A THEORY OF THE POLITICALLY OPTIMAL COMMODITY TAX

CARLOS SEIGLE*

A theory of the politically optimal tax is developed where tax rates are endogenous and determined by forces in the political market. The theory is used to explain the levels of alcoholic beverage taxes between states in the United States. It is shown that these rates are influenced by the ownership structure existing in the liquor industry, the consumption externalities associated with drinking, the minimum drinking age laws, the earmarking of tax revenues, the enforcement of regulations and real income.

1. INTRODUCTION

Over the past fifteen years an economic approach to political behavior has emerged which emphasizes the role the political market serves in redistributing wealth. In this approach, which was introduced by Stigler [1971] and extended by Peltzman [1976] and Becker [1983; 1985], the political agents (elected representatives) are seen as transferring wealth to dominant subsets of their constituency in order to maximize political support. In other words, the dominant groups are effectively given the right to tax the wealth of the opposing interests. Most of the applications in this area relate to the regulatory process, with the maximizing agents being the politicians who control regulations.

Coinciding with these developments has been a substantial literature on the role of taxation in achieving a vast array of objectives usually related to some criteria of social welfare. This literature ranges from studies of the socially optimal income tax to those which emphasize the role of taxes in reducing externalities. Recently, a number of empirical works have studied the effectiveness of taxes on alcoholic beverages in achieving some implied socially desirable objectives. These range from Saffer and Grossman [1987] on the use of taxes in lowering traffic fatalities to Cook and Tauchen [1982] in reducing excessive drinking. Since taxes are generally viewed as exogenous in these works, there seems to be a need to complete the system by introducing the political market to explain their determination, especially if these rates tend to deviate from those implied by some social welfare criteria. This paper addresses the need by emphasizing the redistributive role played by government. Although concentrating on the determination of commodity taxes, the model permits generalization to other taxes.

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In this model, taxation is important for two reasons. First, it provides the legislature with the revenues needed for public spending and thereby gaining support from the beneficiaries of these expenditures. Second, the level and incidence of taxes alters the support forthcoming from the affected groups. Emerging from the process of balancing these two opposing concerns is a theory of optimal commodity taxation, not based on distributional considerations (as implied by the application of the concept of distributional weights), but instead on political distributional weights.

This model is applied to explain the level of taxes on liquor and beer across states. From it several propositions emerge: (1) if there are no externalities, the tax rate will never be set so as to place the consumption of a commodity in the elastic portion of the tax revenue curve; (2) the ownership structure of the alcoholic beverage industry will affect the level of the tax rate, more specifically, states with government liquor monopolies will tend to have higher tax rates; (3) the tax rate moves inversely with other demand or supply reducing regulations, e.g., the minimum drinking age. These and several other propositions are tested empirically.

II. A POLITICAL DISTRIBUTIONAL WEIGHTS MODEL

The legislature is seen as maximizing a function which maps the set of legislative choices to the support it receives from its constituency. More specifically, it determines the amount of a public good, \( X \), it wishes to provide along with the taxes to finance this expenditure. The financing option is limited to an excise tax, \( T \), on some private good, \( Y \) (alcoholic beverages). For simplicity, assume that no distortions exist in the market for goods which are substitutes or complements to \( Y \). If there are no administrative costs in collecting and distributing tax revenues, then

\[
X = T \cdot Y. \tag{1}
\]

Note that \( Y \) represents the legal consumption of liquor and, therefore, is less than or equal to total consumption.

The equilibrium quantity consumed of the commodity depends upon the tax rate, \( T \), real income, \( P \), and a vector of regulatory parameters, \( R^0 \), which affect the demand and/or supply of the commodity. Therefore,

\[
Y = Y(T, P^0, R^0) \tag{2}
\]

1. More generally, \( X = \sum T_j Y_j + \sum T_i I_i - C(X) \),

where, \( T_j \) is the tax rate set on commodity \( Y_j \), \( T_i \) the rate set on income source \( I_i \) and \( C(X) \) the cost of administering the provision of \( X \). This includes the tax collection costs as well as the rents to the bureaucracy involved in supplying \( X \).
and is decreasing in the excise tax and other regulations. For example, an increase in the tax rate, the minimum drinking age or in the enforcement of existing liquor laws reduces the equilibrium quantity legally consumed. As Rodney Smith [1976] showed, they do so by shifting demand and supply away from legally produced and taxed alcoholic beverages to other commodities, including illegally produced and untaxed alcoholic beverages. Since consumers' surplus, producers' surplus and consumption externalities depend on the amount consumed, they are also decreasing in the tax rate and other restrictive regulations. For example, an increase in the minimum drinking age results in a decline in $Y$ by raising the transactions cost to those who previously were legally allowed to drink. This exclusion results in a reduction of consumers' and producers' surplus, as well as in the amount of an externality if one exists.

In the Pigovian tradition, the degree to which liquor consumers are taxed or regulated is facilitated by the claims of organized groups that liquor consumption imposes negative externalities on society. Yet, even if these claims are justified, the effectiveness of this solution is dampened by the fact that the tax structures of contiguous jurisdictions impose a constraint on the tax policies of any given state as Smith [1976], Wales [1968] and Whalen [1967] have shown. In addition, since bootlegging and moonshining emerge as taxes are raised, taxation as a form of reducing consumption externalities serves to shift consumption from legally to illegally purchased liquor and, as occurred during Prohibition, possibly lead to the fostering of organized crime while reducing tax revenues in the process. More specifically, the responsiveness of revenues to the tax rate,

$$\frac{\partial X}{\partial T} = T \frac{\partial Y}{\partial T} + Y = (1 + \varepsilon_{YT})Y \geq 0,$$

(3)

depending on whether $|\varepsilon_{YT}| \leq 1$

$$\varepsilon_{YT} = (\frac{\partial Y}{\partial T})(T/Y) = \frac{T}{Y} (\frac{\partial d}{\partial T} - \frac{\partial s}{\partial T}) .$$

$$(3')$$

The variables $\varepsilon_d$ and $\varepsilon_s$ are the elasticities of demand and supply for $Y$, and $P_d$ and $P_s$, the demand and supply prices.

The legislature’s political support from its constituency depends on the levels of public spending, $X$, consumers’ and producers’ surplus, $CS$ and $PS$, and the consumption externality, $E$. Formally,

$$S = S(X, CS, PS, E)$$

(4)

$$= S[X, f[Y(T, ^0, R^0)], h[Y(T, ^0, R^0)], z[Y(T, ^0, R^0)]]$$

2. Assume all the cross partials are zero.
and is assumed to be increasing in $X$, $CS$ and $PS$ and decreasing in $E$. Furthermore, assume diminishing marginal political productivity for each group and that the cross partial derivatives are all zero, which corresponds to an assumption of no envy on the part of each group.\(^3\)

The government's problem is:

$$\max_{X,T,\lambda} L = S(X, CS, PS, E) + \lambda(TY - X).$$

(5)

The first order conditions are:

$$S_1 - \lambda = 0,$$

(6)

$$S_2 f'Y_T + S_3 h'Y_T + S_4 e'Y_T + \lambda(Y + TY_T) = 0,$$

(7)

$$(TY - X) = 0,$$

(8)

where $S_2 = \partial S/\partial CS$, $f' = \partial CS/\partial Y$, and similarly for $PS$ and $E$. Combining (6) and (7) and rearranging gives

$$[(S_2 f' + S_3 h' + S_4 e') e_{YT}] / [(1 + e_{YT}) T'] = -S_1.$$  

(9)

Equation (9) states that on the margin the government chooses the tax rate so that the additional support it receives from spending the tax revenue and reducing the externality is just equal to the loss in support resulting from the reduction in consumers' and producers' surplus.

The optimum values of $T$ and $X$ are derived by using equations (8) and (9). This is shown graphically in Figure 1, where $(X^*, T^*)$ are the optimum values yielding a level of support to the legislator of $S^0$. From these first order conditions, the first proposition is derived.

**PROPOSITION 1.** A support maximizing politician will never operate in the elastic portion ($|e_{YT}| > 1$) of the tax revenue curve, $X$, if either: (a) there is no externality ($e' = 0$), or (b) the marginal influence of the taxed group is greater than that of the group affected by the externality ($S_2 f' + S_3 h' > |S_4 e'|$).

\(^3\) Furthermore, assume all other forms of regulation on alcohol consumption have already been determined. In other words, assume that the preferences of the political agents take a specific functional form, e.g., separability, thereby allowing one to view the regulatory process as being multi-staged for many issues. This assumption may be justified by noting that, for example, over the past forty years the minimum drinking age has been changed on average only twice in most states. This rigidity seems to exist in other regulations.
The politically optimal tax rate, $\tau^*$, is derived by substituting for $\epsilon_1, f'$ and $h'$ in (9) yielding

$$\tau^* = \frac{(P^d/P^s) \left[ (S_2/S_1-1)/\epsilon_{d_1} \right] - (S_2/S_1-1)/\epsilon_{s_2} - (S_2/S_1) (z'/P^s)\right]}{T^*/P^s},$$

(10)

where $\tau^* = T^*/P^s$.

The optimal rate is a function of the elasticities, the demand and supply prices, the marginal externality and $S_i$, the marginal political productivity of group $i$. These latter are defined here as political distributional weights, to distinguish them from the concept of distributional weights in applied welfare economics as discussed by Harberger [1978]. These weights are not arrived at by a social planner nor necessarily derived from a social welfare function, but are endogenous, being determined by the relative influence of participating groups.

For example, in equation (10) if $S_1 = S_2 = S_3$ and $z' = 0$, then the optimal tax is zero. This corresponds to the results presented by Harberger [1978].
when the distributional weights for consumers, producers and tax revenues are all equal to unity. In our analysis, whether consumers or producers are taxed ($T' > 0$) or subsidized ($T' < 0$) depends upon their relative influence, with the amount of the tax or subsidy depending upon the elasticities of the commodity in question. Also note that if $S_4 \neq 0$ and $z' > 0$, then $\tau'$ is higher for a commodity associated with a negative externality. Finally, the following proposition is derived from equation (10).

**PROPOSITION 2.** An increase in either the elasticity of demand or supply, while holding the level of consumers' and producers' surplus constant, leads to a decline in the politically optimal tax rate.

**COROLLARY 1.** If the government operates in the inelastic portion of the revenue curve, an increase in deadweight loss results in a decline in tax revenues and, therefore, in the expenditure on the public good.

The more elastic either curve becomes, the greater is the deadweight loss resulting from any given tax rate and, therefore, the politically optimal tax rate and revenue declines. It should be noted that the preceding proposition and corollary are consistent with the results derived by Becker [1983; 1985].

### III. COMPARATIVE STATICS

There is probably no commodity or service which has been the subject of more government attempts at regulation and taxation than alcoholic beverages. As a source of government revenues, Federal taxes on liquor provided for the majority of the government's Internal Revenues until the introduction of the income tax in 1913. Coinciding with this decline in the importance of liquor taxes was the increased influence of the Temperance Movement, which resulted in the passage of the 18th Amendment to the U.S. Constitution (Prohibition). Prohibition lasted from 1919 until its repeal in 1933 at which time each state decided on the supply arrangement for the wholesale and retail industries. The two options most considered were the licensing of outlets or their placement under the state's control. As Borcherding [1983; 1988] has indicated, the determinants of the supply arrangements will be the cost of monitoring and enforcing private contractual agreements and the government's desire for redistributing income which is made easier by public ownership. Two studies which emphasize these factors are Acheson [1977], documenting the extent of income transfers to Ontario wine producers through the pricing policies of government liquor dispensaries, and Seiglie [1985] which emphasizes the demand for public ownership by groups opposed to liquor consumption because of the lower monitoring cost provided by this form.

As a result, there are presently eighteen states in the United States where the government engages in the sale of distilled spirits, often wine and some-
times beer at the wholesale level (sixteen of these at the retail level). These states buy directly from suppliers and, in general, sell for off-premise consumption in government-owned and operated stores or state agencies. Their main source of tax revenue comes from excise taxes and the markups or monopoly profits derived from their sales. These are generally referred to as control states. The remaining states are referred to as license states. These permit private individuals to secure licenses to conduct all phases of the wholesale or retail sale of beverage alcohol and derive their tax revenues mostly from excise taxes and license fees. It should be pointed out that all states license the sale of beer to private retailers.

Since the government assumes the function of both wholesaler and retailer of liquor in control states, one would expect that the legislature’s support function does not include the wholesaler’s (retailer’s) interest. Therefore, if the liquor market and the political influence of consumers and those affected by the externality is the same in either type of state, at any given $T$, the slopes of the control state’s iso-support curves are less steep. Therefore, it is tangent to the revenue curve at a higher $T$. This is illustrated in Figure 2. We therefore state our next proposition.

**Proposition 3.** The average tax rate on liquor is higher in states operating a government monopoly, than in those where private retailers are licensed.

In other words, if the market for distilled spirits is assumed the same in control and license states and the demand by the constituencies for the public good is the same, one would expect the control states to have a higher average tax rate on liquor since opposition from wholesalers and retailers to the tax is not a constraint on the state’s behavior. Therefore, these states have an extra “degree of freedom” in choosing the rate and should be less responsive to the incidence of the tax on producers’ surplus, since part of the tax, although not all, falls on themselves. As is the case for license states, part of the tax falls on the distillers or bottlers of liquor. These are concentrated in just a few states in the country, such as Kentucky and California, and more importantly, since foreign imports account for nearly 40 percent of domestic consumption, part of the tax falls on foreigners. In addition, as should be expected, most states tax “foreign” (produced outside of state) beverages at a higher rate than domestically produced brands.

4. The same result holds if one employs Becker’s (1983) or Borcherding’s (1983) frameworks. Assuming there are $N$ liquor groups being taxed in the license states, there are at least two less (no state retailers and wholesalers) in the control states. If there are an equal number of identical subsidized groups in both and the $N - 2$ groups in both states have the same political effectiveness, Becker’s approach implies that tax rates will be higher in the control states. Similarly, using Borcherding’s framework, if monitoring and enforcement costs are assumed the same for either type, then one should observe public ownership in states having a stronger desire to redistribute income. If taxation is a complementary instrument in achieving this goal, then the tax rate must be higher in these states (if $|\eta_T| \leq 1$).
Next, suppose that as a result of a change in the political structure an interest group emerges which pressures for a change in the minimum drinking age, $M$. Such a change occurred during the Vietnam War era when the passage of the 26th Amendment to the Constitution lowered the voting age to eighteen and, consequently, led to a majority of states lowering their minimum drinking age. In general, minimum drinking age laws will not be totally effective in prohibiting consumption of alcohol by minors, but at least they serve to raise the transaction costs to those under the legal age and therefore, as Coate and Grossman [1988] have shown, consumption is less when a state adopts a higher age.

5. For reasons of tractability, the demand and supply curves are assumed linear. This implies that if

$$f = \int_0^e p'(y)dy - p'dy_e$$

and $f' = -Y_e \partial p'/\partial Y = -p'/\epsilon > 0$, then

$$f'' = -p'/Y_e \epsilon > 0$$

and likewise for producers' surplus.
Using equation (10), we can solve for the effects of a change in $M$ or equivalently, $R$, on the tax rate:

$$dT/dM = - \left\{ \left[ S_{11} T^2 + S_{22}(P^d/e_d)^2 + S_{33}(P^c/e_c)^2 + S_{44}(z')^2 \right](Y/T) \varepsilon_{\gamma T} \right\}$$

$$+ S_{11} X - \left[ S_2 (P^d/e_d) - S_3 (P^c/e_c) \right]$$

$$+ \varepsilon_4 (z'-z''(1+\varepsilon_{\gamma T}) Y/e_{\gamma T}^2 \right] \varepsilon_{\gamma T}^2[T(1+\varepsilon_{\gamma T})]} \right\} Y_m/D,$$

where $D$ must be negative if the second order condition for a maximum is to hold.

If the government is operating in the inelastic region of the revenue curve, every term in the numerator has a positive sign with the exception of $S_{11}X$. So long as the marginal political support of the constituency receiving the public good is not diminishing too rapidly relative to the other terms, the numerator will be positive. Therefore, if the above conditions hold, then (11) will be negative.

**PROPOSITION 4.** An increase (decrease) in the minimum drinking age results in a decrease (increase) in the average tax rate on alcoholic beverages.

Intuitively, the state in lowering the minimum drinking age increases consumers' and producers' surplus. In the case of consumers, only those who were previously excluded gain. Therefore, the state taxes some of these gains and with the additional revenue supplies a greater amount of the public good, thereby generating more support as shown in Figure 3. They will raise $T$ by an amount that still leaves producers better off than before the lowering of the drinking age. Given that older consumers will tend to have a high cost of organizing and relatively small per capita losses from the tax, they will incur the largest burden. In other words, there is a cross subsidization from those over the previous drinking age who now pay higher taxes, to those who are now legally allowed to drink, as well as to the retailers, wholesalers and producers of alcoholic beverages. The higher tax also reduces the amount of the externality.

Next, let us solve for the effect of real income on the tax rate. Assuming $\partial^2 Y/\partial T \partial l = 0$, we get

$$dT/dl = - \left\{ \left[ S_{11} T^2 + S_{22}(P^d/e_d)^2 + S_{33}(P^c/e_c)^2 + S_{44}(z')^2 \right](Y/T) \varepsilon_{\gamma T} \right\}$$

$$+ S_{11} X - \left[ S_2 (P^d/e_d) - S_3 (P^c/e_c) \right]$$

$$+ \varepsilon_4 (z'-z''(1+\varepsilon_{\gamma T}) Y/e_{\gamma T}^2 \right] \varepsilon_{\gamma T}^2[T(1+\varepsilon_{\gamma T})]} \right\} Y_l/D.$$
In this case, the sign of the numerator depends upon the income elasticity of demand for the commodity. If the conditions discussed above hold, the sign would tend to be positive, zero or negative depending upon whether the income elasticity is greater, equal or less than zero. In addition, the sign is made more ambiguous if one considers that a majority of states have an income tax and, therefore, increases in income would lead to increases in tax revenues. For example, if liquor is an inferior good, the increase in income would lead to an increase in tax revenues from income, but to a decrease in revenues from liquor as consumption falls. A more complex analysis would have to take into account the elasticities of substitution between different instruments of taxation in affecting support since the legislator would then be choosing over the set of taxing instruments.\(^6\)

\(^6\) If \( X = TY + F(I) \), the first term in (12) becomes \( S_{11}T + F'Y \), instead of \( S_{11}T^2 \).
Finally, from the comparative statics of the model one can derive the effects that state control, the minimum drinking age and income have on total tax revenues, \( X \).

COROLLARY 2. If \( |\varepsilon_{RT}| < 1 \), then total tax revenue from distilled spirits is higher in states where the retail ownership structure is a government monopoly, than in those where private retailers are licensed.

Given that the government does not operate in the elastic portion of the revenue curve, a higher tax rate in control states implies higher tax revenues as well.

COROLLARY 3. An increase (decrease) in the minimum drinking age results in a decrease (increase) in tax revenues from the corresponding beverage.

COROLLARY 4. An increase in income results in an increase (decrease) in tax revenues from the particular beverage if the income elasticity for the beverage is greater (less) than zero (assuming \( |\varepsilon_{RT}| \leq 1 \) and \( S_{11}X \) is "small" as previously defined).

IV. EMPIRICAL EVIDENCE

The propositions derived from the comparative statics were all conditional on the government operating in the inelastic portion of the revenue curve. Proposition 1 presented the sufficient conditions for this to hold. Therefore, it is appropriate to begin by deriving estimates of the elasticity of the revenue curve. In order to estimate the elasticity, the log of tax revenues per capita from the sale of each alcoholic beverage is regressed on the log of the average tax rate per gallon of distilled spirits and, correspondingly, on the log of the average tax rate per barrel of beer. The measure tax revenues per gallon was used since it is an average tax rate which incorporates excise taxes, license fees and the monopoly tax, all of which serve to decrease consumers' and/or producers' surplus. For example, a consumer should be indifferent between a license state setting the license fee and excise tax such that it raises the price of a gallon of vodka 10 percent above the competitive price and a control state setting the markup to raise the price by the same amount. Using a cross-section of the fifty states, we obtain the following results (t-statistics are in parentheses):

\[
\text{Liquor Revenues per capita} = 1.20 + 0.70 \text{ Liquor Rate, (13)} \\
(6.29) \\
R^2 = .45
\]
Beer Revenues per capita = .82 + .53 Beer Rate, 
(14) 
(5.10)

\[ R^2 = .35 \]

The coefficients above are positive and less than one as should be the case. Therefore, a higher tax rate results in higher revenues, an implication of the model if legislators operate in the inelastic section of the revenue curve.

In order to test the other propositions, the log of tax revenues per gallon of distilled spirits is regressed on the log of real per capita income, the expenditure on enforcement of alcoholic beverage laws, on a measure of the degree of religious opposition to liquor, and on three dummy variables, one indicating whether the state was a control or license state, the second indicating whether tax revenues were used by the state for general purposes or targeted to specific groups or programs and the third corresponding to whether the minimum drinking age for distilled spirits was low or high.7 Let me briefly discuss these variables.

Since the effectiveness of regulation—the amount by which the regulated equilibrium differs from the unregulated—depends upon the degree of enforcement, expenditure on enforcement will be important. More specifically, \[ |\epsilon_{YT} | \] is a declining function of enforcement expenditures if these expenditures are directed at reducing or eliminating the supply of illegally produced substitutes for the commodity in question. On the other hand, if enforcement is directed only at the legal market this would tend to increase \[ |\epsilon_{YT} | \] and, as a result, the deadweight loss from the tax. Therefore, since the effects of enforcement on \[ |\epsilon_{YT} | \] and on deadweight loss is ambiguous, the expected sign of enforcement expenditure on tax rates is also ambiguous. Two proxy variables are used. The first, Enforcement/Establishment, is the amount spent on enforcing and administering liquor regulations per liquor store and drinking establishment in the state. One would expect that if these expenditures are directed at the legal market, the higher they are, the greater the probability of detecting malfeasance on the part of the alcoholic beverage industry and, therefore, the lower the number of violations of liquor regulations. Since there probably exists economies of scale in enforcement (with population density and distribution affecting the effectiveness of expenditures), the sec-

7. Data is from the Distilled Spirits Council of the United States Annual Statistical Review and Public Revenues from Alcoholic Beverages; Quinn et al., Churches and Church Membership in the U.S. 1980; and Statistical Abstract of the U.S. All the data is for 1979 with the exception of enforcement expenditures, which is for 1975 (the last year it was compiled by DISCUS), and the religion data, which is for 1980. Tax revenues per wine barrel of beer have been converted from figures on tax revenues per wine gallon of beer.
ond variable used was the aggregate variable, *Enforcement Spending*, measuring the total expenditure on enforcement and administration.

The variable *Temperance* is defined as the number of Southern Baptists and Mormons as a percent of the state’s total population and is a proxy for the temperance sentiments of the constituency. This proxy and similar ones have been used by many, including Saffer and Grossman [1987], Smith [1982] and Toma [1988]. The tax rate should be positively related to this measure if there are consumption externalities ($z' > 0$) and if the group has influence in the political market ($S_4 < 0$).

The variable *Public Ownership (wholesale)* is defined as taking on a value of one if it is a control state at the wholesale level and zero if it is a license state at this level. *Public Ownership (retail)* is defined similarly but at the retail level. *Liquor Minimum Age* and *Beer Minimum Age* are defined as having a value of one if the minimum legal drinking age is high (20, 21) and zero if it is low (18, 19).

Finally, *Interest Group* is a proxy for the degree of influence of the recipients of the tax revenues from alcohol. Most states place the tax revenues, store profits and license fees in their General Fund, but some allocate them for specific groups or projects. For example, Colorado allocates 85 percent to the Old Age Pension Fund and the remainder to the general fund, whereas Arizona allocates its revenues to the Dept. of Mental Retardation, the public employment and welfare relief fund and to school aid, with the remainder to the general fund. The variable *Interest Group* is set to equal one if the state disburses any percentage of tax revenues from alcohol to a specific group, and zero otherwise. Presumably if revenues are targeted for specific groups, these are better organized and therefore more effective in exerting influence to raise taxes. This is equivalent to $S_4$ being higher at any given level of $X$ in those states with defined recipient groups. The results are shown in Table I.

The estimated coefficients of both *Public Ownership* and *Liquor Minimum Age* conform to Propositions 3 and 4 and are significant. In the case of distilled spirits, public ownership results in higher average taxes on liquor. The effect of lowering the minimum drinking age is to raise the average tax rate. The state lowers the age, but taxes part of the gain consumers and producers derive from the policy change. This result is contrary to what would be expected if the sole objective of government is to reduce the externalities involved in the liquor market, since in that case high taxes would be associated with high minimum drinking ages. The sign of *Temperance* is positive, implying that as the proportion of the state's population which views alcohol consumption as an externality (sinful?) increases—the magnitude of $S_4$ increases at every level of $E$ —the state responds by raising taxes in order to reduce consumption and gain political support. The first measure of enforcement is insignificant, whereas the second, *Enforcement Spending*,
TABLE I
OLS Estimates for the Tax on Distilled Spirits

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<thead>
<tr>
<th>Variable</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
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<td></td>
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<td>.69</td>
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<td>t-ratios in parenthesis.</td>
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</tbody>
</table>

is positive and significant, implying that if this proxy is measuring enforcement expenditures which raise the cost of substitutes for legally consumed liquor, the resulting increase in demand for legal consumption will be met by higher taxes. For the above variable to be theoretically plausible, the effectiveness of enforcement should be independent of the size of the liquor market. The effect of income on the average tax rate on liquor is insignificant. Finally, as expected, Interest Group is positive and significant at the 0.05 level for two of the equations and at the 0.10 level for a third, i.e., if the revenues from taxation are earmarked for a specific group, their greater efficiency in exerting influence will lead to higher tax rates and revenues.

Next, the propositions are tested for the case of beer. Since private retailers are allowed to sell beer in control states, the effect of taxation on producers' surplus is a consideration for legislators in control states as it is
for those in license states. Therefore, the degree of freedom that control states have in setting liquor tax rates is eliminated. The results are shown in Table II where the dependent variable is the log of tax revenues per barrel of beer, Beer Rate.

In the case of beer, the effect of ownership structure is small and insignificant as should be expected. Again it should be emphasized that in most cases control state government stores tend to sell beer, but they must compete with private retailers who are permitted to sell it as well. As for the other variables, the coefficient of Beer Minimum Age is negative and statistically significant. Therefore, lowering the minimum drinking age for beer results in the state raising the average tax rate on beer. In addition, an increase in income leads to a reduction in the average tax rate on beer. This result is consistent with our model if beer has a low income elasticity, an observation
which seems to be supported by the empirical evidence. Note that the coefficient of Interest Group is positive, yet insignificant. More interesting, Temperance is not a significant variable for the taxation of beer. This may be explained by the fact that Southern Baptists are concentrated in the South where beer consumption has historically been low, and therefore it would be more efficient for them to direct resources at opposing the relatively more consumed and higher in alcoholic content beverages.

In Table I tax revenues per gallon of distilled spirits are used in order to compare the tax rates in different ownership structures. Let us now test proposition 4 by looking only at the license states. The log of the excise tax rate on distilled spirits, Liquor Excise Tax, is regressed on the log of per capita income and on the minimum drinking age. The results follow:

\[
\text{Liquor Excise Tax} = 2.75 - .30 \text{ Liquor Minimum Age} - .22 \text{ Income.} \quad (15)
\]

\[
(-2.94) \quad (-0.54)
\]

The results above are consistent with proposition 4, providing further evidence that states tend to tax the benefits provided to young adults and retailers when they decrease the legal drinking age. Since all states permit private retailing of beer, Table II above is the analogous specification.

Next, let us test corollaries 2, 3 and 4, namely that a state monopoly leads to higher tax revenues; that lowering the minimum drinking age results in a rise in tax revenues derived from the particular beverage; and that the effect of income on revenue depends upon the income elasticity for the beverage. To test these, the log of tax revenues from the sale of the particular beverage is regressed on the log of real income, Aggregate Income, Public Ownership (wholesale), population, and to the minimum drinking age. The results follow (t-statistics in parentheses):

\[
\text{Liquor Revenues} = -4.0 + .72 \text{ Aggregate Income} + .52 \text{ Public Ownership} \quad (16)
\]

\[
(1.89) \quad (5.28)
\]

\[
- .19 \text{ Liquor Minimum Age} + 29 \text{ Population} \quad (-2.05) \quad (0.75)
\]

\[
R^2 = .92
\]

\[
\text{Beer Revenues} = 10.4 - 1.1 \text{ Aggregate Income} - .22 \text{ Public Ownership} \quad (17)
\]

\[
(-2.43) \quad (-1.87)
\]

\[
- .38 \text{ Beer Minimum Age} + 2.2 \text{ Population} \quad (-4.80) \quad (4.80)
\]

\[
R^2 = .91.
\]
All the coefficients conform to corollaries 2 and 3 with the exception of Public Ownership for the case of beer. Given the results in Table II showing no significant difference in tax rates on beer between the license and control states, the negative coefficient for Public Ownership is consistent with smaller beer consumption in the latter states. The coefficients for income are positive for the case of distilled spirits and negative for beer, results most consistent with beer having a low or negative income elasticity and liquor having a relatively higher one. This lower or negative income elasticity for beer implies that the share of beer in total expenditure is higher than liquor's in the early stages of the life cycle and, therefore, lowering the legal minimum drinking age should shift the demand curve for beer relatively more than for liquor. In fact, the higher coefficient for Beer Minimum Age than for Liquor Minimum Age is consistent with this proposition.

V. SUMMARY

In the classical public finance literature both the tax rate and the distributional weights attached to the welfare changes of groups are treated as exogenous variables. This paper presents a framework where both are in fact endogenous, being determined and influenced by forces in the political market. In particular, an analysis of the effects of minimum drinking age laws, ownership structure, religious sentiments, enforcement, earmarking of tax revenues and income on taxes on alcoholic beverages was conducted. As mentioned above, claims by organized groups of the existence of consumption externalities facilitate the taxation or regulation of the good or service in question. In the case of alcohol, the Anti-Saloon League was formed during the latter part of the last century and managed to pressure government into prohibiting the consumption of alcohol because of its purported "sinfulness." Recently, several groups have formed to pressure legislators into enacting stricter regulations, including raising the minimum drinking age, in order to reduce the number of accidents on the road. This pattern of loosening and tightening of regulations points to the need for future research to be directed at explaining the formation of pressure groups through time, since up to now all models have assumed this process to be exogenous. Only then will we be able to explain a phenomenon such as Prohibition.
REFERENCES


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