Market competition and program type diversity: A cross-sectional study of U.S. television stations*

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Abstract

Using a cross sectional sample 231 randomly selected television stations, the study examines the relationship between market competition and station ownership structures and program diversity. The results from analyzing each station's 2003 programming schedules for a constructed two-week period show that programs on television stations were concentrated in a handful of program types. Further, the regression analysis showed that market competition (in terms of the number of television stations available in a market) has a negative relationship with program type diversity. We emphasize the preliminary nature of the results.

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Introduction

A recurring issue in media policy debate is whether or not increased market competition and ownership consolidation affect media diversity. As the Federal Communications Commission (FCC) reconsiders its media ownership rules, we examine the relationship between market structure and program diversity for a random sample of U.S. commercial television stations. We ask the following research question: how do market competitive conditions and station ownership structures affect program source and type diversity on local television stations?

In this paper, we first review previous research on program diversity. We then describe our research methodologies and report the preliminary findings. The study is a work in progress. We are working with a vast amount of content data. Much data work is still to be done.

Literature review

Competition and diversity are two of the most important media policy objectives in the U.S. (Napoli, 2001). They are the underpinnings of the "marketplace of ideas" theory that holds that "the widest possible dissemination of information from *diverse* and *antagonistic* sources is essential to the welfare of the public" (*Associated Press v. United States*, 1945, p.1424, emphasis added). Most, if not all, of the FCC media policies, past and present, are motivated by these two policy goals – fostering competition and enhancing diversity (FCC, 1998).

Competition and diversity are two separate but interrelated media policy principles (Napoli, 2001). While some policies, especially those targeting media content or equal opportunity in employment, may seem to focus exclusively on achieving media diversity, most media policy measures are substantiated on both policy grounds. Take media ownership rules as an example. These rules, be it national, local or cross media ownership limits, were created to increase competition and ensure diversity by maintaining ownership boundaries and maximizing independent voices in the marketplace. Similarly, the recent FCC decision to relax ownership rules was mainly motivated by its conclusion that reduction in competition and diversity is minimized by the presence of a plethora of media choices for the public, including cable television, satellite television and the Internet (FCC, 2003).

The interrelationship between two media policy principles is well understood in media economic and policy analyses, even though the nature of their relationship is subject to continuous debate. Ever since 1950s, various program choice models have been developed to theoretically examine the relationship between market competition and program diversity in the media (Beebe, 1977; Rothenberg, 1962; Spence and Owen, 1977; Steiner, 1952; Waterman, 1992; Wildman and Owen, 1985; Wiles, 1963. See Owen & Wildman, 1992 for a summary of these models). How does the presence of more media outlets or more competition among existing media outlets affect their program choices and thus content diversity? The answer is not clear. On the one hand, it is well-known that competing broadcasters tend to duplicate each other’s programs, given the number of channels available (Steiner, 1952). On the other hand, increase in the number of available channels stimulates competing stations to program more distinct television content (Spence and Owen, 1977).

Empirical research on the effects of market competition on program diversity in the context of broadcast television also has a long history (For summaries, see Einstein, 2004a; Napoli, 2001). However, most of the past studies in this area are descriptive. The foci were on measuring the trend of program diversity and that on broadcast network television (e.g., Dominick & Pearce, 1976; Einstein, 2004b; Grant, 1994: Lin, 1995; Litman, 1979; Wakshlag & Adams, 1985). Although competition had always been used in these studies as an explanation for the increase or decrease in program diversity over time, the relationship was never actually measured. Instead, it was simply assumed that as time passed, the (network) television industry became more and more competitive. Empirical studies that explicitly model the relationship between market structure and program diversity are abundant in the radio sector (e.g., Alexander, 1997; Berry & Waldfogel, 2001; Chambers, 2003; Roger & Woodbury, 1996), but rarely exist in broadcast television (Levin, 1971; Li & Chiang, 2001). The current study contributes to this area of research by statistically examining how market competition and ownership structures are related to program diversity on individual local television stations.

Method and model

The data used in this study consist of 233 randomly selected commercial stations. The station sample frame is a list of 1,447 full power, English-language television stations published in the *Nielsen Station Index Directory of Television Stations 2003-2004*. For each sampled station, a two-week constructed sample of programming in 2003 was analyzed. The specific days comprising the sample two weeks were randomly selected. They are Jan. 11 (Sat.), Jan. 22 (Wed.), Feb. 17 (Mon.), Feb. 27 (Thu), Mar. 23 (Sun.), Mar. 28 (Fri.), Apr. 22 (Tue.), Aug. 11 (Mon.), Sep. 30 (Tue.), Oct. 18 (Sat.), Nov. 5 (Wed.), Nov. 6 (Thu.), Nov. 9 (Sun.) and Nov. 28 (Fri.), all of 2003. An entire day's program schedule of each station was analyzed.

Station programming data were obtained from Tribune Media Services. In addition to operating the on-line schedule database (zap2it.com, which only provides scheduling information for the current two-week period), Tribune provides detailed television program schedule data to commercial and non-commercial clients. For this study, 18 fields of data were obtained, ranging from station call letters to the date, time, title, description, and duration of program broadcasts. The Program Type field classified each program according to 31 programming types (see Table 1). The data set also included a Program Origination field, which identified each program as Local, Syndicated, or Network (along with identifying the originating network). The last two data fields helped create the dependent variable for the statistical analysis – program source and type diversity.

Dependent variable

Media diversity is a multi-dimensional term, both conceptually and empirically. There are at least three dimensions to diversity: source diversity, content diversity and exposure diversity, with sub-components within each of the three dimensions (Napoli, 2001). This study focuses on content diversity and more specifically, on program source and program type diversity. Only the results regarding program type diversity are reported in this paper.

Measuring program type diversity has a long tradition and is prevalent in media diversity research. The reason is fairly straightforward. The presence of a diverse mix of program options is a necessary, if not sufficient, condition for a marketplace of ideas. Since every television program is different, using categories to measure differences in programming represents a simple and reasonable solution.[1]

In constructing program type diversity, this study relied on the 31 program type classifications utilized by the data provider. Two program types (*Pelicula* and *Sports anthology*) did not have any programming and were deleted, so the diversity index was calculated using the remaining 29 program types (see Table 1).

For each station, a program type diversity index (DVI) was constructed using the Herfindahl-Hirschman index (HHI) method.[2] To examine the relationship between market competition and program diversity, we then regressed the diversity indices on a range of key market and station ownership variables including market size, the number of commercial and public stations, penetration rate of cable television, duopoly, local and network ownership.

<u>*Independent variables*</u>

We assessed the competitive conditions in a station's market by using variables capturing a station's market size (in terms of number of television households), the number of commercial and non-commercial stations in a station's market, cable television penetration, and the audience share for public and non-broadcast television in the market. These variables are intended to capture both the number and the competitive

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[1] See Napoli (2001, pp. 138-142) for a critique of program type diversity measurement.
[2] Specifically, for each station, we first calculated the percentage of program minutes for each program type over the entire two-week constructed sample period. Then, we squared the 29 individual program type percentages and added them up. The result is the program type diversity index (DVI) for the station.

strength of the alternative program sources against which any broadcast station must compete. Some of these variables have been shown to affect program diversity (Levin, 1971; Li & Chiang, 2001; Rogers & Woodbury, 1996). Rogers & Woodbury (1996), for instance, found a moderate but positive relationship between the number of radio stations and the number of radio formats in a market. Li & Chiang (2001), however, found a negative impact of increased competition among stations on television program diversity in Taiwan.

In addition to market concentration, whether or not ownership consolidation affects content diversification is also of policy concern. Berry and Waldfogel (2001), for example, found some evidence that consolidation increased the amount of programming variety in radio, with the positive effect more manifest in jointly owned local stations. Li & Chang (2001), in their Taiwanese television sample, reported a negative relation between station ownership concentration and content diversity.

The ownership characteristics incorporated into this study included whether the station was a duopoly, whether the station was owned locally, whether the station was owned by one of the Big Four broadcast networks, and the size of the station group owning the station (as measured by the group's national household reach). These variables are intended to capture the primary station ownership characteristics that have been of interest to policymakers and that frequently have been asserted to bear some relationship with television programming.

Besides the above key market competition and station ownership variables, we also included a number of control variables in the statistical model. A station's status as a VHF or UHF station, a station's annual revenues and a station's network affiliate status were included to gauge the effect of station financial strength and network affiliation on program diversity. A network affiliate station relinquishes most of its air time to its parent network. This has negative impact on program diversity, all other things being equal. On the other hand, stations with greater financial resources are in a better position to provide diverse programming. Finally, the percentage of the population in a station's market that is white was included as a control variable because the extent to which minorities comprise a significant portion of a station's potential audience may compel stations to provide a more diverse mix of programming. For example, taking African-American & Hispanic populations into account, Rogers and Woodbury (1996) found a positive relationship between ethnic makeup and radio program diversity in radio.

Data for the station and market independent variables used in this study were obtained from the *2003 Investing in Television Market Report* (4^{th} ed.) and the *2003 Investing in Television Ownership File* (3^{rd} ed.), both published four times a year by BIA Research. Table 3 includes a complete list of variables, their descriptions and descriptive statistics.

Results

Program type diversity

Average program type diversity for the sample stations during the sample period, based on the original 29 program types, is 1964 (see Table 1). This indicates a high concentration of program types. The large standard deviation indicates a wide range of program type diversity among the stations. The minimum program diversity value is 900. As for individual program types, talk shows led the pack, followed by news, religious programming, daytime soap and game shows.

We reduced the number of program types to 17 by combining some of closely related program categories. For example, we combined *sports event*, *sports related*, *team vs. team*, *pseudo sports* and *play off sports* into *sports*. The resulted mean program type diversity is 2004 (see Table 2). Talk shows, news and religious programming still dominated the schedules, but after the category recoding, sports now accounted for more programming time than daytime soap and game shows.

Regression results

The regression analysis estimated the effects of market competition and station ownership structures on the station program diversity index. Twelve stations did not have station revenue data and had to be excluded from the regression analyses.

First, regarding market variables, the number of commercial stations and public stations in a given market were found to have a negative relationship with program type diversity. That is, the more television stations available in a station's market, the more concentrated the station's programming is. The relationship is marginally significant. This result is consistent for both diversity measures. This suggests that market competition (as represented by the availability of more television stations) is inversely related to program type concentration of individual stations.

Other market competitive measures, including number of television households, cable penetration, public station and other non-broadcast viewing, had no significant relationship with station program diversity.

As for station ownership variables, all other things being equal, locally owned stations had a significantly more concentrated programming mix, whereas duopoly stations or commonly owned stations had a significantly less concentrated programming mix. Big four network ownership and station owner national household reach did not show any significant relationship with station program type diversity.

Two of the controlling variables (big four network affiliate and station revenue) were found to have significantly positive relationship with program type diversity. That is, big four network affiliate stations and financially stronger stations provided a programming mix with more diverse program types. A station's VHF status and the demographic composition in its market did not have any significant effect on the program diversity measures.

Conclusion

This study examined the relationship between market and ownership concentration and television program diversity by analyzing the programming schedules of 233 commercial stations in 2003. Measuring program diversity in terms of program type diversity, our preliminary analysis of the available data shows that programs on television stations were concentrated into a handful of program types. The regression results show that market competition (in terms of the available number of television stations in a market) has a negative relationship with program type diversity. That is, all other things being equal, stations in markets with a larger number of stations had a more concentrated programming menu. In addition, programming on locally owned stations was more concentrated and duopoly stations were less concentrated.

The results reported in this paper are preliminary and we caution readers not to "over-interpret" the results. Four of the original program categories used by the data provider are not content based. They are *first run syndication*, *syndication*, *network series* and *mini series* (see Table 1). Together, these four types accounted for a quarter of all of the programming analyzed. We are working on re-coding programs that were classified as one of the above four types using the content based categories. Until that work is done, the program diversity measures we present in this paper are flawed. An attempt to identify the sources of individual programs is also in the works. This enables us to examine how market competition and ownership structures affect the diversity of program sources and, in particular, stations' efforts in local programming. Together, we believe this research project will make a valuable contribution to media diversity research by relating measures of media diversity to market structural factors.

Table 1 Distribution of TV Programming by 29 Program Types

	Mean (%)	Std. Dev.	Mean (min.)	Std. Dev.
Talk show	16.76%	10.54%	3381.050	2125.060
Other	14.39%	17.28%	2903.040	3482.900
News	11.98%	9.95%	2417.000	2008.330
Religious	7.17%	16.85%	1446.900	3398.680
Daytime Soap	4.48%	4.42%	904.309	891.916
Game show	3.93%	2.88%	793.923	582.250
Team vs. team	2.37%	1.86%	479.004	374.530
Movie	2.20%	2.73%	443.172	550.619
Cartoon	2.06%	2.73%	416.614	550.993
Sports event	1.51%	1.15%	304.279	232.976
Play off sports	1.38%	1.99%	277.931	402.955
Sports related	1.27%	0.82%	257.172	166.252
Public affairs	0.98%	1.04%	197.202	209.935
Seasonal special	0.89%	1.28%	180.227	257.977
Children’s show	0.89%	1.01%	179.004	204.076
Hobbies & Craft	0.77%	1.20%	154.639	242.763
Music	0.46%	0.97%	93.082	195.115
TV movie	0.34%	0.52%	67.704	103.923
Finance	0.33%	0.60%	67.262	120.317
Pseudo sport	0.21%	0.50%	43.223	101.399
Health	0.14%	0.68%	27.339	137.271
Music special	0.12%	0.40%	23.820	81.116
Children's special	0.06%	0.15%	13.004	30.717
Arts	0.03%	0.47%	6.180	94.338
Instructional	0.01%	0.05%	1.931	10.429
Syndicated	10.50%	10.42%	2119.540	2102.100
Network series	8.24%	3.68%	1663.580	741.968
First run syndicated	6.49%	5.51%	1309.420	1111.940
Mini series	0.03%	0.20%	5.279	40.642
Diversity Index (DVI-A)	1964.03	1451.86		

Diversity Index is calculated using HHI which is the sum of the squared percentages of each program type.

Table 2 Distribution of TV Programming by 17 Program Types

	Mean (%)	Std Dev	Mean (min.)	Std. Dev.
Talk show	16.76%	10.54%	3381.050	2125.060
Other	14.39%	17.28%	2903.040	3482.900
News	11.98%	9.95%	2417.000	2008.330
Religious	7.17%	16.85%	1446.900	3398.680
Sports	6.75%	3.87%	1361.610	782.580
Daytime Soap	4.48%	4.42%	904.309	891.916
Game show	3.93%	2.88%	793.923	582.250
Children’s show	3.02%	2.52%	608.622	509.380
Movie	2.53%	2.86%	510.876	576.414
Informational/Instructional	1.28%	1.75%	257.352	353.237
Public affairs	0.98%	1.04%	197.202	209.935
Seasonal special	0.89%	1.28%	180.227	257.977
Music	0.58%	1.17%	116.901	235.839
Syndicated	10.50%	10.42%	2119.540	2102.100
Network series	8.24%	3.68%	1663.580	741.968
First run syndicated	6.49%	5.51%	1309.420	1111.940
Mini series	0.03%	0.20%	5.279	40.642
Diversity Index (DVI-B)	2004.34	1436.87		

Diversity Index is calculated using HHI which is the sum of the squared percentages of each program type

Sports=Team vs. team + Sports events + Play off sports + Sports related + Pseudo sport
Info/Instructional=Hobbies & Craft + Finance + Health + Arts + Instructional
Children's show=Cartoon + Children's show + Children's special
Movie=Movie + TV movie
Music=Music + Music special

Table 3 Variable Names and Descriptions

Variables	Definitions	Mean Yes	Std. Dev. No
Dependent Variables:			
DVI-A	Program type diversity index, based on 29 program types	1964	1452
DVI-B	Program type diversity index, based on 17 program types	2004	1437
Independent variables:			
Station and ownership variables:			
VHF STATUS	Whether a station is a VHF or UHF station (1=VHF, 0=UHF)	0.46	0.50
STATION REVENUES	Station annual revenues in 2002 (mil)	20.22	31.09
BIG FOUR AFFILIATE	Whether a station is a Big Four (ABC, CBS, FOX, NBC) affiliate (1=yes, 0=no)	158	63
DUOPOLY	Whether a station is a local duopoly station (1=yes, 0=no)	38	183
LOCAL OWNER	Whether a station is owned by a local media company (1=yes, 0=no)	40	181
BIG FOUR OWNER	Whether a station is owned by the Big Four (ABC, CBS, FOX, NBC) (1=yes, 0=no)	25	196
NATIONAL REACH	Percentage of national television households reached by a station's parent company	0.13	0.18
Market variables:			
TVHH	Number of television households in a station's market (mil)	0.80	1.03
COMMERCIAL STATIONS	Number of commercial television stations in a station's market	8.00	4.22
PUBLIC STATIONS	Number of public television stations in a station's market	2.17	1.45
CABLE %	Percentage of households in a station's market subscribing to cable television (%)	68.51	9.55
% PTV VIEWING	Percentage of public television viewing in a station's market (%)	1.85	1.37
% OTHER VIEWING	Percentage of non-broadcast television viewing in a station's market (%)	50.79	9.43
% WHITE	Percentage of white population in a station's market (%)	78.13	12.86

Note: Data are for 2003, unless otherwise indicated. Summary statistics are based on 221 commercial stations included in the regression analysis.

Table 4Robust Results of OSL Regression (N=221)

	DV=DVI-A			DV=DVI-B		
	Beta	t		Beta	t	
Constant	98.719	1.24		101.105	1.28	
Commercial stations	5.352	1.70	*	5.205	1.66	*
Public stations	10.845	2.16	**	10.969	2.20	**
TVHH	0.024	1.56		0.024	1.58	
Cable %	0.568	0.76		0.541	0.73	
% PTV viewing	-3.745	-0.46		-3.461	-0.43	
% Other viewing	-0.132	-0.14		-0.087	-0.09	
Local owner	50.184	2.01	**	49.973	2.02	**
Duopoly	-47.388	-2.81	***	-47.570	-2.84	***
Big four owner	-15.330	-0.71		-15.225	-0.71	
National reach	-29.969	-0.53		-29.434	-0.52	
VHF status	-4.776	-0.43		-3.415	-0.31	
Big four affiliate	-79.931	-3.46	***	-76.972	-3.37	***
Station revenues	-0.812	-2.94	***	-0.814	-2.99	***
% white	0.675	1.47		0.660	1.46	
Adjusted R Square =	0.3918			0.3857		

*** Significant at .01 level
** Significant at .05 level
* Significant at .01 level

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