

Regulation of television advertising

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This version September 2004.
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Abstract

Regulation of television advertising typically covers both the amount of time devoted to commercials per hour and restrictions on the commodities or services that can be publicized to various audiences (stricter laws are often applied to children's programming). Time restrictions (advertising caps) may improve welfare when advertising is overprovided in the market system. Even then though, such caps may reduce the diversity of programming by curtailing revenues from programs. They may also decrease program quality on net (i.e., after allowing for the direct beneficial effect on viewers). Restrictions on advertising of particular products (such as cigarettes) likely reflects paternalistic altruism, but restrictions may be less efficient than appropriate taxes.

Keywords: television, advertising, regulation, length caps, advertising content

JEL Classification: D42 L15 M37

Acknowledgement 1 *I gratefully acknowledge research funding from the NSF under grant SES-0137001. I thank Juan Carlos Bisso for research assistance, and Ed Olsen for discussion.*

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1 Introduction

Most nations restrict what is broadcast on television. In what follows, I refer quite extensively to the case of Australian television, for which there exists a detailed set of guidelines.¹ Many of the regulations in Australia have counterparts in other nations. Australian television is governed by the Australian broadcasting authority (ABA). One of the objectives of the ABA is to promote the development and reflection of Australian identity, character, and cultural diversity through what is broadcast. While the ABA leaves the primary responsibility for ensuring that broadcasts meet community standards with the television stations themselves, it also has developed a code of practice that suggests guidelines as well as some compulsory standards. These include Australian content and children's program content.² They also include restrictions on both the length of advertisements (advertising caps) and the content of advertisements and the types of goods that may be advertised.

This paper is concerned with regulation of advertising. To continue with the Australian example, there are both length and content restrictions on advertising. The ABA requires that at least eighty percent of advertising time broadcast each year between 6am and midnight is used for Australian-produced advertisements.³ The argument why some commercials might be made abroad recognizes that foreign-produced advertising may be a reality.

Many countries ban the advertising of certain products. These products include tobacco products and hard alcohol. The argument for banning advertising of such goods reflects paternalistic concerns about the consumption of these goods and is also reflected in typically high tax rates. Conversely, many countries require stations to carry certain public service announcements (PSAs) as well as party political broadcasts in election season. One might view these as commodities that being encouraged by the government with an implicit subsidy to their promotion.

The rest of the paper is organized in the following way. The next section describes the regulations for Australia in more detail, and also gives details on selected European countries. Section 3 sets out a model of advertising caps. The Section contains a discussion of the market interaction (between viewers and advertisers, intermediated by broadcast "platforms") in television markets, and extends the discussion of the basic market to allow for quality choice and format competition. Section 4 addresses why certain goods are barred from

¹The July 2004 draft of the Australian "Commercial Television Industry Code of Practice" is available online at www.freevaust.com.au, and from Free TV Australia, Mosman, NSW 2088, Australia.

²The ABA also has specific regulations aimed at sports content. First they have an anti-siphoning list that prevents certain sports events from being siphoned off by pay television and therefore preventing free to air viewers from watching. Conversely, the ABA also enforces free to air broadcasters via an anti-hoarding provision that is intended to discourage them from holding back the live coverage of certain events. Concerns similar to those that underscored the Australian regulation were also a worry in the European Union. Hansen and Kyhl (2001) give some background details to the European case, as well as providing an analysis of the positive and normative economics of pay-per-view broadcasts.

³Since 1981, New Zealand commercials have fully qualified as Australian.

advertising in some countries, and also discusses the likely implication for the product markets concerned.

2 Regulations and restrictions

The Australian case is treated in some detail, followed by short remarks for salient features from other nations.

2.1 The Australian Broadcast Authorities Code of Practice

The Australian Broadcast Authority (ABA) Code of Practice is intended to regulate the content of commercial television according to current community standards and ensure that viewers are helped to make firm choices about their viewing and that of their children. There is quite a complex layer of regulations and publications that describe the guidelines. The code operates alongside three overlapping authorities. These are ABA standards that regulate programs for children and sustain Australian content; advertising codes from the Australian Competition and Consumer Commission (ACCC) governing the content of television commercials and advertising generally; the commercial television advisory notes which respond to cultural diversity people with disabilities etc.

There are several requirements in the code concerning television commercials. First television advertisers are expected to make sure that their ads comply with both the Advertisers Code of Ethics⁴ and the code for advertising for children.⁵ The code also sets up restrictions on the amount of advertising and other program matter (that stations may air during the day.) There are also placement restrictions on certain types of “sensitive” advertising. Moreover, commercials must not be too noisy or strident or even sound louder than adjacent programming and transmission should not be higher in advertising

⁴The Australian Association of National Advertisers (AANA) was adopted for advertising self regulation. The intention is to ensure that ads are legal, decent, honest and truthful with a “fair sense of responsibility to competitors”. In particular, ads should not be misleading or deceptive, nor likely to be so, and “shall not contain a misrepresentation which is likely to cause damage to the business or goodwill of a competitor.” Neither should ads portray people in a discriminatory way (disability, age, sex, ethnicity, etc.) Ads should not present violence, sex or obscene language unless justified by context. There is a separate code Automotive Code of Practice that relates to advertising for motor vehicles.

⁵The AANA code for advertising to children concerns advertising self-regulation towards children of fourteen years or less. In particular, advertisements to children must not mislead or deceive them and must be clearly understood by them. They also must not undermine parental authority nor must they imply that a product makes children who own it superior to their peers or that persons who buy that is advertised are more generous than those who do not buy such a product. If prices are mentioned, they must be done so accurately and not played down by words such as “only” or “just”.

breaks.⁶ In addition, commercials and other promotions⁷ must be easily distinguished from program material by viewers. This is especially important where children are concerned. There are also guidelines for disclosure of commercial arrangements, for example, if products or services are endorsed or featured in the program and such endorsements have been paid for by the sponsoring firm.

There are considerable rules on commercials and promotions. These intend that there is “A reasonable balance between program and non-program matter broadcast by a licensee.” The code distinguishes limits from non-program materials as opposed to what is actually broadcast. The idea is to give flexibility and not oblige licensees to force breaks because of unpredicted segment lengths in live programs. The code uses as a reference point the amount of non-program matter on the Final Schedules.⁸ These are the last schedules prepared before the broadcast and indicate when breaks are to be aired and what is aired within the breaks.

Non-program matter includes the following. First, spot commercials, which are advertising for a product service or belief which is scheduled within a program break or between programs. Second, advertising which takes the form of superimposed text occupying all of the screen during the program. Third, a program promotion (known as a “tune-in” in the United States) or station promotion. The code exempts several categories as non-program matter. These include a prize, a competition, or information segment, community service announcements (promoting a charitable cause or activity, and broadcast free by licensees and announcements for an election authority, and sponsorship announcements⁹. Interestingly, also excluded are infomercials. Another way to get exemption is to use a voice-over or promotion over the closing credits of another program or superimposed text over only part of the screen during the program. Further more, as long as it contains no more than 10 seconds of program content, an announcement that a program will not be shown when advertised a list of programs to be broadcast that day, a short announcement of the next program, a movie-opener (a brief introductory sequence to a feature film), or station identification. Also permitted are a plot summary at the beginning of a episode of a series and a program trailer for a future episode if broadcast before the closing credits.

The economics of these regulations seem to beg the question of whether informative advertisements can be excessive in equilibrium, since the types of advertisement under scrutiny here are of the informative type (such as tune-ins etc.) There are relatively few economic analysis that suggest that information provision maybe excessive in a market equilibrium. Grossman and Shapiro

⁶Casual empiricism regarding radio advertisements for used cars in the US suggest such

standards are not applied in America. Likewise, television commercial breaks in the US often seem louder than the surrounding programming.

⁷These include program promotions (“tune-ins”), station promotions, and community service announcements.

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⁹Sponsorship announcements must make no reference to prices nor last more than 10 seconds per sponsor (with a maximum of 30 seconds).

(1985) find such a result for oligopolists selling competing products. Dixit and Norman (1979) also find that oligopolists may over-advertise in the context of persuasive advertising.

We now consider the Australian Rules for Limitations to the number of adverts that may be aired. There are both average limitations and limitations for particular hours. These are quite close together in terms of number of minutes, as opposed to the European context in which the numbers are quite different. In Australia, an average of thirteen minutes of non-program matter may be broadcast between 6 p.m. and midnight, and fifteen minutes at other times (excepting in P&C periods as discussed below). In any particular hour, between 6 p.m. and midnight up to fifteen minutes maybe broadcast, but no more than fourteen minutes in any 4 hours. During election periods, stations can add one minute of political matter. At all other times, the maximum limit is sixteen minutes. The two categories of programming that concern children are P&C periods. No commercials may be broadcast during P periods. In the C period, each half hour may contain no more than five minutes of commercials and one minute of other promotions.

There are also regulations for placement of commercials for certain types of goods and services. Alcoholic drinks may only advertised in mature and adult time zones but exceptionally they may accompany live broadcasts of sporting events on public holidays and weekends. Alcoholic drinks include beer, wine and spirits. Commercials for betting and gambling also must only be shown during mature audience periods although government lotteries etc. are accepted. Commercials for X-rated films may not be broadcast, and commercials for R-rated films only after 8:30 p.m. There are also regulations concerning children. Notably, adverts for food and drink should not encourage an inactive lifestyle nor promote unhealthy eating habits. Also, the host or the character in the program must not promote products for services.

In summary, children's television standards must not demean people or groups on the basis of ethnicity etc., they must not distress or frighten children, display unsafe situations or mislead or deceive children. They also must not cause children to put undue pressure on their parents to buy goods and claims must be clear and truthful.

2.2 Regulations in Other Countries

Sweden has one of the highest percentages of TV household ownership at 97%. Half of the viewers of broadcast television are equally split between two public televisions (SVT1 and SVT2). These stations are not allowed to advertise. The average viewing time in Sweden is a 140 minutes per person per day. Advertising spots must be clearly identified in terms of beginning and end points. Sweden has the strictest regulations concerning children.¹⁰ Indeed, no advertisement may be directed primarily to children under 12 years old, there can be

¹⁰Sweden voted against the regulations promoted by the European community because it felt that it was not strict enough.

no advertising before and after children's programs and presenters of children's programs must not feature in any adverts.

The regulations on time allowed for advertisements is eight minutes maximum in any given hour rising to ten minutes between 7 p.m. and midnight. However, ads may only take up an average of six minutes per hour over the whole day, and six minutes per hour from 6 p.m. to midnight. Ads must fall in natural breaks in programming (such as halftime in football matches) and they must be at least twenty minutes apart. Products which are excluded from advertising are alcohol, tobacco, and prescription medicine.

The Netherlands also has several regulations designed for the protection of children and there should be no pressure for children under 12 to buy products and children's inexperience and credulity should not be abused. The overall law for time limits conforms with the EU directive of 20% per hour but in practice, the Dutch minister sets a much tighter limit of 6.5% of daily programming for the public television stations. Advertisement spots are in blocks of at least 2 minutes and must only occur in natural breaks. Excluded sectors include tobacco, prescription drugs, or ideological messages. Alcohol is allowed to be advertised, but with a three second educational slogan such as "drink but moderately", "Stay sociable. Drink moderately", "Let's stay sociable and drink with moderation". For candy ads, a pictogram of toothbrush and toothpaste is featured prominently.

The average viewer time in Great Britain is 225 minutes per day. 41% of the viewers of broadcast television watch public television (BBC) while 28% of cable with satellite viewers watch the BBC. No advertising is allowed on the BBC. In accord with European laws, no more than 12 minutes are broadcast in advertisement in a given hour. There can be no more than nine minutes per hour average per day and seven and a half minutes on average in prime time viewing. Ads must fall in natural breaks in programming and be at least 20 minutes apart. Ads are not allowed to interrupt certain types of programs such as religious ceremonies, royal ceremonies, or programs including members of the royal family, parliamentary broadcast, and scholastic and children's programs. Excluded sectors are political ads, tobacco, betting, private detective agencies, weapons, pornography, prescription medicine, and products that mask the effects of alcohol. Some restrictions are applied to religious messages, those soliciting donations, marital agencies, alcohol, financial messages, food products, betting, and medicines. It is understood that spirits should not be advertised. There are also specific rules that forbid subliminal ads and comparative ads are only authorized under reservations. The sound volume of ads should not be louder than the surrounding programming.

3 A model of advertising caps

Commercial (or free to air) television runs on advertising revenues. Advertising caps might therefore substantially alter the performance of the industry. As well as having a direct effect on reducing nuisance to viewers and curtail-

ing information flows from firms to prospective purchasers, caps may change both the types of programs, the quality of programming, and the variety of programs offered. To understand how advertising caps may affect broadcast firms' incentives (and the ensuing equilibrium), we need to carefully describe the structure of competition within the industry. The broadcast industry has a very interesting economic structure quite different from the industrial organization of most markets for consumer goods. The basic business model is that broadcasts are used as entertainment for viewers and these broadcasts also carry advertisements which the viewers are then exposed to as a side product of their consumption of the entertainment content. The entertainment content is paid for by advertisers who use the intermediary of the broadcast company to deliver messages to the advertising firms' prospective customers. This setup may be described as two-sided market with network externalities. In this vein, we may view the intermediary, the broadcast company, as a platform that needs to get both sides on board in order to generate revenues. That is, the broadcaster must deliver viewers to advertisers and does so by judicious choice of the level and types of advertising it proposes along with an attractive enough vehicle to entice the prospective buyers of the advertisers products to watch. Competition with other broadcasters (other platforms), is also an important feature of the competitive landscape. A broadcaster needs to take into account how increasing the number of advertisements shown will cause viewers to switch off or switch channels, and this decision also impacts the amount of revenue raised per viewer from the advertisers.

To construct a model of platform competition in two-sided markets therefore requires that we describe the behavior of the three types of agent who interact on the platform. We first describe advertisers, then viewers, then the broadcaster that bring the two together.

3.1 Advertisers

We describe the advertiser side of the market by their willingness to pay to communicate with viewers who are the prospective consumers of the wares they advertise. We shall abstract from various well established features of advertising namely it is recognized that a viewer typically needs to see an advertisement to two or three times at least before there is any marked change in her awareness of the good being advertised. Thereafter the benefit from hitting a particular consumer with an ad falls off quite rapidly after several exposures in a short time frame. We also abstract from the time dimension and, in particular, that a broadcaster may be able to deliver a viewer to an advertiser in one time slot, a viewer who was delivered by a different broadcaster in another time slot. We shall furthermore assume that all viewers are homogenous to advertisers so that there is no matching of advertisements to programs (golf clubs in a golfing program). We shall assume also that the demand for advertising time by a particular advertiser is a simple linear function of the number of viewers delivered. This means that if an ad delivers twice as many viewers, then the advertiser is willing to pay twice as much in order to air the ad before the higher

group size.

Let the demand price per viewer when a adverts are aired be given by $p(a)$. Thus if a broadcaster delivers N_i viewers and airs a_i advertisements, the broadcaster's advertising revenue is $N_i p(a_i) a_i$. It will be convenient in what follows to write $R(a_i) = p(a_i) a_i$, as the revenue earned on a per viewer basis when a_i advertisements are screened. We shall assume that $R(\cdot)$ is log-concave meaning that $\ln R$ is concave. This in turn implies that the ratio R'/R is a decreasing function. This means that the revenue function has the standard hump shape, although it does not necessarily have to be strictly concave.

3.2 Viewers

We assume that viewers react to the full price, f_i , associated to viewing option i . This full price may be decomposed into advertising nuisance, which we assume to be a linear function of the number of adverts watched, and any direct monetary subscription price for watching television, if applicable. That is,

$$f_i = \gamma a_i + s_i,$$

where γ is the nuisance cost imposed per ad, a_i is the number of ads screened on channel i and s_i is its subscription price. Viewers choose which channel to watch according to a discrete choice model. The conditional utility to a viewer from watching channel i is depends on the match value of the option minus the full price paid:

$$u_i = \varepsilon_i - [s_i + \gamma a_i],$$

where the term in square brackets is the full price, f_i , and ε_i is the idiosyncratic evaluation of the consumer for the particular viewing option.¹¹ In the sequel, this idiosyncratic benefit may be visualized as a distance function (as in models based in spatial economics) or else a random draw from a taste distribution as in standard discrete choice models.

Denote by $N_i(f_i, f_{-i})$ the number of viewers in the population who choose to watch channel i where f_{-i} denotes vector of full prices of other stations. We shall frequently invoke the assumption of fully covered markets, which means that each viewer selects one of the n available stations to watch. Let $N'_i < 0$ denote the derivative of the own viewer share with respect to own full price and we will use the notation N' to describe the derivative under a symmetric market situation. Thus, for example, the derivative $\frac{\partial N_i}{\partial a_i}$, when evaluated at a symmetric solution, will be written as simply $\gamma N'$.

¹¹We might also deduct from the full price any expected surplus the consumer expects from buying products showcased in the ads seen. Such surplus (loosely) reduces the effective γ , and may even make it negative. Infomercials may constitute an example of negative γ insofar as some consumers actively watch to garner information about such goods as exercise bikes. Such advertising provides a positive net benefit rather than a loss.

3.3 Broadcasters

There are n broadcasters in the market and they are assumed to maximize profits. These are given by the product of the number of viewers and the total revenues earned per viewer. The revenues per viewer potentially comprise two terms, the subscription price and the advertising revenues. Thus

$$\pi_i = N_i(f_i, f_{-i}) [s_i + R(a_i)].$$

First consider the case of a monopolist which chooses only its advertising level (we refrain from considering subscription prices for the moment). The monopolist's first order condition for its choice of advertising level is

$$\frac{\partial \pi_i}{\partial a_i} = \gamma N'_i R(a_i) + N_i(f_i) R'(a_i)$$

since N'_i is negative then marginal revenue, $R'(a_i)$, is necessarily positive at any interior solution. This means that the monopolist reins back advertising levels so as to not lose too many viewers. This condition can usefully written as

$$\frac{R'(a_i)}{R(a_i)} = \frac{-\gamma N'_i}{N_i(f_i)}.$$

The left-hand side is strictly decreasing under the assumption that R is log-concave, and the right-hand side is increasing under a similar assumption on the demand function, $N_i(f_i)$. The effect of an increase in γ are then seen to be that advertising levels must fall. This is because a higher γ corresponds to a higher nuisance value from advertising and so a higher loss factor from raising ads. Put another way, individual viewer demand becomes more elastic in advertising, and so the advertising "price" paid by viewers falls.

For the welfare analysis that follows we must consider the surpluses accruing to three types of agent in the model. We therefore sum the broadcasters profit the advertisers surplus and the viewers entertainment benefits. Note that the advertising revenue component of the broadcasters profit is simply the revenue under the advertising demand curve so that the surplus from advertising per se is measured simply as the full area below the advertising demand curve. In the case a fully covered markets, the analysis is also simplified because subscription prices are simply a transfer from viewers to broadcast firms and their level is therefore revenue neutral and plays no role in the overall welfare analysis. It is however, crucial in determining the distributional effects of any policy change.

Now consider the optimal level of advertising in the presence of a single advertising channel. If the market is fully covered then the optimal level of advertising stipulates simply that the marginal cost of advertising equal the marginal benefit of advertising. With fully covered markets, the marginal cost is simply the nuisance to viewers, γ , and this insight carries over to the analysis of several broadcast channels which follows. The marginal social benefit is the demand price p and so the social optimum as the equality of advertising nuisance and demand price per viewer. In the case of markets that are not

fully covered (so that there is some leakage to the non-viewing option at the margin) the marginal social cost of advertising must be augmented by the lost surplus caused by inducing another viewer to switch off. This lost surplus is the advertiser benefits that no longer accrue on account of that viewer.

We can now compare the optimal level of advertising with the equilibrium level for the monopoly as described above. From this comparison we can determine whether advertising caps are binding and/or have beneficial or detrimental or social consequences. Notice first that if advertising nuisance, γ , is very low then the monopolist's optimal choice of advertising will be where marginal revenue is practically zero. This is because the monopolist holds back advertising levels in order to extract the maximum revenue per viewer from the advertising market. However the social optimum in the case of negligible nuisance costs to viewers, stipulates that all advertisers with positive demand prices ought to be allowed access to the viewers (who anyway do not view the ads as an intrusion in this particular benchmark case). This clearly implies that the market equilibrium level of advertising is below the optimal level in the same manner that a monopolist's output is below the competitive output. Any advertising cap in such a situation would just exacerbate the market failure because a binding cap must be less than the monopolist's advertising choice and therefore even further from the socially optimal level of advertising.

Consider now the opposite scenario where the advertising nuisance per advertisement is high. Indeed, this nuisance can be higher than the demand price of the advertiser with the highest willingness to pay to reach prospective consumers. In this case the socially optimal level of advertisements is zero because no consumer ought to be disturbed by an ad that returns to its sender less benefit than it costs to the unfortunate viewer whose entertainment is disturbed by it. However, the market equilibrium must always involve a positive level of advertising. Even though this level of advertising falls with the nuisance cost to viewers (because the higher the advertising cost than the larger propensity for viewers to turn off, a situation the monopolist guards against), this level of advertising must always be positive. This is because, in the absence of the ability (or the technology) to use subscription pricing, the only source of revenue for a free to air broadcaster is revenue from advertising. In this scenario the market level of advertising is necessarily too high. Any ad cap will then improve social welfare by drawing down the level of advertising by the monopolist to closer to the socially optimal level. Notice that there are strong distributional consequences to such an advertising cap. The broadcaster's profits fall (because marginal revenue is positive in the neighborhood of its choice); viewers' utility rises since they suffer less nuisance from ads; and advertisers' surplus necessarily falls as the reduced level of advertising implies a higher price per ad per viewer and correspondingly less producer surpluses for the advertisers. We must though be careful with the conclusion that welfare rises from such an ad level restriction. The fact that broadcast profits have fallen will mean, in the broader context of several firms, that some firms may no longer find it profitable to enter and serve the market. Viewers would then suffer an additional loss from reduced variety of television offerings. Secondly, even with a fixed number

of broadcast firms in the market, the change in profit incentives induced by the advertising cap may in turn change the quality and the type of programming offered. We return to these themes below.

3.4 Quality

We now address how the presence of advertising caps may affect the quality provision of television programming in the market place. The advertising cap affects the revenue earned per consumer reached and so affects the incentive to provide quality. For simplicity, we consider a monopoly. Let the utility of a consumer be given by

$$u = q - \gamma a - tx,$$

if the consumer watches television, and zero otherwise. Here q denotes quality of the program and the firm maybe viewed as locating at zero. Hence, the market length served by the monopolist is proportional to

$$\hat{x} = \frac{q - \gamma a}{t},$$

and the monopolist viewership is given by

$$N = 2f\hat{x},$$

where f is the consumer density, and the 2 simply represents the fact that the monopoly serves consumers in both directions away from its own location. The monopolist's profit is therefore given by

$$\pi = 2f\hat{x}R(a) - C(q).$$

First consider the monopoly solution in the absence of any restriction on advertising levels. The advertising first order condition is

$$\frac{\partial \pi}{\partial a} = 2f \left[\hat{x}R'(a) - \frac{\gamma}{t}R(a) \right]$$

and the quality first order condition is

$$\frac{\partial \pi}{\partial q} = 2f \frac{R(a)}{t} - C'(q).$$

These first order conditions show how advertising levels and quality are related. In particular, a higher consumer density f will entail a higher quality provision because of economies to scale in providing quality that the television program is effectively a public good.

The advertising first order conditions above gives the following relation:¹²

$$\frac{R'}{R} = \frac{\gamma}{t\hat{x}} = \frac{\gamma}{q - \gamma a},$$

¹²If the advertising demand is linear, $p(a) = \alpha - ba$, and the cost of providing quality is quadratic, $C(q) = \frac{q^2}{2}$, then the solution to the advertising level has a closed form solution given by the solution to the cubic equation $[\alpha - 2ba][q - \gamma a] = \gamma a[\alpha - ba]$.

and the conditions may be combined to give $2f\hat{x}R'(a) = \gamma C'(q)$.

Let us now consider the effects of an advertising cap set at level \bar{a} . Then the firm's profit is

$$\pi = 2f\hat{x}R(\bar{a}) - C(q),$$

meaning that the quality choice is determined, as above, by

$$\frac{\partial \pi}{\partial q} = 2f \frac{R(\bar{a})}{t} - C'(q).$$

This shows that a lower advertising cap will cause the monopolist quality choice to be smaller. The social effects of this cap depend on both whether advertising was previously over-provided and whether quality was over-provided or under-provided. In particular, the monopolist's quality choice depends upon the extra revenue that may be extracted from the marginal viewer, while the socially optimal level of quality depends upon the improvement in average total surplus from further quality.

We now need to consider the social welfare function for this problem. This comprises three parts, viewers, broadcasters, and advertisers. The viewer surplus is an average of $(q - \gamma a - t\hat{x}/2)$ over the $2f\hat{x}$ viewers served. The profit is $2f\hat{x}R(a) - C(q)$, and advertiser surplus is $2f\hat{x} \left\{ \int_0^a p(\tilde{a}) d\tilde{a} - R(a) \right\}$. The last term represents the number of viewers reached times the advertisers' surplus per viewer. Note that the revenue per viewer is simply a transfer from advertisers to the broadcaster. We can then write the welfare function as

$$W = 2f\hat{x} \left\{ q - \gamma a - t\hat{x}/2 + \int_0^a p(\tilde{a}) d\tilde{a} \right\} - C(q).$$

where $\hat{x} = \frac{q - \gamma a}{t}$. Denote the term in brackets by Ω , which is therefore the surplus per consumer.

It is a useful point of reference to derive the full optimum for this model. First of all, the optimal quality choice is determined by

$$2f\hat{x} + \frac{2f}{t}\Omega - C'(q) = 0.$$

This indicates that, like the equilibrium, the optimum quality choice is increasing in the consumer density. The fixed cost of quality is then spread over a larger consumer base, and so the quality will be higher. Such a result also underscores the empirical findings of Berry and Waldfogel (2004) for newspapers, and is in turn based on insights in Sutton (1991) and Shaked and Sutton (1987).

The optimal advertising choice (again, when interior) is determined by

$$-2f\hat{x}\gamma - \frac{2f\gamma}{t}\Omega + 2f\hat{x}p(a) = 0,$$

and so reduces to

$$\hat{x}[p(a) - \gamma] = \frac{\gamma}{t}\Omega.$$

The left-hand side of this expression represents the positive divergence between demand price and nuisance cost, which is caused by the rate of turn-off of viewers and the consequent surplus lost on that account, as represented on the right side. An alternative interpretation (Anderson and Coate, 2004) is to view $\frac{\gamma}{t\bar{x}}\Omega$ as an additional term (on top of the direct nuisance term, γ) in the marginal cost of advertising: this term is the lost surplus per consumer (Ω) times the turn-off rate ($\frac{\gamma}{t}$).

The next issue to consider is the effect of a cap on advertising levels. Clearly, the monopolist is worse off through being constrained. Moreover, the monopolist provides a lower program quality because the cap reduces its incentives to attract viewers. A priori, it is unclear whether viewers are better off (because they suffer less nuisance from commercials) or worse off from the lower program quality. Preliminary results with a cubic cost of providing quality indicated that even the viewers were always worse off from tighter advertising caps. This means that all agents are worse off.

We now address the generality of this latter property. Let $N(\gamma a - q)$ denote the demand (number of viewers) for the monopolist's program, as a function of the full price, $\gamma a - q$. Assume that N is strictly log-concave and twice differentiable, so that $(N')^2 - N''N > 0$. Assume furthermore that the monopoly problem

$$\max_{\{a,q\}} R(a) N(\gamma a - q) - C(q)$$

has an interior solution.

If there is an advertising cap at some level, \bar{a} , below the monopoly's preferred choice, then it satisfies

$$R'(\bar{a}) N(\gamma \bar{a} - q) + \gamma R(\bar{a}) N'(\gamma \bar{a} - q) > 0. \quad (1)$$

The first order condition for quality choice at level q^* is

$$-R(\bar{a}) N'(\gamma \bar{a} - q^*) - C'(q^*) = 0$$

(where the first term is positive since $N'(\gamma \bar{a} - q^*) < 0$).

Applying the implicit function theorem, this tells us that the quality choice varies with the cap according to the relation

$$\frac{\partial q^*}{\partial \bar{a}} = \frac{R'(\bar{a}) N'(\gamma \bar{a} - q^*) + \gamma R(\bar{a}) N''(\gamma \bar{a} - q^*)}{(R(\bar{a}) N''(\gamma \bar{a} - q^*) - C''(q^*))} \quad (2)$$

where we assume the denominator is negative from the second order condition for a maximum to the quality choice problem. If $N'' \leq 0$, then the numerator is necessarily negative. Otherwise, consider the following argument. From the binding ad cap condition, (1), we have that $\gamma R(\bar{a}) < -R'(\bar{a}) N(\gamma \bar{a} - q) / N'(\gamma \bar{a} - q)$ and hence that $R'(\bar{a}) N'(\gamma \bar{a} - q^*) + \gamma R(\bar{a}) N''(\gamma \bar{a} - q^*) < R'(\bar{a}) N'(\gamma \bar{a} - q^*) - R'(\bar{a}) [N(\gamma \bar{a} - q) / N'(\gamma \bar{a} - q)] N''(\gamma \bar{a} - q^*)$ for $N'' > 0$. Now, the R.H.S. of this expression is necessarily negative since $R'(\bar{a}) > 0$ and N is log-concave. Hence the L.H.S. is also negative and so $\frac{\partial q^*}{\partial \bar{a}} > 0$. The intuition for this

condition is that an ad cap reduces the revenue yield per viewer delivered to advertisers, and so the broadcaster's marginal benefit is lower than without an ad cap. This leads to lower provision of quality.

We are next interested in showing how viewer surplus changes with the ad cap. From the demand function, $N(\gamma\bar{a} - q^*)$, a higher full price, $\gamma\bar{a} - q^*$, will mean lower surplus per viewer (and also a lower equilibrium number of viewers) so that viewer surplus rises with the level of the ad cap (conversely, the tighter the cap, the lower the viewer surplus) as long as

$$\gamma - \frac{\partial q^*}{\partial \bar{a}} > 0.$$

We now indicate when this inequality holds, meaning that quality rises from a relaxed cap more than offset advertising nuisance costs. Indeed, using the quality derivative, (2), we have a sufficient condition

$$(-\gamma C''(q^*)) - (R'(\bar{a}) N'(\gamma\bar{a} - q^*)) < 0.$$

Substituting for γ from the condition (1), gives a stronger sufficient condition as

$$\left(\frac{R'(\bar{a}) N(\gamma\bar{a} - q)}{R(\bar{a}) N'(\gamma\bar{a} - q)} C''(q^*) \right) - (R'(\bar{a}) N'(\gamma\bar{a} - q^*)) < 0.$$

Hence it suffices that

$$C''(q^*) > \frac{R(\bar{a}) (N'(\gamma\bar{a} - q^*))^2}{N(\gamma\bar{a} - q)}.$$

A somewhat similar condition follows from the second order condition assumption on quality choice, namely that

$$C''(q^*) > R(\bar{a}) N''(\gamma\bar{a} - q^*).$$

However, while the first of these implies the second under the log-concavity assumption, the converse is not true. This leaves open the possibility that the viewer welfare may rise with a tighter ad cap.

3.5 Product Selection and Advertising Caps

Advertising caps may also affect the breadth of products offered in an equilibrium. The basic insight follows from Gabszewicz, Laussel, Sonnac (2003). To see this, consider a simple sketch of duopoly product selection along the lines of the well-trodden framework pioneered by Hotelling (1929). In the simplest version of the model (see Lerner and Singer, 1937, and Eaton and Lipsey, 1975), firms simply compete by choosing locations (program formats in the current context) in order to maximize the number of viewers. Such would be the relevant behavioral assumption when firms are constrained by an advertising cap, or indeed if viewers face no nuisance cost from the presence cost of the advertising and advertising was fixed from the demand side. This setup is

then the classic “ice-cream sellers’ problem” with two firms striving to sell to the most consumers. The (unique) equilibrium is that both firms choose the central location in the market, a situation described by Boulding (1955) as the “Principle of Minimum Differentiation.” Any location of one firm away from the center would induce the other to locate right next to it on the longer side of market. Notice for the later development that, as long as firms are constrained by ad caps, each wants to move in closer to its rival. This is because the market served by a firm is determined by the midpoint between its own location and that of its rival, and so is increasing as the firm moves closer to its rival (leaving aside for the moment the possibility of jumping over its rival location).

Now consider the ingredient to this model, namely the version of the Hotelling model written down by d’Aspremont, Gabszewicz, and Thisse (1979). This model, as did Hotelling, considers a sub-game perfect equilibrium in which two competing firms are to choose locations on the unit segment, following which they both rationally anticipate the sub-game equilibrium choice of prices that ensues from the location chosen in the first stage of the game. The difference introduced by these authors over the original Hotelling specification was to specify transportation as a quadratic function of distance, as opposed to Hotelling’s original linear specification. D’Aspremont, Gabszewicz, and Thisse (1979) show that the unique sub-game perfect equilibrium involves the firms locating at the extreme points of the unit interval.¹³ This outcome results from the balance of two opposing forces that apply to the pricing sub-game. First, *Ceteris Paribus*, moving closer to one’s rival triggers a more acute level of price competition, in particular a lower rival’s price, which a firm strives to avoid by locating far away. However, as we argued above in the fixed price version of the model, locating closer to the rival also gives the firm a higher market share. In the version of the model with quadratic transportation costs, the former effect dominates throughout the location on the unit interval leading to the maximal differentiation result.

We now show how to translate this location result into the context of the advertising framework. Suppose that the demand for ads is perfectly elastic, and each advertiser is willing to pay β in order to their advertisement seen by a prospective consumer (television viewer). Assume to that the number of viewers attracted to the station depends linearly on the nuisance on the advertising, and indeed that we may write the utility of a viewer at location $x \in [0, 1]$ is

$$u_i = y - \gamma a_i - t|x - x_i|^2, \quad i = 1, 2,$$

where y is consumer income for simplicity the same for consumers, x_i is the location of product i , and t is the transportation rate per unit distance. The

¹³This maximal differentiation result relies on the restriction that the locations are constrained to lie within the unit interval. There does not seem any technological reason why indeed the support of the product specification must necessarily be the same as the support as the consumer taste distribution. Relaxing this restriction and instead allowing the firms to locate anywhere on the real line gives instead the equilibrium locations as $-1/4$ and $5/4$, which means that firms do locate far apart but not as far apart as might be physically possible. See Anderson (1987) for further details.

demand addressed to firm i , N_i , is then determined by the measure of consumers for whom u_i exceeds u_j , $i \neq j$. This is exactly the same viewer demand equation as in the standard spatial formulation. The profit to firm i can then be written as

$$\pi_i = \beta a_i N_i,$$

which is exactly the same (up to a multiplicative constant) as the formulation of d'Aspremont, Gabszewicz, and Thisse (1979), with a_i replacing the standard price p_i . Therefore, the maximum differentiation result holds under this specification that is firms avoid intensive advertising competition by locating as far apart as possible. They still would like to come closer to increase unilateral market share, but refrain from doing so to keep advertising levels, and hence advertising revenues, as high as is possible under Bertrand-Nash advertising competition.

We now allow for advertising caps in the framework sketched out above. First note that, as a function of symmetric locations, the sub-game equilibrium advertising levels are greatest the further apart are the firms. This means that an advertising cap if set below the level that attains at maximally differentiated locations, will be necessarily be locally binding on both firms. Consequently, under such a binding cap firms will find their profits locally increasing as long as the cap is binding, as they move in toward each other, following the logic of the fixed price model. However, at some point the cap must necessarily be reached since the equilibrium advertising level falls continuously to zero at the point of minimal differentiation (when firms locate together then they are indistinguishable and there is not product differentiation so that competition a la Bertrand with homogenous products and price goes to the competitive level, namely zero.) As soon as the cap is reached, the firms clearly wish to go no further together from the logic of the model with endogenous advertising levels expounded above.

The lesson from this simple sketch is first of all, that advertising caps may have an impact on product selection and the existence of caps may increase the proclivity of firms to produce similar programming. Indeed, the seminal analysis of Steiner (1952) suggests that duplication may be a prevalent problem in television broadcast selection. His analysis though, relies on the assumption that broadcasters aim to maximize the number of viewers, an assumption that is only effectively tenable if advertising levels are capped (or indeed if viewers do not care about the level of advertising they consume) Nevertheless, some care ought to be exercised in taking literally the result from the quadratic cost model. In particular, this model always predicts that the free market equilibrium product selection is socially excessive (the optimal format choices being at the quartiles). Other transportation cross functions, and hence the possibilities of other possibilities prove remarkably difficult to analyze in a tractable fashion but there is no presumption a priori, that the equilibrium format choices would necessarily lie outside the optimal ones as they do for the quadratic model.

Notice that the equilibrium in the presence of the advertising caps is at the location at which the cap is binding. This means that the cap could be

judiciously set so as to induce equilibrium format choices at exactly the socially optimal level. (However, the advertising level itself may be suboptimal.) Indeed, with this stark current specification, in which consumers always watch one of the two channels and advertisers are willing to pay a constant amount per viewer reached, the optimal level of advertising is zero if $\gamma > \beta$, and is infinite if $\gamma < \beta$.

4 Paternalistic altruism and merit goods

The restrictions on the products that are not allowed to be advertised can be understood by reference to the economics of externalities and government paternalism. Cigarette advertising is widely banned - even sponsorship of motor-racing by cigarette firms was recently illegal in Belgium, for example. Goods that impart negative externalities on others (e.g., second-hand smoke effects) can traditionally be treated with Pigouvian taxes on their consumption, and/or direct quantity regulations (banning smoking in bars, banning smoking by those under-age). Alcohol also may be associated with negative externalities (drunk-driving, and violent behavior towards others). Consumption of these goods is also often viewed as addictive. Economists usually prefer taxation to outright bans in cases of negative externalities: the preferences of individuals are respected albeit under the modification that the full price paid reflects all harm done to others.

However, it may be that a consumer who is deterred from consumption may not become addicted or may give up or reduce the habit, and may later be thankful for having been induced to moderation. If people care about the consumption levels of other individuals of such “dangerous” goods, they may support regulations or taxes. In the earlier literature, the concept of “merit goods” (like education) corresponded to goods that were to be encouraged according to an implicit governmental welfare function. Cigarettes, alcohol, gambling, etc., fall in the opposite category of demerit goods that are to be discouraged. The encouragement or discouragement reflects paternalism by the Government or, indeed, on behalf of the individuals who elect the Government to act on their behalf. Why then are bans used instead of further taxes? Instead of banning cigarette advertising, taxes could be levied on advertising tobacco products, and/or the product could itself be taxed still more. Perhaps the decision by the authorities is made without full consideration of the range of available options for reducing consumption; and the symbolism may be more significant with a ban than with a higher tax (where, after all, one might suspect the Government of wanting higher consumption to raise more revenue). It may be viewed as inherently rather contradictory for the product’s makers to be persuading people to smoke on the one hand (and the Government collecting revenues from that activity), and the Government on the other hand spending money persuading them not to smoke.

Banning advertising of some products also has direct economic consequences in the industries affected. The Economics of Advertising traditionally separates informative advertising from forms of persuasion. If the prime role of the ad-

vertising is informative (telling people where and how to buy the product, and informing them of new products) then a ban in advertising through some channels (cigarettes may still be advertised in magazines in the U.S., for example) may be analyzed rather like an increase in the costs of advertising. Then, some surprising results by Grossman and Shapiro (1987) suggest that oligopolists might actually see their profits rise as costs rise.¹⁴ This is because prices rise substantially after the reduced level of information transmitted in equilibrium decreases the overlap of informed consumers and so reduces competition. Another form of informative advertising, sometimes attributed to many television advertisements, is quality signalling (see e.g., Nelson, 1974, and Milgrom and Roberts, 1986). Eliminating this role for advertising could either cause firms to switch to other forms of signalling (product price reductions, or sponsorship of sporting events, perhaps) or else could shut down signalling completely. In the latter case, one would expect it very difficult to launch new products: in such industries one might expect only mature brands without new ones being contemplated.

Some advertising is sometimes proffered as an example of a zero-sum game. Insofar as cigarette advertising only serves to reshuffle consumers without corresponding new consumers being drawn in, then all advertising expenditures are “wasted” and firms’ profits would be higher if the Government would do them all a favor by eliminating what they cannot avoid competing over, and ban advertising completely. The welfare economics of persuasive advertising are already quite controversial (even before we get to demerit goods!) because, aside from the informative context where it is clear how to proceed with evaluating the effects of more information (through advertising), there is not much agreement of whether or how advertising affects tastes. For economists in the Chicago tradition (Stigler and Becker, 1977, and Becker and Murphy, 1993) tastes are fundamental and advertising can be viewed as contributing a complementary consumption enjoyment. Banning advertising would close this down: although it is still a reasonable question to ask if closing down a device that promotes “smoking is cool” could possibly be viewed as a cause for concern! Lastly, Dixit and Norman (1979) take an agnostic stand on whether the right welfare measure to evaluate quantity changes induced by advertising is to be based on the demand before or after the advertising. Insofar as they claim that advertising is already excessive without social preferences over goods, then, in the context of demerit goods, reducing advertising (by banning TV advertising, say) must presumably be beneficial.

Finally, an interesting recent case concerns Direct-to-Consumer (DTC) Prescription Drug Advertising.¹⁵ Advertising of prescription drugs directly to consumers is prohibited all over the world except for the United States and New Zealand. In U.S., the Wheeler-Lea Act 1938 granted the FTC jurisdiction over all drug advertising. However, in 1962, authority over prescription drug advertising was transferred to the FDA (Federal Drug Administration) while

¹⁴See also the discussion in Tirole (1988) for a simple exposition of their model. Bagwell (2002) provides a fine survey of the overall Economics of Advertising.

¹⁵I thank Jayani Jayawardhana for this material.

the FTC retained regulatory authority over over-the-counter (OTC) drug advertising. According to the FDA regulations on prescription drug advertising, the advertisement must comply with two major requirements. First, the ad must include a “brief summary”, which includes providing the drug’s side effects, contraindications, warnings and precautions and the indications for use. Second, the ad must comply with the “fair balance doctrine”, meaning that the ad must provide a balanced account of all clinically relevant information, the risks and the benefits.

The FDA recognizes three different types of prescription drug advertisements, which are regulated differently. The first category is “reminder advertisements”, which call attention to the name of the drug product, but do not include the specification of the drug product. Second, help-seeking ads (or disease oriented advertisements), which are generally broadcast with the heading “see your doctor”, describe the symptoms of a disease or condition, and encourage consumers to consult their physician to discuss treatment options, but do not mention the drug’s name. Finally, “product claim” (or “indication” advertisements) reveal both the drug’s name and the indication. While product claim ads are subject to brief summary requirement and the fair balance doctrine, reminder advertisements and help-seeking advertisements are exempt from the brief summary and fair balance requirements, as they do not reveal information about the effectiveness of a drug.

Although the brief summary requirement can be easily met by print advertisements, it can be impractical for a broadcast advertisement (which normally lasts for only about 30 seconds). In August 1997, the FDA issued the “Draft guidance for industry, consumer-directed broadcast advertisements” allowing sponsors of broadcast advertisements to make “adequate provision” of approved product labeling (known as a major statement) instead of the brief summary. After receiving the comments on the draft guidance, the final guidance was issued by the FDA in August 1999. The FDA requires that a broadcast ad through media such as television, radio, or telephone communications systems to disclose the product’s major risks in either the audio or visual parts of the ad. This disclosure of risks is known as the “major statement”.¹⁶

This recent change in the FDA guidance on DTC advertising of prescription drugs, introduced in 1997 and finalized in 1999, has opened the door to a flood of TV advertisements in the U.S. There are, of course, proponents on both sides of the debate over whether the effective legalization of TV advertising of prescription drugs is socially desirable.

On one side, patients may be induced to clamor for drugs that are inappro-

¹⁶The adequate provision requirements include: 1) Disclosure in the advertisement of an operating toll-free telephone number, through which the consumer can choose to have the labeling information mailed or have the labeling information read over the phone. 2) Reference in the advertisement to an alternative mechanism, such as reference to a print advertisement, to provide package labeling to consumers with restricted access to the Internet or those who are uncomfortable actively requesting additional information. 3) Disclosure in the advertisement of an Internet web page address that provides access to the package labeling. 4) Disclosure in the advertisement that pharmacists, or healthcare providers, may provide additional information.

priate for their conditions. At the same time, patients may be “persuaded” by an advertisement that they have some condition that can be alleviated, which in turn would increase the number of visits to the doctor, allowing for discussions on the drug they are exposed to. This may be seen as undermining doctor’s authority in prescription, and wasting her time on unnecessary discussions. Some argue that due to these patients demand, doctors may over-prescribe, or prescribe something costly or inappropriate, which in turn would bring negative effects on the patient.

On the other hand, DTC ads may be seen as an information source that informs the consumer about new drugs and treatments for various conditions, hence increasing the number of visits to the doctor. If the consumer was diagnosed with a condition and was prescribed a medically justified treatment, it could be welfare improving as many diseases are under diagnosed. DTC ads can also increase the awareness of certain conditions and the available treatments for these conditions among the consumers. This may help improve the communication between the doctor and the patient, which in turn would help the doctor to choose the best treatment choice for the patient.

Empirical results from the study conducted by Iizuka and Jin (2002) on patient and doctor behavior suggest that DTCA leads to a large increase in outpatient visits but no impact on doctor’s choice of drug within a therapeutic class. However, the study by Wosinska (2002) on the role of DTCA and the cholesterol reducing drug demand suggests that DTCA has a significant positive effect on the demand of an individual brand for the drugs that have preferential status with the insurer (are listed on the formulary).

Given these arguments on both sides and the some of the results from the existing literature, it is suffice to conclude that this debate on what ought to be (not) advertised on TV will remain an active one.

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