Rev Econ Household (2014) 12:589–612
DOI 10.1007/s11150-013-9198-5

Alcohol control and foster care

Sara Markowitz · Alison Cuellar · Ryan M. Conrad · Michael Grossman

Received: 4 February 2013 / Accepted: 10 May 2013 / Published online: 23 May 2013

Abstract Parental alcohol consumption is often associated with an increased likelihood of child abuse. As consumption is related to price, the purpose of this paper is to investigate the propensity for increases in the full price of alcohol to influence entry rates and the length of time spent in foster care. Using alcoholic beverage prices and a measure of availability in combination with data on foster care cases, we find that higher alcohol prices are not effective in reducing foster care entry rates; however, once in foster care, the duration of stay may be shortened by higher prices and reduced availability.

Keywords Alcohol policy · Alcohol prices · Alcohol outlets · Foster care · Child abuse

JEL Classification I0 · K0

S. Markowitz (✉)
Department of Economics, Emory University, Atlanta, GA 30322, USA
e-mail: sara.markowitz@emory.edu

S. Markowitz · A. Cuellar · M. Grossman
NBER, Cambridge, MA, USA

A. Cuellar
George Mason University, Fairfax, VA, USA

R. M. Conrad
US Food and Drug Administration, Silver Spring, MD, USA

M. Grossman
City University of New York, New York, NY, USA

1 Introduction

Parental substance abuse problems can be extremely detrimental to the health and well being of children. Children of substance abusers are at a much greater risk of physical, mental, and sexual abuse, and suffer more physical and mental health problems than children in the general population [Center on Addiction and Substance Abuse (CASA) 2001; Puttler et al. 1998]. The Substance Abuse and Mental Health Services Administration estimates that approximately 5.156 million children live with parents who abuse or are dependent on alcohol (Office of Applied Studies 2003). In addition, nearly 1 million children annually are victims of child abuse and neglect. Estimates of alcohol involvement in cases of mistreatment range from 40 to 70 % of all cases (Famularo et al. 1986; Children of Alcoholics Foundation 1996; CASA 2001). Some of the children of substance abusing parents will have encounters with state child protective services, and these children may be temporarily or permanently separated from their parents in order to provide a safe and stable environment.

The close association between parental alcohol abuse and the mistreatment of children suggests that alcohol control policies can play a tremendous role in improving the lives of abused children. In this paper, we examine the relationship between two alcohol policies and the most severe cases of child abuse—those resulting in the child's removal from the home and placement into child protective services. Specifically, we estimate whether higher alcohol prices, (which can be manipulated through taxes), and changes in the number of outlets licensed to sell liquor can influence rates of entry and the length of time spent in foster care.

We use a panel data set of individual cases to generate state level entry rates into foster care. We also use individual level data to examine the length of time a child remains in care after removal. After controlling for a variety of state-level factors, we find that higher prices of beer, wine, and liquor are not effective in reducing foster care entry rates. However, once in foster care, the duration of stay may be shortened with higher beer and wine prices. We also find that reduced availability of alcohol through changes in the number of liquor outlets per capita may reduce the numbers of alcohol abusing children entering foster care, along with the duration of time in care.

2 Background

Studies showing a high prevalence of alcohol abuse and dependency among parents of abused children provide the motivating context for this study. Examples of this research include Kelleher et al. (1994), who find that parents of abused children are 2.7 times more likely to have a substance abuse problem than other parents, and parents of neglected children are 4.1 times more likely to have a substance abuse problem. DeBellis et al. (2001) also show a higher incidence of alcohol and/or substance abuse or dependence disorders among parents of maltreated children as compared to sociodemographically similar parents of non-maltreated children.

In substantiated cases of child abuse and neglect, one-third to two-thirds are believed to involve parental alcohol abuse or abuse of other drugs, although estimates go as high as 97 % (USDHHS 1999; CASA 1999). Alcohol is the primary culprit in these reports. One report found that alcohol was involved in 77 % of cases and was more harmful than drugs (cocaine, primarily) in 64 % of the cases (USDHHS 1999).

The most severely maltreated children may end up removed from the home and placed in foster care. Sixteen percent of families with a substantiated case of child abuse have the child removed to foster care (USDHHS 1998). Research by Frame et al. (2000) and Frame (2002) show that among foster care children, children coming from families with substance abuse problems remain in foster care longer than other children and are more likely to enter the system multiple times. This literature, however, is based on the experience of infants and toddlers in one state (California) in the early 1990s. The results are largely descriptive. Our research improves on this by evaluating the experiences of children of all ages in foster care across the country over a long time period. Our focus on alcohol control policies rather than consumption provides a possible policy prescription for improving foster care outcomes.

The effectiveness of alcohol control policies in improving the lives of children is an understudied area in the disciplines of economics and public policy. Previous research approaches the study of the alcohol-violence relationship using the large body of economic literature on the demand for alcohol (see Grossman 2005 for a survey of this literature). This literature demonstrates that alcohol consumption and excessive consumption are inversely related to the price of alcohol and to measures of its availability. The latter variables include policies such as the minimum legal drinking age, the number and types of outlets that are permitted to sell alcohol, and statutes pertaining to alcohol advertising and server liability.

Based on the alcohol demand literature and on the well documented relationship between alcohol and domestic violence, researchers have examined the propensity for public policy related to alcohol control to reduce the incidence of child abuse. For example, Markowitz and Grossman (1998, 2000) use parental-reported data from the 1976 and 1985 National Family Violence Survey to estimate models in which the incidence of child abuse is affected by the state excise tax rate on beer and a variety of other policies pertaining to alcohol. Results from these studies both show that increasing the beer tax and the presence of laws designed to make obtaining beer more difficult are effective policy tools in reducing violence.

In a more recent paper, Markowitz et al. (2010) use data from 1994 to 2004 to examine the relationship between alcohol policies and an objective measure of child mistreatment as opposed to parental reports. The data used capture severe cases—cases that are serious enough to warrant investigation by child protection services. The results show that higher taxes and prices of beer, liquor, and ethanol are negatively related to state level child abuse rates and child fatalities. Restrictions on alcohol in the form of fewer licensed outlets per capita, are also associated with improvements in child welfare.

Freisthler (2004) and Freisthler et al. (2005) examine the relationship between alcohol outlet densities and rates of child abuse. These papers both find that areas in

California with higher densities of alcohol outlets also have higher rates of child mistreatment. The results of these studies must be interpreted with caution as it is impossible to know whether the abusers are choosing to locate in areas with high-density outlets or whether the availability of alcohol contributes to the abuse.

This current paper expands on the previous literature by examining the effectiveness of alcohol control measures on the most severe cases of child abuse—those resulting in the child's removal from the home and placement into child protective services. While previous research has shown children coming from families with substance abuse problems remain in foster care longer than other children and are more likely to enter the system multiple times, it is not clear whether stricter alcohol control policies can yield improvements in these outcomes. The results of this paper will provide policy makers with this information. It has been estimated that substance abuse related problems translates into an annual $7.9 billion of state spending for child welfare (CASA 2009). Information on ways to reduce the burden on these systems and to improve the lives of children can be particularly valuable.

3 Analytical framework

The framework for this project involves two well-established relationships: the relationship between alcohol consumption and the mistreatment of children, and the negative relationship between alcohol consumption and the full price of alcohol. If a parent's alcohol consumption leads to an increased risk for child mistreatment, then following the law of demand, an increase in the price of alcohol should reduce consumption and thereby reduce the risk of mistreatment. The "reduced form" equation directly relates alcohol prices and policies to the outcomes of interests–entry into foster care and the duration of foster care placement. This strategy has been used extensively in the economics literature to study the role of alcohol policies in reducing the negative outcomes associated with consumption (Cook and Moore 1993; Markowitz and Grossman 1998, 2000; Dee 2001; Chesson et al. 2000; Markowitz et al. 2003).

We seek to answer two main questions in this paper: (1) are higher alcohol prices and reduced availability effective in reducing state-level entry rates into the foster care system, and (2) are higher alcohol prices and reduced availability effective in reducing duration in foster care, once a child is placed in the system.

We begin with an analysis of entry rates into foster care. The general framework for the empirical estimation is as follows:

$$F_{jt} = f\left(\alpha_0 + \alpha_1 P_{jt} + \alpha_2 X_{jt} + \alpha_3 \lambda_j + \alpha_4 \tau_t + \varepsilon_{jt}\right). \quad (1)$$

Equation (1) uses a panel of states over time and shows the determinants of foster care entry rates (F) for state j in time t (quarters from 1998 to 2004). The vector P represents variables that contribute to the full price of alcohol, including alcohol prices and the number of licensed liquor outlets per capita. The model also includes variables designed to capture observed characteristics of the state (X) as described below. In addition, state dummies (λ) will capture unobserved time-invariant state-

level effects which may influence entry rates. Time dummies (τ) are included as separate indicators for the 7 years and four quarters (less the reference categories). Alternative models with twenty-eight indicators for each unique year and quarter yield very similar results. Our estimation technique for analyzing entry rates will vary based on the entry rate under consideration (removal for any reason, removal for reason of alcohol abusing parent, and removal for reason of alcohol abusing child, as described below).

Next, we use individual level information on the children in the foster care system to answer the question of whether higher alcohol prices and more outlets licensed to sell liquor are associated with reductions in the time a child spends in care. This question is best answered using a hazard model.

In the foster care data, we know the entry date and, if relevant, the exit date for each child. To run the hazard models, we divide time in care into three-month intervals (quarters), indexed by t. We observe foster care spells from 1998 to 2004 giving us a maximum of 28 quarters per observation. The discrete time hazard rate (h) is the probability that a child leaves foster care in period t, conditional on staying in foster care up to this period. To estimate this model we chose a complementary log–log (extreme value) specification. This specification of the baseline hazard is advantageous because it is linear in the parameters. The complementary log–log model is:

$$\begin{aligned} h_{it} &= 1 - \exp\left\{-\exp\left[\theta(t) + \beta' P_{jt} + \gamma X_{jt} + \lambda_j\right]\right\} \Leftrightarrow \log[-\log(1 - h_{it})] \\ &= \theta(t) + \beta' X_{it} \end{aligned} \tag{2}$$

where P_{it}, X_{it} and λ_j are the fixed and time-varying characteristics as described above, β and γ are coefficient vectors and $\theta(t)$ represents the parameterization of the baseline hazard. In the duration models X includes individual characteristics, age at entry into foster care, gender, race, ethnicity and whether or not the child had a disability, along with the state characteristics. We chose a flexible form for the baseline hazard using indicators for each quarter. We refer the reader to Cameron and Trivedi (2005) for more details on the hazard model.

4 Data

Data on foster care entrants and length of stay come from the Adoption and Foster Care Analysis and Reporting System (AFCARS). This is a federal data collection system that collects event level information for all children removed from their parents and placed in foster care, including the date of foster care entry and exit for each child, information on the child's demographics, disabilities, reasons for removal, and foster care case goals. As described below, we merge these data with information on state-level alcohol variables and other relevant state characteristics.

4.1 Entry rates

The AFCARS data are used to create counts of the number of children entering foster care every quarter. Termed "removals," this count includes new entrants into

the foster care system along with children who previously had been in foster care and are re-entering in the current year/quarter. We focus on entrants rather than the total number in care so that we can more closely match the alcohol control variables to the date of the abuse and subsequent removal from the home. The choice to use quarters (rather than half-years or years) as the time dimension allows us the closest match possible of alcohol prices with the date of removal. We aggregate the individual level case information to generate counts of entries into foster care by state, year and quarter. We divide this count by the population of children in the state and year in order to generate an entry rate.

One advantage of the AFCARS data is that the reasons for removal are reported for each case. Note that all pertinent reasons are identified but are not presented in any order of importance. Our primary measure of entries pertains to removal for any reason. We subsequently use the reason for removal information to create an entry rate for the number of children removed because of an alcohol abusing parent. In AFCARS, removal due to alcohol abuse is worded as follows: "As a condition associated with a child's removal from home and contact with the foster care system, the principal caretaker's compulsive use of alcohol that is not of a temporary nature." (National Data Archive on Child Abuse and Neglect 2002). Since not all cases of abuse are alcohol-related, this second dependent variable will identify the group of parents who are known to regularly consume alcohol. The drinking behaviors of all adults are potentially affected by changes in the full price of alcohol, however, the determinants of the decision to drink may be very different from the determinants of quantity to consume among the heaviest drinkers. This dependent variable therefore will allow us to isolate the effects of alcohol policies on behaviors of heavy alcohol users. Note that this variable is not our primary focus because of the potential for alcohol to be an indirect cause of abuse when it is not recorded as an immediate cause.

Next, we examine the number of children removed because of the child's alcohol problem. This removal is worded in the data source as follows: "As a condition associated with a child's removal from home and contact with the foster care system, the child's compulsive use of or need for alcohol. This element should include infants addicted at birth." (National Data Archive on Child Abuse and Neglect 2002). Because this variable contains infants, and their alcohol experience is already reflected by the parental use, we limit this sample to children ages 12 and up.

The foster care removal data are available beginning in 1995; however, most states did not begin reporting until 1998, so this is the first year of our panel. In 1998, all but 8 states provided annual foster care data. In 1999, Nevada was the only state not to provide data and by 2000, all states reported. Our data collection ends in 2004.[1] Fewer observations are available for counts of removals due to child or parent alcohol abuse because many states did not begin reporting until the later years of the data. The states of Alaska, Illinois, New York, and Wyoming never reported child or parent alcohol abuse as the primary reason for removal. These

[1] The liquor price series collection by ACCRA ends in 2004. Also, the variation in alcohol taxes (which is a source of variation for price) is limited after this date. For example, no state changed its beer tax change between 2004 and 2008.

states are excluded from the analyses when removals due to child or parent alcohol abuse are the dependent variables.

Descriptive statistics for all variables are shown in Table 1. As can be seen from this table, entry into foster care is fairly common. Average quarterly counts for the number of foster care entries range from 110 to 15,421 with a mean quarterly rate of 1.4 entries per 1,000 children. Because of skewness in these data, we analyze the log of the entry rates. We estimate the model shown in Eq. (1) using weighted least squares (WLS) with the population of children in each state and year as the weight, and adjust the standard errors for unknown heteroskedasticity and within-state cluster correlation (Bertrand et al. 2004).

Entry rates as a result of alcohol abuse are much less common with mean quarterly rates of 0.15 and 0.02 per 1,000 children for parent and child alcohol abuse, respectively. The actual number of cases of parental alcohol abuse range from 0 to 1,752. Twelve of the state-year-quarter observations have a zero value for the number of new cases due to alcohol abusing parents, accounting for 1 % of the total observations. Because we use a log model to analyze the rates, we need to replace the zeros with a small value before taking logs. We chose 0.5 as the value, but changing this value does not alter the results. As with the "any reason" entry rates, we analyze the log of entries from alcohol abusing parents using weighted least squares, with the population of children in each state and year as the weight, and adjusted standard errors.

The estimation of the entry rates from child alcohol abuse is a bit more difficult as zeros are much more common in these entry rates, with 14 % of the observations having a zero value. Because of the large number of zeros and the small range of the counts here (see Table 1), we use a Poisson regression model to estimate these counts. The advantage of the Poisson estimation in our set-up is that the estimates are consistent regardless of whether the counts actually have a Poisson distribution (Wooldridge 2002). To permit for overdispersion, standard errors are adjusted for heteroskedasticity of unknown form that includes a within-state cluster correlation (Cameron and Trivedi 2009; Bertrand et al. 2004). Each model includes the log of the annual child population as a right hand side variable to normalize for exposure. The coefficient on this log population is constrained to equal one. The Poisson model is preferred to the negative binomial since the negative binomial estimates are not consistent if the variance specification is incorrect (Cameron and Trivedi 2009). Nevertheless, negative binomial models were tested and give similar results.

4.2 Length of stay

For the duration analysis, we include only the first observed entry into foster care. Note that some children are never reunited with a parent, for instance, if the parent died or is in prison. Because the AFCARS data identify the case goal for each child, we are able to select only those children for whom the goal is reunification with parents (46 % of the cases). For other children, whose goals are emancipation, adoption or similar, administrative and legal proceeding may be more salient in determining length of stay than alcohol policies. These are excluded. When

Table 1 Summary statistics

	Quarterly, 1998–2004 (N = 1,228)			
	Mean	SD	Min	Max
Foster care entries count	1,890.94	2,237.39	110	15,412
Foster care entries rate per 1,000 children	1.40	0.72	0.35	7.25
FC entry, parent alcohol abuse count	168.98	262.40	0	1,752
FC entry, parent alcohol abuse per 1,000 children	0.15	0.25	0	2.12
FC entry, child alcohol abuse count	17.42	24.30	0	163
FC entry, child alcohol abuse per 1,000 children	0.02	0.03	0	0.23
Beer price	2.62	0.29	1.67	3.42
Wine price	3.30	0.49	1.93	4.52
Liquor price	11.53	1.46	7.11	15.36
Ethanol price	0.82	0.10	0.50	1.06
Liquor outlets per 100,000 state population	122.72	63.81	13.27	398.14
Medical marijuana indicator	0.11	0.31	0	1
Child welfare spending per child population	281.75	236.49	60.35	2,099.27
College education	25.64	5.19	15.30	46.40
Female labor force participation rate	61.13	4.36	47.70	71.20
Real income (in $1,000 s)	16.44	2.69	11.99	27.58
Unemployment	4.80	1.23	2.20	8.80
Percent rural	27.62	14.18	0.00	62.90
Mormon	3.16	10.10	0.09	67.21
Southern Baptist	7.47	9.68	0.11	32.47
Catholic	18.68	11.46	3.13	48.70
Protestant	19.11	8.73	2.82	44.68
	Person level (N = 462,923)			
	Mean	SD	Min	Max
Number of quarters in foster care	10.26	8.16	1	27
Number of quarters in foster care, alc abusing parent	10.81	8.12	1	27
Number of quarters in foster care, alc abusing child	9.07	8.06	1	27
Male	0.52	0.50	0	1
Hispanic	0.14	0.35	0	1
Ethnicity missing	0.13	0.34	0	1
Black	0.25	0.43	0	1
Race missing	0.18	0.38	0	1
Age at entry	7.75	5.58	0	18
Disability	0.14	0.35	0	1
Disability missing	0.08	0.26	0	1

All monetary variables expressed in real (1982–1984) dollars

reunification is possible, alcohol control policies may be a relevant determinant of length of stay if the policies have influence on adult drinking behavior. We also note that since reunification is possible, these cases may also be the least severe cases of

abuse among the foster care cases. For each child duration is measured in calendar quarters in order to match our alcohol control variables.

As with the entry rates, we use the information on reason for removal to analyze durations among all children removed for any reason, and among only those children who were removed because of an alcohol abusing parent or because the child was abusing alcohol. Table 1 shows the average duration of a foster care stay is 10.3 quarters for all children, 10.8 quarters for children of alcohol abusing parents, and 9.1 quarters for children who were removed for abusing alcohol.

4.3 Alcohol price and availability

Average retail prices that are inclusive of state and federal taxes for beer, wine, and liquor are published quarterly by ACCRA in the *Inter-City Cost of Living Index* for between 250 and 300 cities across the United States. The liquor price is for a .75 l bottle of J&B Scotch, the wine price is for a 1.5 l bottle of Livingston Cellers or Gallo Chablis Blanc, and the beer price reported is for a six pack of Budweiser or Miller Light (through 1999) and Heineken thereafter. We generate state average annual prices by using a population weighted average of the city prices present in each state. All prices are deflated by the CPI and the ACCRA cost of living index. We have also adjusted the beer price data for the brand change.

The ACCRA price data have some limitations. Young and Bielinska-Kwapisz (2003) discuss the potential measurement error contained in the price series, stemming in part from the data collection process and the focus on urban areas. Ruhm et al. (2012) also cite issues with the lack of representativeness of the beverage prices, which can be particularly erroneous when consumers substitute from higher to lower price alcoholic beverages. To avoid these issues, many researchers use alcohol taxes instead of prices or instrument for prices using taxes. Unfortunately, during our sample time frame, only seven states raised their beer and wine taxes, and six changed the liquor tax. There is simply not enough variation in these taxes to identify the effects of taxes on price or the foster care outcomes. Ruhm et al. (2012) recommend using Uniform Product Code scanner data prices. In their paper, they find that the ACCRA prices are overstated compared to alcoholic beverages sold in grocery stores. In their analysis, however, they necessarily omit states where alcohol is not sold in grocery stores, which limits the number of states analyzed.

At present, the ACCRA prices are the best option available to us. While the price level may be overstated, our estimation relies on changes in the prices, not the level per se, and Young and Bielinska-Kwapisz (2002) find the ACCRA prices track national trends very well. The ACCRA price differences will be primarily driven by changes in factors such as transportation costs, distribution costs and the competitive environment, with tax changes as a minor portion of the price (Young and Bielinska-Kwapisz 2002). There appears to be substantial price variation within states over time. For example, the standard deviation of the nominal beer price varies by state from a low of 0.07 to a high of 0.47. In addition, the focus on urban area prices may not be problematic for a study of foster care. For example, Malm

et al. (2011) show that 75 % of children adopted from foster care are from urban or suburban areas.

The beer, wine, and liquor prices are too highly correlated to include in the same regression, so the models presented in the tables below include each price separately. The drawback to including these prices separately is that we necessarily ignore substitution effects whereby consumers may switch among the types of alcohol when the price of one increases. One solution to this problem is to use a summary measure representing the price of an ounce of pure ethanol. This price is generated by computing the price of an ounce of ethanol in each beverage and then averaging, using the fractions of total ethanol consumption accounted for by beer, wine, liquor, respectively as weights. These weights are fixed over time and are averages for the U.S. as whole during our sample period.

The availability of alcohol is an important component of the full price, so all models include the number of retail outlets per 100,000 population that are licensed to sell liquor for on-premise or off-premise consumption. These data come from *Jobson's Liquor Handbook*. With fewer outlets available, travel time to obtain alcohol increases, adding to the full price of alcohol. If alcohol consumption contributes to child mistreatment, then it is expected that policies that make obtaining alcohol more costly will reduce the incidence of mistreatment.[2] The outlet data exhibits some variation within each state over time, with some states experiencing much faster growth than others. The typical within-state standard deviation ranges from about 1–9 outlets per 100,000 population.

4.4 Individual and state variables

Equations (1) and (2) also include state characteristics which may also determine foster care entry rates and duration. In all models we include the female labor force participation rate, the unemployment rate, real income per capita, the percentage of the population living in rural areas, and the percentage of the population 25 years and over that has obtained a bachelor's degree. The percentages of each state's population identifying with certain religions (Catholic, Protestant, Southern Baptist, Mormon) are included as well. Also, the state dummies will help to capture any remaining, unobserved time-invariant effects which may influence child mistreatment and may be correlated with the alcohol control policies.

Next, we include in our specifications total spending per child population on child welfare programs in the state. This spending represents total dollars from federal, state, and local sources. These data are available biennially from 1996 to 2004. We have interpolated the odd years from 1995 to 2003 using rates of growth. We include this variable to help account for the resources dedicated to each state's foster care systems since states with more resources may be more likely or able to remove children from their homes. It is possible that this variable is endogenous in that states with more need for child welfare programs may allocate more resources

[2] The percent of a state's population living in dry counties is another potential availability measure. This variable was tested in the models but suffers from limited variation during our sample period and is therefore is not included. However, results suggest that areas with larger populations in dry areas have lower foster care entry rates. These are available upon request.

towards this activity. We tested models that exclude this variable and the results of the alcohol variables remain unchanged. We also tested models that include the number of full time equivalent workers responsible for all functions within each state's child welfare system. This measure is only available for a subset of the states, but including this variable does not change the results appreciably. Results are available upon request.

A last consideration is the relationship between alcohol and illicit drugs. Previous research has shown that these substances may be complement or substitute goods (Saffer and Chaloupka 1998; Cameron and Williams 2001; Zhao and Harris 2004; Yörük and Yörük 2011; Crost and Guerrero 2012; Crost and Rees 2013). Also, drug use itself is a cause of removal from the home. While accurate measures of drug prices are difficult to obtain, we do include a measure of the availability of marijuana in each state as reflected in the legality of the use of marijuana for medicinal purposes. This information comes from Anderson et al. (in press). During our sample period, ten states legalized medical marijuana, with nine of those states enacting the law during our sample period. The remaining state, California, passed the law prior to our sample period.[3] All models include an indicator variable that equals one for the states and years in those states in which this medical marijuana law is in effect. Models that exclude this variable yield very similar results and are available upon request.

5 Results: entry rates

Tables 2 and 3 show the effects of alcohol taxes on the "any reason" entry rates (Table 2) and the alcohol-related entry rates (Table 3). Four models are shown for each outcome, each containing either the beer, wine, liquor, or ethanol price. All models in the tables also include the number of liquor outlets per capita, the indicator for medical marijuana, the state characteristics, per capita total spending on child welfare, year indicators, quarter indicators and state fixed effects.

The results in Table 2 show that the coefficients on three of the four alcohol prices are statistically insignificant with the sign varying depending on the price under consideration. Only the wine price is negative and significant at the 10 % level. The price results are similar in Table 3 showing no statistical relationship between any alcohol price and foster care entry rates for reasons of adult or child alcohol abuse.

The results in Tables 2 and 3 also show that liquor outlets also are not associated with changes in "any reason" foster care entry or with parental alcohol abuse entry. However, more liquor outlets are statistically associated with an increase in foster care entries for the reason of child alcohol abuse. The coefficients here indicate that each additional outlet per capita is associated with an increase in foster care entries by just under 1 %. This result is consistent with the notion that children and teens may have an easier time accessing alcohol when more outlets are present. Indeed,

[3] The ten states are Alaska, California, Colorado, Hawaii, Maine, Montana, Nevada, Oregon, Vermont, and Washington. Maine has missing alcohol prices in all years and is excluded from the analyses.

Table 2 Foster care entry rates—any reason for removal

	(1)	(2)	(3)	(4)
Beer price	0.0044			
	(0.092)			
Wine price		−0.0887*		
		(0.048)		
Liquor price			−0.0168	
			(0.029)	
Ethanol price				−0.2785
				(0.390)
Liquor outlets	−0.0011	−0.0010	−0.0011	−0.0011
	(0.001)	(0.001)	(0.001)	(0.001)
Medical marijuana	0.2214***	0.2323***	0.2303***	0.2302***
	(0.063)	(0.064)	(0.065)	(0.063)
Child welfare spending	0.0003	0.0004	0.0003	0.0003
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
College education	0.0137	0.0121	0.0138	0.0130
	(0.014)	(0.013)	(0.013)	(0.014)
Female LFP	0.0289**	0.0311**	0.0300**	0.0303**
	(0.014)	(0.013)	(0.013)	(0.013)
Real income	0.0426	0.0401	0.0407	0.0403
	(0.054)	(0.051)	(0.051)	(0.052)
Unemployment	−0.0183	−0.0176	−0.0191	−0.0166
	(0.023)	(0.024)	(0.025)	(0.023)
Percent rural	−0.0014	−0.0054	−0.0039	−0.0014
	(0.042)	(0.042)	(0.042)	(0.042)
Mormon	−0.1222	−0.1556	−0.1250	−0.1313
	(0.110)	(0.110)	(0.107)	(0.111)
Southern Baptist	−0.1456*	−0.1552*	−0.1467*	−0.1465*
	(0.085)	(0.085)	(0.085)	(0.085)
Catholic	0.0095	0.0081	0.0062	0.0068
	(0.034)	(0.033)	(0.035)	(0.034)
Protestant	−0.0316	−0.0334	−0.0336	−0.0347
	(0.037)	(0.037)	(0.037)	(0.037)
Price elasticity	0.011	−0.293	−0.194	−0.230

N = 1,228. The dependent variable is ln(entry rates per 1,000 children). Coefficients shown from log-linear models estimated with weighted least squares. Standard errors clustered by state shown in parentheses. Intercept not shown. All models include year, quarter and state fixed effects

* Denotes statistical significance at $p < 0.10$; ** denotes statistical significance at $p < 0.05$; *** denotes statistical significance at $p < 0.01$

previous research shows a positive correlation between alcohol outlets and consumption (or outcomes associated with consumption such as crime), although a causal relationship is often difficult to establish (Carpenter and Dobkin 2011;

Table 3 Foster care entries—removal reason of alcohol abuse

	Parent alcohol abuse (N = 1,093)				Child alcohol abuse (N = 1,084)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Beer price	0.0267				−0.1896			
	(0.229)				(0.289)			
Wine price		−0.0125				−0.0141		
		(0.113)				(0.175)		
Liquor price			−0.0701				−0.0724	
			(0.047)				(0.055)	
Ethanol price				−0.4308				−1.3123
				(0.855)				(1.339)
Liquor outlets	0.0013	0.0013	0.0015	0.0013	0.0099**	0.0098**	0.0096**	0.0098**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)	(0.004)
Medical marijuana	0.4978***	0.5012***	0.5316***	0.5118***	0.4221*	0.4311*	0.4346*	0.4243**
	(0.151)	(0.146)	(0.153)	(0.152)	(0.216)	(0.236)	(0.228)	(0.210)
Child welfare spending	0.0009	0.0009	0.0009	0.0009	0.0001	0.0001	0.0001	0.0002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
College education	−0.0377*	−0.0382*	−0.0376*	−0.0390*	−0.0263	−0.0247	−0.0229	−0.0267
	(0.020)	(0.021)	(0.020)	(0.020)	(0.024)	(0.024)	(0.025)	(0.024)
Female LFP	0.0183	0.0188	0.0223	0.0204	0.0326	0.0328	0.0373	0.0353
	(0.027)	(0.027)	(0.028)	(0.027)	(0.034)	(0.035)	(0.035)	(0.035)
Real income	−0.1258	−0.1270	−0.1330	−0.1295	0.0654	0.0900	0.0704	0.0513
	(0.128)	(0.129)	(0.124)	(0.127)	(0.128)	(0.148)	(0.146)	(0.127)
Unemployment	−0.0421	−0.0408	−0.0478	−0.0386	0.0242	0.0199	0.0182	0.0260
	(0.053)	(0.055)	(0.057)	(0.054)	(0.099)	(0.099)	(0.099)	(0.098)

Table 3 continued

	Parent alcohol abuse (N = 1,093)				Child alcohol abuse (N = 1,084)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Percent rural	0.1655**	0.1659**	0.1535*	0.1664**	0.2922*	0.2696	0.2524	0.2856
	(0.073)	(0.077)	(0.079)	(0.076)	(0.165)	(0.189)	(0.193)	(0.175)
Mormon	0.0009	−0.0073	−0.0191	−0.0153	0.2870	0.2947	0.3017	0.2743
	(0.114)	(0.118)	(0.108)	(0.119)	(0.202)	(0.196)	(0.191)	(0.202)
Southern Baptist	0.3334	0.3321	0.3321	0.3325	0.2162	0.1993	0.2227	0.2301
	(0.244)	(0.245)	(0.237)	(0.243)	(0.461)	(0.485)	(0.469)	(0.451)
Catholic	−0.2251***	−0.2262***	−0.2389***	−0.2297***	−0.1241	−0.1165	−0.1108	−0.1181
	(0.060)	(0.062)	(0.061)	(0.061)	(0.271)	(0.271)	(0.263)	(0.269)
Protestant	−0.1860**	−0.1878**	−0.1966**	−0.1924**	0.0013	0.0139	0.0164	0.0024
	(0.078)	(0.077)	(0.073)	(0.075)	(0.193)	(0.197)	(0.200)	(0.194)
Price elasticity	0.070	−0.041	−0.810	−0.356	−0.500	−0.047	−0.839	−1.087

Standard errors clustered by state shown in parentheses. Intercept not shown. All models include year, quarter and state fixed effects. Columns 1–4 are log-linear models estimated with weighted least squares, with the dependent variable expressed as ln(entry rates per 1,000 children). Columns 5–8 are estimated with Poisson regression with the dependent variable being counts of entries and the population of children on the right hand side with the coefficient constrained to equal one

* Denotes statistical significance at $p < 0.10$; ** denotes statistical significance at $p < 0.05$; *** denotes statistical significance at $p < 0.01$

Nelson 2008). For example, Nelson (2008) specifically examines the effects of outlet density on drinking among youth, but finds different results depending on the specification used.

In previous research, Markowitz and Grossman (1998, 2000) and Markowitz et al. (2010) find that higher beer taxes are associated with lower rates of child abuse, and thereby provide suggestive evidence that changes in alcohol prices lower alcohol use by abusers. The results presented here thus far contradict that of the previous research. It is plausible that these divergent results arise from differences in the severity of the cases examined in the different papers. Since foster care removals are the most serious cases of child abuse, here we are likely examining the subsample of cases with parents who are the heaviest alcohol consumers and are relatively price insensitive. Research by Manning et al. (1995) confirms very inelastic demand among heavy users. This would explain why we do not see any effects of higher prices on foster care entry rates where we see them with cases from surveys and official investigations.

While the results point to no relationship between the alcohol prices and foster care entry rates, the indicator for medical marijuana has a positive sign and is statistically significant in all models shown in Tables 2 and 3. This result should be treated cautiously since the indicator is reflecting the experience of eight states and may also reflect other unobserved factors related to illegal drugs in the states at the time. One interpretation of the positive coefficients is that legalized medical marijuana increases the use that directly leads to child abuse. Another interpretation arises if the marijuana does not directly cause the abuse, but the evidence of use, which may be more obvious and prevalent in states where medical marijuana is legal, makes case workers more likely to remove the child. Such a story would generate a positive association, but not necessarily a causal association, between legalized medical marijuana and the number of reported cases.

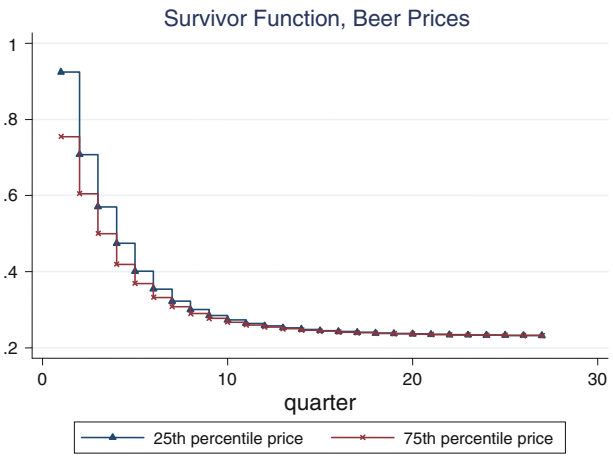

Fig. 1 Survivor function, beer prices

Table 4 Proportional hazard models—any reason for removal

	(1)	(2)	(3)	(4)
Beer price	1.1534***			
	(0.024)			
Wine price		1.0038		
		(0.016)		
Liquor price			0.9892*	
			(0.006)	
Ethanol price				0.9095
				(0.088)
Liquor outlets	0.9987***	0.9988***	0.9988***	0.9988***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Medical marijuana	0.7343***	0.7408***	0.7445***	0.7425***
	(0.033)	(0.033)	(0.033)	(0.033)
Male	0.9748***	0.9748***	0.9748***	0.9748***
	(0.005)	(0.005)	(0.005)	(0.005)
Hispanic	0.9638***	0.9631***	0.9630***	0.9630***
	(0.009)	(0.009)	(0.009)	(0.009)
Ethnicity missing	0.8914***	0.8903***	0.8909***	0.8905***
	(0.009)	(0.009)	(0.009)	(0.009)
Black	0.8886***	0.8880***	0.8879***	0.8879***
	(0.007)	(0.007)	(0.007)	(0.007)
Race missing	0.6330***	0.6328***	0.6324***	0.6333***
	(0.009)	(0.009)	(0.009)	(0.009)
Age at entry	1.0241***	1.0240***	1.0240***	1.0240***
	(0.001)	(0.001)	(0.001)	(0.001)
Disability	0.8357***	0.8358***	0.8358***	0.8358***
	(0.008)	(0.008)	(0.008)	(0.008)
Disability missing	0.8417***	0.8461***	0.8459***	0.8467***
	(0.032)	(0.032)	(0.032)	(0.032)
Female LFP	0.9417***	0.9432***	0.9440***	0.9434***
	(0.003)	(0.003)	(0.003)	(0.003)
Unemployment	0.9165***	0.9169***	0.9165***	0.9164***
	(0.005)	(0.005)	(0.005)	(0.005)
Real income	0.8160***	0.8127***	0.8108***	0.8089***
	(0.011)	(0.011)	(0.011)	(0.012)
Percent rural	1.0157*	1.0184*	1.0159*	1.0200**
	(0.009)	(0.009)	(0.010)	(0.010)
College education	1.0236***	1.0212***	1.0211***	1.0207***
	(0.003)	(0.003)	(0.003)	(0.003)
Mormon	1.2925***	1.2797***	1.2796***	1.2776***
	(0.030)	(0.030)	(0.029)	(0.029)

Table 4 continued

	(1)	(2)	(3)	(4)
Baptist	1.0897***	1.0878***	1.0866***	1.0884***
	(0.019)	(0.020)	(0.019)	(0.019)
Catholic	0.998	0.9891**	0.9873**	0.9876**
	(0.006)	(0.006)	(0.006)	(0.006)
Protestant	0.995	0.9908	0.9902	0.9904
	(0.008)	(0.008)	(0.008)	(0.008)
Child welfare spending	0.9994***	0.9994***	0.9994***	0.9994***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Ll	−5.90E+05	−5.90E+05	−5.90E+05	−5.90E+05

Non-parametric baseline hazard; hazard ratios, t statistics in parentheses. Models also include state and year/quarter fixed effects

* Denotes statistical significance at $p < 0.10$; ** denotes statistical significance at $p < 0.05$; *** denotes statistical significance at $p < 0.01$

Only a few of the other include state-level variables explain the variation of entry rates into foster care. Female labor force participation and Southern Baptist are the only other control variables that are statistically associated with the "any reason" entry rate. States with more highly educated populations and less rural populations are associated with fewer foster care entries due to alcohol abusing parents. However, none of the state level variables are associated with entry rates for alcohol abusing children.

6 Results: duration analyses

We first examine the nonparametric Kaplan–Meier survivor function (Fig. 1) examining the curves separately for individuals in states with high and low beer prices. In the first quarter, the empirical survivor function is obtained by calculating one minus the proportion who leave foster care. More generally, the survivor function each quarter is the product of one minus the exit proportion, i.e., the proportion who leave foster care among those still in foster care in a given quarter, over the number of quarters to date. In Fig. 1, states with high prices are those with prices at the 75th percentile or above, while states with low prices are those below the 25th percentile. The higher line reflects the higher survivor rates for individuals in states with lower prices, meaning more individuals stay in foster care each quarter than in high price states. The lower line represents the quarterly survivor estimate in states with higher prices. The figure also illustrates that the exit rates are high initially and fall rapidly during the first few quarters. In the figure, the overall trends appear to be proportional in high and low price states although the differences decline over time.

The effects of the determinants of foster care duration are reported in Tables 4 and 5 with the set-up similar to that of Tables 2 and 3. These tables show the hazard ratios and standard errors associated with the coefficients. Values of hazard ratios greater than one indicate that the covariate increases the exit probability and,

Table 5 Proportional hazard models—removal reason of alcohol abuse

	Parent alcohol abuse (N = 414,036)				Child alcohol abuse (N = 25,132)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Beer price	1.1101				1.0708			
	(0.080)				(0.188)			
Wine price		1.1018*				1.0719		
		(0.051)				(0.127)		
Liquor price			1.0114				0.8724**	
			(0.021)				(0.058)	
Ethanol price				0.693				0.1539**
				(0.315)				(0.812)
Liquor outlets	0.9995	0.9996	0.9996	0.9995	1.0068*	1.0069*	1.0060	1.0066*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.004)	(0.004)	(0.004)	(0.004)
Medical marijuana	0.6630***	0.6770***	0.6666***	0.6799***	0.6839	0.6837	0.6917	0.6711
	(0.094)	(0.093)	(0.093)	(0.093)	(0.293)	(0.291)	(0.291)	(0.286)
Male	0.9614**	0.9615**	0.9614**	0.9613**	1.1240**	1.1236**	1.1216**	1.1211**
	(0.018)	(0.018)	(0.018)	(0.018)	(0.052)	(0.052)	(0.052)	(0.052)
Hispanic	0.9500	0.9497	0.9501	0.9502	1.0089	1.0088	1.0028	1.0058
	(0.032)	(0.032)	(0.032)	(0.032)	(0.088)	(0.088)	(0.088)	(0.088)
Ethnicity missing	0.9530	0.9525	0.9526	0.9521	1.0145	1.0147	1.0176	1.0143
	(0.035)	(0.035)	(0.035)	(0.035)	(0.111)	(0.111)	(0.111)	(0.111)
Black	0.8141***	0.8133***	0.8137***	0.8134***	0.7059***	0.7053***	0.6994***	0.7011***
	(0.026)	(0.026)	(0.026)	(0.026)	(0.093)	(0.093)	(0.093)	(0.093)
Race missing	0.4631***	0.4622***	0.4633***	0.4638***	0.7444***	0.7417***	0.7311***	0.7445***
	(0.033)	(0.033)	(0.033)	(0.033)	(0.086)	(0.085)	(0.086)	(0.086)

Table 5 continued

	Parent alcohol abuse (N = 414,036)				Child alcohol abuse (N = 25,132)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age at entry	1.0160***	1.0159***	1.0160***	1.0159***	1.1609***	1.1613***	1.1602***	1.1603***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.019)	(0.019)	(0.019)	(0.019)
Disability	0.7993***	0.7992***	0.7993***	0.7996***	0.9182	0.9186	0.918	0.9194
	(0.028)	(0.028)	(0.028)	(0.028)	(0.059)	(0.059)	(0.059)	(0.059)
Disability missing	0.8295	0.8274	0.8319	0.8334	0.8806	0.8733	0.8618	0.8705
	(0.103)	(0.103)	(0.103)	(0.103)	(0.531)	(0.530)	(0.533)	(0.530)
Female LFP	0.9538***	0.9541***	0.9537***	0.9549***	1.0508	1.0505	1.0602*	1.0476
	(0.012)	(0.012)	(0.012)	(0.012)	(0.032)	(0.032)	(0.032)	(0.032)
Unemployment	0.8800***	0.8838***	0.8809***	0.8791***	0.9985	1.0008	0.9986	0.9952
	(0.016)	(0.016)	(0.016)	(0.016)	(0.046)	(0.046)	(0.046)	(0.046)
Real income	0.7135***	0.7202***	0.7108***	0.6949***	0.7831*	0.7877*	0.7467**	0.6960***
	(0.042)	(0.043)	(0.042)	(0.046)	(0.126)	(0.127)	(0.128)	(0.136)
Percent rural	1.1089***	1.1117***	1.1081***	1.1086***	0.9100	0.9171	0.8771	0.9729
	(0.034)	(0.034)	(0.034)	(0.034)	(0.097)	(0.094)	(0.096)	(0.097)
College education	1.0133	1.0128	1.0109	1.0101	1.0297	1.0308	1.0327	1.0295
	(0.010)	(0.009)	(0.009)	(0.009)	(0.025)	(0.026)	(0.025)	(0.025)
Mormon	1.3506***	1.3937***	1.3406***	1.3332***	1.2589*	1.2872*	1.2337	1.2233
	(0.070)	(0.072)	(0.069)	(0.069)	(0.132)	(0.140)	(0.132)	(0.132)
Baptist	1.6568***	1.6623***	1.6544***	1.6668***	0.5282**	0.5330**	0.5730**	0.5777**
	(0.084)	(0.084)	(0.084)	(0.084)	(0.250)	(0.250)	(0.253)	(0.253)
Catholic	0.7947***	0.7883***	0.7919***	0.7918***	0.8622	0.8542	0.8747	0.865
	(0.026)	(0.026)	(0.026)	(0.026)	(0.141)	(0.142)	(0.141)	(0.141)

Table 5 continued

	Parent alcohol abuse (N = 414,036)				Child alcohol abuse (N = 25,132)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Protestant	0.7907***	0.7871***	0.7908***	0.7893***	1.2541**	1.2431**	1.2241**	1.2162**
	(0.034)	(0.034)	(0.034)	(0.034)	(0.096)	(0.095)	(0.096)	(0.096)
Child welfare spending	0.9978***	0.9979***	0.9979***	0.9978***	1.0002	1.0001	1.0001	1.0000
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.001)	(0.001)	(0.001)	(0.001)
Ll	−4.80E+04	−4.80E+04	−4.80E+04	−4.80E+04	−4,997	−4,997	−4,997	−4,997

Non-parametric baseline hazard; hazard ratios, standard errors in parentheses. Models also include state and year/quarter fixed effects

* Denotes statistical significance at $p < 0.10$; ** denotes statistical significance at $p < 0.05$; *** denotes statistical significance at $p < 0.01$

therefore, decreases the time to leaving foster care, while values less than one increase the time to exit.

As shown in Tables 4 and 5, we find higher beer prices are associated with faster exit times for all three removal causes but the effect is statistically significant only for the model in which the child was initially removed for any reason. Wine prices also have a positive effect, but here the effect is statistically significant only for the models where the child was removed because of an alcohol abusing parent. Also in the "any reason" models, liquor outlets are associated with lower hazard rates indicating that more licensed outlets are associated with a slower exit time and a longer time in foster care.

Taken together, our analysis provides some evidence that once children have been removed from the home, the alcohol control environment takes on some importance as individuals become more responsive to beer and wine prices and children are able to exit foster care more quickly. One explanation for why the price elasticity may change after removal is that the event may serve as a taste shifter would in a traditional consumer demand analysis. That is, the removal may serve as a motivator to reduce consumption at a given price, which could result in a more elastic demand function. In addition, because the samples evaluated here reflect the experiences of families with the goal of reunification, these results suggest that alcohol policies can shorten duration among the least severe foster care cases, which is the group for which we would expect the policies to matter most.

The coefficients on the medical marijuana indicator are statistically significant and less than one in all models shown in Tables 4 and 5. This implies that states with such a law have longer times to exit. This is also consistent with the results shown in Tables 2 and 3 showing an association with increased entry rates. Together, these results indicate that the medical marijuana laws may lead to worsened outcomes for children, but given that these models exclude other drug market related time varying factors, again, we caution that these results should be considered as only suggestive, and are an area for further study.

The results in Tables 4 and 5 do contain some counterintuitive results. The liquor price has a negative and significant effect in the "any reason" and child alcohol models, as does the ethanol price in the child alcohol model. Also, more outlets are associated with a faster exit rate for alcohol abusing children. It is not clear why these contradictory results would occur, but we note that the magnitude of the effects are all very small. For example, a dollar increase in the liquor price is associated with a hazard rate that is just 1 % lower in the "any reason" model (Table 4). One possible explanation for the liquor price result is that a higher price of liquor induces a substitution to other, less expensive alcohol, so consumption and abuse may rise. Unfortunately, we have no way of testing this hypothesis with these data and this remains a question for further research.

In terms of demographic variables, males have lower hazard rates, except among children who abuse alcohol where results are the reverse. Hispanics and blacks have lower hazard rates (meaning longer lengths of stay) with these results statistically significant across all specifications for blacks but only significant in the "any reason" models for Hispanics. We also observe longer lengths of stays for children

with disabilities. In contrast, older children have higher hazard rates, but of course they may age out of the system more quickly.

7 Conclusions

This paper seeks to evaluate whether strict alcohol control policies can be effective in reducing the mistreatment of children as measured by entry into foster care and the duration of stay in care. We consider the prices of beer, wine, and liquor, and a composite price for pure ethanol. To represent the availability of alcohol, we include the per capita number of outlets licensed to sell liquor.

We first examine the determinants of entry into foster care, but find that higher prices of beer, wine, liquor, and ethanol are not effective in reducing these entry rates. However, once in foster care, the duration of stay may be shortened with higher beer or wine prices. That is, children are able to exit foster care more quickly in environments where alcohol is more costly.

We estimate a hazard ratio of 1.15 for beer in the all-cause models, but a one unit increase would be a significant increase over the mean beer price of $2.62. Since policy makers can influence prices through taxes, as an alternative, we estimated the predicted survival after 1 year if the beer tax were increased by 25 cents (and assuming a 100 % pass through rate from taxes to prices). The predicted mean survival is 75.5 % at 1 year, but drops to 53.8 % with a 25 cent increase in the beer tax holding all other variables at their mean values. For wine taxes, in cases with an alcohol abusing parent, the predicted mean survival at 1 year drops by less than one percentage point from 78.5 to 78.0 % with a 25 cent increase in the wine tax. Note that since we assume a 100 % pass through rate from tax to prices, our estimates may be understated since prior research has shown slightly larger pass through rates (see Kenkel 2005; Bergman and Hansen 2010).

We also find evidence that the availability of alcohol as measured through outlets is helpful in improving the lives of children. We do find that fewer outlets are associated with reduced foster care entry rates for the reason that the child abused alcohol, but not for entry from other reasons. We also find that fewer outlets licensed to sell liquor are associated with reductions in the duration of time in foster care for all removals, but again, this result is challenged by the lack of effectiveness where we would expect to find stronger results, in the parental alcohol abuse models. The effectiveness of restrictions on alcohol outlets to reduced foster care entry and duration is currently limited, but is worthy of further research.

One conclusion that can be drawn from these results is that the factors that determine the entry into foster care are very different from those that determine the length of time in foster care. In the case of the initial removal, it is possible that those who abuse alcohol are heavy consumers and are relatively price insensitive. This would explain why we do not see any effects of higher prices on entry rates. Research by Manning et al. (1995) confirms very inelastic demand among heavy users. However, once the child is in foster care, adults may have the motive to change behavior and higher alcohol prices may facilitate decreased consumption and promote reunification with the child.

Acknowledgments Funding for this project was provided by Grant #R03AA016836 from the National Institute on Alcohol Abuse and Alcoholism. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute on Alcohol Abuse and Alcoholism or the National Institutes of Health. We are grateful to two anonymous referees for their very helpful suggestions.

References

Anderson, D. M., Hansen. B., & Rees, D. I. (in press). Medical marijuana laws, traffic fatalities, and alcohol consumption. *Journal of Law and Economics*.

Bergman, U. M., & Hansen, N. L. (2010). *Are excise taxes on beverages fully passed through to prices? The Danish evidence*. Working Paper, University of Copenhagen, Denmark.

Bertrand, M., Duflo, E., & Sendhil, M. (2004). How much should we trust differences-in differences estimates? *Quarterly Journal of Economics, 119*(1), 249–275.

Cameron, A. C., & Trivedi, P. K. (2005). *Microeconometrics: Methods and applications*. Cambridge, MA: Cambridge University Press.

Cameron, A. C., & Trivedi, P. K. (2009). *Microeconometrics using stata*. College Station, TX: StataCorp LP.

Cameron, L., & Williams, J. (2001). Cannabis, alcohol and cigarettes: substitutes or complements? *Economic Record, 77*(236), 19–34.

Carpenter, C., & Dobkin, C. (2011). Alcohol regulation and crime. In P. J. Cookm, J. Ludwig, & J. McCrary (Eds.), *Controlling crime: Strategies and tradeoffs* (pp. 291–329). Chicago: University of Chicago Press.

Center on Addiction and Substance Abuse. (1999). *No safe haven: Children of substance-abusing parents*. New York: Center on Addiction and Substance Abuse.

Center on Addiction and Substance Abuse. (2001). *Shoveling up: The impact of substance abuse on state budgets*. New York: Center on Addiction and Substance Abuse.

Center on Addiction and Substance Abuse. (2009). *Shoveling up II: The impact of substance abuse on federal, state and local budgets*. New York: The National Center on Addiction and Substance Abuse at Columbia University.

Chesson, H., Harrison, P., & Kassler, W. J. (2000). Sex under the influence: The effect of alcohol policy on sexually transmitted disease rates in the U.S. *Journal of Law and Economics, 43*(1), 215–238.

Children of Alcoholics Foundation. (1996). *Helping children affected by parental addiction and family violence: Collaboration, coordination, and cooperation*. New York: Children of Alcoholics Foundation.

Cook, P. J., & Moore, M. J. (1993). Economic perspectives on reducing alcohol-related violence. In S. E. Martin (Ed.), *Alcohol and interpersonal violence: Fostering multidisciplinary perspectives* (pp. 193–211), National Institute on Alcohol Abuse and Alcoholism Research Monograph 24. NIH Publication No. 93–3469. Washington, DC: U.S. Government Printing Office.

Crost, B., & Guerrero, S. (2012). The effect of alcohol availability on marijuana use: Evidence from the minimum legal drinking age. *Journal of Health Economics, 31*(1), 112–121.

Crost, B., & Rees, D. I. (2013). The minimum legal drinking age and marijuana use: New estimates from the NLSY97. *Journal of Health Economics, 32*(2), 474–476.

DeBellis, M. D., Broussard, E. R., Herring, D. J., Wexler, S., Moritz, G., & Benitez, J. G. (2001). Psychiatric co-morbidity in caregivers and children involved in maltreatment: A pilot research study with policy implications. *Child Abuse and Neglect, 25*(7), 923–944.

Dee, T. D. (2001). Does setting limits save lives? The case of 0.08 BAC laws. *Journal of Policy Analysis and Management, 20*(1), 111–128.

Famularo, R. K. S., Barnum, R., & Wharton, R. (1986). Alcoholism and severe child maltreatment. *American Journal of Orthopsychiatry, 56*(3), 481–485.

Frame, L. (2002). Maltreatment reports and placement outcomes for infants and toddlers in out-of-home care. *Infant Mental Health Journal, 23*(5), 517–540.

Frame, L., Berrick, J. D., & Brodowski, M. L. (2000). Understanding reentry to out-of-home care for reunified infants. *Child Welfare, 79*(4), 339–359.

Freisthler, B. (2004). A spatial analysis of social disorganization, alcohol access, and rates of child maltreatment in neighborhoods. *Children & Youth Services Review, 26*(9), 803–819.

Freisthler, B., Needell, B., & Gruenwald, P. J. (2005). Is the physical availability of alcohol and illicit drugs related to neighborhood rates of child maltreatment? *Child Abuse and Neglect, 29*(9), 1049–1060.

Grossman, M. (2005). Individual behaviors and substance use: The role of price. In B. Lindgren, & M. Grossman (Ed.) Substance use: Individual behavior, social interaction, markets and politics, Volume 16 of *Advances in Health Economics and Health Services Research*, 15–39. Amsterdam: JAI, an imprint of Elsevier Ltd.

Kelleher, K. M., Chaffin, J., Hollenberg, J., & Fisher, E. (1994). Alcohol and drug disorders among physically abusive and neglectful parents in a community-based sample. *American Journal of Public Health, 84*(10), 1586–1590.

Kenkel, D. S. (2005). Are alcohol tax hikes fully passed through to prices? Evidence from Alaska. *American Economic Review, 95*, 273–277.

Malm, K., Vandivere, S., & McKlindon, A. (2011). *Children adopted from foster care: Child and family characteristics, adoption motivation, and well-being*. Washington, DC: Office of the Assistant Secretary for Planning and Evaluation, U.S. Department of Health and Human Services.

Manning, W. G., Blumberg, L., & Moulton, L. H. (1995). The demand for alcohol: The differential response to price. *Journal of Health Economics, 14*(2), 123–148.

Markowitz, S., Chatterji, P., & Kaestner, R. (2003). Estimating the impact of alcohol policies on youth suicide. *Journal of Mental Health Policy and Economics, 6*(1), 37–46.

Markowitz, S., & Grossman, M. (1998). Alcohol regulation and domestic violence towards children. *Contemporary Economic Policy, 16*(3), 309–320.

Markowitz, S., & Grossman, M. (2000). The effects of beer taxes on physical child abuse. *Journal of Health Economics, 19*(2), 271–282.

Markowitz, S., Grossman, M., & Conrad, R. (2010). Alcohol policies and child maltreatment. In D. Slottje & R. Tchernis (Eds.), *Contributions to economic analysis* (Vol. 290, pp. 17–35)., Current issues in health economics England: Emerald Group Publishing Limited.

National Data Archive on Child Abuse and Neglect. (2002). *Adoption and Foster Care Analysis and Reporting System (AFCARS) User's Guide and Codebook for Fiscal Year 2000 to Present*. Ithaca, NY: Family Life Development Center, College of Human Ecology, Cornell University.

Nelson, J. P. (2008). How similar are youth and adult alcohol behaviors? Panel results for excise taxes and outlet density. *Atlantic Economic Journal, 36*, 89–104.

Office of Applied Studies, Substance Abuse and Mental Health Services Administration. (2003). *The NHSDA Report, Children Living with Substance-Abusing or Substance-Dependent Parents*. Washington, DC: U.S. Government Printing Office.

Puttler, L. I., Zucker, R. A., Fitzgerald, H. E., & Bingham, C. R. (1998). Behavioral outcomes among COAs during the early and middle childhood years: Familial subtype variations. *Alcoholism, Clinical and Experimental Research, 22*(9), 1962–1972.

Ruhm, C. J., Jones, A. S., Kerr, W. C., et al. (2012). What U.S. data should be used to measure the price elasticity of demand for alcohol? *Journal of Health Economics, 31*(6), 851–862.

Saffer, H., & Chaloupka, F. (1998). *Demographic differentials in the demand for alcohol and illicit drugs*. Working Paper No. 6432, National Bureau of Economic Research, Inc., NBER.

U.S. Department of Health and Human Services, Administration for Children and Families, Substance Abuse and Mental Health Services Administration, and Office of the Assistant Secretary for Planning and Evaluation. (1999). *Blending perspectives and building common ground. A report to congress on substance abuse and child protection*. Washington, DC: U.S. Government Printing Office.

U.S. Department of Health and Human Services, Children's Bureau. (1998). *Child Maltreatment 1996: Reports from the States to the National Child Abuse and Neglect Data System*. Washington, DC: U.S. Government Printing Office.

Wooldridge, J. M. (2002). *Econometric analysis of cross section and panel data*. Cambridge, MA: MIT Press.

Yörük, B., & Yörük, C. (2011). The impact of minimum legal drinking age laws on alcohol consumption and marijuana use: Evidence from a regression discontinuity design using exact date of birth. *Journal of Health Economics, 30*, 740–753.

Young, D. J., & Bielinska-Kwapisz, A. (2002). Alcohol taxes and beverage prices. *National Tax Journal, 55*(1), 57–73.

Young, D. J., & Bielinska-Kwapisz, A. (2003). Alcohol consumption, beverage prices and measurement error. *Journal of Studies on Alcohol, 64*(2), 235–238.

Zhao, X., & Harris, M. N. (2004). Demand for Marijuana, Alcohol and Tobacco: Participation, Levels of Consumption and Cross-Equation Correlations. *Economic Record, 80*(251), 394–410.