varepsilon_{sy}\quad(1)$$

where V_{sy} is the logged rate of female homicide victimizations (FH_{sy}) for women between 15-50 in state s in year y, A_{sy} is the alcohol tax index (or vector of state alcohol taxes for beer, wine, and liquor), N_{sy} is a vector of demographic characteristics measured at the state-level including real per capita income, population density, unemployment rate, percent of the population that is African American, and gun prevalence proxied by the fraction of suicides committed with a firearm , θ_s are state fixed effects, and δ_y are year fixed effects. We also modify equation (1) to consider alternative measures of violence (V_{sy}) including male (MH_{sy}) and total homicide (TH_{sy}) rates. Observations are weighted by the state population and standard errors are adjusted for clustering at the state-level. Alternative strategies for weighting the data (Johnston & DiNardo, 1996) were evaluated but did not fundamentally change our results. In addition, we estimated count data models and two-stage least squares models and found similar results.

Results

Alcohol Taxation and Alcohol Consumption

For alcohol taxation to influence violence, it must first influence alcohol consumption. Thus, we first model the influence of beer, wine, and liquor taxes on consumption of beer, wine, and liquor per capita, respectively, as well as total consumption per capita (Table 2). We then model the relationship between the alcohol tax index and total alcohol consumption per capita. The results suggest that both beer taxes and wine taxes are negatively associated with beer and wine consumption per capita, respectively, but that liquor taxes do not significantly influence liquor consumption per capita. We do not include a model with all three taxes on total alcohol consumption per capita, since the three taxes are highly multicollinear. Instead, we use the alcohol tax index, which improves the estimation. A one cent per ounce of ethanol increase (in 1982-84 dollars) in the alcohol tax index reduces per capita alcohol consumption by one percent. Thus, our first-stage model predicts the negative relationship we expect between taxes (and prices) and demand for alcohol.

Next, we show the relationship between alcohol consumption and violence (Table 3). Not surprisingly, the results suggest that increased alcohol consumption per capita is positively associated with female homicide rates, male homicide rates (not shown), and total homicide rates (not shown). Moreover, this relationship holds for each type of alcohol – beer, wine, liquor – consumed. Together the models in Tables 2 and 3 tell a coherent story; increases in alcohol taxes lead to a decline in alcohol consumption and a decline in alcohol consumption can reduce violence against women. It appears that alcohol taxation may effectively promote a reduction in domestic violence. According to the coefficient estimate, a one percent reduction in total alcohol consumption (ethanol gallons of beer, wine, and liquor) per capita results in a 1.33 percent decline in the female homicides rate. The 95 percent confidence interval suggests that a one percent reduction in alcohol consumption per capita is associated with a reduction in female violence of between 0.5 and 2.1 percent.

The relationship between alcohol consumption and female homicide estimated in Table 3, however, may be biased due to unobserved factors that are both correlated with alcohol consumption and with violence. We, therefore, estimate the relationship between alcohol taxation and homicide rates for females, males, and the total population. As shown in Table 4, the relationship between alcohol taxation and homicide rates is not statistically significant (columns 1-6). While we were able to estimate an effect of alcohol consumption on female homicide rates, we do not appear to have the power to detect a statistically significant reduction in violence attributable to alcohol taxation. This is evidenced through the combination of results shown in the first stage and second stage models, compared with the reduced form results. If a one cent increase in the alcohol tax increase results in a 1.07 decrease in alcohol consumption, and a one percent increase in consumption is associated

with a 1.43 percent increase in violence, then the combined expected effect of the alcohol tax on violence is approximately −1.43 percent. Our results in Table 4, however, suggest a coefficient of −0.0044 with a larger standard error. We cannot rule out the possibility that the effect is null. We do find, however, that the prevalence of violence is positively associated with the percent of the state's population that is African American. In addition, economic conditions influence male homicide rates but not female homicide rates.

As a check on the robustness of our results, we employ an alternative measure of violence from the Supplemental Homicide Report (SHR) data produced by the FBI. These data are an improvement in some ways, but have drawbacks in others. First, the SHR data report homicide counts by state over time based on the relationship of the perpetrator to the victim. These data allow us to calculate homicide rates by relationship status for females, males, and total homicides. Our measure is the sum of homicides classified as perpetrated by a family member or by an acquaintance. This approach allows us to use an outcome measure that is slightly more tailored to the idea of "intimate partner violence." There are some drawbacks, however, to these data. First, there is some measurement error in these homicide rates by relationship status because not all relationships will be evident or identified by the police. Second, there are missing data, where certain states in certain years fail to report this information. Third, there are also a large number of zeroes in the data (due to lack of reporting), and those observations must be dropped when we use the logged specification. Finally, while the measures inform us about the relationship status as well as the gender of the victim, they do not inform us of the gender of the perpetrator. In spite of these drawbacks, we consider this measure in addition to our preferred specification.

The reduced form results using SHR data are presented in Table 4 (columns 7-12). The alcohol tax index is statistically insignificant with respect to homicide rates. The negative coefficients are noticeably larger in absolute value than our prior reduced form estimates using WISQARS data, but remain statistically insignificant. Again, we do not have the power to detect a statistically significant effect using the SHR, but the 95 percent confidence interval (between −0.11 and 0.03 for female homicide rates) around the alcohol tax index coefficient suggests that taxation is likely to reduce intimate partner violence. In sum, we are unable to identify a relationship between alcohol tax policy and female homicide using either the original homicide measure or the homicide measure by relationship status. It is worth noting, however, that the proxy for gun prevalence does appear to be positively related to violence against men.

Discussion and Conclusions

Prior research suggests that alcohol control policies can effectively reduce some forms of violence. While alcohol taxation does reduce consumption, that reduction in alcohol consumption does not translate into statically significant reductions in violence towards women in our analysis. Our results provide some evidence that reductions in alcohol consumption can reduce violence. Our results, however, do not appear to have enough power to argue that taxes can effectively reduce violence through their affect on alcohol consumption. Looking across a 14-year period, we are unable to identify a statistically significant relationship between alcohol taxes and female homicides. This result is consistent with prior literature (e.g., Cook & Moore, 1993; Sloan et al, 1994) that finds that alcohol prices and taxes are associated with reductions in violent crimes such as rape, assault, and robbery, but not homicide. Our results persist when we utilize SHR data where the relationship between the perpetrator and victim is known and we can focus our analysis more exclusively on intimate partner violence. Because both the first-stage relationship between taxes and consumption and the second stage relationship between consumption and violence exist, we conclude that taxes may affect the alcohol consumption of one segment of

the population, while consumption changes and violence may influence a different segment of the population. In other words, alcohol taxes may indeed reduce consumption of alcohol for individuals who are most sensitive to prices, but these individuals are not necessarily the individuals whose alcohol consumption is associated with the commission of homicides.

These findings, therefore, beg the question – what state-level policies can be implemented to reduce femicide, overall homicide rates, and violence more generally? Although the Centers of Disease Control (CDC) have invested in adolescent violence prevention programs and programs to reduce the prevalence of domestic violence, we were not able to identify a source of state-level data on investments in violence and domestic violence prevention programs. This is a potential limitation of our analysis. Resources directed at providing mental health services, teaching young adults how to cope with anger and frustration, and providing safe houses for women to escape domestic violence can potentially reduce victimization. But, without state-level data on these resources, we cannot identify their effects.

In addition to developing data on the state-level investments in prevention, future research could also benefit from the development of county-level data. Alcohol taxation is a state-level policy. But, homicide and other violent crimes may be more strongly influenced by county-level resources for violence prevention, the prevalence of firearms in the county, law enforcement efforts at the county-level, and local-level labor market conditions. Currently, many of these data are not readily available at the county-level. With the development of additional data at the county-level, researchers will be better able to identify what types of policies at different levels of government can reduce homicide and other forms of violence.

At both the state- and county-levels, additional longitudinal data collection efforts are needed on the incidence of intimate partner violence. Our study focuses on measuring an extreme form of violence – femicide –because it is subject to fewer reporting biases than other measures of intimate partner violence currently available. However, female homicides occur somewhat infrequently, making identification of an effect difficult. With state- and county-level crime data that captured both the gender of victims and the relationship of perpetrators to victims for both violent and non-violent crimes, researchers would be better able to monitor the effectiveness of prevention programs and other policies on reducing intimate partner violence.

Finally, while our research suggests that alcohol taxation policy does not play a significant role in reducing female homicide, previous research has shown that alcohol control policies do strongly influence the incidence of injury and non-fatal violence such as drunk driving accidents . Moreover, alcohol taxation helps to reduce the consumption of alcohol among young adults . Given the harmful effects of alcohol on brain development among youth, it is, overall, an important tool for health promotion and injury prevention. Policymakers, however, may need additional strategies to promote reductions in intimate partner violence, especially fatal violence towards women.

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Appendix: Calculation of Alcohol Tax Index

Alcoholic beverages are taxed by alcohol type, with different rates for beer, wine, and liquor. Because consumption of alcohol type differs by state, we utilize an *alcohol tax index* rather than alcohol taxes themselves as our policy variable. The alcohol tax index is a

composite index of taxes for different types of alcohol, weighted by the relative consumption of different alcohol types in a particular state averaged across all years of analysis. Federal and state taxes for beer, wine, and liquor were compiled from the Beer Association's Brewer's Almanac, the Distilled Spirits Council of the United States, annual editions of the Adams/Jobson handbooks for wine and liquor, and the National Council of State Legislatures. Eighteen "control" states, however, serve as the sole distributor of liquor, and therefore have no liquor sales taxes. Liquor taxes for these states were imputed by subtracting a yearly "price net taxes," based on average liquor prices and taxes in the non-control states, from control state liquor prices. More specifically, liquor taxes were imputed as follows: First, liquor taxes in the non-control, or "license," states were averaged for each year of data. Second, alcohol prices from all states were compiled from the Inter-City Cost of Living Index published quarterly by ACCRA, and liquor prices from license states were averaged for each year of data. Average license state taxes were then subtracted from their corresponding average license state prices to determine yearly alcohol prices net taxes. Finally, these net prices for each year were subtracted from the corresponding liquor price for each control state, to generate an imputed tax for each state, each year. As of 2005 ACCRA has stopped compiling quarterly data on liquor prices. Alcohol prices were compiled from the Inter-City Cost of Living Index published quarterly by the American Chamber of Commerce Research Association (ACCRA). Prices for beer, wine, and liquor are based on prices for a 6-pack of Bud/Miller Lite, a 1500 ml Gallo Chablis Wine, and a 750 ml 86 proof J&B Scotch, respectively.

Beer, wine, and liquor are distinct alcohol products because they are taxed at different rates, are consumed at different rates, and contain different amounts of ethanol. To create an overall measure of alcohol taxes in a state in a specific year, therefore, beer, wine, and liquor taxes were first adjusted to real dollars using the Consumer Price Index (Economic Report of the President, relevant years), and then converted from tax per gallon of product to tax per ounce of alcohol, using the number of alcohol ounces per gallon of product compiled from the National Institute on Alcohol Abuse and Alcoholism of the National Institutes of Health (NIAAA). State proportion of total alcohol consumption accounted for by beer, wine and liquor was determined by dividing the alcohol amount consumed for a specific product, in gallons of alcohol, by the total number of alcohol gallons consumed for all products. These proportions were averaged across all years of data collection to create the weights used in the index. Alcohol consumption data were also compiled from the NIAAA, which reports "apparent consumption" drawn from alcohol sales data. Converted taxes were multiplied by their corresponding average consumption proportion, and then summed, to create a consumption-weighted total tax index for each state in each year. Mathematically, the tax index is calculated as follows:

$$TaxIndex_{sy} = \left[\frac{T_{bsy}}{\frac{CPI}{100}} * \left(E_{by)} * \frac{C_{bs}}{C_{ts}}\right]\right] + \left[\frac{T_{wsy}}{\frac{CPI}{100}} * \left(E_{wy)} * \frac{C_{ws}}{C_{ts}}\right]\right] + \left[\frac{T_{lsy}}{\frac{CPI}{100}} * \left(E_{ly)} * \frac{C_{ls}}{C_{ts}}\right]\right]$$

where *s* is the state, *y* is the year, and product types indexed as follows: *i* = *b* (beer), *w* (wine), *l* (liquor), and *t* (total).

T_{isy}= Nominal federal and state (actual or imputed) taxes for product type *i*, in cents, in state *s* in year *y*

E_{iy}= Number of alcohol ounces of product *i* in year *y*

C_{is}= Number of ethanol gallons of product *i* consumed in state *s* over all years

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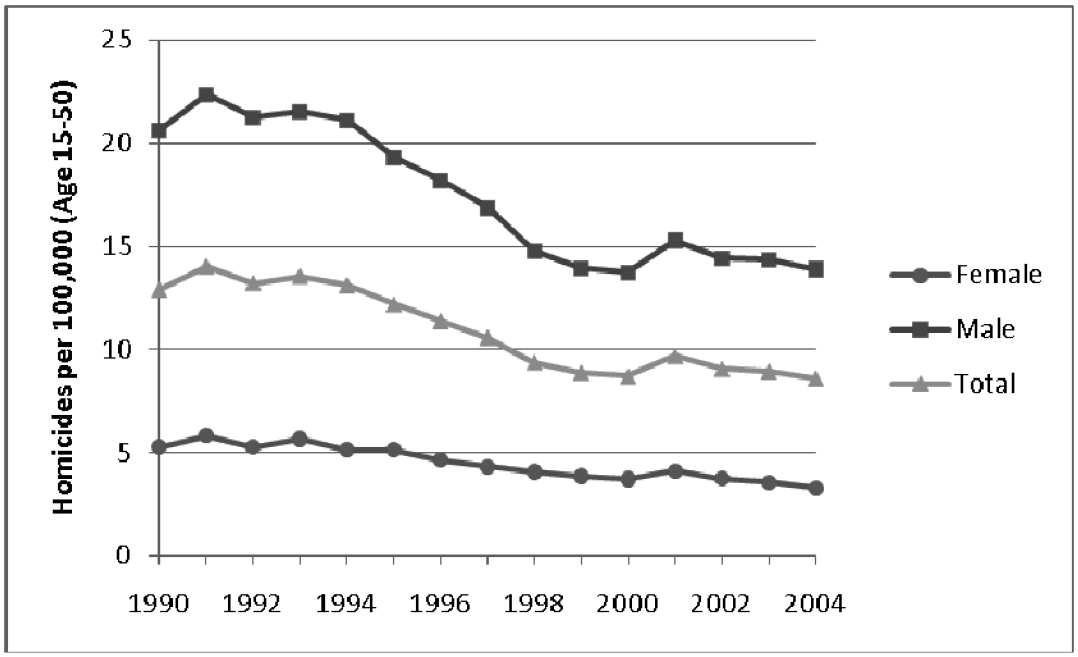

Figure 1.
National Trends in Homicide Rates, 1990-2004

Table 1

Descriptive Statistics, Full Sample & Analysis Sample

Variable	Analysis Sample (n=702)	
	Mean (St. Dev)	
Homicide Rates†		
Female Homicide Rate (log)	1.394	(0.572)
Male Homicide Rate (log)	2.591	(0.777)
Total Homicide Rate (log)	2.177	(0.697)
Alcohol Tax Index†† [Cents per ounce of ethanol,1982-1984 dollars]	12.698	(2.525)
Beer tax per ounce of ethanol (real)	8.684	(2.248)
Wine tax per ounce of ethanol (real)	6.606	(2.086)
Liquor tax per ounce of ethanol (real)	22.803	(6.429)
ACCRA Beer Price (real cents per ounce of ethanol)	85.62	(12.28)
ACCRA Wine Price (real cents per ounce of ethanol)	52.83	(5.87)
ACCRA Liquor Price (real cents per ounce of ethanol)	107.21	(8.95)
Alcohol Consumption (ethanol gallons) per capita		
Total Alcohol Consumption per capita	1.858	(0.373)
Total Alcohol Consumption per capita (log)	0.603	(0.179)
Beer Consumption per capita	1.042	(0.152)
Beer Consumption per capita (log)	0.031	(0.142)
Wine Consumption per capita	0.242	(0.125)
Wine Consumption per capita (log)	−1.552	(0.519)
Liquor Consumption per capita	0.575	(0.189)
Liquor Consumption per capita (log)	−0.596	(0.279)
Percent of Suicides Committed with Firearm	58.107	(13.562)
Per Capita Income in 1000s (real)	15.478	(2.666)
Population Density (100s per square mile)	3.737	(13.356)
Unemployment Rate	5.273	(1.453)
Percent African American	11.941	(12.074)

†Three zero values of female homicide rates, and one zero value for male homicide rates resulted in analysis sample sizes of 699 and 701, respectively.

††The alcohol tax index was only calculated for the analysis sample; descriptive statistics are therefore the same in each column (n=702). Wine taxes were not imputed, and missing data prevented calculation of liquor taxes for 18 observations.

Table 2

Alcohol Taxes on Alcohol Consumption

Specification	1	2	3	4	5	6	7	8
	Log Alcohol Consumption per Capita							
	Beer	Beer	Wine	Wine	Liquor	Liquor	Total	Total
Alcohol Tax Index							−0.0113** (0.0052)	−0.0107*** (0.0038)
Beer Tax	−0.0243* (0.0138)	−0.0258* (0.0133)						
Wine Tax			−0.0592*** (0.0121)	−0.0517*** (0.0120)				
Liquor Tax					−0.0016 (0.0014)	−0.0019 (0.0012)		
Gun Prevalence		−0.0004 (0.0013)		0.0015 (0.0014)		0.0007 (0.0010)		0.0003 (0.0009)
Income Per Capita (real)		0.0110 (0.0088)		0.0051 (0.0130)		0.0391*** (0.0109)		0.0205*** (0.0076)
Population Density		−0.0264 (0.0182)		−0.0182** (0.0081)		−0.0252 (0.0182)		−0.0203 (0.0135)
Unemployment Rate		0.0082 (0.0053)		0.0026 (0.0073)		0.0061 (0.0052)		0.0031 (0.0035)
% African American		0.0115 (0.0092)		0.0303* (0.0151)		0.0148 (0.0142)		0.0151 (0.0104)
R-Squared	0.95	0.95	0.98	0.98	0.95	0.96	0.95	0.95
No. of Observations	702	702	702	702	702	702	702	702
State & Year FE	X	X	X	X	X	X	X	X

Note: The alcohol tax index is calculated as cents per ounce of ethanol in 1982-1984 dollars. Standard errors are clustered at the state-level and observations are weighted by state population.

*Significant at the 0.10 level,

**Significant at the 0.05 level,

***Significant at the 0.01 level

Table 3

Alcohol Consumption and Female Homicide

Specification	1	2	3	4	5	6	7	8
	Log Female Homicide Rate (Age 15−50)							
Log Total Consumption per capita							1.3638** (0.3816)	1.3282*** (0.3806)
Log Beer Consumption per capita	1.1378*** (0.3770)	1.0613*** (0.3538)						
Log Wine Consumption per capita			0.4352** (0.1687)	0.3744** (0.1456)				
Log Liquor Consumption per capita					0.6411** (0.2562)	0.6419** (0.2506)		
Gun Prevalence		−0.0027 (0.0047)		−0.0035 (0.0053)		−0.0036 (0.0053)		−0.0035 (0.0048)
Income Per Capita (real)		−0.0030 (0.0226)		0.0054 (0.0274)		−0.0192 (0.0232)		−0.0193 (0.0214)
Population Density		0.0137 (0.0213)		−0.0087 (0.0285)		0.0014 (0.0213)		0.0130 (0.0193)
Unemployment Rate		0.0129 (0.0132)		0.0191 (0.0136)		0.0135 (0.0126)		0.0136 (0.0131)
% African American		0.0446** (0.0199)		0.0440* (0.0242)		0.0508** (0.0235)		0.0366** (0.0174)
R-Squared	0.86	0.86	0.85	0.86	0.85	0.86	0.86	0.86
No. of Observations	699	699	699	699	699	699	699	699
State & Year FE	X	X	X	X	X	X	X	X

Note: The alcohol tax index is calculated as cents per ounce of ethanol in 1982-1984 dollars. Standard errors are clustered at the state-level and observations are weighted by state population.

*Significant at the 0.10 level,

**Significant at the 0.05 level,

***Significant at the 0.01 level

Table 4

Alcohol Taxes and Index on Homicide (Female, Male, and Total)

Specification	1	2	3	4	5	6	7	8	9	10	11	12
	Log Homicide Rate (15-50) WISQARS Data						Log Homicide Rate (Family or Acquaintance Perpetrator) SHR Data					
	Female		Male		Total		Female		Male		Total	
Alcohol Tax Index	−0.0104 (0.0140)	−0.0044 (0.0118)	−0.0032 (0.0134)	0.0034 (0.0107)	−0.0038 (0.0131)	0.0026 (0.0105)	−0.0427 (0.0316)	−0.0384 (0.0335)	−0.0464 (0.0318)	−0.0413 (0.0371)	−0.0453 (0.0321)	−0.0392 (0.0366)
Gun Prevalence		−0.0031 (0.0055)		0.0011 (0.0073)		−0.0004 (0.0068)		0.0028 (0.0054)		0.0128** (0.0055)		0.0095** (0.0047)
Income Per Capita (real)		0.0061 (0.0279)		0.0317 (0.0339)		0.0281 (0.0310)		0.0353 (0.0361)		0.0570 (0.0475)		0.0560 (0.0404)
Population Density		−0.0147 (0.0296)		0.0108 (0.0348)		0.0054 (0.0303)		−0.1573 (0.1595)		−0.0469 (0.2858)		−0.1199 (0.2330)
Unemploy. Rate		0.0177 (0.0136)		0.0486*** (0.0145)		0.0415*** (0.0141)		0.0118 (0.0249)		0.0527 (0.0444)		0.0434 (0.0393)
% African American		0.0595** (0.0288)		0.0680** (0.0263)		0.0673*** (0.0239)		0.0350 (0.0383)		0.0282 (0.0833)		0.0400 (0.0687)
R-Squared	0.85	0.85	0.92	0.92	0.92	0.93	0.80	0.80	0.90	0.89	0.89	0.90
No. of Observations	699	699	701	701	702	702	601	601	598	598	601	601
State & Year FE	X	X	X	X	X	X	X	X	X	X	X	X

Note: The alcohol tax index is calculated as cents per ounce of ethanol in 1982-1984 dollars. Standard errors are clustered at the state-level and observations are weighted by state population.

* Significant at the 0.10 level,

** Significant at the 0.05 level,

*** Significant at the 0.01 level