

# Alcohol Taxation and Child Maltreatment

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## INTRODUCTION

More than 3.4 million children were the subject of a child maltreatment investigation or alternative response in the United States during 2016.<sup>1</sup> The prevalence of child maltreatment is disturbing, with at least 37% of children being investigated for abuse or neglect during their childhood.<sup>2</sup> While the emotional cost of this harm cannot be quantified, the lifetime economic cost of child maltreatment exceeds one hundred billion dollars annually.<sup>3</sup> Due to the large number of children at risk and the significant cost, the prevention of child maltreatment is a significant public health concern.

One policy response not frequently discussed is increasing alcohol tax rates. An increase in the tax on alcohol raises the cost of alcohol consumption, causing some people to stop or reduce their drinking.<sup>4</sup> The reduction in alcohol consumption could, in turn, reduce child maltreatment. This might occur because alcohol is a factor in 40% of child maltreatment cases.<sup>5</sup> Excessive alcohol consumption causes some people to experience increased levels of aggression,<sup>6</sup> and excessive alcohol

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1. CHILDREN'S BUREAU, U.S. DEP'T OF HEALTH & HUM. SERV., CHILD MALTREATMENT 2016 (2016).

2. Hyunil Kim et al., *Lifetime Prevalence of Investigating Child Maltreatment Among US Children*, 107 AM. J. PUB. HEALTH 274, 277 (2017).

3. Xiangming Fang et al., *The Economic Burden of Child Maltreatment in the United States and Implications for Prevention*, 36 CHILD ABUSE & NEGLECT 156, 162 (2012).

4. Frank J. Chaloupka et al., *The Effects of Price on Alcohol Consumption and Alcohol-Related Problems*, 26 ALCOHOL RES. & HEALTH 22, 29 (2002); Alexander C. Wagenaar et al., *Effects of Beverage Alcohol Price and Tax Levels on Drinking: A Meta-Analysis of 1003 Estimates from 112 Studies*, 104 ADDICTION 179, 187-89 (2009).

5. Sara Markowitz & Michael Grossman, *Alcohol Regulation and Domestic Violence Towards Children*, 16 CONTEMP. ECON. POL'Y 309 (1998).

6. PHILIP J. COOK, *PAYING THE TAB: THE ECONOMICS OF ALCOHOL CONTROL* 91 (Princeton University Press ed. 2007).

consumption has been linked to violence.<sup>7</sup> Thus, it is possible that alcohol-related violence could lead to physical, sexual, and/or psychological abuse of children.<sup>8</sup> In addition, excessive alcohol consumption impairs people's judgment and causes them to engage in risky, short-sighted behavior.<sup>9</sup> Such cognitive impairment might plausibly result in child neglect, a proposition that will be tested in this study. For these reasons it is possible that alcohol taxes, through their effect on alcohol consumption, might have an effect on child maltreatment rates.

Alcohol tax increases have been promoted as an effective policy response to a number of social problems,<sup>10</sup> the most prominent being drunk driving. Roughly 40% of the deaths that occur from crashes are related to alcohol.<sup>11</sup> However, the costs of excessive alcohol consumption are not limited to drunk driving. Excessive consumption has been linked to reduced productivity,<sup>12</sup> workplace injury,<sup>13</sup> suicide,<sup>14</sup> health costs,<sup>15</sup> and domestic violence.<sup>16</sup> Alcohol is the third-highest cause of preventable death among all age groups in the U.S.,<sup>17</sup> with 88,000 deaths occurring annually.<sup>18</sup> The cost of excessive alcohol consumption in the

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7. Christine Piette Durrance et al., *Taxing Sin and Saving Lives: Can Alcohol Taxation Reduce Female Homicides?*, 73 SOC. SCI. & MED. 169, 170 (2011).

8. COOK, *supra* note 6, at 102-03 (collecting studies).

9. *Id.*, at 86.

10. Preventing Excessive Alcohol Consumption: Evidence-Based Interventions for your Community, THE COMMUNITY GUIDE, <https://www.thecommunityguide.org/sites/default/files/assets/What-Works-Alcohol-factsheet-and-insert.pdf> (last updated May 2015).

11. Brent D. Mast et al., *Beer Taxation and Alcohol-Related Traffic Fatalities*, 66 S. ECON. J. 214, 214 (1999).

12. Randy W. Elder et al., *The Effectiveness of Tax Policy Interventions for Reducing Excessive Alcohol Consumption and Related Harms*, 38 AM. J. PREVENTIVE MED. 217 (2010).

13. Robert L. Ohsfeldt & Michael A. Morrissey, *Beer Taxes, Workers' Compensation and Industrial Injury*, 79 REV. OF ECON. AND STAT. 155 (1997).

14. D. Wasserman et al., *Male Suicides and Alcohol Consumption in the Former USSR*, 89 ACTA PSYCHIATRICA SCANDINAVICA 306 (1994).

15. Markowitz, *supra* note 5.

16. Durrance et al., *supra* note 7; Sarah Markowitz, *The Price of Alcohol, Wife Abuse, and Husband Abuse*, 67 S. ECON. J., 279 (2000).

17. Task Force on Community Preventative Services, *Increasing Alcoholic Beverage Taxes is Recommended to Reduce Excessive Alcohol Consumption and Related Harms*, 38 AMER. J. PREVENTATIVE MED., 230 (2010).

18. *Alcohol Facts and Statistics*, NAT'L INST. ON ALCOHOL ABUSE AND ALCOHOLISM (2018), <https://www.niaaa.nih.gov/alcohol-health/overview-alcohol-consumption/alcohol-facts-and-statistics>.

U.S. for 2010 was \$249 billion, not including costs related to child maltreatment.<sup>19</sup>

This study examines whether state-level changes in alcohol tax rates predict changes in state-level child maltreatment rates. It also explores whether this relationship differs based on the type of alcohol being taxed (beer, wine, or spirits) or the type of child maltreatment (neglect, physical abuse, psychological abuse, or sexual abuse). The purpose of these tests is to understand whether an alcohol tax may be an effective policy lever in reducing child abuse and/or neglect. This information would be of value to child advocacy organizations and legislators interested in preventing harm to children.

## I. LITERATURE REVIEW

The various problems associated with excessive drinking have prompted several societies to ban alcohol, but this has generally resulted in illegal smuggling<sup>20</sup> and violence.<sup>21</sup> From 1920 to 1933 alcohol was prohibited in the U.S., yet this had little effect on alcohol consumption.<sup>22</sup> One might therefore conclude that drinking would continue unabated if the price of alcohol were to increase. Yet, research studies have demonstrated that alcohol consumption is affected by price.<sup>23</sup> Demand is most elastic for spirits (price elasticity of -1.5) and least elastic for beer (-0.3), while demand for wine is unitary elastic.<sup>24</sup> Thus, a 10% increase in the price of spirits, wine, and beer would lead to consumption decreases of 15%, 10%, and 3%, respectively. While it seems intuitive that spirits, wine, and beer

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19. Jeffrey J. Sacks et al., *National and State Costs of Excessive Alcohol Consumption*, 49 AMER. J. PREVENTATIVE MED., 73, 73-79.

20. Mark Keller, *A Historical Overview of Alcohol and Alcoholism*, 39 CANCER RESEARCH 2282, 2282 (1979).

21. Jeffrey A. Miron, *Violence and the U.S. Prohibitions of Drugs and Alcohol*, 1 AM. L. & ECON. REV. 78, 79-89 (1999).

22. Jeffrey A. Miron, *An Economic Analysis of Alcohol Prohibition*, 28 J. DRUG ISSUES 741, 742 (1998).

23. COOK, *supra* note 6, at 68.

24. Chaloupka, *supra* note 4, at 23; Siu Fai Leung & Charles E. Phelps, 'My Kingdom for a Drink...?': *A Review of Estimates of the Price Sensitivity of Demand for Alcoholic Beverages*, in NAT'L INST. ON ALCOHOL ABUSE AND ALCOHOLISM, ECONOMICS AND THE PREVENTION OF ALCOHOL-RELATED PROBLEMS 1, 2 (Michael E. Hilton & Gregory Bloss eds., 1993).

would be substitutes, the data do not necessarily support this.<sup>25</sup>

The sensitivity of alcohol consumption to price has stimulated interest in the use of alcohol taxes as a tool for improving public health, as alcohol taxes have been associated with a number of social benefits.<sup>26</sup> Increases in the state-level beer tax, for example, are associated with reductions in the number of youths who die in a motor vehicle crash.<sup>27</sup> One study that examined a number of regulatory responses found beer taxes to be one of the most effective policy tools in reducing drunk driving.<sup>28</sup> A comprehensive study that examined the relationship between various regulatory responses and crash deaths found that the beer tax was the only regulation that remained robust after using a number of specifications.<sup>29</sup> Thus, evidence suggests that alcohol taxes appear to affect the number of deaths attributable to drunk driving.<sup>30</sup>

Drunk driving is not the only deleterious behavior that is potentially mitigated by alcohol taxes. Beer tax increases have been found to reduce the number of robberies and rapes<sup>31</sup> and overall crime,<sup>32</sup> and this reduction may stem from alcohol's relationship to aggression and violence.<sup>33</sup> While researchers have not found alcohol tax rates to be linked to homicide rates,<sup>34</sup> one study noted that, "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

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25. COOK, *supra* note 6, at 30.

26. Chaloupka, *supra* note 4, at 32.

27. Michael Grossman, *Beer Taxes, the Legal Drinking Age, and Youth Motor Vehicle Fatalities*, 16 J. LEGAL STUD., 351, 373 (1987).

28. Frank J. Chaloupka, Henry Saffer & Michael Grossman, *Alcohol-Control Policies and Motor-Vehicle Fatalities*, 22 J. LEGAL STUD. 161, 181-84 (1993).

29. COOK, *supra* note 6, at 29.

30. Christopher J. Ruhm, *Alcohol Policies and Highway Vehicle Fatalities*, 15 J. OF HEALTH ECON. 435, 435-54 (1996). When a good is unitary elastic, an increase of X% in the price of the good would lead to a decrease of X% in quantity demanded of the good.

31. Philip J. Cook & Michael J. Moore, *Economic Perspectives on Reducing Alcohol-Related Violence*, in ALCOHOL & INTERPERSONAL VIOLENCE: FOSTERING MULTIDISCIPLINARY PERSP. 193-212 (Sarah E. Martin ed., 1993).

32. Henry Saffer, *Substance Abuse Control and Crime: Evidence from the National Household Survey of Drug Abuse*, in ECON. ANALYSIS OF SUBSTANCE USE & ABUSE: THE EXPERIENCE OF DEVELOPED COUNTRIES & LESSONS FOR DEVELOPING COUNTRIES 291-307 (Michael Grossman & Chee-Ruey Hsieh, eds. 2001).

33. COOK, *supra* note 6, at 90.

34. Chaloupka et al., *supra* note 4, at 30; COOK, *supra* note 6, at 102.

strongly influence the incidence of injury and non-fatal violence such as drunk driving accidents"<sup>35</sup> The 1991 federal alcohol tax increase<sup>36</sup> led to a number of benefits, including a reduction in suicides, traffic fatalities, and violent crime.<sup>37</sup> There is also evidence that increases in alcohol taxes provide drinkers a number of health benefits<sup>38</sup>

There are, however, external health costs incurred by the children of drinkers. One study found that increases in the beer tax reduced the number of violent acts committed against children.<sup>39</sup> In terms of practical significance, the authors noted that a 10% increase in the beer tax rate reduced violence against children by roughly 2%.<sup>40</sup> A later study by the same authors controlled for state fixed effects and obtained a similar result, with a 10% increase in the beer tax implying a 2% reduction in physical child abuse committed by females.<sup>41</sup> The fact that excessive alcohol consumption is related to aggression, violence, and poor decision-making suggests that beer, wine, and spirits taxes might be related to each form of child maltreatment.<sup>42</sup>

The findings from the aforementioned studies suggest there would be an inverse relationship between alcohol tax rates and child maltreatment rates. However, it is possible that an increase in alcohol tax rates could actually increase child maltreatment, just as increases in cigarette taxes are correlated with child maltreatment.<sup>43</sup> This is because increases in alcohol tax rates might decrease the disposable income of people who continue to drink. There is research that shows that negative financial shocks are correlated with child maltreatment.<sup>44</sup> A reduction in disposable income

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35. Christine P. Durrance et al., *Taxing Sin and Saving Lives: Can Alcohol Taxation Reduce Female Homicides?*, 73 SOC. SCI. & MED. 169, 174 (2011).

36. Omnibus Budget Act of 1990 § 11201, Pub. L. No. 101-508, 104 Stat. 1388 (1990) (codified as amended at IRC §§ 5001, 5010, 5041 & 5051 (2012)).

37. Philip J. Cook & Christine P. Durrance, *The Virtuous Tax: Lifesaving and Crime-Prevention Effects of the 1991 Federal Alcohol-Tax Increase*, 32 J. HEALTH ECON. 261, 261-67 (2013).

38. COOK, *supra* note 6, at 175.

39. Markowitz & Grossman, *supra* note 5, at 319.

40. *Id.*

41. Sara Markowitz & Michael Grossman, *The Effects of Beer Taxes on Physical Child Abuse*, 19 J. HEALTH ECON. 271 (2000).

42. COOK, *supra* note 6, at 83.

43. Michael McLaughlin, *The Relationship Between Cigarette Taxes and Child Maltreatment*, 79 CHILD ABUSE & NEGLECT 339 (2018).

44. Lawrence M. Berger et al., *Income and Child Maltreatment in Unmarried Families: Evidence*

could cause a parent to become stressed and engage in poor parenting.<sup>45</sup> There is a growing body of research that documents various manifestations of this relationship. Changes in the minimum wage,<sup>46</sup> gas prices,<sup>47</sup> and cigarette tax rates<sup>48</sup> have all been linked to changes in child maltreatment rates, with higher disposable income (which increases when a person's wages increase, and decreases when a person's expenses increase) associated with lower child maltreatment in each case. Thus, the family of a drinker who continues drinking unabated will have less money as a result of the tax and may be worse off.<sup>49</sup> For this reason, the relationship between alcohol taxes and child maltreatment is unclear.

## II. METHODS

This study examines whether changes in state-level alcohol tax rates affect state-level rates of child abuse and neglect. Due to the high prevalence of alcohol abuse in cases of child maltreatment,<sup>50</sup> an inverse relationship between alcohol tax rates and child maltreatment is predicted. Since alcohol tax rates could instead have a positive relationship with child maltreatment rates by increasing a drinker's disposable income, this study relies on two-tailed tests.

The data include the beer tax rate, wine tax rate, spirits tax rate, child maltreatment rate, child neglect rate, child physical abuse rate, child sexual abuse rate, child psychological abuse rate, and a number of control variables. The control variables are the poverty rate, unemployment rate, Gini coefficient, percentage of African-American residents, and percentage of Hispanic residents. These control variables were included

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*from the Earned Income Tax Credit*, 15 REV. OF ECON. OF THE HOUSEHOLD 1345 (2017); Maria Cancian et al., *The Effect of Additional Support Income on the Risk of Child Maltreatment*, 87 SOC. SERVS. REV. 417 (2013).

45. Lawrence M. Berger, *Income, Family Structure, and Child Maltreatment Risk*, 26 CHILDREN & YOUTH SERVS. REV. 725 (2004).

46. Kerri M. Raissian & Lindsey R. Bullinger, *Money Matters: Does the Minimum Wage Affect Child Maltreatment Rates?*, 72 CHILDREN & YOUTH SERVS. REV. 60, 60-70 (2017).

47. Michael McLaughlin, *Less Money, More Problems: How Changes in Disposable Income Affect Child Maltreatment*, 67 CHILD ABUSE & NEGLECT 315 (2017).

48. McLaughlin, *supra* note 43, at 339.

49. COOK, *supra* note 6, at 90.

50. Markowitz & Grossman, *supra* note 5, at 309.

because they have been used in research studies where the child maltreatment rate was the dependent variable,<sup>51</sup> and when other social outcomes were used as the dependent variable.<sup>52</sup> The variables are measured annually at the state level from the period 2000 to 2014.<sup>53</sup>

Unfortunately there are a number of missing observations pertaining to the child maltreatment variables. The child maltreatment rate is missing 120 times, which comprises 16% of the total possible observations. One hundred and two of the missing observations are attributable to twelve states that are missing five or more years of data.<sup>54</sup> In most cases the observations are missing for several consecutive years, making imputation of the missing values impractical. The child maltreatment subtype variables are also missing a number of observations. The neglect rate, physical abuse rate, and sexual abuse rate are each missing fifteen times for the same state-years, while the psychological abuse rate is missing thirty-three times.<sup>55</sup> These missing observations, which occurred because various states did not report the data, decrease the power of the statistical tests and potentially limit the generalizability of this study's findings.

The spirit tax rate and wine tax rate have also been coded as missing in several instances. This is because certain states control the distribution of spirits or wine. In these states, the price of spirits or wine is set by a state agency.<sup>56</sup> There are seventeen "control" states for spirits and four control states for wine. Because the state government has a monopoly over the distribution of spirits or wine in those states, tax data are not available.

State-level tax rates for beer, wine, and spirits were obtained from publicly-available datasets published by the Tax Policy Center, a nonpartisan joint venture of the Brookings Institution and the Urban

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51. McLaughlin, *supra* note 47, at 316; McLaughlin, *supra* note 43, at 341-42.

52. KATHERINE S. NEWMAN & ROURKE O'BRIEN, *TAXING THE POOR: DOING DAMAGE TO THE TRULY DISADVANTAGED* (2011) (using the high school graduate rate, teen pregnancy rate, and other social outcomes as dependent variables).

53. Thus, there are 750 observations per variable (fifteen years of observations for each of the fifty states). For example, the unemployment variable includes the state unemployment rate for Alabama for 2000, 2001, etc.; for Arkansas for 2000, 2001, etc.; and so forth.

54. Those states are Connecticut, Hawaii, Illinois, Louisiana, Maryland, Michigan, New Jersey, New York, North Carolina, North Dakota, Ohio, and Pennsylvania.

55. North Dakota, Oregon, and Washington are responsible for most of these missing observations.

56 COOK, *supra* note 6, at 90.

Institute.<sup>57</sup> Cook notes that alcohol excise taxes are a good way to measure the effects of changes in price, since the effects of tax rate increases or decreases are quickly impounded into the price of alcohol and passed on to consumers.<sup>58</sup> The use of tax rates instead of alcohol consumption rates is important because alcohol consumption is endogenous with respect to child maltreatment.<sup>59</sup> Alcohol tax rates, however, are exogenous with respect to child maltreatment. Each of the state-level tax rates was measured in cents per gallon and has been converted to 2014 dollar amounts using the inflation calculator provided by the Bureau of Labor Statistics. There is also a federal tax rate that was levied across all fifty states, but it has not been changed since 1991 and therefore did not affect the sample period of this study.

In some previous studies, the effects of various state-level alcohol taxes (beer, wine, and spirits) were investigated independently. For example, Markowitz and Grossman examined changes in the beer tax rate.<sup>60</sup> Several other studies, however, have adopted a weighted-average alcohol index.<sup>61</sup> This alcohol index is computed by finding the respective proportions of beer, wine, and spirits consumed in a state on average across the entire sample period, and then multiplying these proportions by the respective tax rates.<sup>62</sup> This study utilizes both approaches: the effects of beer, wine, and excise taxes are examined in separate regressions, and an additional regression instead relies on the weighted-average alcohol index. Both

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57. *State Alcohol Excise Taxes*, TAX POLICY CTR. (Mar. 2018), <https://www.taxpolicycenter.org/statistics/state-alcohol-excise-taxes>.

58. COOK, *supra* note 6, at 90.

59. Durrance et al., *supra* note 7, at 172.

60. Markowitz & Grossman, *supra* note 5.

61. Philip J. Cook et al., *Are Alcohol Excise Taxes Good for us? Short and Long-Term Effects on Mortality Rates* (Nat'l Bureau of Econ. Research, Working Paper No. 11138), available at <http://www.nber.org/papers/w11138>; Philip J. Cook & Bethany Peters, *The Myth of the Drinker's Bonus* (Nat'l Bureau of Econ. Research, Working Paper No. 11902), available at <http://www.nber.org/papers/w11902>.

62. Durrance et al., *supra* note 7, at 172. For example, if the proportionate consumption of beer, wine, and spirits was 50%, 20%, and 30%, respectively (averaged across the entire sample period), for a state, and the tax rates on beer, wine, and spirits were 80, 50, and 100 for a given year (after adjusting for inflation), then the weighted-average alcohol tax index for that state-year observation would be 80 cents [(50% \* 80) + (20% \* 50) + (30% \* 100)].



approaches are conducted to ensure that this study's findings are not sensitive to the way alcohol taxes are measured.

The dependent variable in this study is the child maltreatment rate (in separate regressions, the rates for various child maltreatment subtypes are used). Data for the child maltreatment variables were obtained from annual reports released by the Children's Bureau. These reports make selected data from the Child Abuse and Neglect Data System (NCANDS) publicly available.<sup>63</sup> The child maltreatment referral rate measures the number of referrals that occurred in a state during a given year. This includes referrals that are screened in for an investigation and referrals that are screened out (not investigated). The use of the overall referral rate is supported by prior research, which finds that the lack of an investigation,<sup>64</sup> or substantiation of an investigation,<sup>65</sup> does not imply the absence of child maltreatment. The state-level child maltreatment referral rate has been used as a measure of child maltreatment prevalence in previous studies.<sup>66</sup>

This study also measures child maltreatment by subtype, with variables for child neglect, physical abuse, sexual abuse, and psychological abuse. Data for these variables were obtained from the same reports as the child maltreatment referral rate. Unfortunately, the child maltreatment subtype is not determined unless an investigation is conducted and substantiated. A state might have 20,000 child maltreatment referrals but 3,000 findings of neglect, 500 findings of physical abuse, 300 findings of sexual abuse, and 200 findings of psychological abuse. When added together, the numbers pertaining to child maltreatment subtypes do not sum to the number of child maltreatment referrals. This is because not all referrals are investigated, and not all investigations are substantiated. For a child maltreatment subtype to be recorded in the data, there must be both an investigation and a substantiation of that investigation. Furthermore, the NCANDS data provide a total number for each child maltreatment

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63. U.S. DEP'T OF HEALTH AND HUMAN SERV., CHILD MALTREATMENT 2014 (2016).

64. Emily Putnam-Hornstein et al., *Risk of Re-Reporting Among Infants Who Remain at Home Following Alleged Maltreatment*, 20 CHILD MALTREATMENT 92, 99 (2015); Susan J. Wells et al., *The Decision to Investigate: Child Protection Practices in 12 Local Agencies*, 17 CHILD. & YOUTH SERVS. REV. 523, 542-43 (1995).

65. Patricia L. Kohl et al., *Time to Leave Substantiation Behind: Findings From a National Probability Study*, 14 CHILD MALTREATMENT 17, 21 (2009).

66. McLaughlin, *supra* note 47, at 317; McLaughlin, *supra* note 43, at 342.

subtype, not a rate, so for this study a rate was computed by dividing the number for each child maltreatment subtype by the total child population in the corresponding state for the given year and then multiplying by one thousand (so that the rate is per 1,000 children, similar to the child maltreatment referral rate). For example, if there were 4,000 findings of neglect for a state with 400,000 children, the neglect rate variable would have a value of ten. The child maltreatment referral rate and the subtype rates approximate the normal distribution<sup>67</sup> and do not require special estimation procedures.

The models in this study also contain a number of variables to control for changes that might affect rates of child abuse and neglect. The poverty rate, unemployment rate, and Gini coefficient (a measure of income inequality) are used to control for economic changes occurring in a state over time. These variables were obtained from the U.S. Census Bureau, the U.S. Bureau of Labor Statistics, and a dataset created by an economics professor named Mark Frank, respectively.<sup>68</sup> In addition, the proportion of African-American residents and the proportion of Hispanic residents were retrieved from the U.S. Census Bureau to control for changes in the socioeconomic status of a state's population over time. Each of these variables has been used in prior research.<sup>69</sup> The results of a variance inflation factor test suggest that multicollinearity among these variables is not a concern.

The goal is to understand how changes in the various types of alcohol taxes predict changes in child maltreatment and child maltreatment subtypes. There are four different tax variables (beer, wine, spirits, and the weighted-average index) which are estimated in separate regressions to avoid issues with multicollinearity. Five different measures of child maltreatment are used (the overall child maltreatment rate, neglect, physical abuse, sexual abuse, and psychological abuse) as the dependent

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67. This means the observations of the dependent variable, when plotted, resemble a bell curve. There are no unusual patterns in the distribution of the dependent variable.

68. Mark W. Frank, *A New State-Level Panel of Annual Inequality Measures Over the Period 1916-2005*, 31 J. BUS. STRATEGIES 241, 257 (2014); Mark W. Frank, *U.S. State-Level Income Inequality Data*, SAM HOUSTON ST. U., [http://www.shsu.edu/eco\\_mwf/inequality.html](http://www.shsu.edu/eco_mwf/inequality.html) (last visited Sept. 26, 2018).

69. McLaughlin, *supra* note 52, at 317; McLaughlin, *supra* note 53, at 342; NEWMAN, *supra* note 57, at 102.

variable. Thus, a total of twenty regressions are performed (for each of the five dependent variables, four regressions are run using the various tax variables and the same set of control variables).

Because the datasets consist of panel data with fifteen years of observations for each state, this study adopts the fixed-effects approach for estimating the regression models. The fixed-effects method is the traditional approach because it controls for unobserved differences between states.<sup>70</sup> There are inherent differences between a state like Alabama and a state like New York that research could not possibly capture using control variables. The fixed-effects approach addresses this issue by focusing strictly on within-state, rather than between state, variations over time.<sup>71</sup>

The fixed-effects method has been used in studies examining the relationship between state-level taxes and social outcomes.<sup>72</sup> In particular, the fixed-effects method has examined the relationship between state-level taxes and child maltreatment rates.<sup>73</sup> Moreover, the analysis of panel data across the fifty states using a fixed-effects approach has been the standard workhorse model for alcohol tax studies since the early 1980's.<sup>74</sup> Cook describes the approach as quasi-experimental since it uses states as laboratories to analyze the effects of policy changes over time.<sup>75</sup> Controlling for state fixed effects eliminates the possibility that the results are attributable to inherent differences between the states. To rule out the possibility that the results are driven by long-term trends in the variables, this study also controls for year effects in accordance with prior research.<sup>76</sup>

An underlying assumption of this approach is that current-year observations (e.g., an increase in the beer tax this year) can predict current-year changes (e.g., an increase in neglect this year). This raises the question of whether there is a lagged effect that isn't visible until several

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70. Jerry A. Hausman & William E. Taylor, *Panel Data and Unobservable Individual Effects*, 49 *ECONOMETRICA* 1377, 1377-78 (1981); JEFFERY M. WOOLDRIDGE ET AL., *ECONOMETRIC ANALYSIS OF CROSS SECTION AND PANEL DATA* (2d ed. 2010).

71. PETER E. KENNEDY, *A GUIDE TO ECONOMETRICS* 286 (6th ed. 2008).

72. NEWMAN & O'BRIEN, *supra* note 52, at 98.

73. McLaughlin, *supra* note 47.

74. COOK, *supra* note 6, at 71-72.

75. *Id.* at 83.

76. McLaughlin, *supra* note 47, at 342; NEWMAN, *supra* note 57, at 102.

periods into the future. This issue was addressed by the statistician Scott Lynch in the appendix to Newman and O'Brien's book *Taxing the Poor: Doing Damage to the Truly Disadvantaged*.<sup>77</sup> Lynch performed a number of simulations and found that this approach actually underestimated the effect of the tax variables on social outcomes.<sup>78</sup> Thus, it seems unlikely that any results found in this study are spurious, particularly since the fixed-effects approach with state-level panel data has been used in alcohol policy studies for decades,<sup>79</sup> and is well-respected within the field of economics.<sup>80</sup>

### III. RESULTS

Information regarding alcohol tax rates is presented in Table 1. All fifty states levy a tax on beer. Forty-six states tax wine and thirty-three states tax spirits. The remaining states a state agency controls the distribution of wine or spirits and thus no tax was levied. Alcohol taxes were increased twenty-eight times and decreased three times between 2000 and 2014. Beer and wine tax rates were each increased ten times, while the tax on spirits was increased eight times. The beer tax was the only alcohol tax that was decreased during the sample period. The tax rates exhibited substantial variation between states, ranging from \$0.02 to \$1.07 for the beer tax, from \$0.11 to \$2.50 for the wine tax, and from \$1.50 to \$14.27 for the tax on spirits. Only one state changed from being a control state to a non-control state during the sample period; this occurred when Washington privatized the distribution of spirits in 2013.

Table 2 presents descriptive statistics for the entire sample period and for the most recent year of the sample period. On average, states received close to fifty child maltreatment referrals for every 1,000 children during the sample period. There were also around seven substantiated cases of neglect, two of physical abuse, one of sexual abuse, and one of psychological abuse per 1,000 children during the same time frame. After adjusting for inflation, the average tax rates on beer, wine, and spirits were

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77. Scott M. Lynch, *How Many Lags of X?*, available in NEWMAN, *supra* note 57, at 163.

78. NEWMAN, *supra* note 57.

79. COOK, *supra* note 6, at 71-72.

80. WOOLDRIDGE, *supra* note 70, at 52; KENNEDY, *supra* note 71.

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\$0.33, \$0.95, and \$4.70 respectively. The weighted-average alcohol index was \$1.89.

A significant assumption of this study is that alcohol tax rates affect child maltreatment indirectly by affecting alcohol consumption. For this reason, this study follows prior literature in modelling the effect of alcohol tax rates on alcohol consumption.<sup>81</sup> The results are presented in Table 3. The results suggest that changes in the beer tax rate affect beer consumption, changes in the tax on spirits affect the consumption of spirits, and changes in the weighted-average alcohol index affect the total consumption of alcohol. In each case, there is an inverse relationship between the tax rate and consumption that achieves a high level of statistical significance. The only type of alcohol tax that is not found to be related to consumption is the tax on wine. Taken as a whole, the results are consistent with prior findings that drinkers are responsive to changes in price.<sup>82</sup>

One drawback to estimating the effect of tax rates on consumption is that it is difficult to determine the actual amount of alcohol consumption. As one author notes, “Patterns of drinking across population subgroups and individuals must usually be estimated through surveys, where the quality of the data is limited by respondent’ willingness and ability to report just how much they drink.”<sup>83</sup> This study therefore relies on consumption data that have been derived from alcohol sales. These data, published by the National Institute on Alcohol Abuse and Alcoholism, are limited to the extent that drinkers may travel to a different state to purchase alcohol.<sup>84</sup> The data also do not account for the consumption of alcohol produced at home; nevertheless, Cook notes that alcohol sales data are the most reliable approximation of alcohol consumption currently available.<sup>85</sup>

The results of this study’s main model are presented in tables four through eight. Table 4 shows the coefficient estimates for beer, wine,

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81. Durrance et al., *supra* note 7.

82. Chaloupka et al., *supra* note 4.

83. COOK, *supra* note 6, at 51.

84. NAT’L INSTIT. ON ALCOHOL ABUSE AND ALCOHOLISM, APPARENT PER CAPITA ALCOHOL CONSUMPTION: NATIONAL, STATE, AND REGIONAL TRENDS, 1977-2016, (Apr. 2018), <https://pubs.niaaa.nih.gov/publications/surveillance110/CONS16.pdf>.

85. COOK, *supra* note 6, at 51-52.

spirits, and the weighted-average alcohol index obtained from a fixed-effects regression in which the child maltreatment referral rate is the dependent variable. Each tax rate is estimated as part of an independent regression to avoid issues with multicollinearity<sup>86</sup> between the tax variables. Both the weighted-average alcohol tax rate and the tax on spirits have a high level of statistical significance. The wine tax variable does not achieve statistical significance (p-value of 0.08), nor does the beer tax variable. The coefficient estimate for each of the tax variables is negative, which suggests that a tax increase predicts a decrease in the child maltreatment referral rate.

Table 5 presents the same model as Table 4, except the dependent variable has been changed from the child maltreatment rate to the rate of child neglect. Each of the tax variables achieves a high level of statistical significance and has a negative sign. This suggests that increases in the alcohol tax predict decreases in child neglect. Table 6 again presents the same models but with a different dependent variable: the rate of child physical abuse. All four of the tax variables have a negative sign and a high level of statistical significance. This is consistent with the findings of Markowitz and Grossman and suggests that increases in the alcohol tax rate predict decreases in child maltreatment.<sup>87</sup>

In Table 7 the dependent variable is child sexual abuse. The results show an inverse relationship between each of the alcohol tax variables and sexual abuse, with a high level of statistical significance in each case. The final child maltreatment subtype, psychological abuse, is the dependent variable for the models presented in Table 8. All four of the tax variables have a negative sign, which suggests alcohol tax rates have an inverse relationship with psychological maltreatment. However, only three of the four tax variables achieve statistical significance (the beer tax is not statistically significant), and the significance is not as strong as it is for the other types of child maltreatment.

In terms of practical significance, a \$1.00 increase in the weighted-average alcohol tax rate is associated with five fewer child maltreatment

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86. Multicollinearity exists when multiple independent variables are correlated with one another; this makes it difficult to determine the unique effect of each independent variable on the dependent variable.

87. Markowitz & Grossman, *supra* note 5.

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referrals per 1,000 children. A \$1.00 tax increase also predicts decreases in neglect, physical abuse, sexual abuse, and psychological abuse of 2.74, 1.38, 0.66, and 0.34 per 1,000 children, respectively.

The other covariates are generally not statistically significant, with the exception of the unemployment rate. In seven of the twenty regressions, the unemployment rate variable is statistically significant with a positive sign. This suggests that a state's unemployment rate is positively related to various types of child maltreatment, which is consistent with prior research.<sup>88</sup>

#### IV. DISCUSSION

##### *A. The Findings*

Taken as a whole, the findings suggest that changes in alcohol tax rates are inversely related to the incidence of child abuse and neglect. More specifically, alcohol tax rate increases are associated with decreases in the various types of child maltreatment, whereas alcohol tax rate decreases are associated with increases in child maltreatment. In all twenty of the regressions presented in tables four through eight, the tax rate variable had a negative sign. In seventeen of the twenty regressions, the tax rate variable achieved statistical significance, although the strength of the relationship was less dramatic for psychological maltreatment.

##### *B. Implications*

It would seem that alcohol tax rates could be used as a policy lever to reduce child maltreatment. Rather than costing the state money, an alcohol tax increase might generate additional revenue. This might be cheaper than designing and implementing an intervention to improve parenting or strengthening the social safety net, both of which have been employed as a means of reducing child maltreatment, although this study has not tested this proposition. The potential reduction in child abuse and

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88. Richard D. Krugman et al., *The Relationship Between Unemployment and Physical Abuse of Children*, 10 CHILD ABUSE & NEGLECT 415, 415-418.

neglect is just one benefit that would accrue from higher alcohol taxes; society would benefit from reductions in drunk driving, crime, and medical costs. One study suggested that a modest increase in alcohol tax rates could spare as many as 25,000 lives annually.<sup>89</sup>

Despite several decades of research that highlights the benefits of alcohol taxes, scholars argue that alcohol taxes remain too low.<sup>90</sup> Not only has the federal excise tax remained constant since 1991, but it has declined in real terms. This is because alcohol taxes are levied based on volume, not on value. As a result, alcohol taxes have actually become cheaper in real terms over the years.<sup>91</sup> This is particularly troubling since thirty-seven states did not increase taxes on any type of alcohol during the fifteen-year sample period examined in this study. Thus, the effects of alcohol taxes are eroding over time (due to inflation) and state governments have done nothing to address this.<sup>92</sup> In effect, state governments have allowed alcohol to become relatively cheap.

### *C. Why are Alcohol Taxes So Low?*

There is a long history of taxing alcohol in the U.S.,<sup>93</sup> and state governments have raised taxes on other goods deemed to be “sinful” with alacrity. For example, forty-seven state governments raised cigarette taxes 117 times between 2001 and 2014. Only three state governments did not raise cigarette taxes at all during that time frame, which stands in stark contrast to the thirty-seven state governments that did not raise alcohol taxes from 2000 to 2014. States are clearly reluctant to raise alcohol taxes.

This could be because alcohol is viewed as fundamentally different from tobacco. Consuming a little alcohol may not be harmful, whereas any level of tobacco use is regarded as bad. Cook notes that the movement to treat alcoholism as a disease has shifted blame from alcohol itself to people who abuse alcohol.<sup>94</sup> According to this view, alcohol is

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89. Cook et al., *supra* note 61.

90. Philip J. Cook, *Increasing the Federal Excise Taxes on Alcoholic Beverages*, 7 J. HEALTH ECON. 89, 89-91 (1988).

91. COOK, *supra* note 6.

92. COOK, *supra* note 6, at 166.

93. Keller, *supra* note 20.

94. COOK, *supra* note 6.



not inherently bad; it is the excessive consumption of alcohol that is the problem. Consuming low to moderate amounts of alcohol may even reduce a person's risk of heart disease.<sup>95</sup> Thus, increasing the alcohol tax would affect not only excessive drinkers, but moderate drinkers who do not drive drunk or abuse their children

Pogue and Sgontz proposed a model for determining the optimal tax, which is based on the percentage of drinkers who consume alcohol excessively and the elasticities of demand for abusers and non-abusers.<sup>96</sup> However, even with such a system, people who moderately consume alcohol will inevitably be harmed. It is unlikely that an increase in alcohol tax rates can be Pareto-improving (providing benefits without doing anyone harm), but raising alcohol tax rates might still make society as a whole better off if the benefits exceeds the costs.<sup>97</sup> Cook argues that alcohol should be treated as a good for which the consumption produces negative externalities such as the costs that are born by the victims of drunk drivers, abused spouses and children, victims of alcohol-related crime, etc.<sup>98</sup> Viewed in this context, the aggregate consumption of alcohol may exceed the optimal level of consumption from society's perspective, even if there are some drinkers who do not consume alcohol excessively. By increasing the tax rate and the marginal cost of consuming the good, one can reduce the aggregate level of alcohol consumption. While this harms some moderate drinkers, the benefits achieved (reduced drunk driving, reduced child abuse, etc.) outweigh the costs incurred by those people who drink responsibly. Thus, there might still be a strong economic argument for increasing alcohol tax rates even if some moderate drinkers are harmed in the process.

Another argument against reducing alcohol tax rates is that drinkers might respond by substituting other drugs for alcohol. This argument is not supported by empirical evidence as Cook notes that marijuana and

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95. Michael J. Thun, et al., *Alcohol Consumption and Mortality Among Middle-Aged and Elderly U.S. Adults*, 337 NEW ENG. J. MED., 1705, 1713 (2007); Philip J. Cook, et al., *The Net Effect of an Alcohol Tax Increase on Death Rates in Middle Age*, 95 AM. ECON. REV., 278, 278-281 (2005).

96. Thomas Pogue & Larry Sgontz, *Taxing to Control Social Cost: The Case of Alcohol*, 79 AM. ECON. REV. 235 (1989).

97. JOSEPH STIGLITZ & JAY ROSENGARD, *ECONOMICS OF THE PUBLIC SECTOR* (W.W. Norton & Company ed. 2015).

98. COOK, *supra* note 6, at 136-137.

alcohol are actually complements, not substitutes.<sup>99</sup>

An argument that is supported by evidence is that the alcohol tax is regressive. While alcohol consumption rises with a person's income, alcohol taxes paid as a percentage of income decline as income increases.<sup>100</sup> This is important because research suggests that regressive taxes may financially constrain some families, resulting in stress and increased child maltreatment.<sup>101</sup> Research suggests that alcohol taxes are not highly regressive and that the effect is concentrated around a small number of heavy drinkers.<sup>102</sup> An effort could be made to alleviate concerns regarding regressivity if states pledged to use the proceeds from increased alcohol tax rates for public health programs to reduce excessive alcohol consumption. Alternatively, states could reduce the rate for a different regressive tax (e.g., the sales tax) to offset the effects of the increase in the alcohol tax rate.

One obstacle faced by legislators intent on raising the alcohol tax is pushback from the alcohol industry itself. Nearly 2,000,000 people work for alcohol producers, distributors, or retailers, and the alcohol industry has stressed its role in the American economy.<sup>103</sup> As Cook notes, however, any job losses occurring as a result of a tax increase are likely to be temporary and may ultimately be offset by increases in jobs in other industries (e.g., soft drinks) and other benefits (reduced car insurance premiums, increasing the disposable income of consumers). Thus, concerns raised about the economic impact of alcohol taxes may overstate the case.<sup>104</sup>

#### *D. Alternative Policies*

Having said this, alcohol taxes are not the only policy response available to curtail excessive drinking. The Centers for Disease Control

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99. *Id.* at 168.

100. *Id.* at 173.

101. McLaughlin, *supra* note 47.

102. Brian Vandenberg & Anurag Sharma, *Are Alcohol Taxation and Pricing Policies Regressive? Product-Level Effects of a Specific Tax and a Minimum Unit Price for Alcohol*, 51 *ALCOHOL & ALCOHOLISM*, 493, 500 (2016).

103. COOK, *supra* note 6, at 145.

104. COOK, *supra* note 6, at 174.

and Prevention suggest limits on the days and times when alcohol can be sold, increased dram shop liability, and regulation of alcohol outlet density as additional ways to reduce excessive alcohol consumption.<sup>105</sup> A number of research studies have found that limiting the days on which alcohol can be sold (such as banning sales of alcohol on Sundays) decreases the consumption of alcohol.<sup>106</sup> Similarly, placing limits on the hours during the day when an establishment may sell alcohol also has been shown by several studies to reduce drinking.<sup>107</sup> Dram shop liability involves holding the owner (or server) of the establishment serving alcohol responsible for the actions of a patron who was served an excessive amount of alcohol (or who was underage).<sup>108</sup> This has been found to reduce alcohol consumption and alcohol-related crash deaths,<sup>109</sup> and survey evidence suggests that restaurant and bar owners do take liability into consideration when training and supervising staff.<sup>110</sup> Several studies have also demonstrated that the density of alcohol outlets is associated with alcohol consumption, injuries, and crime.<sup>111</sup> A large number of studies have found that states experience a significant decrease in alcohol-related harms after increasing the minimum legal age for drinking.<sup>112</sup> Zero-tolerance laws, which allow minors to be charged with a DUI for having any level of alcohol while driving, may also reduce drinking.<sup>113</sup>

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105. THE COMMUNITY GUIDE, *supra* note 10, at 5.

106. Jennifer Cook Middleton et al., *Effectiveness of Policies Maintaining or Restricting Days of Alcohol Sales on Excessive Alcohol Consumption and Related Harms*, 39 AM. J. PREVENTATIVE MED. 575, 576 (2010).

107. Robert A. Hahn et al., *Effectiveness of Policies Restricting Hours of Alcohol Sales in Preventing Excessive Alcohol Consumption and Related Harms*, 39 AM. J. PREVENTATIVE MED. 590, 591 (2010).

108. *Dram-Shop Liability*, BLACK'S LAW DICTIONARY (10th Ed. 2014).

109. Veda Rammohan et al., *Effects of Dram Shop Liability and Enhanced Overservice Law Enforcement Initiatives on Excessive Alcohol Consumption and Related Harms*, 41 AM. J. PREVENTATIVE MED. 334, 336 (2011).

110. FRANK A. SLOAN ET AL., DRINKERS, DRIVERS, AND BARTENDERS: BALANCING PRIVATE CHOICES AND PUBLIC ACCOUNTABILITY 204-05 (2000).

111. Carla Alexia Campbell et al., *The Effectiveness of Limiting Alcohol Outlet Density as a Means of Reducing Excessive Alcohol Consumption and Alcohol-Related Harms*, 37 AM. J. PREVENTATIVE MED. 556, 561 (2009). *But, see*, COOK, *supra* note 6, at 158 (noting the limited experimental evidence).

112. COOK, *supra* note 6, at 187 (noting seventy-nine studies finding a decrease in alcohol related arms after increasing the legal drinking age). *But, see*, Jeffrey A. Miron & Elina Tetelbaum, *Does the Minimum Legal Drinking Age Save Lives?*, 47 ECON. INQUIRY, WESTERN ECON. ASS'N INT'L 317, 332 (2009) (arguing the benefits are more limited than initially believed).

113. COOK, *supra* note 6.

To the extent that the policies listed above reduce excessive drinking they might reduce the incidence of child maltreatment. But some of these policies, such as raising the minimum legal drinking age, have already been implemented. At this point, the policy that has been leveraged the least is increasing the alcohol tax rate; as discussed earlier, legislators might be reluctant to raise alcohol taxes because this might be seen as unfairly punishing responsible drinkers. Given the results of the current study, and more than seventy studies that have found alcohol taxes to be an effective means of reducing alcohol-related harms,<sup>114</sup> it would appear that an increase in alcohol tax rates is a cost-effective means of reducing not only child maltreatment, but also a host of unfavorable social outcomes.

#### *E. Limitations*

This study has a number of limitations. First, the study does not control for changes in alcohol policy or availability at the local level. This study only focuses on changes in tax rates at the state level, but local governments may also impose taxes or supply restrictions that affect the consumption of alcohol. Future researchers could improve the external validity of this study's findings by identifying and including variables to control for factors at the local level.

Second, this study analyzes data aggregated at the state level. While the findings show that an increase in alcohol tax rates predicts a decrease in child maltreatment, one cannot definitively conclude that the resulting reduction in child maltreatment is driven by drinkers who cut back on alcohol consumption in response to the tax. It is possible that the observed decline in child maltreatment is attributable to non-drinkers, moderate drinkers, or heavy drinkers. Future research could address this limitation by using alcohol consumption and child maltreatment data collected at the individual level.

Third, this study relies on quasi-experimental data. This limits the inferences that can be drawn regarding causality. Due to the nature of alcohol research, it would not be ethical to conduct an experiment. This

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114. Randy W. Elder et al., *The Effectiveness of Tax Policy Interventions for Reducing Excessive Alcohol Consumption and Related Harms*, 38 AM. J. PREVENTATIVE MED. 217 (2010).

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study has therefore relied on established statistical tests that have been used in alcohol research for decades.<sup>115</sup> These tests go beyond the mere documenting of associations between variables, but they do not have the power of a randomized control trial.

#### CONCLUSION

The results of this study suggest that changes in state-level alcohol taxes predict changes in state-level child maltreatment rates. The relationship is inverse, which means that increases in the alcohol tax rate are associated with decreases in child maltreatment. This relationship holds true regardless of whether the alcohol tax is levied on beer, wine, or spirits. Moreover, alcohol taxes are related to each subtype of child maltreatment, although the relationship with psychological abuse is the weakest. Taken as a whole, the findings suggest that alcohol taxes could be used as a policy tool for reducing child abuse and neglect. The fact that alcohol tax increases yield a number of additional benefits (e.g., reduced drunk driving) makes increasing alcohol taxes a particularly attractive lever for improving social welfare.

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115. COOK, *supra* note 6.

Table 1

*Summary of Alcohol Tax Rate Changes over the Sample Period, 2000-2014*

	<u>Beer Tax</u>	<u>Wine Tax</u>	<u>Spirits Tax</u>
Number of states imposing the tax	50	46	33
Number of tax increases	10	10	8
Number of tax decreases	3	0	0
Highest tax rate	\$1.07	\$2.50	\$14.27
Lowest tax rate	\$0.02	\$0.11	\$1.50

*Note. Seventeen states do not report a tax rate on spirits because they are “control” states, which means they have a monopoly over the distribution of spirits. Washington used to be a control state but privatized in 2013.*

*Similarly, four states do not report a tax rate on wine because they control wine distribution.*

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Table 2

*Descriptive Statistics for State-level Variables: Entire Sample Period and 2014 only*

Variable	M (all years)	M (2014)	SD (all years)	SD (2014)
MALRATE	49.71	58.32	19.19	23.40
NEGLECT	7.06	6.62	5.59	4.44
PHYSABUSE	2.03	1.72	1.76	1.24
SEXABUSE	1.13	0.86	1.39	0.67
PSYCHABUSE	1.08	0.92	2.33	1.41
BLACK	10.51	10.91	9.53	9.59
HISPANIC	9.77	11.41	9.64	10.20
POVRATE	12.63	13.97	3.43	3.88
URATE	5.91	5.76	2.05	1.25
GINI	0.60	0.61	0.04	0.04
BEERTAX	0.33	0.29	0.30	0.26
WINETAX	0.95	0.86	0.66	0.59
SPIRITSTAX	4.70	4.56	2.41	2.84
ALCINDEX	1.89	1.82	1.05	1.12

$MALRATE_{it}$  = child maltreatment referrals per one thousand children in state  $i$  and year  $t$

$NEGLECT_{it}$  = neglect substantiations per one thousand children in state  $i$  and year  $t$

PHYSABUSE<sub>it</sub> = physical abuse substantiations per one thousand children in state *i* and year *t*

SEXABUSE<sub>it</sub> = sexual abuse substantiations per one thousand children in state *i* and year *t*

PSYCHABUSE<sub>it</sub> = psychological abuse substantiations per one thousand children in state *i* and year *t*

BLACK<sub>it</sub> = percent of the population that is African-American for state *i* and year *t*

HISPANIC<sub>it</sub> = percent of the population that is Hispanic for state *i* and year *t*

POVRATE<sub>it</sub> = average poverty rate in state *i* and year *t*

URATE<sub>it</sub> = average unemployment rate in state *i* and year *t*

GINI<sub>it</sub> = Gini coefficient for state *i* and year *t*

BEERTAX<sub>it</sub> = state excise tax on beer (in cents) for state *i* and year *t*, inflation-adjusted

WINETAX<sub>it</sub> = state excise tax on wine (in cents) for state *i* and year *t*, inflation-adjusted

SPIRITSTAX<sub>it</sub> = state excise tax on spirits (in cents) for state *i* and year *t*, inflation-adjusted

ALCINDEX<sub>it</sub> = weighted-average state excise tax on alcohol (in cents) for state *i* and year *t*



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Table 3

*FE Regression Models Estimating Alcohol Consumption Per Capita as a Function of Alcohol Tax Rates: 2000-2014*

Variable	Dependent Variable			
	BEER CONSUMPTION	WINE CONSUMPTION	SPIRITS CONSUMPTION	TOTAL CONSUMPTION
Constant	1.57***	0.35***	0.84***	2.72***
BLACK	0.01	0.00	0.04***	0.05***
HISPANIC	-0.04***	-0.00	-0.03***	-0.07***
POVRATE	-0.01***	-0.00*	-0.00	-0.01**
URATE	-0.01***	-0.00**	-0.01***	-0.03***
GINI	0.15	-0.02	-0.08	0.19
BEERTAX	-0.11***	-	-	-
WINETAX	-	0.01	-	-
SPIRITSTAX	-	-	-0.01***	-
ALCINDEX	-	-	-	-0.05***
N	750	690	482	482
R <sup>2</sup>				
within	0.55	0.64	0.71	0.51
between	0.00	0.07	0.00	0.02
overall	0.01	0.00	0.00	0.02

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F	41.99***	56.48***	53.03***	21.89***
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*Note.*  $CI = confidence\ interval.$  \* =  $p \leq .05$ , \*\* =  $p \leq .01$ , \*\*\* =  $p \leq .001$ .

$MALRATE_{it}$  = the number of child maltreatment referrals per one thousand children in state  $i$  and year  $t$

$NEGLECT_{it}$  = neglect substantiations per one thousand children in state  $i$  and year  $t$

$PHYSABUSE_{it}$  = physical abuse substantiations per one thousand children in state  $i$  and year  $t$

$SEXABUSE_{it}$  = sexual abuse substantiations per one thousand children in state  $i$  and year  $t$

$PSYCHABUSE_{it}$  = psychological abuse substantiations per one thousand children in state  $i$  and year  $t$

$BLACK_{it}$  = percent of the population that is African-American for state  $i$  and year  $t$

$HISPANIC_{it}$  = percent of the population that is Hispanic for state  $i$  and year  $t$

$POVRATE_{it}$  = average poverty rate in state  $i$  and year  $t$

$URATE_{it}$  = average unemployment rate in state  $i$  and year  $t$

$GINI_{it}$  = Gini coefficient for state  $i$  and year  $t$

$BEERTAX_{it}$  = state excise tax on beer (in cents) for state  $i$  and year  $t$ , inflation-adjusted

$WINETAX_{it}$  = state excise tax on wine (in cents) for state  $i$  and year  $t$ , inflation-adjusted

$SPIRITSTAX_{it}$  = state excise tax on spirits (in cents) for state  $i$  and year  $t$ , inflation-adjusted

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ALCINDEX<sub>it</sub> = weighted-average state excise tax on alcohol (in cents)  
for state i and year t

Table 4

*FE Regression Models Estimating the Child Maltreatment Referral Rate as a Function of Alcohol Tax Rates: 2000-2014*

Variable	MALRATE	MALRATE	MALRATE	MALRATE
Constant	21.14	29.79	73.35**	70.84**
BLACK	3.14*	2.82*	2.12	2.18
HISPANIC	-3.01***	-3.21***	-3.51***	-3.49***
POVRATE	0.02	-0.07	0.03	0.03
URATE	-0.58	-0.85	-0.15	-0.21
GINI	29.86	33.49	-9.22	-9.15
BEERTAX	-1.30	-	-	-
WINETAX	-	-5.15	-	-
SPIRITSTAX	-	-	-2.46***	-
ALCINDEX	-	-	-	-5.19**
N	630	582	403	403
R <sup>2</sup>				
within	0.27	0.29	0.30	0.29
between	0.02	0.01	0.00	0.00
overall	0.01	0.00	0.01	0.01
F	10.43***	10.69***	7.34***	7.26***

*Note.* CI = confidence interval. \* =  $p \leq .05$ , \*\* =  $p \leq .01$ , \*\*\* =  $p \leq .001$ .

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$MALRATE_{it}$  = the number of child maltreatment referrals per one thousand children in state  $i$  and year  $t$

$BLACK_{it}$  = percent of the population that is African-American for state  $i$  and year  $t$

$HISPANIC_{it}$  = percent of the population that is Hispanic for state  $i$  and year  $t$

$POVRATE_{it}$  = average poverty rate in state  $i$  and year  $t$

$URATE_{it}$  = average unemployment rate in state  $i$  and year  $t$

$GINI_{it}$  = Gini coefficient for state  $i$  and year  $t$

$BEERTAX_{it}$  = state excise tax on beer (in cents) for state  $i$  and year  $t$ , inflation-adjusted

$WINETAX_{it}$  = state excise tax on wine (in cents) for state  $i$  and year  $t$ , inflation-adjusted

$SPIRITSTAX_{it}$  = state excise tax on spirits (in cents) for state  $i$  and year  $t$ , inflation-adjusted

$ALCINDEX_{it}$  = weighted-average state excise tax on alcohol (in cents) for state  $i$  and year  $t$

Table 5

*FE Regression Models Estimating the Child Neglect Rate as a Function of Alcohol Tax Rates: 2000-2014*

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Variable	NEGLECT	NEGLECT	NEGLECT	NEGLECT
Constant	13.43*	18.97**	17.63	18.30
BLACK	-0.44	-0.81	-0.98	-1.01
HISPANIC	0.27	0.27	0.52	0.52
POVRATE	0.12	-0.12	-0.11	-0.11
URATE	0.40*	0.49*	0.55	0.53*
GINI	-2.13	-2.45	0.59	0.10
BEERTAX	-8.09***	-	-	-
WINETAX	-	-3.84***	-	-
SPIRITSTAX	-	-	1.10***	-
ALCINDEX	-	-	-	2.74***
N	735	675	473	473
R <sup>2</sup>				
within	0.07	0.08	0.10	0.11
between	0.00	0.00	0.00	0.00
overall	0.00	0.00	0.00	0.00
F	2.63***	2.50***	2.43***	2.58***

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*Note.* *CI* = confidence interval. \* =  $p \leq .05$ , \*\* =  $p \leq .01$ , \*\*\* =  $p \leq .001$ .

NEGLECT<sub>it</sub> = neglect substantiations per one thousand children in state *i* and year *t*

BLACK<sub>it</sub> = percent of the population that is African-American for state *i* and year *t*

HISPANIC<sub>it</sub> = percent of the population that is Hispanic for state *i* and year *t*

POVRATE<sub>it</sub> = average poverty rate in state *i* and year *t*

URATE<sub>it</sub> = average unemployment rate in state *i* and year *t*

GINI<sub>it</sub> = Gini coefficient for state *i* and year *t*

BEERTAX<sub>it</sub> = state excise tax on beer (in cents) for state *i* and year *t*, inflation-adjusted

WINETAX<sub>it</sub> = state excise tax on wine (in cents) for state *i* and year *t*, inflation-adjusted

SPIRITSTAX<sub>it</sub> = state excise tax on spirits (in cents) for state *i* and year *t*, inflation-adjusted

ALCINDEX<sub>it</sub> = weighted-average state excise tax on alcohol (in cents) for state *i* and year *t*

Table 6

*FE Regression Models Estimating the Child Physical Abuse Rate as a Function of Alcohol Tax Rates: 2000-2014*

Variable	PHYSABUSE	PHYSABUSE	PHYSABUSE	PHYSABUSE
Constant	3.97	6.11*	3.91	4.33
BLACK	-0.20	-0.39*	-0.35	-0.37
HISPANIC	0.14	0.10	0.17	0.17
POVRATE	-0.00	-0.00	-0.01	-0.01
URATE	0.10	0.19**	0.20*	0.19*
GINI	2.06	2.43	5.28	5.03
BEERTAX	-5.49***	-	-	-
WINETAX	-	-2.00***	-	-
SPIRITSTAX	-	-	-0.55***	-
ALCINDEX	-	-	-	-1.38***
N	735	675	473	473
R <sup>2</sup>				
within	0.19	0.19	0.23	0.24
between	0.08	0.05	0.09	0.10
overall	0.01	0.01	0.01	0.01
F	7.64***	6.90***	6.32***	6.75***

*Note.* CI = confidence interval. \* =  $p \leq .05$ , \*\* =  $p \leq .01$ , \*\*\* =  $p \leq .001$ .

PHYSABUSE<sub>it</sub> = physical abuse substantiations per one thousand



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children in state  $i$  and year  $t$

$BLACK_{it}$  = percent of the population that is African-American for state  $i$  and year  $t$

$HISPANIC_{it}$  = percent of the population that is Hispanic for state  $i$  and year  $t$

$POVRATE_{it}$  = average poverty rate in state  $i$  and year  $t$

$URATE_{it}$  = average unemployment rate in state  $i$  and year  $t$

$GINI_{it}$  = Gini coefficient for state  $i$  and year  $t$

$BEERTAX_{it}$  = state excise tax on beer (in cents) for state  $i$  and year  $t$ , inflation-adjusted

$WINETAX_{it}$  = state excise tax on wine (in cents) for state  $i$  and year  $t$ , inflation-adjusted

$SPIRITSTAX_{it}$  = state excise tax on spirits (in cents) for state  $i$  and year  $t$ , inflation-adjusted

$ALCINDEX_{it}$  = weighted-average state excise tax on alcohol (in cents) for state  $i$  and year  $t$

Table 7

*FE Regression Models Estimating the Child Sexual Abuse Rate as a Function of Alcohol Tax Rates: 2000-2014*

Variable	SEXABUSE	SEXABUSE	SEXABUSE	SEXABUSE
Constant	1.44	2.47	1.44	1.63
BLACK	0.04	-0.08	-0.04	-0.05
HISPANIC	0.13	0.13	0.12	0.12
POVRATE	-0.01	-0.01	-0.01	-0.01
URATE	0.05	0.08	0.10	0.10
GINI	-1.16	-0.63	0.36	0.24
BEERTAX	-2.23***	-	-	-
WINETAX	-	-1.00***	-	-
SPIRITSTAX	-	-	-0.26***	-
ALCINDEX	-	-	-	-0.66***
N	735	675	473	473
R <sup>2</sup>				
within	0.10	0.10	0.11	0.12
between	0.04	0.04	0.02	0.02
overall	0.00	0.00	0.00	0.00
F	3.49***	3.29***	2.68***	2.79***

*Note.* CI = confidence interval. \* =  $p \leq .05$ , \*\* =  $p \leq .01$ , \*\*\* =  $p \leq .001$ .

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$SEXABUSE_{it}$  = sexual abuse substantiations per one thousand children in state  $i$  and year  $t$

$BLACK_{it}$  = percent of the population that is African-American for state  $i$  and year  $t$

$HISPANIC_{it}$  = percent of the population that is Hispanic for state  $i$  and year  $t$

$POVRATE_{it}$  = average poverty rate in state  $i$  and year  $t$

$URATE_{it}$  = average unemployment rate in state  $i$  and year  $t$

$GINI_{it}$  = Gini coefficient for state  $i$  and year  $t$

$BEERTAX_{it}$  = state excise tax on beer (in cents) for state  $i$  and year  $t$ , inflation-adjusted

$WINETAX_{it}$  = state excise tax on wine (in cents) for state  $i$  and year  $t$ , inflation-adjusted

$SPIRITSTAX_{it}$  = state excise tax on spirits (in cents) for state  $i$  and year  $t$ , inflation-adjusted

$ALCINDEX_{it}$  = weighted-average state excise tax on alcohol (in cents) for state  $i$  and year  $t$

Table 8

*FE Regression Models Estimating the Child Psychological Abuse Rate as a Function of Alcohol Tax Rates: 2000-2014*

Variable	PSYCHABUSE	PSYCHABUSE	PSYCHABUSE	PSYCHABUSE
Constant	0.81	0.52	-0.15	-0.10
BLACK	0.05	-0.06	0.06	0.06
HISPANIC	0.01	0.02	0.13	0.13
POVRATE	0.01	0.01	0.02	0.02
URATE	0.07	0.10*	0.08	0.08
GINI	-0.14	2.38	-0.64	-0.69
BEERTAX	-1.46	-	-	-
WINETAX	-	-0.61*	-	-
SPIRITSTAX	-	-	-0.14*	-
ALCINDEX	-	-	-	-0.34*
N	717	657	464	464
R <sup>2</sup>				
within	0.03	0.06	0.09	0.09
between	0.12	0.00	0.04	0.05
overall	0.04	0.00	0.02	0.02
F	0.92	1.84*	2.05**	2.08**

*Note.* CI = confidence interval. \* =  $p \leq .05$ , \*\* =  $p \leq .01$ , \*\*\* =  $p \leq .001$ .

PSYCHABUSE<sub>it</sub> = psychological abuse substantiations per one

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thousand children in state  $i$  and year  $t$

$BLACK_{it}$  = percent of the population that is African-American for state  $i$  and year  $t$

$HISPANIC_{it}$  = percent of the population that is Hispanic for state  $i$  and year  $t$

$POVRATE_{it}$  = average poverty rate in state  $i$  and year  $t$

$URATE_{it}$  = average unemployment rate in state  $i$  and year  $t$

$GINI_{it}$  = Gini coefficient for state  $i$  and year  $t$

$BEERTAX_{it}$  = state excise tax on beer (in cents) for state  $i$  and year  $t$ , inflation-adjusted

$WINETAX_{it}$  = state excise tax on wine (in cents) for state  $i$  and year  $t$ , inflation-adjusted

$SPIRITSTAX_{it}$  = state excise tax on spirits (in cents) for state  $i$  and year  $t$ , inflation-adjusted

$ALCINDEX_{it}$  = weighted-average state excise tax on alcohol (in cents) for state  $i$  and year  $t$