The Economics of Media Programming

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I. Introduction

This chapter is generally about how economic forces determine market outcomes in media industries, especially the electronic media. Of course, that is a very broad subject, and our focus is on certain aspects of it. Among the main questions we ask: How do market structure (eg, competition vs. monopoly), and the economic system of support (eg, advertising vs. direct payment) affect the prices, audience sizes, and especially the diversity, quality, and certain other content characteristics of media products? How do the costs and technologies of media production and distribution affect these outcomes?

Underlying these questions are important issues of social welfare and government policy. Government determines the type of market system we employ to produce and distribute media products. Throughout the world, a variety of government regulations or other controls have attempted to control or modify outcomes of the market, such as by promoting greater program diversity, or by insuring the availability of certain types of programs not offered by the market. Publicly funded radio and television systems have had similar objectives. Thus, a policy focus is inherent to our analysis.

This chapter is both a theoretical and an empirical investigation. We begin in Sections I. A. below by establishing some criteria for evaluation, in terms of measurable market outcomes and social welfare, followed by discussion in I B. of fundamental economic tradeoffs in the program production and distribution process. In Section II, we proceed to review and evaluate the theoretical literature in media program/product economics as it has evolved both in the economics and communications literatures. In Section III, we review and evaluate the related empirical literature. Discussion of social welfare and public policy issues is interwoven throughout. Finally in Section IV, we set out some ideas about future research needs.

At the outset, some limitations exist. We primarily focus on electronic media, along with some consideration of motion pictures. We do not attempt to cover a large literature on the economics of newspaper and other print media content. Also outside the scope is a substantial literature on the economics of international trade in media products that involves issues of product quality, diversity, and content.[1] The review of theoretical and empirical literature in this chapter is also inherently incomplete, even

within its electronic media focus. Only English language works are within this author's reach, and even inside that range, there is an unquestionable bias toward articles and books that are most readily available in the United States or that involve U.S. media.

A. Evaluation criteria and public policy concerns

Media program economics is fundamentally about outcomes of the market process. Those outcomes can be defined in terms of four basic variables: prices, quantity, quality, and diversity. All of these variables are related to social welfare, which is most often defined by media economists in terms of economic satisfaction.

Concerns about the prices and quantities of media products parallel those that economics has in the case of non-media products more generally. Just as we want to know how many bicycles are produced and sold at what prices, we are interested in how DVDs, pay TV subscriptions, etc. are priced and how many sold, and how many people watch or listen to various programs. Thus, quantities are usually defined in media economics in terms of the number of buyers, viewers, listeners, or readers, who consume a particular product or class of products. A complicating aspect of pricing and consumption in most media is the involvement of advertisers. In general, advertisers' willingness to pay for audience exposure encourages low or even zero prices of media products. For this reason, they tend to have very large audiences. From an economic welfare perspective, low prices and high levels of consumption are generally desirable, although as we discuss further, advertising has other effects that may be socially detrimental.

Product quality is of fundamental, general interest in economics. Other things equal, we want bicycles, cars, and cell phones to be reliable and last a long time. Product quality has a different, somewhat touchier meaning in media economics. Of course, media quality has aesthetic or other subjective dimensions about which economics has, so far at least, relatively little to say. Along at least one dimension, though, media product quality can be explicitly and usefully defined--in terms of "first copy" investments, or product creation costs. In general, the more resources that are invested in a movie, a TV program, etc., the more attractive it becomes to audiences or consumers. Media quality can also be defined in terms of the physical product in which the information itself is embodied, such as a DVD or VHS tape. In

most cases, though, the most important dimension of media quality for purposes of this chapter is first copy investment.

Turning to diversity (or product variety), questions about how many different auto models, types of restaurants, etc. appear in the market are a significant subject of general economic research. Market outcomes in terms of product variety or diversity, however, are a central focus of media economics. The diversity of media products affects the satisfaction of viewers because they desire variety, as opposed to "sameness." Diversity also has rather sensitive First Amendment and other political overtones. Does the spectrum of available news and opinion programs, for example, appropriately reflect the diversity of viewpoints in our society?

Media product diversity can be defined along three dimensions.[2] One easily measured dimension is simply a *count* of the number of different products available at some point in time, or over a period of time. The second, and by far the most heavily researched dimension of media diversity, is often labeled as "type" diversity and measures *how different* the available media products are from each other, or whether they appeal to different groups. As we will see, such differences are inherently subjective and difficult to define. This dimension of diversity is intrinsically tied, though, to questions of whether consumers with minority tastes, including ethnic and racial minorities, are adequately served. A distinct third dimension of diversity is the number of different *owners* of the available products. If, for example, four news programs are available, but three are offered by outlets under the common ownership of one corporation, then "ownership" diversity would number two. Ownership diversity parallels industry concentration, and from that perspective, has important effects on market outcomes, including count and type diversity. As an outcome in itself, however, ownership diversity primarily involves matters of social and political equity, and is mainly outside the scope of this analysis. Our focus in this chapter on diversity as an outcome is thus primarily in terms of count and type diversity measures.

All four of the variables describing media market outcomes—prices, quantity, quality, and diversity--are related to our ultimate interest, social welfare. How well off are viewers or listeners as a result of the market outcomes? For many purposes, economic welfare can be defined theoretically in fairly simple terms: the sum of the prices that viewers or users would be willing to pay (for a TV program lets say), less the opportunity cost of the economic resources that go into the program's production

and distribution. If a consumer would be willing to pay $8 to watch a pay TV program, but actually pays $6, and the program costs only $5 to produce and distribute, then the total "surplus" of $3 ($2 consumer surplus + $1 producer surplus) serves as a measure of economic welfare.

While such simple measures will sometimes be used in this chapter, there are great practical limitations to the economic welfare concept. The real world is complicated, notably involving benefits and costs of advertising, and market imperfections that result in actual costs which do not reflect true opportunity costs. In any case, we usually have little way of knowing whether someone would have been willing to pay a higher price for something than he or she actually did. Welfare measures are especially difficult to make in differentiated product markets. Also, of course, most of us believe that media has important social, political or cultural effects on their users as well as on society as a whole. All of these broader effects can be put under the rubric of economic "externalities." Still, that label doesn't contribute much. Often in this chapter, we just stick with the outcomes in terms of the objective measures we can make, and let readers arrive at their own judgments about the social welfare.

B. Economic fundamentals and tradeoffs

Media products have fundamental economic characteristics that limit the ability of free markets to achieve socially optimal outcomes in terms of the above variables, or that require tradeoffs among them.

The most important of these characteristics is familiar: relatively high "first copy" costs of production, combined with relatively low, or even zero marginal costs of distribution. As a result, average costs per viewer or listener tend to decline indefinitely as more and more users of the same product are served.

One implication of this "public good" characteristic of media products, as it is often labeled, is a tradeoff between price and diversity. The larger the number of different products offered, the smaller the audiences of each, and thus the higher the price of each (to consumers and/or to advertisers) has to be in order to support production costs. Diversity is thus expensive to achieve. A second implied tradeoff is between diversity and first copy costs. The higher are first copy production investments, the more expensive it is to achieve diversity.

The economic tradeoffs involving first copy production costs, prices, and product variety also have important implications for market structure in media markets. Declining average costs per user imply a force toward monopoly. Counteracting that tendency is the demand for diversity. If consumers have strong preferences and are willing to pay enough to satisfy them, competition among providers offering differentiated products can prevail. A fundamental implication of the public good characteristic of media products, however, is that diversity is costly. It can be prohibitively expensive to design media products that perfectly suit individual or very small group tastes. There are, in other words, especially strong economic pressures in media industries toward "one-size-fits-all" products. The widespread dissatisfactions with media products that media critics, academics and others have expressed—and that are in fact a motivating theme of many of the economic models of the media reviewed below--can in this sense probably be traced to the high economic costs of achieving media diversity.

The tradeoffs between production investments, prices, and diversity also create basic social welfare tradeoffs that are very difficult to resolve. Are we better off, for example, with two news programs at a $10 price per subscriber for each one, or with a single, "homogenized" news program at a price of $7.50 per subscriber? Usually, we have no way of usefully answering this question beyond just observing what the market produces and applying our judgment to that.

II. Economic theories of program choice

The primarily line of research into how demand conditions and market structure determine final outcomes of media markets in terms of prices, quantities, quality, and diversity is called the theory of program choice. Under what conditions does the marketplace offer few programs instead of many programs, very similar vs. very different programs, cheaply produced vs. expensive programs, etc.? What types of programs tend to be offered by alternative regimes of monopoly vs. competition, advertiser vs. pay support, etc.? And of central significance, how does, or how can, government policy affect those outcomes?

Owen and Wildman (1992) offer an extensive and rigorous review of program choice models up to about 1990, with detailed numerical examples. Although the perspective of our presentation differs, we focus on summarizing key results of the models up to that time, reserving more emphasis for later contributions.

A. Alternative regimes of support and market structures

Beginning in the 1950s, a series of program choice models have compared market outcomes and consumer welfare under the alternative regimes of advertiser support vs. direct consumer payment, and under alternative market structures of competition vs. monopoly. Many of these studies were advanced in the context of political debates inspired by dissatisfaction with the system of limited channel, advertiser support that initially governed the television industry, at least in the U.S. Although there have been important technological constraints throughout, government spectrum allocation and other policies have fundamentally influenced what means of economic support, as well as what degree of competition, prevails in these industries.

From an early date, academics and others advocated replacing or supplementing the advertiser supported broadcasting system in the U.S. with pay television. In practice, that meant multi-channel cable television, which has always had a natural tendency toward geographically based monopoly due to high fixed costs of building cable networks at the local level. Publicly supported television was also a hotly debated alternative. In Europe, Asia and elsewhere, mostly very different political choices for the market structure and means of support for television were made, at least initially. The same political debates have been relevant, though, because the introduction of advertising, pay television systems, privatization of public channels and expansion of channel capacity in those countries during the last half century has also involved fundamental government decisions.

1. Discrete demand models

Early program choice models were discrete in form, by which we mean that consumers are assumed to fit into a finite number of groups, within which all individuals have identical tastes. Most of these models specify distinct program "types," (perhaps labeled by their genre), that cost certain amounts to produce and are offered at particular prices, etc. Discrete demand models are limited in the robustness and refinement of their results, especially with respect to economic welfare. Still, most of the basic theoretical results and insights into the economics of programming can be demonstrated using them.

The first study to systematically deal with issues of means of support and media market structure was Steiner's (1952) seminal demonstration that competition

in advertiser-supported broadcasting tends to result in program type duplication. Contrary to all expectations suggested by general economic theory, a media monopoly might actually serve consumers better than does competition. Ironically, Steiner's model was inspired by radio programming, which at the time was dominated by four national networks and was similar in format to the series TV programming of today.

Steiner's basic insight can be represented by a very simple example in which there exist two homogeneous viewer groups, whose sizes are indicated below. Group I prefers a "majority" type program, A, while a smaller group, II, is identified by its members' preference for a "minority" type of programming, B. The dashed lines indicate that neither Group I nor II is willing to watch any but their first choice program. Advertiser support is assumed to prevail, with a set advertising rate per viewer. Program costs are fixed, and assumed not to be a constraint.

Program Choice Model 1: Basic Steiner Version

	Viewer Group I (600)	Viewer Group II (160)
Program type A	1st choice	--
Program type B	--	1st choice

If only one channel is permitted to operate, the majority program, Type A, will be offered. If a second, competing channel enters the market, however, and it is assumed that 2 stations offering the same program type will split the audience, then two versions of Type A will be offered @ 300 viewers each. In fact, there would have to be four channels for the minority type program, B, to be offered at all (3 channels of type A @200 viewers each, and 1 channel of type B @ 160 viewers).

If there were as many as two channels, however, a monopolist could better serve consumers. In the two channel case, for example, both A and B would be offered, serving 760 viewers in total, compared with 600 in the competitive case.

Later contributions by Wiles (1963), Rothenberg (1962), and Noll, Peck, and McGowan (1973) examined outcomes of monopoly vs. competition, and of advertiser vs. pay support, under a variety of alternative demand and cost assumptions. Beebe's (1977) contribution, first reported with extensions in Owen, Manning, and Beebe (1974), generalized discrete program choice models with computer simulations showing how different assumptions about market structure, means of support, viewer

preferences, program costs, and channel capacity affect diversity and consumer welfare.

Beebe's study and those preceding it demonstrated a variety of economic tradeoffs, such as between production costs and diversity, and between the skew of viewer preferences and the achievement of service to viewer minorities. Especially notable was the introduction into models of less preferred, "lowest common denominator" programs that certain consumers do not prefer, but are willing to watch before walking away from their sets. Consider, for example, a simple modification of Model 1:

Program Choice Model 2
Lowest common denominator program choice version

	Viewer Group I (300)	Viewer Group II (200)
Program type A	1st choice	--
Program type B	--	1st choice
Program Type C	2nd choice	2nd choice

In Model 2, a third program type, C, is introduced as a common alternative that all viewers are willing to watch before turning off their sets. The group sizes are also changed from Model 1 as shown. In this case, a single channel would produce the common denominator, Type C, satisfying no one but still serving all viewers. If a competing second channel entered, though, types A and B would both be produced, serving both groups with their first choices.[3] With more channels, that is, Type C disappears from the market.

It is easy to see as well how a pay TV system could better respond to viewer preferences than advertiser support in either of these models. If members of the 160 person minority group in Model 1, for example, were willing to pay three times as much to watch their preferred program as those in the 600 person majority group, then a first channel would still offer A, but a second channel B, thus resulting in diversity rather than duplication of A..

The political backdrop of these academic contributions was the famous speech of FCC chairman Newton Minow (1961) describing program output of the three main U.S. broadcast television networks as a "vast wasteland," tending to offer duplicative, monotonous mass appeal entertainment programs, with little public affairs or other

socially beneficial fare.[4] Also at this time, there was budding support in the U.S. for the introduction of pay TV systems and the deregulation of multi-channel cable television. In 1967, a national public television system was formally introduced in the U.S. to supplement fare of the three commercial networks, following a long period of public debate. [5]

Results of these models thus suggested justification for political initiatives to convert the vast wasteland of television into a cornucopia of channels satisfying diverse tastes and social needs of viewers. From an academic perspective, though, the studies also showed that results are sensitive to basically arbitrary assumptions about the structure of preferences and program costs. As our own examples have suggested, program choice models can be contrived to produce practically any outcome.

Nevertheless, two reasonably broad generalizations appearing to emerge from these models are:

> (1) A transition from competitive advertiser to competitive pay support favors "preferred" programs, and tends to reduce lowest common denominator types.

As consumers become able to express the intensity of their demands in the market, that is, producer incentives to homogenize or produce "least objectionable" programs in order to maximize audience size are diminished.

> (2) Other things equal, higher channel capacity increases diversity and the prevalence of minority taste programs, and also tends to eliminate lowest common denominators.

As long as program cost constraints are not encountered, opportunities to segment television audiences more finely will obviously result in greater selection for consumers. More channels also provide incentives for producers to refine content to the tastes of smaller groups, thus drawing their demand away from lowest common denominator program content. At least in a competitive market, this mechanism works for advertiser as well as pay supported systems because consumers are always attracted to more appealing programs.

Steiner's basic insight that competing channels tend to offer similar or duplicative programming compared with monopoly was generally confirmed by the Beebe and other studies as well. But while a monopoly supplier never has an

incentive to repeat program types, the option of common denominator program types will also induce the profit maximizing monopolist to reduce count diversity in order to save on production costs. The benefits of multi-channel, direct payment TV systems therefore remain ambiguous when a tendency toward local market monopoly in cable is considered.

Given the limited channel, advertiser supported system that dominated television into the 1970s in the U.S., tax-based funding for public television seemed justified by program choice models for three basic reasons. One was the tendency toward program duplication in advertiser supported systems, and their particular failure to offer minority appeal programs like Type B in the model examples above. Secondly, there was an underlying presumption that viewers necessarily had more intense demands for minority appeal programs like B. In the absence of a viable pay TV system, however, they could not express those demands in the market. Thirdly, there was a presumption that some small audience programs, like public affairs, had socially beneficial effects, so that even if price demands for them were low, their presentation on public media was justified.

2. Continuous demand models

Models that assume arbitrarily fine gradations in consumer willingness to pay for programs, or fine gradations in viewer preferences for certain elements of program content, generally permit more refined or robust conclusions. Most such works have been published after the discrete models. Like discrete models, the continuous demand models have centered on characterizing the types of programs that are chosen by profit-making firms under alternative means of support or alternative market structures. These latter models, however, are better equipped to demonstrate welfare implications of those choices.

Before proceeding to discuss individual contributions, a basic framework in Figure 1 illustrates some of the conclusions that can be demonstrated with continuous demand models. Program X has a relatively steep demand curve, or in the terminology of Chae and Flores (1998), "intensive" demand. Program Y has "extensive" demand; it has a potentially larger total audience, but its viewers generally have more lukewarm demand for it. For purposes of this example, say that the program cost is zero, which is just a simplifying convenience to insure there is no cost constraint. We also assume that the advertising rate = $ .50 per viewer.

How does the means of support determine program choice? Under advertiser support, the broader appeal program Y will be offered, yielding total revenue of $30 (60 viewers @ $.50) vs. income of 20 for X. Under pay support, however, the intensive demand program X will be selected since that choice yields revenue of $80, (20 sales @ $4), vs. $60 for Y. As the example illustrates, the choice dichotomy results because advertisers are just in the business of counting eyeballs, while pay TV responds directly to viewer demands.

Which of these systems is better for society? The debate on this subject dates to an exchange of articles published by Samuelson (1964) and Minasian (1964). Samuelson portrayed advertiser support for TV as fortuitous because the zero marginal cost of distributing a TV program called for a socially optimal price to consumers of zero. Minasian argued that subscription TV offered a superior mechanism for response by producers to the intensity of viewer preferences. As Samuelson recognized in this final reply, though, the debate cannot be settled by abstract reasoning: "Imperfections of one arrangement must be weighted against the imperfections of another." (1964, p. 83)

This basic welfare tradeoff is illustrated by the Figure 1 example. The direct pricing of program X @ $4 limits size of the audience, resulting in a "deadweight" loss of C+E, since the two excluded consumers would have been willing to pay more than the true zero marginal cost of distributing the program to them. Total surplus of A+B+D = $120 is still realized. Selection of program X under pay support, however, reflects a better response to the intensity of viewer demands. As the examples are constructed, total viewer welfare turns out the same under pay or advertiser support, given the programs selected, @ $120 (For Program Y, A+B+C+D+E= $120, the total area under the curve). The essential welfare shortcoming of both systems, however, is illustrated by the fact that the highest potential benefit to consumers would result from offering program X under advertiser support, yielding a total surplus of $160 (the total area under the Program X demand curve). That choice cannot be realized, however, by the private market.

Figure 1 about here

One other assumption widely held by pay TV's advocates at the time is illustrated by this model, namely that viewers were generally willing to pay more to watch TV programs than advertisers will pay to reach them.[6] For both programs X and Y, pay support results in a higher and more optimal flow of economic resources into television production. Although not shown by the model directly, that flow would presumably result in production of a larger variety of television programs that were better tailored to viewer demands.

In an elegant comparative statics model, Spence and Owen (1977) compared welfare results of alternative regimes of advertising vs. pay support and alternative market structures in a world of differentiated television products. Spence and Owen demonstrated that from a social welfare perspective, both pay and ad-supported TV are "biased" against programs having certain demand and cost characteristics, but they were able to reach few general conclusions. A basic reason for the ambiguity of their economic welfare results is the irresolvable tradeoff between the benefits of achieving maximum distribution and of responding to the intensity of preferences. Of course, the magnitude of that tradeoff can potentially be measured and weighed, as we have done for Figure 1 above. The fundamental problem, however, is that we have no way of knowing the actual shapes of these demand curves.

To illustrate the basic welfare ambiguity problem in the Spence and Owen model, imagine that demand for program X were $4 for all 20 of the highest value consumers, making the demand function flat between 0 and 20 consumers, instead of having the upward sloping shape that creates the Figure 1 region labeled A. Optimal price for the program is still $4, generating 20 sales, but total surplus under pay support for program X would fall from $120 to $80, now resulting in less rather than more social benefit in comparison to advertiser support of program Y. By having to offer a single price to all consumers, even pay TV suppliers take no account of the intensity of demand above that price and thus may select the "wrong" program from a welfare perspective.[7]

Wildman and Owen (1985) supplemented the Spence and Owen model by considering the possibility of pay and advertiser support at the same time, also including a variable for viewer aversion to commercials. Their welfare results are also

ambiguous, but suggest that viewers would be better off if we had a combination of advertiser and pay supported systems. A combination would allow consumers to self-select according to their willingness to pay and their aversion to advertising.

A key element of such a combined system is price discrimination. That is, high value viewers are induced to pay a high price for A and remaining viewers a low (here zero) price for B. It can be easily seen, in fact, that if a seller could perfectly price discriminate in selling a program, there would be no bias in program selection and viewer welfare would be optimized. Considering program A in Figure 1, for example, perfect price discrimination would imply that the entire area under the demand curve ($120) would be collected, an amount necessarily equal to the aggregate audience satisfaction from watching the program. Although no author has to our knowledge formally demonstrated its welfare benefits, the system by which movies and some other programs are released over time to a variety of different media at progressively lower prices would appear to be the closest approach to perfect price discrimination---and thus perfect program choice and maximum social welfare—that can be achieved by media program suppliers.[8]

Using a framework similar to that illustrated by Figure 1, Chae and Flores (1998) investigate characteristics of programs selected under pay vs. advertiser support. Consistent with earlier models, they find that more "extensive" demand programs (ie, wide but shallow demand) are favored by advertiser support, and that a given program is more likely to be selected by advertiser supported broadcasting as advertising rates rise, as advertising nuisance parameters fall, and as costs of pay revenue collection rise. Measures of welfare are ambiguous for reasons similar to those discussed above. Notably in Chae and Flores' analysis, though, welfare also depends on whether advertising is informative (having a positive effect) or merely persuasive (having a negative effect).

Papandrea (1997) investigates program choice and welfare tradeoffs for extensive vs. intensive demand programs in a circular demand model, as originally developed by Salop (1979). As illustrated in Figure 2, consumers are positioned along a circle according to the intensity of their tastes for (unspecified) elements of program content. Distance above the circle measures each consumer's demand for the program nearest to their particular tastes. A consumer at point C, for example, has the maximum possible willingness to pay for program Z. Demand intensity of adjacent

consumers falls off to zero according to the slope of intensity function, alternatively shown as β or γ in Figure 2.

Figure 2 about here.

Using this framework, Papandrea compares price and non-price (ie, advertiser support) systems under alternative market structures. He confirms results of previous models that since advertiser supported channels ignore the intensity of demand; they are biased toward "broad appeal" types of programs. He also finds that competition has a greater tendency to duplicate programming than does monopoly if the number of channels is restricted. Welfare results are ambiguous, although Papandrea notes that if it is assumed that programs with relatively intense demand generate greater external benefits to the society as a whole, then advertiser support is to that extent an inferior system

Doyle (1998) addresses similar questions with a framework in which program distributors can use advertiser support, pay support, or both. Advertiser supported systems tend to offer large audience programs, while diversity is more likely to occur with pay support. With a combination of advertising and pay support, program diversity is even more likely. Doyle explicitly considers policy issues, from a British perspective. She points out the advantages of using profit taxes conditional on the types of programs produced as a means to enhance diversity in ad supported systems. She also discusses the possible benefits of controlling subscription fees of pay TV systems as a means to minimize the welfare reducing effects of viewer exclusion.

In an article inspired by high priced boxing matches on PPV TV like Tyson vs. Ruddock in 1991, Holden (1993) shows straightforwardly that presenting such an event on pay-per-view television instead of free broadcasting reduces consumer surplus. With PPV, that is, consumers have to pay the supplier, while if the event were on broadcast TV they do not. Hansen and Kyhl (2001) address this issue from a European perspective, inspired by recent European Union bans on PPV exhibition of certain sports events. They show a similar result—that the ban increases consumer surplus, but they find also that it reduces copyright holder income. Both of these models appear to support government restrictions on PPV exhibited sports events, although as Hansen and Kyhl note, that holds true only if the lower income to

copyright holders would not have prevented the event from being staged in the first place.

A further line of theoretical research in this category involves public television. Using a model in which viewer preferences are distributed along a line, Noam (1987) shows that the presence of public TV might have the ironic effect of discouraging or driving out the future provision of similar programming by commercial stations. If public TV offers programs that appeal to relatively small minorities, for example, profit-making market entrants might choose to offer broader appeal programs than they otherwise would have.[9] Noam's (1987) analysis leads into empirical studies of this question that we consider later.

B. Endogenous product quality models

While some of the models reviewed above permit first copy costs to vary, those variations serve only as simplistic constraints on variety. That is, for example, an assumption of higher television program production costs implies that less variety can be achieved because the higher costs eliminate profits for marginal programs. Another group of program choice models, however, explicitly recognizes that media product quality is embodied in first copy costs. First copy investments are thus a decision variable that program producers can use to raise or lower demand by increasing attractiveness of their products. In reality, variations in the first copy quality of media products are in fact so extreme that simply counting them up often has little meaning as a measure of product variety or industry output.

Endogenous product quality models have a general theoretical origin in the work of Shaked and Sutton(1983). For industries in which product quality is embodied in setup costs rather than marginal costs, they show that if marginal costs are low enough, industry concentration does not necessarily diminish as size of the market (ie, the volume of demand) increases. The intuition of this result follows from economies of scale. As demand grows, a single producer may be able to continuously undercut would-be entrants by increasing product quality, thereby offering a wide range of consumers better value for their money than could an entrant with a differentiated product.[10]

Wildman and Lee (1989) recognize the media quality-variety tradeoff in a model of television network programming strategy that predicts cheaper programming, or more program repetition, as channel capacity expands.

Understanding the basic effects of channel proliferation on program quality is useful for interpreting recent trends in television genres. Imagine, for example, an initial situation in which there are 3 advertiser support channels and a total audience of 30 million viewers that is fixed in size. Let the advertising rate be 10 cents per viewer. If these channels equally split the audience 3 ways, each can earn $1 million. Competition among them to attract viewers will induce each of them to invest in a program costing $1 million, which might, say, result in 3 reasonably high quality dramas. Now say that technology or regulatory change permits 6 television channels to compete. Since advertising rates and total audience size are fixed, each station can now earn only $500,000, inducing them to switch to cheaper program forms, such as game shows, variety, or reality programs. The option of pay support may mitigate the quality reducing effects of channel proliferation, but not by much unless viewer demands for differentiated programs are very intense. The key feature of the model is evidently plausible assumption that in the initial situation, government or technology artificially restricts the supply of channel capacity. When that restriction is relaxed, entry moves the market outcome toward a new equilibrium.

Using a model in which consumer tastes are distributed along a circle and program production costs are endogenous, Waterman (1990) shows that a shift from advertiser to pay television support in a competitive market does not necessarily lead to greater product variety, as earlier models with exogenous production costs suggested would happen. Rather, the result may only be higher cost programs, with no increase in product variety. In effect, the quality-variety tradeoff in this model depends on the elasticity of consumer demand with respect to product quality vs. the elasticity of demand with respect to product variety. If the former is stronger, then higher costs rather than greater variety tend to result when demand rises.

In a related paper, Waterman (1992) attempts to explain why new technologies such as multi-channel cable have appeared not only to segment audiences more finely with narrow appeal programs, but have also offered relatively expensive broad appeal programs, such as some major Hollywood movies, that are typically repeated on different media over time. This program choice model shows that a conversion to pay support, or the addition of greater channel capacity, may not only induce a producer with monopoly power to offer more expensive programs rather than greater product variety, but contrary to results of previous models, those programs may have increasingly "lowest common denominator" content. Owen and Wildman (1992) also

construct a model to show how multi-media distribution opportunities may induce producers to increase their production budgets, but they do not address the product variety issue in that context.

Although the following example abstracts from the product quality-variety tradeoff by assuming that no entry is possible, it illustrates an essential idea of endogenous product quality models: why an expansion in potential market size— whether that occurs through population growth, rising income levels, or the accessibility of larger audiences due to new media outlets---tends to induce media producers to offer more expensively produced, higher quality media products.

Model 3: Product quality and market size.

(a) Program cost options	(b) Initial market demand	(c) Initial demand X 2
high 10	9	18
low 5	6	12

We assume that there are 2 program cost options, low = 5 and high = 10, which can respectively generate initial market demand of 6 and 9 respectively (Column b). Notice that the doubling of production investment from 5 to 10 results in less that a doubling of demand--an assumption that, reasonably, reflects diminishing marginal returns to those investments. Under these conditions, a monopoly producer offering the high cost program will lose money (@ a profit of 9 - 10 = -1), and will thus offer the low cost program (@ a profit of 6-5 = 1).

Now say that market size doubles, as indicated by column (3). The producer will now make higher profits with the high cost program (profit = 18 - 10 = 8 vs. 12 – 5 = 7 for the low cost program). The basic reason for the producer's incentive to increase production costs can be traced to the extreme economies of scale in media product distribution. When market size doubles, the marginal productivity of investing another dollar in the production automatically doubles, inducing the producer to expand investment until the marginal return of that spending again falls to one dollar. Or in other words, the lump sum cost of moving from one quality level to a higher one becomes cheaper as the potential audience increases.

Endogenous cost models based on Shaked and Sutton (1983) have been applied in several papers by Waldfogel and colleagues to issues of radio and

television content. These are basically empirical papers, however, and we consider them in the following section.

Among other authors working with endogenous media quality models, Wright's (1994) research is presented in the context of regulations in Australia and the UK that limit the number of minutes per hour that television advertisements can be shown. He shows that such regulations will cause program quality to fall in a competitive market because higher investment levels can no longer be sustained. Such regulation benefits consumers to the extent that they may be averse to watching TV ads, but that must be weighed against the detrimental effects on consumers due to the lower program quality.

A classic result in the general economic literature on product differentiation is that firms have an incentive to differentiate their products in order to soften price competition. Two recent program choice modeling papers highlight the influence of this result on the advertiser vs. pay TV support tradeoff when program quality is endogenous.

Using a straight line-type duopoly model, Bourreau (2003) shows that pay support generally leads to greater program differentiation than does ad support due to the price softening motive. Under advertiser support (assuming that ad rates are exogenous), the two stations tend to "mimick" each other's content because they cannot use price as a competition softening device. To compensate for this inflexibility, the stations engage in relatively intense program quality competition. Program quality and differentiation outcomes under ad support vary with advertising rates. If rates are relatively low, lower quality and less differentiation results compared to pay support, while sufficiently high ad prices can result in program quality greater than that under pay support. The notable feature of this model is that while results are similar to the Steiner-type models, a different economic mechanism is at work.

The second article, Mangáni (2003), also investigates the effects of advertising in a duopoly broadcasting model with endogenous program production costs, but comes to a different conclusion. With the added assumption that viewers dislike advertising, he shows theoretically that an audience size maximization strategy pursued as a consequence of advertiser support can actually promote diversity. The mechanism at work in Mangáni model is that the amount of advertising works something like a price. The farther are the programs from each other in product space,

the more likely it is that a given viewer has satisfactory content, and thus the more minutes of advertising that the average viewer is willing to endure. That in turn permits higher quality programs to be produced, which further attract viewers, etc. Contrary to earlier papers, Mangáni thus identifies a mechanism by which advertising can encourage rather than discourage program diversity.

Economic welfare results of endogenous media program quality models are mostly ambiguous, depending on parameter values. Bourreau (2003) and Waterman (1991) both find that program variety (or the degree of differentiation) is overproduced relative to the social optimum—a finding common to differentiated product models in the general economic literature--while quality is underproduced. These results, however, are not necessarily robust to alternative demand assumptions. As in the case of program choice models with fixed first copy costs, perfect price discrimination is generally impossible, and we do not know shapes of the demand curves that incorporate consumer valuations.

B. Summary

Theoretical program choice models have offered relatively few unambiguous predictions about market outcomes or consumer welfare, mostly because the models are dependent on largely unverifiable assumptions about audience preferences. The models have, however, provided useful devices for describing economic tradeoffs involving prices, audience sizes, diversity, quality, the quantity of advertising, and other aspects of program content, and how those tradeoffs differ under alternative assumptions about channel capacity, means of support, and market structure. In that context, the models have suggested a variety of generally beneficial outcomes that would be likely to result from public policies encouraging higher channel capacities, availability of direct pricing mechanisms, and with qualifications, from more centralized control of program menu decisions. Also with qualification due to potential crowding out effects, program choice models have theoretically justified publicly funded media as well.

II. Empirical studies

We first consider broadly focused empirical studies that relate changes in channel capacity, market structure, or the means of support to market outcomes, especially program diversity. We then turn in a second section to research that has

been targeted toward individual types of programs, namely ethnic/racial minority oriented programming, news and information, culture, and children's programming. In a third section, we consider empirical evidence of economic constraints on the narrowcasting model of television. Finally, we discuss empirical evidence related to the appropriate role of publicly funded media.

Although containing less detail about individual studies in most cases, a recent book by Napoli (2003) usefully reviews or references a broader range of empirical studies involving the economics of the media and media audiences.

A. Market Structure, means of support, and diversity

Beginning in the 1960s, scholars have sought to measure the effects of higher channel capacity, or alternative means of support, on diversity and other aspects of program content.

Litman (1992) surveys empirical studies of TV program diversity. Our focus is on the extent to which these studies may confirm, refute, or otherwise inform the results of theoretical program choice models surveyed above. Of particular interest, what insights do empirical studies offer into how successful higher channel capacity and alternative means of payment have been in generating diverse, minority-appeal programming? Some studies addressing these questions have evaluated programming across local markets or across countries, while others have measured changes over time within the same markets.

Cross-sectional studies of diversity in local U.S. broadcast markets provide a natural laboratory to measure the effects of channel capacity expansion because larger markets have more channels than smaller markets. In an early academic study, Levin (1971) used 20 standard program "types," ("feature film" "cartoon", "situation comedy," "sports event," "religious," etc.), and showed that the number of different TV program types available over a one-week period increased, though at a decreasing rate, as the number of commercial stations in the market rose. He also showed that public TV stations (then called Educational Television, or ETV) had a decisively higher positive impact on diversity than did commercial stations--one suggestion, at least, that public TV is socially beneficial. Levin's results generally confirmed the findings of a National Association of Broadcasters study by Herman Land Associates (1968), using a similar coding scheme and a more complex diversity measure. In a later and more elaborate diversity study, Levin (1980) also reports an increase in the

amount of aggregate television viewing both as the number of stations rises, and as the number of program types rises, indications that viewers value and benefit from diversity.

A study by Grant (1994) evaluates the performance of multi-channel television media using 1986 data. He defines 25 different program type categories and uses a measure of diversity that varies inversely with the concentration of individual program types in the sample.[11] Grant finds that basic cable networks have greater "horizontal" diversity (measured at a given point in time) than three other separate categories of channels: superstations, pay cable networks, and broadcast networks. As Grant acknowledges, his results are clouded by a possible bias in the diversity index with respect to the number of channels measured within each channel group. Also, choice of program categories may bias the results if certain categories tend to be more prevalent on basic or pay cable, for example, than on broadcast networks.

Grant's study nevertheless offers a degree of confirmation that multi-channel cable does fragment audiences and that cable menus are more diverse than broadcast menus. The exact relationship between cable's performance and the predictions of theoretical models remains murky, however. On the one hand, cable operators tend to be local monopolists, which as we discussed above, theory predicts will have less incentive to offer similar programs than will competitive suppliers. Theory also predicts, though, that a monopolist will tend to restrict the amount of programming offered, and may tend to offer lowest common denominator types. In reality, of course, cable operators are not true monopolists because they compete with broadcast and other media, now including DBS. It seems evident that cable's competitive environment has been sufficient to prevent any major reduction in channel capacity or reversion to LCD programming.

Ishikawa et al (1996) reports results of a large scale international study of programming diversity covering the 1990-1993 period, conducted under auspices of the NHK Broadcasting Culture Research Institute. Litman and Hasegawa (1996) measure diversity of programming on 22 U.S. broadcast and cable networks, based upon 15 program type categories. They primarily used a "relative entropy"[12] measure of diversity, which like Grant's measure, rises with lower concentrations of the same program types. Litman and Hasegawa found that overall diversity (measured over a full week of time) tended to be highest among a group of "narrowly targeted" basic

cable networks, although results were somewhat different using a differently defined diversity index.

Ishikawa et al (1996) compared TV programming diversity in five major countries for the year of 1992, considering only a more limited group of 26 public service and commercial channels in total, including the 4 commercial broadcast networks and PBS in the U.S. Using the relative entropy measure, they found the UK system to have the highest overall diversity, followed respectively by Sweden, Japan, and Canada, with the U.S. networks bringing up the rear. The Ishikawa, et al study showed that public television networks contributed positively to diversity in all 5 countries, but especially so in the United States. As the authors acknowledge, however, their results remain tentative because the relative entropy index is sensitive to the number of channels covered within each country.

A series of other studies have measured trends in program diversity over time. In a well-known paper, Dominick and Pearce (1976) showed that the diversity of prime-time major broadcast network programming in the U.S., as measured by 14 programming categories, steadily fell from 1953 to 1974. During this time, networks also turned away from news, public affairs, and interview/talk formats toward "entertainment" formats. Litman (1979) then showed a slight increase in major broadcast network diversity from 1973-78. That paper was followed by Lin (1995), who found no overall trend in prime-time diversity among the major networks from 1980 to 1989.

The use of different program type classifications and diversity measures makes it difficult to interpret results of these studies as a continuous period of time. Also, while oligopolistic interaction, competition from other media, and other external pressures are mentioned, these studies seem to lack compelling explanations for the trends. Especially after 1980, there was also significant entry of local stations and new networks not covered by the studies. To that extent, trends over time measured only for a subset of available channels become less meaningful.

Wakshlag & Adams (1985) studied prime-time broadcast network programming variety over a longer interval, 1950-1982. Using an entropy-based measure and 37 programming categories, they found no overall trend in diversity over the 33 year period, but noted a sharp and sustained decline coinciding with promulgation of the 1971 Prime Time Access Rule (PTAR). Essentially, the PTAR prohibited network-affiliated TV stations in the top 50 TV markets from showing

more than three hours of network or "off-network" programs between 8 and 11 pm, thus reducing the number of daily network-delivered programs after 1970. An ostensible purpose of the PTAR was to promote program diversity. Wakshlag and Adams found, however, a substantial decline in type diversity following the rule's introduction. Although they did not report evidence of a direct or straightforward effect that the rule had on diversity, Wakslag and Adams concluded that the PTAR (eventually repealed by the FCC in 1995) had apparently not served the public well with respect to the diversity of prime time network programming that remained.

A recent study focusing on effects of the PTAR is Einstein's (2002) FCC-sponsored study of prime time network program diversity. Einstein uses 22 program categories to measure "before and after" diversity trends within two defined historical intervals: 1966 to 1974—during which the PTAR came into effect--and 1989 to 2002—during which the rule ended. Diversity was calculated in various ways, and for the latter period, the six most significant broadcast networks were included for some measures and only CBS, NBC and ABC for others. Like Wakslag & Adams (1985), Einstein found a substantial decline in diversity right after the PTAR's 1971 debut. She also found a substantial rise in diversity after its 1995 repeal. While acknowledging that a number of economic factors had also intervened, Einstein also concluded that the PTAR appeared not to have achieved, or that it had been counterproductive to, its diversity objectives.

Einstein also reported that in spite of the strong trends within the separate time periods studied, there were no evident long term trends in average diversity between the 1966-74 and the 1989-2002 periods. Both the Wachslag & Adams and Einstein studies thus partly addressed shortcomings of other historical trend studies of diversity by using consistent measures over longer time intervals. They also, however, left unmeasured the trends in overall diversity due to the entry of cable and other programming that occurred over their study periods..

A study by De Jong and Bates (1991) compared programming diversity for a more complete, expanding menu of U.S. broadcast and cable networks for the years 1976, 1981 and 1986. They sampled the menus of 413 cable systems, which offered average capacities of approximately 14, 16, and 27 channels at the three respective points in time. Using 32 program type categories, their study showed an increase not only in absolute diversity, but in relative diversity, where the latter is defined as absolute diversity divided by the number of available channels. The rise in relative

diversity is a more interesting result than the rise in absolute diversity since the former implies a more segmented array of programming options. Comparable to the earlier Levin and Herman Land & Associates studies, however, relative diversity did not increase as fast as the number of available channels. That is, absolute diversity tends to increase, but at a decreasing rate, as channel capacity expands.

Some more recent studies measure time trends in TV program diversity within other countries. Li and Chiang (2001) find that the three main networks in Taiwan responded to market entry and greater competition from cable and satellite channels over the 1986 to 1996 period by reducing the diversity of their programming menus. Van der Wurff and Cuilenburg (2001) conducted a similar study of nine public and general interest commercial channels supported primarily by advertising in the Netherlands, covering the period from 1988 to 1999. Using alternative measures, the authors generally find that up to about 1995, type diversity of programming on the subject networks increased. As competition intensified after this date, diversity declined. As explained by the authors, established networks appeared to respond to competition from "special interest" channels by reverting to menus of more "popular" program types.[13] These studies may suggest that competition among advertiser supported networks promotes "sameness," as some program choice models implied. In both of these studies, though, the programming of only a limited number of channels was analyzed in the midst of substantial market entry by cable or satellite networks. Thus, while the strategic response of established networks may be to offer less diverse programming when confronted with competition, the impact of entry on the overall menu of programming available to consumers may be quite different.

The large number of localized radio markets in the U.S., and the dominant tendency for radio stations to segment audiences by selecting distinct programming formats, offer a convenient means to investigate how population size and other market characteristics affect media diversity and use. Such studies have intrinsic policy interest because the FCC has long pursued a controversial practice of attempting to influence diversity by favoring license applications of radio stations that promise to offer certain differentiated formats. The FCC's station ownership rules may also affect diversity for reasons that we detail further below.

Rogers and Woodbury (1996) use 1987-88 cross-sectional data for 115 local radio markets to investigate the relationship between the number of stations, format availability, and listening. They report that a 10% increase in the number of stations

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increases format availability by about 2%, but increases aggregate listening by only about one-half of 1%. Other things equal, a 10% rise in format availability leads to a 2% rise in listening, but they reported that more stations within a given format had no effect on listening. Rogers and Woodbury's results involving radio formats are limited by their use of only 11 format categories—fewer than the radio industry defines. As the authors observe, their results are generally consistent with predictions of program choice models that higher channel capacity under advertiser support leads to greater diversity. Their results confirm that at least to some extent, listeners value diversity.

A more recent empirical study by Berry and Waldfogel (2001) assesses effects of relaxing the radio ownership rules, as mandated by the 1996 Telecommunications Act, on entry in radio station markets, and on the mix of radio formats. Berry & Waldfogel first present theoretical examples using a traditional line segment model to show how the effects of horizontal media mergers on product variety can differ depending on consumer preferences and the size of fixed costs. Based on these models, the authors conduct a "before and after" comparative study of 243 radio markets in 1993 and 1997, during which time substantial increases in local and national radio station ownership concentration took place. Forty-six different formats are considered.

Berry and Waldfogel's principal finding is that while greater ownership concentration within local markets tended to reduce the number of stations in operation, the ratio of formats to diversity (ie, formats per station) rose over the period. They also found a weak tendency for absolute format diversity—that is, the total number of different formats offered--to rise. Berry and Waldfogel's interpretation of the apparent paradox that diversity rises while the number of stations falls is that locally co-owned stations tend to choose different, but still "nearby" formats as a strategy to crowd out entry of competing stations. Their results are also generally consistent with the predictions of classic program choice models that under advertiser support, co-owned stations have a greater tendency to differentiate their programming than do competing stations.

Three other studies have considered the effects of market concentration on radio programming diversity using more recent data. An FCC Staff Research Paper by Williams and Roberts (2002) reported that the variety of radio formats available to consumers had held steady since the 1996 Act. In another FCC study, Williams, Brown and Alexander (2002) investigated the effects of substantially increasing

station ownership concentration over the 1996-2001 period on the diversity of Rock and Roll station play lists. While these authors stop short of a definitive conclusion about whether concentration affects radio program diversity, they report that play list diversity generally remained stable over the five year time period, suggesting that rising concentration has had little effect by that measure. Chambers (2003) studies the relationship between radio program diversity and market structure in the top 50 radio markets, using a cross-section of 2001-2002 data. He found positive relationships between the degree of competition in local markets (as measured by HHI), and both the variety of different available formats and the diversity of song titles.

The different results reported by both the FCC and Chambers studies in comparison to Berry & Waldfogel's paper may reflect more recent changes in radio markets. Both of the more recent studies, however, were based only on descriptive data and/or simple correlations, so it is difficult to be certain of the complete picture.

B. Specialized diversity studies

Other academic works have been concerned with how economic factors affect the availability and consumption of particular program types. While some of these studies also deal with general program diversity issues, they are included below if they substantially focus on specialized programming.

1. Ethnic/racial minority programming

Among economic studies of specialized programming types, a disproportionate number have involved on racial/ethnic programming. As Wildman and Karamanis (1996) observe, there has been a general presumption in the U.S. that minorities are "underserved" by radio or television programming that is directly oriented toward their preferences. At least in part, that perception in the U.S. has apparently motivated a history of taxation and FCC licensing provisions that give preference to minority station owners (Mason, Bachen, and Craft, 2001).

Using data from 246 radio markets, Waldfogel (2003) investigates the effects of white, black, and Hispanic population sizes on the availability of programming oriented toward these racial/ethnic groups, and also on their listening rates. He presents a simple discrete program choice model involving the concept of "preference externalities." Since there are fixed costs, the number of black oriented stations, for

example, is expected to increase with an increase in the black population, as should the aggregate level of black listening. Additional blacks in the population, that is, have a positive externality effect on other blacks by increasing the incentives for commercial firms to supply black-oriented programs. For a given sized black population, however, a growth in the number of whites may reduce the availability of black oriented programming to the extent that more ambivalent black listeners are siphoned off by the wider availability of white oriented programming. In his empirical analysis, Waldfogel confirms that black, Hispanic and white-oriented program availability and listening rise significantly with the size of those racial/ethnic populations, respectively; and shows weak evidence of negative externalities in the case of white population size on the black listening share. More generally, Waldfogel reports that blacks and Hispanics have sharply distinct radio listening preferences, a finding that was also suggested by a result from Rogers and Woodbury's (1996) study that both black and Hispanic population sizes significantly encourage radio format diversity.

Other authors have focused more specifically on the "undersupply" issue by studying how audiences having different racial/ethnic compositions are valued by advertisers. Webster and Phalen (1997) found a significant negative relationship between the proportion of non-whites in a market and advertising rates, and an FCC-sponsored study by Ofori (1999) reported lower CPMs for radio stations targeting minority audiences. In an individual radio station-level study, Napoli (2002) reported significantly lower advertiser valuations for black and Hispanic audiences. In explaining these differences, Napoli cites lower average income levels of both blacks and Hispanics in the U.S., but he had insufficient data to statistically isolate the effects of income.

In a related paper, Brown and Cavazos (2002) study advertising rates and their relationship to African-American representation in prime-time broadcast television program casts. They find strong preferences by black audiences for programs with African-American casts, and also that such programs statistically under represent the proportion of blacks in the general U.S. population. Having corrected for audience purchasing power, however, Brown and Cavazos find that this bias disappears. They nevertheless make a case that advertiser supported broadcasting would result in an undersupply of black-oriented programs even in the absence of these income differences. Their logic is that black audience's interests in black-oriented programs

are relatively intense, but advertiser-supported broadcast television does not offer them the means to express those intensities of interest. A higher intensity of interest in television programming among blacks is also suggested by survey data reported in Albarran and Umphrey (1993).

Several authors have also directly studied the relationship between minority station ownership and programming content, but results have varied widely. In an early article, Schement and Singleton (1981) reported that ownership made no significant differences in the amount of news, public affairs, or other non-entertainment programming offered by Spanish language radio stations. Similarly, Singleton (1981) found no significant differences in amounts of public service programming offered by black vs. non-black-owned radio stations. A later study of the effects of minority ownership on television programming content by Spitzer (1991) suggested positive relationships between minority ownership and the amount of minority program content, but did not report definitive results. A recent paper by Mason, Bachen, and Craft (2001) reported on a nationwide telephone survey of news directors at radio and television stations. They found that at least minority owned radio stations put greater emphasis on issues of presumed interest to minorities than did other stations. Overall, the body of these studies appear to offer little policy guidance as to the desirability of minority radio and TV station ownership.

2. News, culture and children's programming

An eclectic group of economic studies has focused on the availability and viewership of these distinct types of programming.

An extensive analysis of television news programming by Hamilton (2004) is loosely based on a program choice model involving numbers of channels, costs per program, audience demand prices, and audience sizes. Among other points, Hamilton argues that television news has become softer and more personality-driven over time due to the proliferation of channels and the relatively high production cost of hard news. Although channel proliferation does favor politically differentiated channels such as Fox news, he argues that the predominant effect is fragmentation of audiences and thus budgets, favoring softer news because it is cheaper. Hamilton also cites the pressures of more competition on the need to "brand" news programs, a strategy that tends to favor personality and entertainment driven forms.

One other recent study by Bae (1999) considered how the cable news networks, CNN, Fox and MSNBC, differentiated their programming as of 1997. He found substantial differences among these channels in terms of programming style or format, but did not report significant political differentiation at that time.

A type of programming often cited in the 1970s and even before as holding out the highest hopes of commercial viability on multi-channel, pay supported television systems was "high culture." In an attempt to explain why cable TV networks fell short of these expectations in the early 1980s, Waterman (1986) cited high costs of production, very small audiences, and a lack of interest by advertisers. He especially identified a popular misconception that cultural program viewers were a distinct group of intense, high willingness-to-pay viewers with an essentially unlimited demand to watch culture on TV.

Children's programs are a category of television fare that has attracted a great deal of policy interest in the U.S. FCC regulations have been based on requirements by the Children's Television Act of 1990 that television stations affiliated with any of the three main broadcast networks offer certain minimum quantities of "educational" programming for children. While numerous authors have studied children's programming, few of those research efforts are from an economic perspective. In an extensive early study, Melody (1973) argued that the commercial television networks were biased against offering socially beneficial children's television programming, largely because of the advertisers' incentives. Chan-Olmsted (1996) documents the proliferation of children's programming on cable television and measures the extent of market concentration among its broadcast and cable providers. She did not, however, study diversity issues directly.

C. Narrowcasting constraints: audience composition and advertiser incentives

A series of studies by Goodhardt and Ehrenberg(1969) and Barwise and Ehrenberg (1988; 1982; 1987) have provided valuable insights into the potential for narrowcast types of programming by revealing the intensity of interest that various television audiences have in the programs that they watch. These studies, which the authors describe to be about the "liking and viewing" of television programs, were based on surveys conducted in the UK and the U.S. In general, they interpret their findings to suggest that audience involvement in television programs is relatively low.

Only a minority of series program viewers (about 40%) reported watching the previous episode, suggesting relatively casual interest. A 1982 Markle Foundation study by Barwise & Ehrenberg found that only about half of the typical program audience reported that they enjoyed the program they had just watched at the "extremely" or "very much." level.

Of most interest, Barwise and Ehrenberg report a significant direct correlation between the size of a program's audience and viewers' average enjoyment of the program. That is, smaller audiences generally appear to have *less* intense demand for the programs they watch. That finding seems to challenge a fundamental assumption of some program choice models: namely that more sharply focused program content can necessarily be more successfully tailored to the tastes of smaller groups because those tastes are more homogeneous. An alternative explanation for the statistical correlation between audience size and average enjoyment, however, is that television audiences enjoy smaller audience programs less because they tend to be more cheaply produced than are large audience programs. Nevertheless, the findings of Ehrenberg and colleagues are not encouraging to the narrowcasting model.

A study by Waterman and Yan (1999) is also somewhat discouraging to the narrowcasting model of cable television from an advertiser's perspective. Contrary to expectations generated by the pattern of higher cost per thousand advertising rates for more specialized, smaller circulation magazines, basic cable networks have historically tended to have lower CPM rates than their larger "mass audience" broadcast network counterparts. Waterman and Yan attribute that discrepancy to a disadvantage that cable networks have had in the advertising market because they have lower national audience reach than free broadcasting. Elasticity estimates suggest, however, that this disadvantage will continue to diminish as DBS and other technologies expand the reach of advertiser supported cable networks.

D. The role of public media

How well have publicly supported radio and television systems served to enhance diversity or otherwise supply programs not offered by the private market? As discussed in Section II, early program choice models suggested public media to be an ideal supplement to correct the bias of limited channel, advertiser supported commercial television systems in the U.S. against high demand, minority appeal programs, including those that might have wider social benefits. As we also noted

above, the Levin (1971; 1980) and Ishikawa et al (1996) studies showed that public television stations have tended to add more to diversity, especially in the United States, than have commercial stations. As Grant (1994) observed in his content analysis, though, cable networks have come to provide substantial quantities of many of the same program fare, including culture, public affairs, and racial/ethnically oriented programs, that PBS distributes. Noam's (1987) model also offered a formal theoretical argument to suggest that public TV might crowd out commercial TV, presumably a socially undesirable outcome.

Systematic empirical studies addressing these issues are sparse. Berry and Waldfogel (1999) concentrate on the potential commercial program displacement effect of publicly funded radio stations. They examine formats, play list overlaps, and audience listening for jazz, classical music and news/talk stations in 165 U.S. local markets. By comparing commercial format availability and listening behavior in markets with and without public television stations that provide similar types of programming, Berry and Waldfogel find evidence of significant displacement of commercial media effects in classical music and to a lesser extent, the jazz format, in larger markets. They do not conclude that public expenditure on radio programming is necessarily undesirable, however, because they do not have direct evidence on the degree of actual similarity between public and commercial programming.

An examination of TV ratings data shows that PBS programs consistently outdraw, often by large margins, similar program types offered on basic cable networks, although these gaps have generally narrowed over the past decade.[14] Of course, such ratings differences could also reflect a crowding out effect. Taken at face value, however, these ratings contrasts might also demonstrate an inability of commercial cable networks media to provide programs that are truly comparable to those of public television. Observations that cable networks provide similar programming to public TV stations may also do more to highlight the shortcomings of program format definitions, than to demonstrate crowding out effects. Public TV stations may provide higher benefits than private stations due to the absence of commercials, and these stations may have positive social externalities as well.

Another more pragmatic element of the policy debate in public broadcasting has been brought to the fore by the spread of cable: public TV program duplication. At the same time that cable has offered competitive program choices, it has dramatically enhanced the range and quality of public station signals, many of which

have been handicapped by assignment to the UHF spectrum. Partly due to the FCC's "Must-carry" rules, several different public television stations originally licensed to different communities within large television markets have often become available to individual cable households. One study by Phillips, Griffiths, et al (1991) found that 15% of public television program hours were duplicated within the same television market during a given week, although only 2% were actually shown simultaneously on the same day and time.

E. Summary

Insights from empirical studies into how variations in channel capacity, different regimes of support, and different market structures actually affect market outcomes, especially in terms of program diversity, have been substantial. Most of the diversity or other program content studies, however, have at best been loosely based on the predictions of theoretical program choice models. They have also been hindered by the notorious difficulty of measuring program diversity, as illustrated by the use of nearly as many program content coding schemes as there have been program content studies. Both of these shortcomings present challenges for future empirical studies to meet.

IV. Research needs

By their nature, the need for theoretical advances in program economics cannot be easily identified. The most evident promise for expanding our knowledge about the economics of programming is empirical, theory-based research. We suggest several areas of empirical study in which potential rewards seem in our judgment to be high.

One prediction of program choice models that appears to hold under a range of assumptions is that pay mechanisms and higher channel capacity should tend to reduce or eliminate lowest common denominator, or "least-objectionable" program types. The weight of empirical evidence is that greater channel capacity and/or direct payment mechanisms increase program diversity, and in some studies, diversity per channel. While these results are suggestive, they do not direct address the "LCD" question. More direct evidence might be, for example, that certain radio formats or types of television programs tend to disappear from the market when capacity rises or when pay mechanisms are introduced. While the arbitrarity of program type or

format definitions are limiting to such an investigation, an alternative methodology may be to define programming focus in terms of the sharpness of demographic appeal. As cable, DBS, and other multi-channel media have proliferated, for example, has programming on the three major U.S. broadcast networks become more finely segmented toward certain demographic categories? Or, have the networks responded with even more broadly focused content, as Van der Wurff and Cuilenburg's (2001) study suggests in the Dutch case?

There is also a need for empirical economic studies of specialized programming, especially of types that involve policy interest. The several studies of how market size and other economic factors determine the supply and usage of black and Hispanic-oriented radio and television programming provide a useful model for studies about programming directed to other minorities, such as foreign language speaking groups. How has the supply of foreign language, or other racial/ethnic programming, changed with the advent of satellites, and other more efficient distribution technologies? How do audience characteristics, advertising markets, channel capacity, and other factors affect the supply and usage of children's, or other types of programming that have arguable social benefits as well as policy-related interests?

A third important subject is the role of publicly funded media. Studies of crowding out effects, such as Berry and Waldfogel's study (1999) of public radio, might be applied, for example, to public television by making use of local variations in program availability. Of most significance, empirical research on public broadcasting must recognize that these organizations are not merely dependent on federal and other government funds. Rather, public TV and radio stations have complex objective functions that follow from dependence on corporate, individual and other contributors, the pursuit of which has undoubted effects on their program choices.

Finally, we note an unresolved empirical issue of fundamental importance. That is the relationship between the intensity of audience demand and breadth of appeal. Other things equal, what is the elasticity of demand with respect to the sharpness of content focus? Can audiences really be better satisfied by sharper focus toward fewer individuals, or are "mass appeal" programs more satisfying for some reason? While the "liking and viewing" studies by Ehrenberg and colleagues have made important strides in this respect, further research is needed to distinguish the

effects of content appeal from the effects of programming budget levels. In order to conduct studies in these and other areas, perhaps the thorniest difficulty is useful definition of program types, and of diversity more generally. In addition to using demographic characteristics of audiences as a proxy, diversity can also be defined in terms of actual perceptions by audiences of how different programs are from each other. Nearly a half century ago, Lang (1957) used surveys in which respondents were asked to rank order radio program preferences as a method to infer the perceived degree of similarly between programs. Perhaps that or another methodology could be used to overcome the most formidable obstacle to empirical studies of media program diversity.

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Figure 1: Advertiser vs Pay Support: Continuous Demand Model
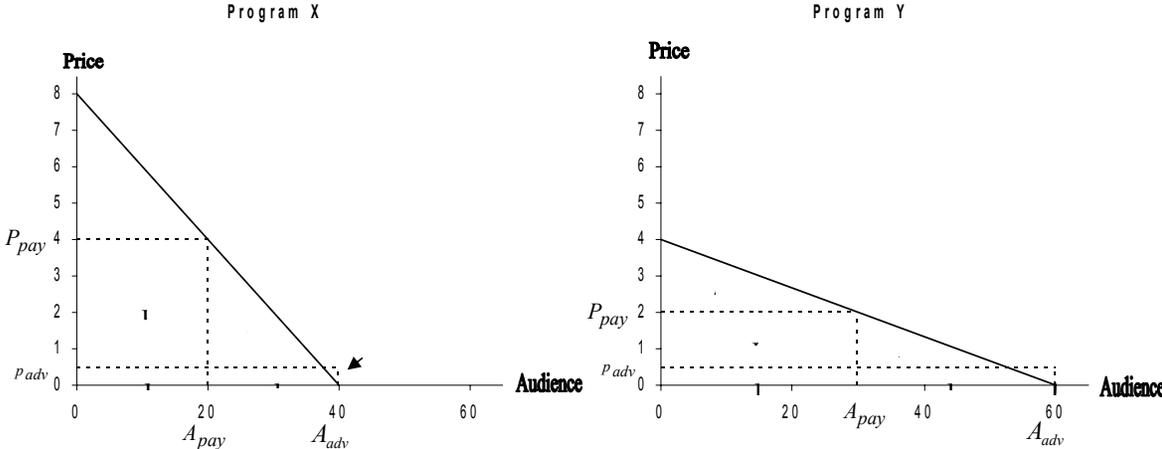
Figure 2

Circular Model of Program Choice:
Alternative Demand Functions for Program Z
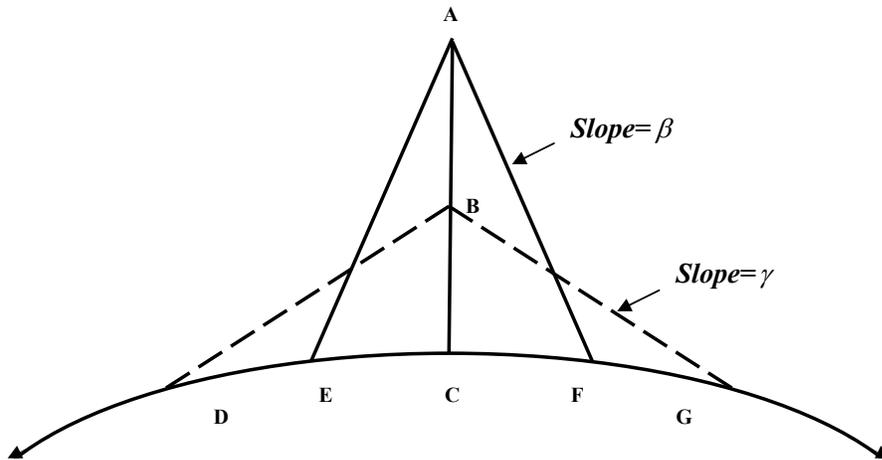
Endnotes

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[1] Economic studies of international trade in media products are surveyed in Waterman (2003)

[2] These three dimensions generally correspond to those set out in Chapter 3 of Levin (1980), and are commonly distinguished in more recent literature. See Napoli (1999) for a recent survey and analysis of an extensive literature on the diversity concept.

[3] If a second channel attempted to split the audience for C @ 250 viewers each, it would be optimal for one of those channels to instead offer A, attracting 300 viewers, leaving 200 for B or C. A channel offering B, however, could attract all of those viewers away from C. The competitive equilibrium result with two channels is thus A and B.

[5] See Noll, Peck, and McGowan (1973) for citations and discussions of the public debates on pay television and public TV in the United States. Wiles (1963) was a British author writing in the context of a limited channel system partially supported by advertising.

[6] Noll, Peck, and McGowan (1973) present often-quoted evidence from early pay TV experiments in the U.S. that this was the case for certain program types.

[7] See Owen and Wildman (1992) and Lence (1978) for more detailed discussion and examples.

[8] For related discussion of this issues, see Waterman (1992) and Owen and Wildman (1992).

[9] See Owen and Wildman for a more detailed discussion of Noam's model.

[10] Berry &Waldfogel (2003) provide a clear exposition of Shaked & Sutton's (1987) model to empirically demonstrate that the average quality of daily newspapers increases with local market size, but that market fragmentation does not occur. That result contrasts with increasing fragmentation as market size grows that they find in the case of restaurants, a product in which quality primarily depends upon variable costs.

11 Grant uses the following formula $Div = 1 - \sum_{i=1}^{n} S_i^2$, in which Si is the proportion of all the program types offered for the "i"th program type. The index decreases as the number of program types offered decreases or if one program type is offered for a disproportionately large number of times.

[12] The Relative Entropy Index is defined as $H = \sum - p_i \log_2 p$, where Pi indicates the probability of each category being selected. Relative entropy reaches its minimum value (0) when the probability of selection concentrates on a single category (minimum diversity) and it rises with the variance of probability of each category being selected. The maximum value (1) is obtained when the probability of selection is equal in all categories (maximum diversity).

[13] Note that some of the channels covered in this study entered during the period, so their programming was covered for only part of the 1988-99 interval.

[14] See, for example, cable network ratings reports in *Cable Programming Investor* (Kagan World Media) and PBS ratings in *PBS Audience, Corporate Facts* (www.pbs.org)