Program Choice in a Broadband Environment

Stephen S. Wildman
and Nancy Y. Lee

Columbia Institute for Tele-Information
Graduate School of Business
809 Uris Hall
Columbia University
New York, New York 10027
(212) 854-4222

PROGRAM CHOICE IN A BROADBAND ENVIRONMENT

I. Introduction

New broadband technologies hold the promise of an abundance of video channels delivered at a fraction of the cost of current multichannel delivery systems. Whether such a change in the economics of television delivery would transform television service into something far different from what we know today, or perturb but slightly the path along which television service currently is evolving with VCR and cable technologies is far from certain. The utimate effect of integrated broadband networks on television service will depend on a variety of factors besides the characteristics of broadband technology itself. Important among them are the structure of consumer tastes for programming, the economics of program supply, the development of other alternative delivery systems, and future regulatory policies. In this paper we consider the effects of changes in these factors in an environment in which significant numbers of viewers receive television service via broadband networks.[1]

The analyses described below focus on the implications of an increased number of widely available television channels for the following aspects of television service: (1) Quality of programs.[2] By this we mean pure audience appeal. We assume that this is a function, at least in part, of the resources consumed (measured in dollars) producing individual programs. That is, for any given program, quality (viewer appeal) reflects the size of the production budget. (2) Program diversity. In the analysis that follows, diversity refers to the range of differentiation among programs provided by channel programmers. (3) Quantity of programs. This could be defined in various ways. For example, a network series and older episodes of the same series that are being shown in

---

[1] Lest the reader misunderstand, we want to state explicitly that we are not predicting that integrated broadband networks will be important television delivery media in the future. The uncertainty concerning regulatory policy alone is too great to justify any confidence in such a prediction. Rather we are speculating on the likely features of television service should low cost, fiber optic broadband networks become important delivery vehicles.

[2] Program quality has received relatively little attention in the economics literature on television. Exceptions are Park (1980), Noll (1978), Waterman (1988a, 1988b), and Wildman and Siwek (1987, and 1988).

syndication could be counted as a single program or as different programs. For the purposes of this paper, repeated showings are not counted as new programs. However, we will also be concerned with (4) The ease with which viewers may access specific programs. The simplest way to make specific programs more accessible is to show them more often. The more frequently a program is repeated, the more likely it is that it will be convenient, or accessible, to a particular viewer. Clearly, there is value in the repeated showings of programs. If there were not, they would not be shown. Therefore an assessment of likely television futures in a broadband environment would not be complete if repetition were not considered. Futhermore, as will be clear in the analysis presented below, the repetition and quality issues are not entirely separate.

Much of the anlaysis that follows is based on a formal economic model of competition among programming services in a broadband environment in which channel capacity was not a constraint on the number of programmers. We describe the model and what it implies for several possible futures for television service in the next section, including a future with video on demand. As is always the case with formal economic models, the price of the analytical clarity acheived is that certain real world considerations must be assumed away for the sake of analytical tractability. We discuss the implications of relaxing certain of the model's assumptions in Section III. Preliminary results from a still ongoing study of programming patterns on current cable channels are presented in Section IV. A few concluding observations make up Section V.

II. A model of programmer competition in an all broadband environment.

A. Description of the model[1]

A broadband television service could be structured in a variety of ways. Channels could be programmed by private or public agents; if by private agents, by single-channel or multichannel

[1] This description is mostly verbal. A formal, mathematical statement of the model will be included as a technical appendix in the final draft of the paper. A full description of the special case of the model used to generate Tables 1 and 2 will be provided by the authors on request.

programmers, or by some mix of the two. Firms that program broadband channels could be subject to various types of regulation, including restrictions on entry. We make no attempt to formally examine all of these possibilities. To ease the modelling task, we assume that all programs are supplied by private agents. While it is likely that there will always be publicly supported channels, it seems unlikely that for the foreseeable future in the United States they attract much more than their current two to three percent share of audience.

A private broadband television industry could also be organized in a variety of ways. Our model is a model of competition among monopolistically competitive programmers, each of which selects programs for a single broadband channel. From the perspective of viewers, each program is differentiated, even if only slightly from other programs on the same channel and from programs on other channels. Viewers select programs according to their perceived qualities and how well they match their own unique personal preferences.

Previous economic models of program choice have taken the costs of programs as given. A contribution of this model is that it makes programmers' expenditures on programs a choice variable of importance in competition among programmers.[1] It is assumed that by increasing production budgets, programmers can increase the basic audience appeal of their programs, the sizes of the audiences they attract, and the revenues they bring in. This is because viewers value programs both for their basic "quality," which is affected by production budgets, and for nonqualitative attributes, such as plot line and subject matter, which also differentiate programs from each other. Viewers consider both the qualitative and non qualitative attributes of programs when selecting among them.[2]

---

[1] See, Waterman (1988a) for a monopoly model of program choice in which the production budget is permitted to vary. Program quality was ignored in previous models of program choice because previous students of the subject focused on the diversity implications of limited channels. This was a logical response to the then prevalent concern with what was perceived to be an excessive sameness in the programs provided by the networks that accounted for almost all of the television audience in earlier periods.

[2] Implicitly, the model also assumes that each viewer has access to the programs on all channels, although the viewer may not subscribe to some channels if the model is applied to competition among pay channel programmers.

Thus a programmer may increase its revenue by increasing the production budgets for its programs relative to the production budgets of competing programmers.

Programmers incur costs of two types in producing programs– a fixed cost, which may be thought of as a minimum set up cost that must be incurred to produce any program, and variable expenditures on production elements that contribute to the perceived quality of a program. The latter type of costs would include talent expenses, on the assumption that more expensive talent contributes more to the basic audience appeal of a program.

A final assumption employed to make the mathematics of the model tractible was symmetry among programmers. That is each programmer perceives the same opportunities and returns from varying program budgets. An implication of the symmetry assumption is that in terms of audience, revenues, and production budgets, all firms look alike in equilibrium. Since we are comparing alternative equilibria, this simplifies the analysis considerably. A drawback of assuming symmetry among programmers is that the model cannot be used to examine competitive outcomes when viewer preferences over program types are unevenly distributed, resulting in larger and smaller clumpings of viewers with fairly similar tastes.[1] Thus we cannot examine minority v. majority taste and programming questions within the formal confines of the model, although we will argue that certain informal extrapolations are probably justified. A second drawback of the symmetry assumption is that, while the model is sufficiently general to apply to competition among advertiser supported services and to competition among pay services, symmetry precludes formal examination of competition among pay *and* ad supported services.[2]

---

[1] Competition among programmers when viewer preferences are unevenly distributed traditionally has been studied with models of the type introduced by Steiner (1952). The literature that wlaborates on Steiners framework is reviewed in Owen, Beebe, and Manning (1974) and Beebe (1977). The program choice described here follows the program choice models of Spence and Owen (1977) and Wildman and Owen (1985) in assuming an even distribution of viewer preferences.

[2] Wildman and Owen (1985) contains the only published attempt to formally model simultaneous competition among pay and ad supported services. Both of their models addressing this issue assumed fixed production budgets.

Two versions of the model were examined. The simpler version, like most other economic models of program choice, assumes competition takes place within a single program period, for example 8:00 to 9:00 PM on Thursday evening. Because we are concerned with repetition of programs within the schedule on a single channel, we also extended the model by adding a second program period immediately following the first in each program day. Each potential member of the television audience in the first period is also a potential audience member in the second period.

B. Results

There is a clear quantity-quality trade-off in the single period version of the model. Since each program is differentiated from all others, this means there is also a diversity-quality tradeoff. The greater the number of programming services, the smaller are production budgets. This relationship is illustrated in Table 1 which shows the effects of changes in the number of channels (or programmers) on the variable portion of the production budget for a representative program for a particular specification of the model in which the total revenue generated by all channels during a program period[1] is assumed to be constant (invariant or inelastic with respect to the quality and number of programs), and program quality as perceived by viewers increases with increases in production budgets, but increases at a decreasing rate.[2] Note also in Table 1 that production budgets increase with increases in the revenue generated by a program period if the number of channels programmed is held constant. Both relationships hold for all specifications of the model.

---

[1] This could be viewer or advertiser payments or some combination of the two.

[2] The results reported in Table 1 (and in Table 2) are based on a specification of the model in which revenues are allocated among channels in proportion to the relative qualities of their programs as perceived by viewers, viewers see program quality increasing in proportion to the fourth root of the variable portion of production budgets, and the fixed cost of producing a program is $200,000. The implication of the assumption that perceived program quality increases at a decreasing rate with increases in production budgets is that a given increase in a program's production budget contributes more to its perceived quality the smaller is the initial base to which the increase is applied. Thus, for example, viewers would appreciate more the effects of a dollar increase in a production budget if the increase were from a base budget of $250,000 than if the increase were from a base budget of $500,000.

Table 1

Production Budgets as a Function of Market Size
and Number of Competing Channels

Period Revenue ($mil.)	No. Channels 2	3	4	5	6	7	8	19*	37*	56*
$5	.31	.28	.23	.20	.17	.15	.14	.06	--	--
$10	.63	.56	.47	.40	.35	.31	.27	.12	.07	--
$15	.94	.83	.70	.60	.52	.46	.41	.19	.10	.07

* 19, 37, and 56 are the largest numbers of channels that can be programmed by competitive firms without generating negative profits in markets with period revenues of $5 mil., $10 mil., and $15 mil. respectively.

Another feature of the model illustrated by Table 1 is that the free entry, competitive equilibrium number of programmers (or channels programmed) rises as the revenue generated by a time period increases. Thus, without restrictions on entry, the number of channels programmed rises from 19 to 37 to 56 as the revenue produced within the period grows from $5 mil. to $10 mil. to $15 mil. A policy implication of this relationship is that competitive networks can be induced to produce higher quality programs if their numbers are reduced. The cost of such a policy to encourage higher quality programs would be the diversity sacrificed from the channels that go dark.

The intuition underlying the relationships illustrated by Table 1 is fairly straightforward. Programmers spend more trying to improve the quality of their programs when the revenue to be divided among them is larger, because, at the margin, the increase in audience share generated by a small increase in the production budget is worth more if the revenue generated by the audience is larger. While diminishing returns imply that, eventually, an additional production dollar will bring in less than a dollar of

additional revenue, this point is reached earlier if the revenue for a program period is small. Thus, holding the number of competitors constant, small market budgets will be smaller. Because viewers value both diversity and program quality, a competitive programming industry provides more of both if the revenue generated by a television audience grows.[1]

A similar logic explains why production budgets might fall if the number of competitors increased. As programs proliferate, viewers find better matches between programs available and their own particular preferences for the nonqualitative aspects of programs. This makes it more difficult for any given programmer to woo viewers away from their more "natural" choices by spending more on its own programs.

To examine the effects of variation in channels available on program repetition we added a second period to the program day. For any channel, the programmer of the first period of the day also programs the second period. The entire audience from the first period is assumed to carry over to the second period with no new additions. The revenue generated by the second period audience is equal to that of the first, so the second period doubles television industry revenues in this model. Programmers have the option of producing an entirely new program for the second period or showing the first period program again in the second period. Viewers who have seen a program in the first period will not watch the same program again if it is repeated in the second period, but do watch a program on another channel.

By repeating its first period program in the second period, a programmer saves the production costs of a second program, but gives up the chance to have those viewers who watched the program in the first period as members of its second period audience. Thus, the programmer's second period audience and revenue will be lower if it shows the second period program again. (Assuming other programmers do not repeat their programs. We have also assumed that a program that is repeated suffers no disadvantage in competing for second period viewers that did not watch it in the first period.)

---

[1] The effects of market size on production budgets and diversity in this model are similar to those observed in recent work on the economics of international trade in video products. See Wildman and Siwek (1987, 1988) and Waterman (1988b).

Table 2 compares, for the same specification of the model used to generate Table 1, the difference between a programmer's profits if it shows the same program in both periods with its profits if it produces a different program for each period, under the assumption that all other channels follow the second strategy of producing two programs, one for each period.[1] The objective of these comparisons is to examine the stability of an equilibrium with all programmers scheduling different programs for each period as the number of channels programmed is varied.

Table 2

Programmer Profits with a Single Program Repeated
Minus Profits with Two Programs

Period Revenue ($mil.)	No. Channels 2	3	4	5	6	7	8	19*	37*	56*
$5	-.74	-.08	.12	.20	.23	.25	.26	.25	--	--
$10	-1.68	-.36	.04	.20	.27	.30	.32	.30	.26	--
$15	-2.61	-.63	-.03	.20	.30	.35	.38	.35	.29	.26

* 19, 37, and 56 are the largest numbers of channels that can be programmed by competitive firms that do not repeat their programs without realizing negative profits in markets with per period revenues of $5 mil., $10 mil., and $15 mil. respectively.

[1] The comparisons in Table 2 assume that production budgets would be the same for programs shown in a single period as production budgets for programs shown in two periods. A more complete analysis would probably show that production budgets would be larger for repeated programs, since the effects of increased budgets would be felt in two periods instead of one. This means that the switch from non repeated programs to repeated programs that occurs as the number of programmed channels increases would occur earlier at a smaller number of channels than indicated in Table 2. See Waterman (1986a) for a discussion of the effect of repeated showings on program budgets.

Since Table 2 reports a programmer's profits with repeated showings of a single show minus the profits it would have if it produced different programs for each time period, negative numbers in the table indicate that separate programs for each period are the most profitable strategy. Positive numbers indicate situations in which a programmer could increase its profits by repeating a single show if competiting programmers provided two shows on their channels. Table 2 shows that if the number of channels programmed is small, an equilibrium in which each programmer provides different programs for each period may be stable. However, as the number of channels programmed increases, at some point it becomes profitable for at least one programmer to switch to a strategy of showing the same program in both periods.[1]

Why the likelihood that some programmers will switch to program repetition increases as the number of channels programmed increases is fairly easy to understand. The fraction of the potential audience that views a program in the first period, and thus is eliminated from its potential audience in the second period, is likely to be large if few channels are programmed. That is, when few channels are programmed and each programmer's share of the first period audience is large, the potential audience available for a second showing of the same program is reduced considerably. The potential audience available for a second showing increases as the first period share declines, which is what happens as the number of channels programmed increases. For example, if three channels are programmed, and they share the first period audience equally, one-third of the second period audience would be eliminated as potential viewers of a program that was repeated. If ten channels are programmed, ninety percent of the second period audience members would be potential viewers of a repeated program.

A comparison of production budgets for aggregate program period revenues of $5 mil. and $10 mil. in Table 1 allows us to see what happens to program budgets when programmers switch from

---

[1] In other exercises with this model, we have found that for some specifications of the model, an equilibrium in which all firms repeat their programs is not stable if only a few channels are programmed because at least one programmer will find it profitable to switch to a strategy of providing a different program for each period. This result is more likely the smaller are the fixed costs of production, the larger is aggregate revenue per period, and the less effective are increases in the variable portion of a representative program's budget in increasing its appeal to viewers.

two programs per day to single, repeated programs. If all programmers repeat their first period programs, then all can expect to share equally in each period's revenue. This effectively doubles the revenue per program, so that competitive equilibrium budgets will be the same as for the single period model with twice the aggregate revenue for the period. Thus, in the two period model, we find that program quality declines initially as the number of channels increases, but that it rises again as programmers switch to schedules with their programs repeated, which effectively halves the number of programs and diversity. Program budgets resume their downward march as the number of channels programmed increases once all programmers have switched to repeated schedules.

A particularly interesting application of this model is video on demand. If all programs are provided on an on-demand basis, distinctions among program periods disappear. From the programmer's point of view, there is but a single period with aggregate revenue equivalent to the total of all revenue generated by viewing throughout the day. Equilibrium program budgets and variety will be the same as those generated by the single period version of the model with aggregate revenue equal to total of revenues generated by viewing throughout the day. Thus the model applied to video on demand collapses to the two period model where all programmers schedule repeated programs.

III. Alternative Broadband Futures

The model presented in the preceding section describes one possible future for broadband television service. By relaxing various of the model's assumptions we can examine alternative futures and the changes that would have to occur for the television industry in the United States to evolve into something approximating that of the model.

An important difference between the current television industry and the one modelled is that today only a few programmers, the three major broadcast networks, are able to reach nearly all U.S. television households. The effects of restricting all but a few programmers to less than 100 percent reach is fairly clear, although we have not worked this out formally with the model described above. Because their investments in programs have the potential to

sway more viewers, the return on dollars invested in program quality (and thus the number of dollars invested) will be higher for the programmers with the greater reach. The programmers able to reach all television households would produce higher quality (larger budget) programs than those whose reach was more limited.[1] This is pretty much the relationship among program budgets for different programming services that we now observe, for ad supported networks in particular. The majority of the high budget programs, especially series, are produced for the three major broadcast networks, although for one time events, such as made-for-television movies, the larger cable networks (HBO, Showtime, and USA Network) sponsor some productions with budgets approximating those of the broadcast networks.[2]

The program choice model therefore suggests that increased penetration of broadband services will reduce the disparity between the current over-the-air networks and other networks with more limited reach. In the limit, if broadband television service approached 100 percent household penetration, all networks would look increasingly similar in terms of program budgets and audience size.[3] Such a process appears to be well underway, with the broadcast networks' audiences dwindling in the face of increasingly strong competition from cable and independent television stations. That both cable networks and independent stations strengthened their positions as they extended their reach is no coincidence. Whether the current broadcast networks will suffer the fate just predicted of blending gradually into a large pack of similarly undistinguished national networks will depend on a variety of factors that may affect the spread of broadband gateways and consumer enthusiasm for the services they carry, and on whether

---

[1] This is similar to the economic explanation offered in recent studies of international trade in films and programs for the positive relationship observed between the size of production budgets for films and television programs and the size of the domestic markets for which they are produced. (Waterman, 1988; Wildman and Siwek 1988) A likely positive relationship between geographic reach and investments in program quality is demonstrated formally and supported by an empirical study of radio stations in Wildman and Cameron (1982).

[2] The ability of these cable networks to finance relatively expensive productions reflects, for the pay networks especially, the importance of viewer payments as a source of revenue not available to the broadcast networks.

[3] Differences in the economics of pay and advertiser support may produce differences in pay and advertiser supported networks. An analysis of the implications of pay and ad support differences is beyond the scope of this paper.

viewer preferences over program types are evenly distributed, as assumed in our program choice model, or exhibit distinct and significant clumpings around particular program types.

Today cable is not available in sparsely populated areas because the cost of cabling these areas is prohibitive. This may well be the case with IBN in the future, expecially if telephone service is provided by means other than wire. To extend their reach, IBN based networks would have to employ spectrum using technologies, such as DBS, as cable networks do today. The local regulatory barriers that have retarded the growth of cable systems in major metropolitan areas and may also hinder the provision of IBN based video services in the future. Approximately fourty percent of households currently passed by cable do not subscribe. This figure has been relatively constant for at least the last five years. More of the homes passed would subscribe, of course, if the price for cable service were lower. That it is not reflects the judgements of cable operators that profits gained on additional subscriptions at a lower price would not be enough to offset revenues lost on current customers who also would benefit from the lower price. It is not at all clear that a lower cost broadband delivery technology would change the pricing calculus very much. So even if IBN's brought broadband television service to every doorstep, the cost of service may still limit penetration to levels well below what is now achieved by the major broadcast networks.[1]

Even if the penetration of broadband services is not limited by the various factors just mentioned, the eventual equilibrium structure of the television industry may still be one in which some networks have large audiences and large program budgets while others produce less expensive programs for smaller audiences if the distribution of viewers preferences over program types is highly uneven. This type of structure is especially likely if one or a few program types are preferred by a majority of viewers. For example, assume that every viewer has a preferred program type and refuses to watch anything else. Most viewers like type A programs and the rest like programs of type B.[2] If there is sufficient channel capacity, the two viewer populations and the channels that served them would constitute distinct television markets for all practical purposes. Thus, by the logic of the model described in Section II, we

---

[1] Of course, prices set by regulators could have the same effect.

[2] There may be some variation among programs within these types.

should see more channels devoted to type A programs than to type B programs and type A programs would be more expensive.

Finally, the tendency for program budgets to fall with the addition of new channels may be limited to some extent if new services generate additional viewers and new revenue. The tendency of budgets to increase with market revenue would offset to some degree the negative effect of increased competition.

IV. Study of cable programming

As we stated in the introduction, our study of cable programming patterns is still in progress. We are still adding data for more cable networks and analyzing the data we have now. The results reported in Tables 3 and 4 must therefore be considered preliminary.

An important focus of the analysis in Section II was the conditions under which channel programmers' profits would be greater if programs were duplicated than if new programs were scheduled for each period. The analytical experiment of varying the number of channels and comparing profits from the two strategies showed that as the number of channels increased and program audience shares declined, repetitive programming became the more profitable strategy. The logic that drives this result also suggests that for a television industry in which some programmers have much larger audience shares than others, it is the firms with the smallest shares that are most likely to repeat their programs.

Table 3 reports two measures of the frequency of program repetition for the NBC, ABC, and CBS Chicago affiliates and for 10 cable networks. These were: (1) the average over 31 days of the percentage of scheduled program hours that were devoted to programs repeated at least once during the same day. This is a measure of repetition in daily schedules. (2) The percentage of programmed hours devoted to programs that were repeated over the course of a month. The monthly figure was calculated because many cable networks program on a monthly basis. Furthermore, there is

Table 3 Analysis of Daily and Monthly Repitition Rates

	31 Day Average of Repeated Hrs/ Total Progam Hours in 1 Day	Hours of Repeated Programs/ Total Program Hours in 1 Month
BROADCAST NETWORKS*		
CBS	1.2%	1.3%
NBC	1.8%	1.9%
ABC	1.5%	1.5%
Average	1.5%	1.6%
SUPERSTATIONS		
WWOR	0.5%	0.5%
TBS**	0.9%	3.6%
Average	0.7%	2.1%
CABLE- BASIC		
USA	0.5%	5.6%
Nashville	54.0%	64.1%
Discovery	1.5%	57.3%
Travel	62.7%	62.7%
Nostalgia	33.3%	66.6%
Average	30.4%	51.3%
CABLE- PAY		
HBO	12.4%	78.1%
AMC	53.7%	72.8%
Showtime**	15.4%	71.0%
Cinemax	4.6%	63.9%
Bravo	41.8%	65.0%
Average	25.6%	70.2%

Sources: Chicago Tribune. TV Week (December 1988 issues) and December 1988 schedules provided by individual companies

Notes:

* Network information based on broadcast schedules of their Chicago affiliates.

** Information based on January 1989 schedules.

no reason why a day should constitute a natural cycle for measuring repetition. The three major broadcast networks rank near the bottom by both measures of repetition. In each case, repetition within the schedule was accounted for entirely by late night news broadcasts that were rebroadcasts of news programs earlier in the evening. TBS, USA, and Discovery (which ranks low on daily repetition but high on monthly repetition) are all among the ten most popular basic cable networks, ranked first, second, and ninth respectively according to their Nielsen prime time ratings for July 1988.[1] WWOR's status as a major independent in its home market probably should be incorporated in a full analysis of this data, but the project has not yet progressed to that point. Nevertheless, if advertiser supported networks are considered as a group, those with the highest degrees of repetition are the ones with the lowest ratings.

A similar relationship appears to hold among pay services. While the five pay services appear fairly similar in terms of monthly repetition, the three more popular services, HBO, Showtime and Cinemax,[2] have significantly less daily repetition. The results are broadly consistent with the hypothesis that networks with small audience shares will repeat their programs more often. Of course, repetition of programs will also produce smaller shares if all firms do not adopt this strategy. However, it does not seem plausible that differences in rates of program repetition could explain differences in ratings of the magnitude observed.

Not reflected in the figures in Table 3 is stripping of syndicated series. This might be considered a form of repetition. All of the network affiliates strip syndicated programs during portions of their non prime time schedules. However, USA, TBS, and WWOR all do somewhat more stripping than the network affiliates.[3]

---

[1] As reported in **Channels,** October 1988, p. 66.

[2] Popularity as measured by subscribing households. We have not yet begun to investigate ratings data for these services.

[3] Off-network syndication was not considered in the model presented in Section II. The logic of that model seems to suggest that off-network programs might be repeated less frequently within a program schedule since the available audience has already been reduced by the original network run.

Table 4. Program Type Breakdown of Hours

	Adven-ture	Audienc Particip	Adv. & Travel	Children	Sit. Comedy	Comedy Variety	Dance & Theatre	Docu-mentary	Devo-tional	Feature Film	How-to- Do/Misc	General Drama	Inter-view	Mini-series	Mystery Suspens	Music Variety	News	Quiz	Sports	Science Fiction	Talks & Educ.	General Variety	Western
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
BROADCAST																							
NETWORKS ***																							
CBS	0.0	1.3	0.0	4.7	2.0	0.1	0.0	0.4	0.1	11.0	4.8	17.9	2.3	0.0	5.6	0.1	32.5	5.9	8.6	0.0	0.5	2.2	0.0
NBC	0.0	0.0	0.3	3.8	4.6	7.1	0.0	0.2	0.3	10.3	4.0	16.2	2.6	0.0	4.8	1.8	24.0	11.9	6.7	0.0	0.6	0.8	0.0
ABC	0.0	0.0	0.0	4.3	5.0	0.0	0.0	1.2	0.2	24.0	2.5	13.9	7.1	0.0	1.7	0.3	24.1	4.6	5.3	0.0	4.7	1.1	0.0
Average	0.0	0.4	0.1	4.3	3.9	2.4	0.0	0.6	0.2	15.1	3.8	16.0	4.0	0.0	4.0	0.7	26.9	7.5	6.9	0.0	1.9	1.4	0.0
SUPERSTATIONS																							
WWOR	5.1	5.9	0.0	13.4	8.5	1.6	0.0	0.0	0.2	4.8	18.8	0.5	11.0	0.0	17.6	0.0	6.3	0.0	5.0	0.7	0.6	0.0	0.0
TBS *	0.0	0.0	3.0	11.0	19.4	0.0	0.0	0.0	3.0	38.8	2.6	3.0	0.0	0.0	2.8	6.7	1.8	0.0	6.4	0.0	0.3	0.0	1.1
Average	2.6	3.0	1.5	12.2	14.0	0.8	0.0	0.0	1.6	21.8	10.7	1.8	5.5	0.0	10.2	3.4	4.1	0.0	5.7	0.4	0.5	0.0	0.6
CABLE- BASIC																							
USA**	1.5	0.0	0.0	23.8	1.1	0.0	0.0	0.0	0.0	15.0	0.0	4.6	1.9	1.5	17.8	3.6	0.0	19.9	9.0	0.3	0.0	0.0	0.0
Nashville	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	11.8	3.6	0.0	9.7	0.0	0.0	36.1	0.0	5.9	13.4	0.0	5.9	9.7	0.0
Discovery	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Travel	0.0	0.0	99.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0
Nostalgia	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	78.6	0.0	1.2	5.2	0.0	8.6	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Average	1.5	0.0	20.4	4.8	0.2	0.0	0.0	20.0	0.0	21.1	0.7	1.2	3.4	0.3	5.3	8.0	0.0	5.2	4.5	0.1	1.4	1.9	0.0
CABLE- PAY																							
HBO	0.0	0.0	0.9	10.0	1.0	1.9	0.0	0.9	0.0	74.2	0.3	2.2	0.0	2.4	0.0	3.0	0.0	0.0	3.2	0.0	0.0	0.0	0.0
AMC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Showtime *	0.0	0.0	0.0	11.9	0.8	2.6	0.0	2.6	0.0	84.1	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Cinemax	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.7	0.0	96.3	0.0	0.0	0.3	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.3	0.0
Bravo	0.0	0.0	0.0	2.1	0.0	0.0	18.4	4.0	0.0	57.4	0.0	0.0	5.0	0.0	0.0	13.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Average	0.0	0.0	0.2	4.8	0.4	1.0	3.7	1.6	0.0	82.4	0.1	0.4	1.1	0.5	0.0	3.6	0.0	0.0	0.6	0.0	0.0	0.1	0.0

Sources: Chicago Tribune, TV Week (December 1988 issues) and December 1988 schedules provided by individual companies.

Notes:

* Information for TBS and Showtime is based on schedules for January 1988.

** The schedule data used for USA Network is limited to the program periods, as specified in their materials.

*** The network schedules were broadcast schedules of their Chicago affiliates.

Table 4 reports percentages of program schedules devoted to programs falling into the various categories used by Nielsen to classify syndicated programs. In general, the networks with higher shares are also have more content diversity as well as lower duplication scores. We hope to pursue the relationship between specialized content and diversity in more detail as we continue with this study. However, high rates of program repetition necessarily limit the amount of diversity that is possible. In the limit, if a single program is shown continuously, a channel can carry only one type of program.

V. Concluding Observation

We conclude with a final reflection on the relationship between channel capacity and program diversity. In the model presented in Section II, diversity and quantity were synomous and, except for the transition to repeat programs in the two period version of the model, varied in proportion with the number of channels programmed. Allowing programs to return in syndication after their initial network runs means that some of the addition channels will show the original programs from previous periods. Thus diversity will increase less rapidly than would otherwise be expected.

Recently some observers of the television industry have decried the fact that program patterns on a number of the cable channels are very similar to those on the major broadcast networks. A closer look at these channels shows heavy reliance on off-network product. So it may be that it is the availability of off-network series which has prevented the emergence of specialized programming in the quantities anticipated and hoped for. In the future, product shown originally on broadband services will be entering the syndication market in greater quantity and can be expected to have a similar effect.

References

Owen, B., Beebe, J., and Manning, W. **Television Economics**, Lexington Books, 1973.

Park, R. E. **New Television Networks: An Update**, Rand Corporation, August 1980.

Spence, A. M. and Owen, B. M., "Television Programming, Monopolistic Competition and Welfare," **Quarterly Journal of Economics**, 1977, v. 91, pp. 103-26.

Waterman, D., "Narrowcasting on Cable Television: A Program Choice Model," paper presented at the International Telecommunications Research Conference, Airlie House, VA, Oct. 30-Nov. 1, 1988a.

_____, "World Television Trade: The Economics Effects of Privatization and New Technologies," **Telecommunication Policy**, June 1988b.

Wildman, S. and Cameron, D., "Competition, Regulation, and Sources of Market Power in the Radio Industry," UCLA 1982.

_____ and Owen, B., "Program Competition, Diversity, and Multichannel Bundling in the New Video Idustry," in E. Noam, ed. **Vide Media Competition: Regulation, Economics, and Technology**, Columbia University Press, 1985.

_____ and Siwek, S., "The Privatization of European Television: Effects on International Markets for Programs," **Columbia Journal of World Business**, Fall 1987, pp. 71-76.

_____ and _____ **International Trade in Films and Television Programs**, Ballinger, 1988.