



Implicit taxes collected by state liquor monopolies *

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Abstract. State monopolization or taxation are supposedly justified because of negative externalities from alcohol consumption, but recent research questions the efficacy of such policies, suggesting that their actual goals may be revenue-generation. Consideration of this hypothesis is facilitated by estimates of the implicit taxes charged in monopoly states, which generally are substantially higher than taxes in non-monopoly states. Evidence that monopolization and high taxes do not affect the level of externalities is also explained by adjustments that rational individuals make to avoid the consequences of such policies, thus providing further support for the revenue-maximization hypothesis.

1. Introduction

Retail alcohol products are sold in some of the most heavily regulated and taxed markets in the United States. The economic argument typically made to justify high taxes and/or regulation is that alcohol consumption causes externalities such as violence and traffic accidents. Recent research questions the efficacy of alcohol tax policy for reducing externalities (Benson et al. 2000b; Dee 1999; Mast et al. 1999; Young and Liken 2000), however, and a related literature appears to be reaching similar conclusions about one of the most dramatic of the regulatory options (Nelson 1990; Benjamin and Anderson 1996): state monopolization of wholesale and/or retail alcohol sales. Thus, as Nelson (1990: 84, 94) suggests, the actual purpose of state monopolies may be to increase state revenues, an argument that is expanded upon and indirectly supported by Benjamin and Anderson's (1996) model of revenue

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seeking that leads to monopolization in some states and taxation in others. Section 2 explains the potential relationships between the implicit taxes in control states (the term applied to these monopoly states in the literature) and non-control states implied by a revenue-seeking hypothesis. The implicit tax rates in states with liquor and wine monopolies, are estimated in Section 3, and found to generally support the predictions from Section 2.¹ In light of these findings, the conclusions (Section 4) explain that the growing evidence indicating that there is no relationship between alcohol taxes or state monopolization and the level of alcohol-induced externalities is predicted by the “property rights” literature’s analysis of the adjustments that rational individuals make to avoid the consequences of regulation and taxes (e.g., Barzel, 1989; Benson, 2002; Cheung, 1974), thus providing further support for the revenue-seeking hypothesis.

2. Hypothesis

Assuming that the primary purposes of both state monopolization and alcohol taxation are to raise revenues, the primary hypothesis is that implicit taxes in control states will be relatively high compared to explicit taxes in non-control states. This expectation is motivated by at least five factors. First, the taxes are hidden, and therefore difficult to observe for tax payers. Taxpayers may, therefore, be less likely to resist relatively high implicit taxes.

Second, in light of the Benjamin-Anderson (1996) arguments, control states could have higher tax rates because they are able to more effectively control the availability of illegal substitutes. Benjamin and Anderson (1996) assume that state governments choose between monopolization and privatization of liquor sales in an effort to minimize the cost of collecting some targeted level of taxes (perhaps, but not necessarily the revenue maximizing level). They assume that this organizational choice is made in the face of a trade-off: (1) if a state chooses privatization then tax evasion through smuggling and/or illegal production and sales can reduce tax revenues, while monopolization greatly reduces the potential for the sale of non-taxed alcohol, but (2) government production tends to be considerably less efficient than private production, so a privatization regime can yield the highest market (and therefore taxable) value for an economic activity. Government employees who perform the same functions as private sector employees tend to receive higher salaries and better benefits than their private sector counterparts (Johnson and Libecap 1994: 96, 108–113; Benson 1995), after all. Furthermore, privatization accompanied by limits on entry (e.g., licenses) can maximize the quasi-rents generated in liquor sales and these rents can be extracted as taxes without eliminating the incentives to produce the retail service. Thus,

Benjamin and Anderson (1996) hypothesize that privatization should dominate where tax evasion is relatively unlikely while monopolization can arise where tax evasion is likely, and their statistical results support the hypothesis. Of course, if the reason for choosing monopolization is that the likelihood of smuggling and bootlegging is high in the state, then the added controls may only partly compensate for the tax evasion incentives, limiting the state's ability to set high implicit tax rates (other factors also suggest that the hypothesis may not hold, as explained below).

Third, non-control states also collect revenues from license fees charged to retail liquor stores, and since the control states do not (except for those that only monopolize the wholesale level of distribution), they should collect more implied taxes to make up for the lack of these licensing fees, given Benjamin and Anderson's (1996) model.²

Fourth, state monopolies may need to cover the costs of relatively inefficient production, as suggested above. However, this may not be the case if a substantial part of the opportunity costs of inefficient production is shifted onto consumers. But this cost shifting argument actually provides a fifth possible reason for higher implicit taxes in control states.

The inefficiency of government production in this case probably arises in part because employees in state owned stores are likely to receive relatively high wages and benefits for labor services, as noted above. On-the-other-hand, monopoly states apparently lower their land (and buildings) rents by substantially limiting the number of outlets, their inventory costs by limiting brands that are available, their advertising costs, and their other expenditures that competitive private firms incur in order to offer consumers greater shopping convenience. If state stores are relatively inconveniently located, as is often alleged, then the state's costs for each parcel of land is also probably lower than what many retailers must pay to be competitive in non-control states. That is, the higher hourly labor costs are offset, perhaps partially and perhaps entirely, by substantial reductions in other expenditures. Thus, the state monopolies probably under-allocate resources to the production of convenience in order to lower their non-labor expenditures relative to those incurred in non-control states, shifting actual but unmeasured opportunity costs onto consumers in the form of higher transactions costs. This suggests that while production in control states is likely to be relatively inefficient in a resource allocation sense, at least some of the costs of the inefficiency are shifted onto consumers, and the accounting costs of operating the state system could even be lower than the accounting costs for private wholesalers and retailers in non-control states. In this case, the same level of prices could imply higher implicit tax rates in the monopoly states than actual taxes in

the non-control states even though the monopoly states involve inefficient allocations of resources.

The null hypothesis, that implicit taxes will be lower in control states than actual taxes in non-control states, is also possible. It is important to recognize that a state's price markups could produce sufficient revenues to cover its own accounting costs because of cost shifting onto consumers, but not cover the costs that would be internalized by private firms competing for the attention of consumers, and these are the costs which are controlled for in the following analysis. Therefore, it is even possible that *relative to the costs that would arise in a privatized liquor market* the implied tax rate in a control state could be negative.³ Such negative tax rates could arise if the state system is extremely inefficient relative to a privatized alternative.⁴

The possibility of negative implied taxes in control states is not necessarily inconsistent with the Benjamin-Anderson (1996) argument.⁵ If the likelihood of tax evasion is very high, for instance, the state may have to set very low tax rates, perhaps near zero. In this regard, Benjamin and Anderson (1996) report statistical results demonstrating that taxes in non-control states adjacent to control states are significantly lower than taxes in states that are farther from control states because, they argue, "adjacent states face some of the same enforcement problems that induce the control states to take over the retail distribution of alcohol." Thus, while the Benjamin-Anderson (1996) model assumes that a state has a targeted level of revenues that it wants to collect, the political environment of the state presumably determines what that targeted revenue is, and conceivably it could be low. Indeed, the hypothesis and its null may actually both be relevant in different political environments. State tax rates clearly vary considerably (see summary statistics in Table 1), and implicit taxes in control states are similarly expected to vary. The political climate in some states (e.g., New York, Massachusetts) has historically produced relatively high taxes in general, for instance, while other states (e.g., Texas, New Hampshire) have had low overall taxes (Benson and Johnson 1986, Rasmussen and Zuehlke 1990). Similarly, populations in some states are more likely to support "sin" taxes than populations in other states (North Carolina and Kentucky have low cigarette taxes, for instance, because of the power of tobacco lobbies). Thus, the political climate in a particular control state, which should determine the level of implicit taxes, may lead to relatively low implicit taxes compared to the average non-control state, even though the tax is high relative to what it would be if that state had chosen to privatize the liquor market. The prediction that implied tax rates in control states should be higher than non-control states should be considered in this light. It is anticipated that many control states will have relatively high implicit tax rates, and that implied tax rates on average will be higher than average

Table 1. Descriptive statistics

Variable	Observations	Standard			
		Mean	deviation	Minimum	Maximum
Liquor Price (all states)	733	90.98	12.23	65.44	125.92
Liquor Price (control states)	276	94.68	11.27	69.08	125.92
Liquor Price (non-con. sts.)	457	88.74	12.45	65.44	120.04
Liquor Excise Tax	480	3.58	1.36	1.31	8.78
Wine Price (all states)	733	28.89	4.61	18.20	47.84
Wine Price (control states)	80	30.13	4.08	21.58	42.24
Wine Price (non-control sts.)	653	28.74	4.65	18.20	47.84
Wine Excise Tax	682	0.74	0.53	0.01	3.04
Percent Males 18–44	768	28.53	1.62	24.17	33.40
Percent Black	768	9.86	9.33	0.22	36.37
Population Density	768	168.33	233.86	4.67	1085.62
Percent Tourism	768	6.43	10.80	1.42	84.10
Percent Metropolitan	768	64.90	22.03	18.16	100.00
Percent Unemployment	768	6.36	2.17	2.20	18.00
Income Per-Capita	768	23.06	3.11	15.87	33.79
Midwest Region	768	0.23	0.42	0.00	1.00
West Region	768	0.23	0.42	0.00	1.00
South Region	768	0.33	0.47	0.00	1.00

Note: All monetary variables expressed in constant 1992 dollars. Alcohol prices and excise taxes are in dollars per gallon. Liquor and wine excise taxes pertain to non-control states only. Missing observations are dropped from the sample.

rates in non-control states, but there are likely to be some control states that have relatively low implied taxes just as there are some non-control states that have relatively low actual tax rates. Indeed, given the method of measuring implied taxes, they could be negative in some control states.

3. Model specification and data

The estimation methodology developed below does not attempt to measure the actual accounting cost outlays of the control states [or the “fair” return on investments in state stores, as in Simon (1966)]. Instead, it focuses on what might be called the “political opportunity costs” (as defined below) by using prices net of state excise taxes in non-control states to estimate what the net price would be *if liquor sales in the state were not monopolized*, and

then compares that net price to observed retail prices. This method is chosen because actual monetary outlays in control states may be distorted by the fact that sales are monopolized by state governments, so state outlays may not be accurate measures of opportunity costs. For instance, it may be relatively easy to unionize labor that works in state monopoly stores, and this in turn could lead to higher wages and benefits as labor captures part of the monopoly rents, as suggested above. Thus, part of the payments to labor would actually be implicit taxes. Such input price distortions mean that an examination of state accounts will not provide an accurate estimate of what the net price would be if the state had chosen the alternative: wholesale and retail sales by licensed private firms. Retail markets with licensed private firms can also have distortions that mask true opportunity costs, of course, since licensing can limit entry and create rents which can be captured by employees and bureaucratic regulators (Benson 2002), so the “opportunity costs” that are relevant here are not necessarily the true economic costs, but the costs that arise in an alternative politicized environment. That is, the comparisons made here are between actual control and non-control states, not between monopolization and idealized perfect competition.

The first step in the methodology is to estimate the price net of taxes in non-control states using a cross-section-time-series pool of data and the following procedure. First, the prices net of taxes (*NetPrice*) in the non-control states are calculated by subtracting excise taxes from the measured retail price:

$$NetPrice_{n,j,t} = RetailPrice_{n,j,t} - ExciseTax_{n,j,t} \quad (1)$$

where n indexes the non-control states, j represents the type of alcohol (spirits or wine), and t is the observation year. This net price is then used as the dependent variable in the following regression:

$$NetPrice_{n,j,t} = \alpha + \beta \mathbf{X}_{n,t} + \gamma \lambda_t + \delta \theta + \epsilon_{n,t}. \quad (2)$$

Coefficients are denoted by α (the intercept term), β , γ , and δ . $\mathbf{X}_{n,t}$ represents a vector of covariates, while λ_t is a vector of year dummies, and θ denotes a vector of regional dummies. Finally, $\epsilon_{n,t}$ is the randomly distributed error term. The actual variables are chosen because they are expected to correlate with *NetPrice*. In other words, the purpose is not to build a theoretical model of *NetPrice*, but to create an equation that predicts with a high degree of precision.

Let upper-case α , β , γ , and δ (A, B, Γ , and Δ) represent estimated coefficients from regression Equation (2). The predicted price net of taxes and monopoly rents is then derived as:

$$\text{PredictedNetPrice}_{c,j,t} = A + B\mathbf{X}_{c,t} + \Gamma\lambda_t + \Delta\theta \quad (3)$$

with c serving as an index of control states (the 18 liquor and five wine control states are listed in Tables 3 and 4⁶). Note that the covariates included in \mathbf{X} in Equation (3) are identical to those in Equation (2) but measured for the control states rather than the non-control states. The annual liquor or wine tax (actual plus implicit taxes collected through monopolized prices) is then estimated to be:

$$\text{ImpliedControlStateTax}_{c,j,t} = \text{RetailPrice}_{c,j,t} - \text{PredictedNetPrice}_{c,j,t}, \quad (4)$$

the measured retail price in a control state minus the predicted value of what the net price (net of actual taxes and implicit taxes from monopoly rents) would be *if the state was not monopolized*. *Data*. The data used to estimate the excise tax rates on liquor and wine implied for control states consists of a panel of 768 potential observations from the 48 continental states over the period 1982 to 1997. Summary statistics for the data are reported in Table 1, and the variables are more fully defined in the attached Data Appendix where data sources are also listed.

The American Chamber of Commerce Research Association (ACCRA) collects quarterly city-level prices in order estimate cost of living, and they include liquor and wine prices in their survey. These ACCRA liquor and wine prices are employed to measure $\text{RetailPrice}_{n,j,t}$ and $\text{RetailPrice}_{c,j,t}$. The observed prices are annual state level averages that were calculated across cities and quarters. They are expressed on a per-gallon basis, in terms of constant 1992 dollars (all nominal variables are similarly adjusted for inflation).⁷

While ACCRA data are the only measures of price for both liquor and wine available from which annual state-level observations can be calculated, they have been criticized by many researchers who point to a number of potential flaws. Some of the standard criticisms are not particularly import in the context of this study, however. For instance, the beverage for which prices are obtained have changed over time, but Young and Bieliński-Kwapisz (2002) develop a consistent series by adjusting the reported prices to reflect the changes in beverage definition.⁸ They provided us with quarterly state-level price estimates calculated from their adjusted data, from which annual averages were calculated. Critics also point out that the brands chosen to represent liquor and wine prices may not be indicative of the average prices of the products across brands. This also may not be a relevant consideration, however. The methodology estimates the net prices in the non-control states and implied taxes in the control states for the brands used in the ACCRA survey, but as long as tax rates do not vary across brands (or qualities) the

estimated tax rates generalize.⁹ Another criticism of the ACCRA data is that the cities included in the sample are not constant over time, and the cities chosen may not be representative of the state as a whole. This criticism is not likely to be relevant to the control states, of course, since price policy is probably determined at the state level rather than in reflection of local market conditions. Prices from the non-control states are used in the estimation procedure, of course, so the issue may be relevant for them. On the other hand, by using prices that were calculated as averages over cities and quarters and pooling 15 years of observations, anomalies and outliers in a few quarterly observations may not create serious problems. A final criticism that should be mentioned is that because the raw data are gathered voluntarily by local Chambers, there could be considerable variation in the quality of the data collection effort that is made. Indeed, some states and years have substantial gaps in reporting.¹⁰ This problem is also mitigated, at least to a degree, by pooling data, but it still must be recognized. The taxes for liquor and wine used in Equation (1) are state gallonage excise taxes. The rate in effect for the majority of the months of the year is used when a state tax rate changes.

The specific covariates used in Equations (2) and (3) are the percentage of the state population that is male between the ages of 18 and 44, the percentage of the population that is black, population density, tourism receipts (the sum of state hotel, motel, and tourist court receipts as a percentage of retail sales), the percentage of the population residing in metropolitan areas, state unemployment rates, and real disposable income per capita.¹¹ While a number of these variables clearly would be included in a demand model, the objective here is simply to produce regression equations that explain net prices well (i.e., have high R^2 s). Therefore, while the regression results are reported below to show the estimated coefficients employed to estimate net prices in the control states, it is not necessary to hypothesize signs or discuss implications of individual coefficients.

Results. Regression Equation (2) results for net liquor prices in the non-control states are reported in the first column of Table 2, and the second column does the same for net wine prices. Note that the R^2 s are quite respectable despite the very streamlined model. The coefficients from Table 2 are used, as in Equation (3), to estimate net prices for the control states, and these net prices are employed to estimate the annual implied tax rates in control states as in Equation (4).¹² These implied tax rates can now be compared to the actual tax rates in non-control states. For this comparison, recall that the descriptive statistics for excise taxes in the non-control states are reported in Table 1. Note that the mean state liquor (wine) tax rate is 3.58 (0.74), with a maximum of 8.78 (3.04) and a minimum of 1.31 (0.01). In order to compare the control states to these values, the estimated annual

Table 2. Weighted-least square net liquor and wine price regressions

Independent variables	Dependent variables	
	Net Liquor Price	Net Wine Price
Percent Males 18–44	+1.098* (6.03)	–0.110 (1.31)
Percent Black	–0.173* (4.10)	–0.008 (0.44)
Population Density	–0.001 (0.80)	+0.002** (2.18)
Percent Tourism	+0.009 (0.21)	+0.001 (0.05)
Percent Metropolitan	+0.007 (0.24)	–0.030* (2.62)
Percent Unemployment	–0.961* (5.13)	+0.109 (1.50)
Income Per-Capita	–0.678* (3.32)	–0.042 (0.49)
Midwest Region	–9.891* (9.51)	–1.956* (4.73)
West Region	–11.320* (8.94)	–3.536* (6.42)
South Region	–3.808* (3.52)	–1.334* (3.14)
Constant	+75.166* (14.05)	+34.069* (15.07)
N	457	647
R-squared	0.83	0.70
F-statistic	84.61	59.03

Note: Estimated coefficients on year dummies are not reported. Absolute values of t-statistics are in parentheses, and a * denotes significance at the one percent level in a two-tailed test, while ** indicates significance at the five percent level.

implied taxes are averaged to obtain sample means which are reported in Tables 3 (for liquor) and 4 (for wine), along with other descriptive statistics.

Two sets of descriptive statistics are reported in Tables 3 and 4. The reason is that some of the annual estimates for some of the states are negative. While this possibility is suggested above, the negative estimates could also be a result of imprecision in the estimates due to inadequacies in the data.¹³ Therefore, means and other descriptive statistics are reported using all estim-

Table 3. Descriptive statistic for estimates of implied liquor tax rates for all estimated observations and for positive estimated observations

State	Number of observations		Mean		Standard deviation		Minimum		Maximum	
	AllObs	Obs>0	AllObs	Obs>0	AllObs	Obs>0	AllObs	Obs>0	AllObs	Obs>0
Alabama	16	16	14.69	14.69	2.41	2.41	9.77	9.77	19.73	19.73
Idaho	16	16	13.43	13.43	3.48	3.48	7.49	7.49	22.05	22.05
Iowa	16	14	8.44	9.76	5.46	4.40	-1.08	0.66	14.95	14.95
Maine	4	3	0.71	1.51	1.64	0.66	-1.69	1.11	1.99	1.99
Michigan	16	16	14.95	14.95	4.84	4.84	9.24	9.24	23.30	23.30
Mississippi	16	16	7.91	7.91	4.91	4.91	1.69	1.69	18.41	18.41
Montana	16	16	13.67	13.67	3.79	3.79	6.65	6.65	20.53	20.53
New Hampshire	16	6	-1.04	2.60	3.58	1.81	-7.14	0.11	4.70	4.70
North Carolina	16	3	-3.63	0.73	3.75	0.24	-10.89	0.58	1.01	1.01
Ohio	16	16	16.42	16.42	1.49	1.49	12.67	12.67	18.45	18.45
Oregon	16	16	21.20	21.20	2.54	2.54	16.57	16.57	24.47	24.47
Pennsylvania	16	12	2.31	3.75	3.18	1.79	-5.43	0.98	6.13	6.13
Utah	16	16	13.52	13.52	5.74	5.74	5.31	5.31	26.46	26.46
Vermont	16	0	-13.07	-	3.88	-	-19.27	-	-5.36	-
Virginia	16	9	0.41	4.83	5.71	1.28	-10.92	2.79	6.52	6.52
Washington	16	16	14.77	14.77	5.85	5.85	6.56	6.56	25.33	25.33
West Virginia	16	16	16.50	16.50	9.02	9.02	4.23	4.23	31.39	31.39
Wyoming	16	16	8.68	8.68	3.39	3.39	3.42	3.42	15.17	15.17

Note: All observations are annual values expressed in constant 1992 dollars per gallon.

Table 4. Descriptive statistic for estimates of implied wine tax rates for all estimated observations and for positive estimated observations

State	Number of observations		Mean		Standard deviation		Minimum		Maximum	
	All Obs	Obs > 0	All Obs	Obs > 0	All Obs	Obs > 0	All Obs	Obs > 0	All Obs	Obs > 0
Mississippi	16	13	1.64	2.14	1.83	1.65	-0.89	0.00	5.07	5.07
New Hampshire	16	4	-1.53	1.03	2.04	0.49	-5.28	0.44	1.65	1.65
Pennsylvania	16	16	3.39	3.39	1.36	1.36	1.18	1.18	5.60	5.60
Utah	16	14	3.31	3.94	2.45	1.85	-1.75	0.50	6.19	6.19
Wyoming	16	16	4.06	4.06	1.44	1.44	0.97	0.97	6.38	6.38

Note: All observations are annual values expressed in constant 1992 dollars per gallon.

ated values in order to avoid the potential of bias producing the relatively high implied taxes hypothesized above, and the same statistics are reported using only the positive observations. The mean implied liquor taxes in nine states for which all observations are positive (Alabama, Idaho, Michigan, Montana, Ohio, Oregon, Utah, Washington, and West Virginia) exceed the maximum tax rate in the non-control states, while two more states with all positive estimates (Mississippi and Wyoming) have means that are very close to the maximum non-control tax rate. Iowa's mean exceeds this maximum when only the 14 positive estimated observations are used, and falls slightly below the maximum when all 16 observations are included. Pennsylvania and Virginia both have means that exceed the mean for non-control state tax rates when only positive estimated observations are used, but their means fall below the non-control states' average tax rate when the negative observations are included. Nonetheless, their means remain positive. Only four control states (Maine, New Hampshire, North Carolina, and Vermont) appear to have low implied taxes compared to the average in non-control states. Maine may be a state where ACCRA price collections are suspect since data are missing for most years. Nonetheless, the implied tax estimates are positive. The estimates for the other three states suggest a negative implied tax (i.e., revenue collections do not cover the costs that would arise if liquor was sold through licensed private firms). This appears to be particularly true for Vermont where every annual estimate is negative, but it probably also holds for New Hampshire and North Carolina.¹⁴ Recall that this does not mean that these states do not generate sufficient revenues to cover their accounting costs, however, as a substantial portion of the opportunity costs may be shifted onto consumers.

Over all, it appears that the implied tax rates in the control states are generally high relative to the non-control states' actual tax rates. Indeed, the mean implied tax rate across all annual state observations is 8.66, just 0.12 less than the maximum actual tax observation, and 2.42 times the mean value of all the actual tax rates in the non-control states.

The results for wine are similar. Means for Pennsylvania, Utah and Wyoming all exceed the maximum wine tax in the non-control states, while Mississippi's mean is greater than the mean tax rates for the non-control states. New Hampshire appears to have a negative implied tax rate, however.¹⁵ Nonetheless, the overall mean of all annual observations is 2.18, which is more than 2.95 times the mean value of the wine tax rates in the non-control states.

The fact that there are a number of negative observations for both implied liquor and wine taxes suggests that outliers may be unduly influencing the overall means for some states and for the sample as a whole. The alternative calculations reported in Tables 3 and 4 eliminate all negative values, but that clearly may be inappropriate too, as some states may have relatively high outliers as well as low outliers. Given the potential problems with ACCRA price data, Tables 5 and 6 report alternative sample means calculated by eliminating all observations that are more than one standard deviation from the mean, and more than two standard deviations from the mean. Inspection of the adjusted estimates suggests that the outliers do not substantially impact the individual state means or the general conclusion that monopolization tends to lead to relatively high per-unit revenue collections (note that these adjustments raise some state means and lower others).

4. Are state liquor monopolies policy failures or revenue-generating successes?

When an attempt is made to alter or influence a spontaneous market order through regulations or taxes, there will inevitably be unanticipated consequences, as Hayek (1973: 51) explains. Because knowledge is incomplete for legislators and bureaucrats, and because policing is imperfect, there will be uncontrolled margins that buyers and sellers can exploit to avoid the consequences of the taxes or regulations (Benson 2002). Consider Cheung's (1974) analysis of the consequences of price ceilings, for instance. Essentially, the price ceiling puts the value between the price consumers are willing to pay and the legal price into the public domain, creating incentives for both buyers and sellers to attempt to capture that value. A new "market-clearing equilibrium" occurs when all individuals have made whatever moves they wish to make given the regulation, an outcome that is substantially different

Table 5. Alternative sample means of implied liquor tax rates considering potential outlier observations

Means for:			
State	All observations	Observations within 2 s.d.	Observations within 1 s.d.
Alabama	14.69	14.69	14.97
Idaho	13.43	12.85	12.80
Iowa	8.44	8.44	10.39
Maine	0.71	0.71	1.51
Michigan	14.95	14.95	14.73
Mississippi	7.91	7.21	8.57
Montana	13.67	13.67	13.15
New Hampshire	-1.04	-1.04	-1.06
North Carolina	-3.63	-3.63	-2.97
Ohio	16.42	16.68	16.60
Oregon	21.20	21.20	21.60
Pennsylvania	2.31	2.83	2.45
Utah	13.52	11.68	12.17
Vermont	-13.07	-13.07	-13.82
Virginia	0.41	0.41	1.81
Washington	14.77	14.77	15.27
West Virginia	16.50	16.50	14.21
Wyoming	8.68	8.68	9.62

Note: All observations are annual values expressed in constant 1992 dollars per gallon.

Table 6. Alternative sample means of implied wine tax rates considering potential outlier observations

Means for:			
State	All observations	Observations within 2 s.d.	Observations within 1 s.d.
Mississippi	1.64	1.64	1.49
New Hampshire	-1.53	-1.53	-1.49
Pennsylvania	3.39	3.39	3.09
Utah	3.31	3.65	3.85
Wyoming	4.06	4.27	4.01

Note: All observations are annual values expressed in constant 1992 dollars per gallon.

from what was anticipated when the price ceiling was imposed.¹⁶ The same is likely to be true in any taxing or regulatory environment (Benson 2002). In particular, findings that alcohol taxes do not reduce measured alcohol consumption very much (Sass and Saurman 1993, Mast et al. 1999) and do not reduce externalities associated with alcohol consumption (Benson et al. 2000b; Dee 1999; Mast et al. 1999; Young and Liken 2000), and that state liquor monopolies do not reduce consumption (Simon 1966; Nelson 1990) are very consistent with such analysis. For instance, Mast et al. (1999) and Dee (1999) explain that higher taxes should not have a large impact on alcohol consumption or DUI behavior because of the potential for substitution. One avenue of substitution is between high and low priced brands. A person could easily maintain the same level of consumption at the same price in the face of a tax increase by substituting a lower priced brand, given the high degree of product differentiation. Another possibility is to substitute between different types of packaging, since alcohol sold in large bottles and kegs generally has a lower price per gallon than alcohol sold in smaller bottles. While these substitutes are not perfect (suggesting that some impact of taxes on consumption may arise) they can mitigate the impact of higher taxes to a substantial degree. Perhaps more importantly, since taxes on one type of alcohol do not correlate perfectly with taxes on other types (Young and Bielińska-Kwapisz, 2002) there also is a potential for substitution between sources of alcohol (DUI studies focus on beer taxes, for instance, and do not control for the taxes on or prices of spirits and wine). In other words, taxes, and especially taxes on one type of alcohol, as a policy tool for limiting ethanol consumption leaves many uncontrolled margins along which consumers can adjust if they want to maintain the same level of consumption [other potential margins are consumption of illegal (i.e., non-taxed) alcohol, as Benjamin and Anderson (1996) stress].

Similarly, it has been suggested that state monopolization should reduce alcohol consumption because it tends to raise the transactions cost or full price of purchasing alcohol by limiting the number of outlets, establishing relative inconvenient locations, shortening operating hours, limiting brand availability, and doing relatively little advertising. As Nelson (1990: 94–95) explains, however, consumers can adjust their buying behavior to overcome these costs. By reducing shopping trips but increasing the amounts purchased each trip and the inventories held for future consumption, consumers need not reduce the level of consumption relative to what it would be in a more competitive environment (consumers may also substitute consumption at bars and restaurants for at-home consumption, and/or consumption of illegal liquor for legal liquor). In other words, monopolization and limits on outlets, operating hours, and other convenience factors still leaves too many uncon-

trolled margins along which consumers can adjust if they want to maintain their consumption of alcohol.

An implication of the property rights approach to regulation [e.g., Cheung (1974), Barzel (1989)] is that broadly-targeted but indirect policy tools (e.g., Pigouvain taxes or monopolization broadly targeted at reducing alcohol consumption by all consumers rather than direct policies that attempt to target only those who actually are likely to produce consumption-related externalities) are not likely to have dramatic impacts on consumption (particularly among those who are most likely to produce externalities), and therefore, on consumption-related externalities. Of course, if the actual goals of such indirect policies is to raise revenues, as Nelson (1990) and Benjamin and Anderson (1996) hypothesize, then we can expect them to persist even when they fail to reduce the externalities that political rhetoric claims they are intended to address.¹⁷ State monopolies have existed since the end of federal prohibition, reinforcing the hypothesis that these are revenue-seeking rather than consumption-controlling institutions.

Policy makers could actually have both consumption control and revenue generating objectives in mind, of course, as well as others. Yandle (1989) explains that some religious organizations (e.g., Baptists) lobby for monopolization (and probably high alcohol taxes) through the political process as a means discouraging consumption, but that other groups (e.g., bootleggers) support this lobbying effort because they expect economic gains by capturing some of the value that the controls on legal markets throw into the public domain. Another group that may benefit from monopolization once it is established, is the employees of the state monopoly, so they also can be expected to resist privatization once a monopoly is established [e.g., see Benson (1990: 332–337)]. After all, as Nelson (1990: 94) suggests, some of the monopoly rents may be captured by the employees of the state liquor monopoly in the form of higher wages and benefits and shorter working hours than their private sector counterparts in non-monopolized states, particularly if employees are unionized. Of course, the tax-collecting and licensing bureaus in non-control states may similarly resist monopolization. Thus, even when the objectives of some of the lobby groups prove to be elusive, such as revenue generation or the reduced consumption sought by the Baptists in Yandle's (1989) example, the institutions that were created to achieve those objectives can persist.¹⁸

Notes

1. Simon (1966) estimates the relative revenue effects of state monopolization, but he does not estimate the implicit excise tax rates for each state, estimates that are of interest in

and of themselves because they provide a potential methodological solution to some of the problems in the empirical literature on the efficacy of taxes highlighted in Young and Bielińska-Kwapisz (2002). Specifically, control states must be dropped from a study of the impacts of taxes on spirits or wine, and many researchers have chosen to simply use beer taxes instead. The method proposed here provides a way to include control states in empirical studies of tax policy effects.

2. Control states will still collect license fees from on-premise consumption sites (bars and restaurants) and from beer retailers (and wine retailers in most of the control states), so they can have substantial revenues from licensing, but they will not obtain such revenues for retail liquor stores.
3. When governments produce or sell goods or services, they often respond to political pressures and set prices below costs. A state could also subsidize the consumption of alcohol, although the existence of negative implied taxes as measured here does not necessarily imply such a subsidy, for reasons explained below (similarly, in a state with a powerful public employee union, revenues could be less than accounting costs, producing negative net taxes, but negative implied taxes as measured here do not indicate that this is the case either).
4. An estimated negative implied tax rate for a control state also could simply mean that the state is price discriminating and the observed prices used in the empirical estimates are among those with relatively low markups. To the degree that price discrimination is practiced, the estimates produced below will, at best, only reflect average implied taxes, and then only to the extent that the observed prices employed in the empirical estimation reflect weighted average prices.
5. Such negative taxes probably would not arise if the objective of a state's liquor control policy is consumption and externality reduction, since it suggests that privatization and a tax regime may well allow for higher money prices to consumers (although transactions costs would fall).
6. These averages were calculated by Young and Bielińska-Kwapisz for their research (2002) and provided to us. The price index used to convert the nominal variables to constant 1992 dollars is the CPI-U taken from the *Economic Report of the President*.
7. Michigan, Mississippi, and Wyoming control wholesale liquor through state-owned warehouses but retailing is through licensed private outlets, Oregon contracts out retail outlets with independent private agents, and the other control states have state owned retail outlets.
8. See Young and Bielińska-Kwapisz (2002, note 27) for detailed discussion of their construction of the standardized liquor and wine prices series. This standardization is relevant for the following analysis because from 1982 to the third quarter of 1988, the ACCRA price of liquor was the retail price of a 750 ml bottle of Seagram's 7-Crown, but in the fourth quarter of 1988, they began using the retail price of a 1.0 liter bottle of J&B Scotch. Similarly, the retail price of a 750 ml bottle of Paul Maissou Chablis represented ACCRA wine prices from 1982 to the fourth quarter of 1983 when they began using a 1.5 liter bottle of the same product, but then in the fourth quarter of 1990 they changed again, to a 1.5 liter bottle of Gallo Sauvignon Blanc.
9. Estimating the net prices in the non-control states clearly should not be a problem in this context, since excise tax rates are not brand specific. Recall Note 4, however, and recognize that if price discrimination is practiced in control states, the estimates produced below reflect average implied taxes, at best, and only to the extent that the ACCRA prices reflect average prices.

10. Missing observations were Connecticut (1992), Delaware (1982–84), Maine (1983–84, 1988–97), Nevada (1983, 1987), North Dakota (1988, 1990–97), and Rhode Island (1982, 1988–94, 1997).
11. All of these data are from Census publications (see the data appendix), most of which have annual observations. The Tourism receipts data comes from the *Census of Service Industries* which is not published annually, so for instance, observations for 1984 were interpolated from 1982 and 1987 data, 1990 observations were interpolated from 1987 and 1992 data, and so on.
12. These annual estimates (not reported here, but available from the authors upon request) can be employed directly in studies of alcohol control policies and their impacts on suspected externalities (e.g., DUI fatalities, violent crimes), as suggested in Note 1, in order to use all states in such studies.
13. In particular, recall notes 5 and 11 which raise the possibility of price discrimination by monopoly states with the brands observed by ACCRA having relatively low prices.
14. The mean liquor prices for the individual control states are: Alabama, \$103.23; Idaho, \$97.16; Iowa, \$91.76; Maine, \$107.48; Michigan, \$93.74; Mississippi, \$91.81; Montana, \$96.52; New Hampshire, \$93.47; North Carolina, \$85.06; Ohio, \$96.23; Oregon, \$102.72; Pennsylvania, \$90.86; Utah, \$101.43; Vermont, \$83.31; Virginia, \$89.04; Washington, \$95.85; West Virginia, \$101.86; and Wyoming, \$92.30. Therefore, low prices are one determinant of low implied taxes (see Vermont and North Carolina), but other factors also matter (see Maine and New Hampshire).
15. The mean wine prices for these states are: Mississippi, \$30.99; New Hampshire, \$27.81; Pennsylvania, \$32.82; Utah, \$28.29; and Wyoming, \$30.74.
16. Barzel (1989) discusses the example of price ceilings on gasoline during the early 1970s, for instance. In that case, sales were in terms of tanks of gasoline, so some consumers added gas-tank capacity and others paid people to wait in the queue for them. Producers were able to capture part of the value from the public domain by reducing quality (e.g., octane, performance additives), unbundling products (e.g., removing additives to sell them separately, removing the “services” that had been bundled with gasoline by moving to self service, reducing the hours of operation and therefore the level of convenience that consumers had previously enjoyed), rebundling products in different ways (e.g., selling gasoline only to consumers who purchased an oil change or a lube job at prices raised to capture the value of the accompanying gasoline), refusing to sell on credit and requiring cash payments instead, and so on. Furthermore, enforcement of the price regulation itself was imperfect, so some sellers gained part of the value in the public domain by illegally selling on the black market.
17. More directly targeted policies might be considered if reduction of such externalities truly is the goal of the policies. In fact, policies that directly address the undesirable consequences of alcohol consumption, such as enforcement of criminal laws against drunk driving, appear to be relatively effective if they are consistently applied (Benson et al. 1999, 2000a).
18. Many characteristics of and policies implemented by the bureaucratic institutions are likely to change over time, however (Benson 2002), in response to changing interest group demands and bureaucratic efforts to maintain their jobs and benefits.

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Data Appendix: Variable descriptions and data sources

Liquor Price and **Wine Price** are average real prices per gallon for all cities reported in a year. These data were provided by Douglas Young who created a consistent average price series using the *Inter-City Cost of Living Index* (various years) from the American Chamber of Commerce Researchers Association (ACCRA).

Liquor Excise Tax and **Wine Excise Tax** are real state gallonage excise taxes. These data are from the Distilled Spirits Council of the U.S., *History of Beverage Alcohol Tax Changes 1996*, and *Adams Liquor Handbook* (Adams Business Media, Various years).

The following variables are from *State Population Estimates*, U.S. Census Bureau, Various years, obtained from <http://www.census.gov/population/www/estimates/statepop/html>: (1) **% Male 18–44**, calculated by multiplying 100 times the number of individuals that are male and between the ages of 18 and 44 divided by total state population age 18 and over; (2) **% Black**, calculated by multiplying 100 times the number of individuals that are black divided by total state population; and (3) **Population Density**, which is total state population divided by total state area in square miles [some observations for this variable also come from the *Statistical Abstract of the United States*, U.S. Census Bureau, various years].

% Tourism, defined as 100 multiplied times Hotel, motel, and tourist court receipts divided by total retail sales, is from the *Census of Service Industries*, U.S. Census Bureau, various years.

% Metro [the percentage of state population residing in metropolitan areas], and **% Unemployment** [the percentage of state population that is unemployed] are from Carl Moody's Webpage (<http://faculty.wm.edu/cemood/research.html>) and from the *Statistical Abstract of the United States*, U.S. Census Bureau, various years.

Income Per Capita, real disposable income in thousands of dollars divided by the number of persons age 18 and over, is from *Regional Accounts Data*, U.S. Bureau of Economic Analysis, various years, found at <http://www.bea.doc.gov/bea/regional/spi/>.

U.S. Census Bureau defined regions are the basis for: (1) **Midwest Region**, a dummy variable = 1 for the Midwestern states (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin) and 0 otherwise; (2) **West Region**, a dummy variable = 1 for Western States (Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming) and 0 otherwise; and (3) **South Region**, a dummy = 1 for Southern states (Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia) and 0 otherwise.

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