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A Theory of Broadcast Media Concentration and Commercial Advertising

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Executive Summary

We analyze a model in which the interaction of broadcasters, advertisers, and consumers determines the level of non-advertising broadcasting produced and consumed. Our main finding is that an increase in concentration in broadcast media industries may lead to a decrease in the total amount of non-advertising broadcasting. The strength of this inverse relationship depends, in part, on the behavioral response of consumers to changes in advertising intensities. We also present numerical general equilibrium solutions to our model and demonstrate a positive relationship between consumer welfare and the number of firms in the broadcast industry.

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I Introduction

The broadcast industry in the United States is unique in that a unit of broadcast firm output is imperfectly related to a firm's revenues. That is, broadcast media output is divided between non-advertising (i.e., programming) and advertising components. The latter generate income for the firm, while the sum of the components jointly determine a firm's costs. Broadcast firms must, on a continuing basis, strike a balance between garnering an audience through the supply of a zero-price output while simultaneously selling different output to a third party. It is this balance that is the central focus of the model we present.

In this paper, we explore how the interaction of broadcasters, advertisers, and consumers determines the level of non-advertising broadcast content produced by broadcast firms. We employ a model of imperfect competition in the advertising market and explore the impact of the number of firms in the broadcast industry on the distribution of broadcasting between non-advertising and advertising content. This model differs from its antecedents in that the broadcast market may be populated by an arbitrary number of firms.[1] We find that the profit-maximizing response of broadcasters to a change in concentration (i.e., the number of firms) depends, in part, upon the behavioral response of consumers to a change in the fraction of broadcast time devoted to advertising.

We consider a full range of values for this response and describe three cases. In the first two cases, the broadcaster's profit-maximizing response to increasing industry concentration is to increase the fraction of broadcasting devoted to advertising. Depending on the precise behavioral response of consumers (captured by a range of elasticities), we find an increase in the

[1]Moreover, unlike previous work we do not assume that consumers directly dislike advertising.

fraction of broadcast time devoted to advertising leads to a fall (rise) in the overall amount of advertising and an increase (decrease) in the price of a unit of advertising. In both of these cases, we find a reduction in the amount of non-advertising broadcasting consumed and supplied. In the third outcome we explore, we find that an increase in concentration results in a reduction of the fraction of broadcast time devoted to advertising, and a crowding-in of non-advertising broadcasting.

It is important to distinguish between the *amount* of advertising and the *fraction* of broadcast time devoted to advertising. We find that, under plausible conditions, the amount of advertising can fall while the fraction of broadcast time devoted to advertising increases. This result emerges from our assumption of market clearing in the broadcast market combined with a particular behavioral response from consumers that we refer to as "switching-off." Simply put, switching-off may occur as consumers reduce their overall media demand in response to increased advertising/broadcast ratios. If this behavior is strong enough, higher levels of concentration can result in lower levels of advertising, higher prices, and a larger fraction of broadcast time devoted to advertising. In this case, we obtain the "classic" market power result of fewer units sold at a higher price and a crowding-out of programming by advertising.

The importance of our findings reside, in part, in the potential welfare effects associated with broadcast media concentration. Closed-form general equilibrium analysis of these effects is intractable. For this reason, we apply numerical techniques to determine the equilibrium values of the model's key endogenous variables for varying levels of concentration in the broadcast industry. This approach reveals that the reduction in programming associated with industry concentration induces indirect utility losses via higher equilibrium prices. Moreover, increasing

concentration induces direct utility losses due to reduced consumption of overall programming.

The remainder of the paper is as follows. In Section II, we review the existing theoretical literature relating to broadcast media and detail how our model is distinct from the existing literature. In Section III, we introduce our model of consumers, advertisers, and broadcasters and present the conditions which characterize optimal behavior in our model. In Section IV, we explore the specific conditions under which variations in concentration may induce a change in the amount of non-advertising broadcasting. In Section V, we specify additional functional forms and present welfare results from numerical solutions to the model. In Section VI we make some concluding remarks and suggest areas for future research.

II Broadcast Literature

There are a handful of important contributions to the broadcast literature. Among the seminal theoretical works on the industry are those of Steiner (1952), Spence and Owen (1977), and Beebe (1977). Recent theoretical work includes that of Anderson and Coate (2001), Nilssen and Sorgard (2000), J. Gabszewicz and Sonnac (2000), and Gal-Or and Dukes (2001).[2]

Steiner's early article demonstrated that under certain (restrictive) conditions a monopoly market structure would provide optimal program diversity. Steiner noted that when viewer preferences were such that a large group of consumers preferred a single program type, and much smaller groups of viewers preferred other types, a monopolist would have the incentive to provide each distinct program type (i.e., the monopolist would internalize the business stealing effect), whereas multiple competing firms would have incentives to provide programming for the largest

[2]This list is not intended to be exhaustive. Rather, the works cited are among the more influential and detailed extant theoretical studies.

group of viewers only. Beebe (1977) extended the analysis in Steiner (1952) and Rothenberg (1962) to include program costs, differing distributions of viewer preferences, and unlimited channel capacity. Beebe concluded that optimal market structure depends on the structure of viewer preferences and the extent of channel capacity.

Spence and Owen (1977) provide a seminal rigorous analysis of broadcasting. They explore the welfare implications of program provision under alternative market structures (e.g., competitive advertiser supported and pay television). Their results suggest that the fixed costs associated with program production often result in under-provision of certain programming since the broadcast subscription revenues of such programs do not exceed costs. Thus, even in situations where benefits exceed costs, broadcast television is biased against certain programming. This bias is reduced under a pure pay-television framework relative to the competitive advertiser-supported structure, while a monopoly (advertiser supported) market structure exacerbates this bias.

The works of J. Gabszewicz and Sonnac (2000), Nilssen and Sorgard (2000), Anderson and Coate (2001), and Gal-Or and Dukes (2001), collectively represent the horizon of analytical work on the broadcast industry. All four works are similar in that they: (1) adopt a two-firm (broadcasters) location-style approach, with each firm carrying one program with advertising, competing for viewers; and (2) assume consumers dislike advertising.[3] Methodologically these works share an important lineage that stems from the path-breaking work of Hotelling (1929). Hotelling's original work suggested firms would minimally differentiate (locations), while the work of d'Aspremont, Gabszewicz and Thisse (1979) demonstrated, under slightly different as-

[3]Anderson and Coate (2001) take a relatively novel approach, and assume that there are two types of consumers for broadcasting: advertisers and viewers, and that advertisers impose a negative externality on consumers and other advertisers. This 'externality' is paid for through the pricing of advertising, which Anderson and Coate note is equivalent to a Pigovian tax. The idea that advertisers impose costs on each other is an important innovation, first noted by Berry and Waldfogel (2001).

sumptions, that firms would maximally differentiate.[4, 5]

Our model differs from the recent literature in at least two important ways. First, we do not employ a location-style, stage-game approach. While this methodology is productive in the two-firm context, a specific focus of our work relates to a situation in which the number of broadcast firms is somewhat large. Location models are generally less tractable when the number of firms is large. The case of many firms is important to consider because, in practice, the number of firms is often greater than two. Second, the works cited above generally assume that commercial advertising imposes direct utility costs on consumers. While we also conclude that consumers reduce their amount of broadcast viewing as the level of advertising relative to the total broadcast increases, our approach is based on weaker assumptions than straight-forward disutility, as discussed further below.

[4]In the case of modern address theory, location refers to product space or, more generally, the degree of product differentiation among firms.

[5]J. Gabszewicz and Sonnac (2000), Anderson and Coate (2001), and Nilssen and Sorgard (2000) are methodologically similar to these works in that they structure stage games in which broadcast firms first choose their programming type, and then each firm chooses a broadcasting/advertising ratio. In contrast, in the work of Nilssen and Sorgard (2000), firms first make the choice of investment in programming and the price of advertising, and then producers choose their level of advertising. Nilssen and Sorgard (2000) suggest that a duopoly market structure reduces the number of viewers and amount of advertising relative to a monopoly market structure. Gal-Or and Dukes (2001) (see also Tirole (1988), p. 293) demonstrate conditions whereby broadcasters minimally differentiate their programming. Minimal differentiation in turn induces a reduction in advertising that reduces consumers overall information. Given reduced information is available to consumers, producers have greater latitude to increase prices. Increased product prices then allow broadcasters to raise the price of advertising, which increases profitability. In direct contrast to Gal-Or and Dukes' finding of broadcast firms maximizing profits via minimal differentiation, Anderson and Coate suggest that minimal differentiation will minimize profits of the broadcast firms. Anderson and Coate's effort highlights the trade-offs inherent in the broadcast industry, and concludes that programming resources and advertising levels may be too high or too low, contingent upon the method of aggregating costs and benefits.

III The Model

In our model, we explore how the interaction of broadcasters, advertisers, and consumers determines the level of non-advertising broadcasting under various levels of market concentration. We assume that broadcasters are also content providers, and that all broadcast content is informational. Broadcasters are only compensated for the informational content provided by advertisers. Broadcasters do not charge their viewers, but they do charge advertisers for delivering their messages to viewers. Additionally, we assume that advertisers are also the producers of the goods that are advertised, and that advertisers are price takers. Finally, we assume consumers maximize utility by their consumption of both non-commercial information and goods produced by advertisers.

A Consumers

We begin by assuming there is a representative consumer that purchases final goods from advertisers, earns a wage, and consumes broadcasting. The following variables are relevant, from the

consumer's perspective:

$$\begin{aligned} A &- \text{total advertising consumed} \\ N &- \text{total non-advertising consumed} \\ B &- \text{total broadcast time consumed} \\ Q &- \text{total quantity of advertised goods consumed} \\ P_Q &- \text{price per unit of goods} \\ w &- \text{wage rate} \\ Y &- \text{consumer's ``full'' income} \end{aligned} \tag{1}$$

By full income, we mean the level of income which would obtain if all of the consumer's time were spent earning wages. Implicitly, we assume a time endowment in which a unit of time spent consuming broadcasting reduces household income by w.

We assume there is a function, $U(Q;N)$, that maps goods consumption and non-advertising consumption to utility, with the standard property of positive and diminishing marginal utilities. Letting $U_x \equiv \partial U/\partial x$ and $U_{xy} \equiv \partial^2 U/\partial x \partial y$, we assume that $U_x > 0 > U_{xx}$ for $x = Q;N$.

There are m broadcast firms in the market, indexed by $i = 1;\ldots;m$. Variables labelled with an i subscript represent firm-level quantities. Letting α_i represent the fraction of each firm's broadcast time devoted to advertising, we have $N = \sum_{i=1}^{m} (1 - \alpha_i) B_i$.

The consumer faces a budget constraint that binds the choice of goods consumption and non-advertising consumption: $P_Q Q + wB = Y$. Consumers choose Q and $\{B_i\}_{i=1}^{m}$ to maximize the LaGrangian:

$$L = U(Q;N) + \lambda (Y - wB - P_Q Q) \tag{2}$$