ADVERTISING RESTRICTIONS, COMPETITION, AND ALCOHOL CONSUMPTION

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Distilled spirits producers recently voted to eliminate their voluntary ban on broadcast advertising. The ban received public support because of the high social cost associated with alcohol consumption and the belief that advertising promotes alcohol consumption and abuse. In spite of this belief, the empirical evidence indicates that advertising has no significant effect on the market demand for distilled spirits. This evidence has led many policy economists to conclude that eliminating the ban will have no effect on alcohol consumption. The purpose of this research is to show that this conclusion is incorrect because it ignores the fact that advertising restrictions may affect industry competition as well as market demand. (JEL D4, I18, L66, M37)

I. INTRODUCTION

Distilled spirits producers voluntarily agreed to ban the use of radio advertising in 1936 and television advertising in 1948. The ban received little opposition because advertising is thought to increase alcohol consumption and generate social costs of more than $100 billion each year (U.S. Department of Health and Human Services, 1995). In recent decades, however, distilled spirits producers have lost market share to beer and wine producers, who have continued to use broadcast (radio and television) advertising. For example, the distilled spirits share of all alcoholic beverages fell from 6.3% to 4.9% from 1985 to 1995 (Brewers Almanac, 1990, 1998). This decline in share and an interest in competing on a “level playing field” motivated Seagram Americas to break the voluntary ban by airing a television commercial for its Crown Royal whiskey in June 1996. Other distillers followed with their own broadcast advertising, and on November 7, 1996, the Distilled Spirits Council of the United States voted unanimously to rescind its voluntary ban on broadcast advertising. (For an excellent account of the these events, see the National Council of Alcoholism and Drug Dependence, Inc. et al. [1997] and the Center for Science in the Public Interest [1998].)

This vote has ignited a public policy debate regarding the impact of broadcast advertising on distilled spirits consumption. Concern with eliminating the ban is based, in part, on the belief that such restrictions reduce market demand and, therefore, alcohol consumption (Wallack, 1983; Martin, 1995; Hacker, 1998). The empirical evidence appears to dispute this belief, however. For example, a study by Nelson (1999) clearly shows that although beer, wine, and distilled spirits advertising affect brand choice, it has little or no effect on the aggregate demand for alcoholic beverages. Comprehensive reviews of the literature for the United States, Canada, and several European countries by Smart (1988), Fisher (1993), Calfee and Schergata (1994), and Bang (1998) generally confirm that advertising has no significant effect on the market demand for alcoholic beverages.

Unfortunately, this evidence has led to the policy conclusion that advertising and therefore advertising restrictions have no effect on the equilibrium level of alcohol consumption. This is based on the presumption that because advertising has no significant effect on market demand, it cannot affect...
consumption. For example, Duffy (1995, 575), who finds that advertising has no significant effect on the demand for beer, wine, distilled spirits, and tobacco concludes that "there is very little in our results to support the view that advertising restrictions, including complete bans, are likely to be an effective way of restraining the consumption of these products to any significant extent." This conclusion is incorrect, however, if an advertising restriction also affects the degree of price competition, a factor that is ignored in previous policy discussions of the impact of advertising restrictions on alcohol consumption.

Although many have ignored the price effect of advertising in this policy debate, it has been discussed in the literature. For example, Tremblay and Tremblay (1999) argue that even though previous research shows that advertising and advertising restrictions have no significant effect on cigarette demand, advertising restrictions may reduce price competition and, therefore, cause cigarette consumption to fall (see Duffy [1996] for a review of this literature). In addition, Motta (1997) uses a duopoly model of persuasive advertising to show that an advertising ban can increase the equilibrium level of consumption even when the ban has no effect on market demand.

The purpose of this article is to develop a formal model that explains how an advertising restriction can affect market demand, price competition, and the equilibrium level of consumption in an imperfectly competitive market like that of distilled spirits. This formalizes the argument of Tremblay and Tremblay (1999) and provides a modeling approach that is useful to policy economists because it can be estimated more readily than the model suggested by Motta (1997). The model herein shows that understanding and accurately estimating the demand and competitive effects of advertising will enable economists to make more accurate policy recommendations regarding the welfare effect of advertising and advertising restrictions.

II. ADVERTISING RESTRICTIONS AND DISTILLED SPIRITS CONSUMPTION

With considerable product differentiation and a four-firm concentration ratio of 53% (U.S. Bureau of the Census, 1992), the U.S. distilled spirits industry can be classified as oligopolistic. (Scherer and Ross [1990], 82, define an oligopoly market as one with more than one firm and a four-firm concentration ratio of 40% or more.) Once a distilled spirits producer enters the market and creates a brand with a particular set of attributes, the firm will compete in output (or price) and advertising. Producers may use advertising to lure customers away from rivals, to prevent established customers from switching to competing brands, and to attract new customers into the market. Because the market for alcoholic beverages is well established, advertising may attract very few new customers. Nevertheless, a firm may still choose to advertise in an effort to expand or defend its market share. In such a case, an advertising ban will have little or no effect on market demand, an implication that is consistent with the empirical evidence for alcoholic beverages.

Even if advertising has no direct effect on market demand, it can still influence the market through its effect on the level of price competition. There is considerable debate regarding the effect of advertising on competition (see Scherer and Ross [1990] and Carlton and Perloff [2000] for a discussion of these differing views of advertising). At one pole, advertising may provide consumers with useful information about price and product characteristics. Grossman and Shapiro (1984) show that informative advertising leads to greater price competition in a duopoly setting where firms simultaneously choose prices and advertising. Alternatively, advertising may increase consumer brand loyalty by persuading consumers to favor one brand over another. Using a modeling strategy similar to Grossman and Shapiro (1984), Von der Fehr and Stevik (1998), and Tremblay and Martins-Filho (forthcoming) find that when advertising increases brand

1. This is the conclusion of those authors listed in the previous paragraph and of the Federal Trade Commission (1985). Government support for this position continues, as both the Federal Communications Commission and the Federal Trade Commission investigated but did not challenge the vote of the Distilled Spirits Council of the United States to lift the broadcast advertising ban. Instead, the Federal Trade Commission recommended that the distilled spirits industry self-regulate its broadcast advertising and recommended that it avoid promoting alcohol to underage consumers (Federal Trade Commission, 1999).
loyalty, it leads to higher market prices. This suggests that advertising (or an advertising restriction) may affect the equilibrium level of consumption in two ways. It can shift market demand and/or change the degree of price competition and, therefore, quantity demanded.

Confusion about the effect of an advertising restriction on the equilibrium level of consumption can result if one incorrectly uses a monopoly model to describe an imperfectly competitive market. To illustrate, consider a monopoly firm with two choice variables: output ($q$) and a quality-adjusted level of advertising ($A$). The firm's goal is to simultaneously choose $q$ and $A$ to maximize the following profit function ($\pi$):

$$
\pi = p[q, A(R)]q - c_q q - F - c(A),
$$

where $p$ is the price of output, $c_q$ is the marginal cost of production, $F$ is the fixed cost of production, $c(A)$ is the cost of advertising, and $R$ captures the restrictiveness of an advertising regulation. Let $R \in [0, 1]$, where $R = 0$ when there are no advertising restrictions and $R = 1$ when the restriction just makes advertising completely ineffective. Advertising regulations operate by reducing the effectiveness or quality of advertising, such that $\partial A/\partial R < 0$ and $\partial^2 A/\partial R^2 > 0$. Assuming production and advertising are profitable, the first-order conditions of this problem are

$$
(\partial \pi/\partial q) = p + (\partial p/\partial q)q - c_q = 0;
$$

$$
(\partial \pi/\partial A) = (\partial p/\partial A)q - c_A = 0,
$$

where $c_A$ is the marginal cost of advertising ($c_q$ and $c_A$ are assumed to be constant).

The Implicit Function Theorem is used to evaluate the effect of a change in $R$ on the equilibrium level of consumption. This is accomplished by rearranging the first-order conditions as follows:

$$
G_1(q, A; R) = p + (\partial p/\partial q)q - c_q - (\partial p/\partial A)q + c_A = 0.
$$

This function is identically equal to zero in the neighborhood of the optimum and is assumed to be once continuously differentiable in $q$ and $A$.

Comparative static analysis is complicated for a regulatory change, however. Given that $A(R)$ is strictly convex, an advertising regulation will have its greatest negative effect on advertising effectiveness from an unregulated state (when $R = 0$). In this case, let $\partial A/\partial R = -\alpha, \alpha > 0$. In the limit, as more and more restrictive regulations are imposed, the negative effect of an advertising regulation approaches 0. That is, $\partial A/\partial R$ approaches 0 as $R$ approaches 1. Because the impact of a broadcast advertising ban may have a range of possible influences on the effectiveness of advertising, it should be described by a subdifferential, $s[A(R)]$. In this case, the subdifferential is defined as the set of all possible slopes of the change in $A$ with respect to the change in the regulation that lie below the curve belonging to $A(R)$ in the relevant region of $R$ (Zeidler, 1985). As the marginal effect of an advertising regulation ranges from $-\alpha$ to 0, $s[A(R)]$ must have a negative sign. This formalizes the notion that a broadcast advertising ban will reduce the effectiveness of advertising.

Assuming initially that advertising increases market demand, the change in the equilibrium level of consumption ($q^*$) with respect to a change in an advertising regulation can be found by using the Implicit Function Theorem and appropriate subdifferentials.

$$
s[q^*(R)] = (-s[G_1(R)])/(\partial G_1/\partial q)
$$

$$
= -\left(\frac{\partial p}{\partial A}s[A(R)] + \frac{\partial^2 p}{\partial q \partial A}
\frac{\partial A}{\partial q}s[A(R)]q
\right)
\frac{\partial p}{\partial A}\frac{\partial^2 p}{\partial q^2}q
\frac{\partial p}{\partial A}\frac{\partial^2 p}{\partial q \partial A}q
\frac{\partial p}{\partial A},
$$

where $s[G_1(R)]$ is the change in $G_1$, due to the advertising ban and $s[q^*(R)]$ is the change in the equilibrium level of consumption due to the advertising ban. If output and advertising are complements in the production and sale of a product ($\partial^2 p/\partial p \partial A > 0$) as Becker and Murphy (1993) claim, then the denominator of equation (4) is negative. This implies that the sign of $s[q^*(R)]$
equals the sign of the portion of the numerator in parentheses. Because \( s[A(R)] < 0 \) and \( \delta^2 p/\delta A^2 < 0 \) (from the second-order conditions of profit maximization), \( s[q^*(R)] < 0 \). Thus, an effective regulation on advertising, such as a broadcast advertising ban, will reduce the equilibrium level of consumption when advertising has a positive effect on market demand.

If, however, advertising has no effect on market demand, as the empirical evidence for alcoholic beverages indicates, then \( \delta p/\delta A, \delta^2 p/\delta q \delta A \), and \( \delta^2 p/\delta A^2 \) equal zero. In this case, advertising restrictions have no effect on the equilibrium level of consumption. It is this model that many policy economists appear to have in mind when they conclude that advertising and advertising restrictions will have no effect on consumption because advertising has no significant effect on demand.

This model is inappropriate for the distilled spirits industry, however, because the industry is oligopolistic and not monopolized by a single firm. Thus, to better understand the effect of an advertising restriction on the output of an imperfectly competitive market, Bresnahan’s (1989) modeling approach is extended to include both supply and advertising relationships for an industry.\(^3\) These supply and advertising relations take the following form:

\[
(5) \quad p - \lambda_q [A(R)] q - c_q = 0;
\]

\[
(\delta p/\delta A) + \lambda_A q - c_A = 0.
\]

Except for the \( \lambda_q \) and \( \lambda_A \) terms, these relations parallel the monopolist’s first-order conditions found in (2). The first equation in (5), the supply relation, characterizes a perfectly competitive setting when \( \lambda_q = 0 \) and a monopoly or cartel setting when \( \lambda_q = -\delta p/\delta q > 0 \). Because price competition falls as \( \lambda_q \) increases, \( \lambda_q \) is frequently called a market power index. The second equation in (5), the advertising relation, characterizes the extent to which firms cooperate or compete in advertising. That is, when \( \lambda_A = 0 \), this condition matches that of a monopolist, and firms cooperate to choose the level of advertising that maximizes joint profits. If firms compete in advertising beyond the joint profit-maximizing level, then \( \lambda_A > 0 \).\(^4\) Thus, one would expect \( \lambda_q \geq 0 \) and \( \lambda_A \geq 0 \).

Finally, the degree of price competition may be affected by advertising and advertising regulations. That is, an increase in advertising will cause \( \lambda_q \) to fall if advertising promotes competition and will cause \( \lambda_q \) to rise if advertising is anticompetitive.\(^4\)

Again, the Implicit Function Theorem is used to evaluate how a change in \( R \) will affect the equilibrium level of consumption. In the case of imperfect competition, the aggregate supply and advertising relations are rearranged as follows:

\[
(6) \quad G_2[q, A; R] = p + \lambda_q [A(R)] q - c_q \]

\[
- \left( \left( \delta p/\delta A \right) + \lambda_A \right) q + c_A = 0.
\]

Under conditions similar to those of the monopoly case, the change in the equilibrium level of consumption with respect to a change in an advertising regulation is defined by the following subdifferential.

\[
(7) \quad s[q^*(R)] = -s[G_2(R)]/(\delta G_2/\delta q)
\]

\[
= -\left( \frac{\partial p}{\partial A} s[A(R)] - \frac{\partial \lambda_q}{\partial A} s[A(R)] q \right)
\]

\[
- \frac{\partial^2 p}{\partial A^2} s[A(R)] q
\]

\[
/ \left( \frac{\partial p}{\partial q} - \lambda_q - \frac{\partial p}{\partial A} - \frac{\partial^2 p - \lambda_A}{\partial A \partial q} \right).
\]

Because the sign of the denominator is negative, the sign of \( s[q^*(R)] \) is determined by

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\(^3\) According to Vives (1999, 186), one advantage of this modeling approach is that it makes it “possible to write in compact form different types of competition.” This allows one to analyze how different exogenous forces, like an advertising restriction, affect competition and the level of consumption in a particular market. In addition, this approach is relatively easy to implement empirically, as described by Bresnahan (1989). Tremblay and Tremblay (1995), and Farr et al. (2001).

\(^4\) One can also assume that \( \lambda_A \) is a function of \( A(R) \), which may be especially important in empirical applications. Assuming diminishing returns to advertising (that is, \( \delta^2 p/\delta A^2 + \delta \lambda_q/\delta A) q < 0 \)), this assumption has no effect on the comparative static results, however. The model becomes one of monopolistic competition by assuming noncooperative behavior and constraining profits to be zero in the long run. Comparative static results are unaffected by this assumption.
the sign of the portion of the numerator in parentheses.\textsuperscript{5} If advertising increases demand \((\partial p/\partial A > 0)\) and given that \(\partial^2 p/\partial A^2\) and \(s[A(R)]\) are negative, then the impact of an advertising regulation on the equilibrium level of consumption depends upon the impact of advertising on competition \((\partial \lambda_q/\partial A)\). If advertising increases price competition, then \(\partial \lambda_q/\partial A\) will be negative and an advertising restriction will unambiguously cause the equilibrium level of consumption to fall. If advertising decreases price competition, however, then \(\partial \lambda_q/\partial A\) will be positive and an advertising restriction will have an ambiguous effect on consumption. When \(\partial \lambda_q/\partial A\) is positive and sufficiently large, an advertising restriction can actually increase consumption.

When a market is imperfectly competitive, an advertising restriction can cause the equilibrium level of consumption to fall even if advertising has no effect on market demand \((\partial p/\partial A\) and \(\partial^2 p/\partial A^2 = 0)\). This can occur if advertising promotes price competition \((\partial \lambda_q/\partial A < 0)\), because a ban will lead to a higher equilibrium price, and, therefore, a reduction in the equilibrium level of consumption. Alternatively, consumption will rise if advertising reduces price competition. This demonstrates that it is incorrect to conclude that advertising and advertising restrictions have no effect on alcohol consumption solely because advertising has no effect on market demand.

Broadcast advertising of alcoholic beverages has elements of both persuasion and information (Bauer and Greyser, 1968; Resnik and Stern, 1977; Weinberger and Spotts, 1989). Thus, the impact of eliminating an advertising restriction on alcohol prices and consumption is an empirical question. This impact can be measured by estimating a structural model that includes a demand function, a supply relation, and an advertising relation.\textsuperscript{6} With estimates of this system of equations, one can correctly determine how advertising affects market demand, competition, and, therefore, the equilibrium level of alcohol consumption.

In general, previous studies demonstrate that advertising restrictions lead to higher equilibrium prices.\textsuperscript{7} In the distilled spirits industry, Luksetich and Lofgren (1976) and Milyo and Waldfogel (1999) find that price advertising leads to greater price competition.\textsuperscript{8} In the cigarette industry, Farr et al. (2001) show that the broadcast advertising ban, in effect since 1971, reduces price competition.

One might question how broadcast advertising, which rarely mentions price, could lead to greater price competition. One possible mechanism is that a firm may defend its market share from an increase in rivals’ broadcast advertising by lowering its price as well as by increasing advertising expenditures. In this case, a broadcast advertising ban will lead to higher average prices. Another possibility is that radio and television advertising may increase consumers’ brand awareness, which would promote competition if it makes it easier for firms to introduce new brands. Eckard (1991) argues that this is the mechanism that explains why the broadcast advertising ban reduced competition in the U.S. cigarette industry.

Because the distilled spirits and cigarette industries are both oligopolistic, have considerable product differentiation, and advertise with the same proportion of informative content (Bauer and Greyser, 1968), one may be able to gain insights into the consumption effect of an advertising regulation in the distilled spirits industry by combining empirical estimates from these two industries. Farr et al. (2001) find that the broadcast advertising ban in cigarettes caused the long-run equilibrium price to

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\textsuperscript{5} The sign of the denominator is negative if: (1) demand has a negative slope \((\partial p/\partial q < 0)\), (2) \(k_p\) and \(k_q\) are nonnegative, (3) advertising does not decrease demand \((\partial p/\partial A > 0)\), and (4) advertising and output are complements \([\partial^2 p/\partial A dq] > 0)\).

\textsuperscript{6} See Bresnahan (1989) for a description of this estimation technique and Tremblay and Tremblay (1995) and Farr et al. (2001) for empirical applications to the brewing and cigarette industries. Alternatively, one could estimate a reduced-form model of alcohol consumption, a suggestion of an anonymous referee.

\textsuperscript{7} For example, complete advertising bans reduce competition in the following industries: eyeglasses (Benham, 1972), cigarettes (Eckard, 1991; Farr et al., 2001), brewing (Sass and Saarman, 1995), retail gasoline (Maurizi, 1972), toys (Steiner, 1973), prescription drugs (Cady, 1976), and optometric services (Kwoka, 1984). See Scherer and Ross (1990) and Carlton and Perloff (2000) for a review of this evidence.

\textsuperscript{8} Milyo and Waldfogel (1999) find that prices are unaffected at nonadvertising stores, but this may be due to the fact that they are only able to analyze the short-term effects of advertising. In the long run, high priced, nonadvertising stores may either lower their prices or fail and exit the market.
effect, the raw data are consistent with these general conclusions. Table 1 compares prices, consumption, and advertising expenditures for the years just before (1995) and just after (1997) the vote to rescind the broadcast advertising ban. It shows that the price of distilled spirits fell relative to inflation and relative to the price of alcoholic beverages as a whole after the ban was lifted. Although the real price of distilled spirits fell by only 1.715%, this should be considered a short-term effect to deregulation. For example, Eckard (1991) finds that it took about six years for the cigarette industry to reach a long-run equilibrium after the broadcast advertising ban was implemented. Regarding the effect on advertising, total advertising expenditures of distilled spirits rose 7.815% and the proportion of the total devoted to television and radio advertising increased from 0.0% to 3.9% from 1995 to 1997 (a result consistent with the comparative statics of the impact of an advertising restriction on the equilibrium level of advertising). If the proportion devoted to broadcast advertising eventually reached that of beer (89.4%), wine (66.1%), or preban cigarettes (65.1%), then a larger price effect would be expected in the long-run (Adams Liquor, Wine and Beer Handbooks, various issues; Federal Trade Commission, 1996).

Finally, Table 1 shows that distilled spirits consumption increased by 1.679% between 1995 and 1997. Although this evidence is only suggestive—it does not control for other forces that may also affect the market equilibrium—it does indicate that relaxing the ban led to an increase in broadcast and total advertising expenditures, which may have increased price competition and, therefore, caused total consumption of distilled spirits to rise. This explanation is supported by the fact that the real price of distilled spirits fell relative to that of other alcoholic beverages and that no other important demand or cost shocks to the distilled spirits market are apparent during this period.

9. This may explain why the industry supported the advertising ban for so long. It also begs the question of why eliminate the ban. According to Bang (1998), distilled spirits producers voted to eliminate the ban because they lost market share to beer and wine producers, who were able to use broadcast advertising. This behavior is consistent with the repeated prisoner's dilemma game. That is, if advertising is primarily informative in nature, an appropriate trigger strategy may sustain a successful agreement to eliminate broadcast advertising. Beer and wine producers supply beverages that are imperfect substitutes for distilled spirits. But, as they gradually gained share from the distilled spirits industry, the optimal strategy for distilled spirits producers would be either to persuade beer and wine producers to also ban broadcast advertising or to abandon their own voluntary ban on advertising. Continued noncooperative behavior on the part of beer and wine producers ultimately triggered a noncooperative response from distilled spirits producers.

10. Two additional pieces of indirect evidence provide further support for this position. First, Saffer (1997) finds that alcohol advertising has a positive and significant impact on U.S. motor vehicle fatalities. Although he does not determine whether the increase in motor vehicle fatalities is due to advertising's effect on market demand or on price competition, the price effect is most
This and evidence from other industries provide some support for the policy concern that eliminating the ban on broadcast advertising will lead to an increase in alcohol consumption, but for a different reason than that proposed by previous policy analysts. Even if advertising has little or no effect on market demand as previous studies indicate, eliminating the ban will increase distilled spirits consumption if it increases price competition. In addition, lower prices for distilled spirits are likely to lead to lower prices for beer and wine, further increasing total alcohol consumption. In any case, this analysis demonstrates that inaccurate policy recommendations may result if one concludes that advertising and advertising restrictions have no effect on alcohol consumption just because advertising has no significant effect on market demand.

III. POLICY ISSUES AND CONCLUDING REMARKS

Many public health advocates are concerned that elimination of the voluntary ban on broadcast advertising in the distilled spirits industry will lead to greater alcohol consumption and abuse. Previous research indicates, however, that advertising has no significant effect on market demand. Unfortunately, this is interpreted to mean that rescinding the voluntary ban on broadcast advertising will have no effect on the equilibrium level of alcohol consumption.

A simple model is used to show that advertising and advertising restrictions may affect the level of price competition as well as the market demand function in imperfectly competitive markets. Evidence from several sources for industries with characteristics similar to those of distilled spirits indicates that the elimination of advertising restrictions generally promotes price competition. If so, then the elimination of the broadcast advertising ban in the distilled spirits industry will cause alcohol consumption to rise even though advertising has no effect on market demand.

This does not imply, however, that an advertising restriction is the most effective policy tool for reducing alcohol consumption. Although an advertising restriction may reduce consumption even when market demand is unaffected, it accomplishes this by hampering competition and raising the prices and profits of distilled spirits producers. This may be one reason why distilled spirits producers voluntarily agreed to the broadcast advertising ban in the first place. As a better alternative, one could design an equally effective excise tax, as Pogue and Sgontz (1989) and Kenkel (1996) suggest, that has the same deterrent effect on alcohol consumption. Rather than adding to industry profits, however, revenues from the tax could then be used to support alcohol treatment programs and to better educate the public about the private and social costs of alcohol abuse.

Nevertheless, this discussion reconciles the empirical finding that advertising has little effect on distilled spirits demand with the belief among many public health advocates that an advertising ban will reduce alcohol consumption. When analyzing the impact of advertising on consumption, advertising may affect the level of industry competition as well as the market demand function in imperfectly competitive markets. Recognizing and accurately estimating these two effects is critical to an informed public policy discussion about the effect of advertising restrictions on the equilibrium level of consumption.

REFERENCES


