FCC Media Study 4: News Operations

Section I: "The Impact of Ownership Structure on Television Stations' News and Public Affairs Programming" by Daniel Shiman

This study examined the programming of about 6700 stations between 2002 and 2005. Stations cross-owned with a newspaper provided 11% (18 minutes) more news programming per day. Each additional co-owned station in the same market is associated with 15% (24 minutes) more per day of news programming. Larger station groups nationwide tended to provide less news programming, although local ownership was associated with 4% (6 minutes) less news programming per day.

Section II: "Ownership Structure, Market Characteristics and the Quantity of News and Public Affairs Programming: An Empirical Analysis of Radio Airplay" by Kenneth Lynch

This study examined the broadcasts of over 1,000 radio stations in 2005. The econometric technique used in this section produces two sets of results which must be considered jointly: the change in the likelihood of airing news, and the change in the amount of news that is aired if the station airs news. The net effect of cross ownership with a TV station was a statistically significant increase of 110 seconds (31%). Stations with owners located farther away were less likely to air news: for each 1% change in the distance between owner and station, the amount of news aired decreased 4%. Each additional in-market station owned by the parent decreased expected news by 6 seconds (2%) but the effect is not statistically significant. For public affairs programming, each additional in-market station owned by the parent had a net positive and statistically significant effect of 16 seconds (10%). There were too few instances of cross ownership with newspapers in the sample to draw meaningful inferences.

Section III: "Factors that Affect a Radio Station's Propensity to Adopt a News Format" by Craig Stroup

This study examined the format choices of about 8,000 radio stations between 2002 and 2005. A radio station that is cross owned with a newspaper is four to five times more likely to be a news station. Radio stations that are cross owned with TV stations are two to three times more likely to be news stations. Having a sibling news station in the market appears to increase a station's propensity to adopt a news format by about 40%. Using the broad definition of news, each additional parent station in the market was not significantly related to the station's odds of being a news station. Using the narrow definition of news, each additional parent station increases a station's likelihood of being a news station by 7%.

Section IV "The Effect of Ownership and Market Structure on News Operations" by Pedro Almoguera

This study examines the amount of news published by 134 newspapers in 2005. Newspapers that are co-owned with other newspapers within the same MSA are associated with a 5% drop in the absolute amount of news. This study found no statistically significant effect of cross ownership with radio or TV on the quantity of news published.

Section I.

The Impact of Ownership Structure on Television Stations' News and Public Affairs Programming

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Daniel Shiman

Abstract

The relationship between broadcast TV stations' ownership characteristics and the quantity of news and public affairs programming they provided is examined, based on the scheduled programming of almost all full power broadcast TV stations for two weeks a year for the four-year period 2002 to 2005. Using a three-way group fixed effects model to control for unobserved market-specific, broadcast network-specific, and time-specific factors, we found TV stations provided more news programming if they were cross-owned with a newspaper (18 minutes per day, an 11% increase), owned by a big four network (22 minutes more, a 13% increase), and had co-owned TV stations in the same market (24 minutes per day more per co-owned station, a 15% increase). They provided less news programming if they were part of a large station group, or if they were locally owned (6 minutes less per day, a 4% decrease). TV-radio cross-ownership did not have a statistically-significant impact on news programming. Most ownership characteristics did not have a statistically significant impact on the quantity of public affairs programming, however, with the exception that TV-radio cross-ownership was associated with 3 minutes more per day (15% increase).

1. Introduction

This section of the study examines the relationship between the ownership characteristics of broadcast television stations and the quantity of news and public affairs programming they broadcast.[1] Unlike most previous analyses of this issue, the analysis we present here is based on the scheduled news and public affairs programming of almost all full power broadcast analog television stations in the U.S. for two weeks a year, over the four year period 2002-2005. In our sample, television stations provided an average of 165 minutes of news programming and 23 minutes of public affairs programming per day. We employed a three-way group fixed effects model for our analysis to control for unobserved market-specific, broadcast network-specific, and time-specific factors. As a check for robustness we also employed a two-way group fixed effects model, controlling for market and time effects, and a two-way full fixed effects model, controlling for station and time effects.

Based on our analysis of this data, we found that certain ownership characteristics have a significant impact on the quantity of news programming provided by stations. Cross-ownership by a TV station of a newspaper in the same city, ownership by a big four network (the Owned and Operated's), and the presence of co-owned stations in the same market (i.e., duopoly status) are associated with a positive, statistically-significant increase in news programming. Meanwhile, stations belonging to larger station groups, and stations that are locally owned, tended to provide less news programming. TV-radio cross-ownership did not have a statistically significant impact. More specifically, TV-newspaper cross-ownership is associated with an 18 minute increase per day in news programming, about an 11% increase, while O&Os tend to have 22 minutes more (a 13% increase). For each additional co-owned station within the market a station tends to have 24 minutes more per day of news programming, a 15% increase. For each additional co-owned station nationally there tends to be a quarter minute less of news programming, and local ownership is associated with 6 minutes less news programming per day (a 4% decrease).

In contrast, most of the ownership characteristics did not have a statistically significant impact on the provision of public affairs programming. We found that higher parent revenues for a station are associated with the provision of less public affairs programming. We also found

[1] We thank Brian Extein for his research assistance for this section.

that TV-radio cross-ownership has a positive, statistically significant impact on public affairs programming. TV-radio cross-ownership was associated with 3 minutes more per day of public affairs programming, a 15% increase.

2. **Background**

There have been numerous studies that have examined the impact of the Commission's ownership rules on the provision of news programming by television stations. We note, however, that few of these studies were published in peer-reviewed journals, and therefore they have not received critical feedback and review. Many of the outside papers are, in fact, working papers and are therefore subject to revision.

The staff of the Commission conducted a study in 1975 examining the impact of station ownership characteristics, especially newspaper cross-ownership, on the quantity of local news, local non-entertainment programming, and total local programming (FCC 1975). The staff compiled a dataset based on the program reports provided by the stations themselves, for network affiliates, excluding satellite stations and stations in the top seven markets, for a composite week in 1972-73. The top seven markets were excluded because the staff determined that stations in these markets behaved differently than other stations. Programs were classified according to their time of day (all day versus prime time), category (news, public affairs, other), and whether the program was local. They also controlled for channel type (UHF or VHF), network affiliation, group ownership, station revenue, number of commercial stations in the station's market, and total minutes broadcast during the composite week. They found that television stations with a co-located, jointly-owned newspaper performed as well quantitatively as other stations, and in certain areas of local programming they broadcast more minutes than other stations, specifically in news, non-entertainment, and total local programming.

In their FCC study, Spavins, Denison, Roberts and Frenette (2002) compared the performance of network owned-and-operated (O&O) stations for the big four (NBC, Fox, CBS, ABC) to their network affiliates in terms of quantity and quality of news and public affairs programming (also called "informational programming"). The quantity of programming was measured on the basis of the number of hours of such programming during the November 2000 sweeps period, and the quality of the programming was measured using the evening newscast ratings, and the number of awards from the Radio and Television News Directors Association

(RTNDA) and of the A.I. DuPont Awards. Examining only markets containing at least one O&O and at least one network affiliate, they directly compared the performance of these stations, and reported the simple unweighted averages of the two kinds of stations. Spavins et al. did not use any regression analysis to correct for the influence of other factors, relying instead on within-market comparisons to eliminate the potential impact of market-specific factors such as market size and income. They also compared the performance of network affiliates co-owned with newspapers with all other network affiliates, using the same methodology. They found that O&Os gain the same ratings as network affiliates, and outperform the affiliates in their quantity of local news and public affairs programming and awards received. They also found that affiliates co-owned with newspapers exceed the performance of other affiliates in every quantity and quality category.

Napoli (2004) argues that an expanded analysis of the FCC's data used in Spavins et al. is needed, and that news programming and public affairs programming are governed by different economic processes and should be examined separately. His analysis incorporated a larger set of explanatory variables, and examined separately the relationship between station ownership characteristics with news programming and with public affairs programming. Based on his own statistical analysis of the FCC's sample of stations, in which he combined the FCC's data with some additional data, he found that the conclusions of Spavins et al. require qualification. Specifically, while the relationship between ownership characteristics and news programming holds up, he found no relationship between ownership characteristics and public affairs programming.

Napoli & Yan (2007) examine a two-week constructed sample in 2003 of broadcast television news programming schedules for a randomly drawn sample of 285 full power television stations to determine the impact of market structure and ownership factors. They found that about one quarter of stations in their data set aired no local news programming, especially public television stations, and about one fifth had no news programming in their schedule, whether local or national. The authors used a two-step sample selection model to handle the large number of stations in their sample that provided no news programming. In the first step (the selection model) they determined the probability that a station will provide any local news programming, and in the second step (the outcome model) they examined the quantity of local news programming provided by stations that provide at least some local news. The

results of their binary probit analysis for the first step showed that VHF status, station revenues, big four network affiliation, and the percentage of nonbroadcast viewing in the market increased the probability that a station would provide local news. For the ownership variables, local ownership and a station owner's national reach increased the probability of providing local news, while big four network ownership reduced it (due in part to CBS' ownership of seven UPN affiliates, which provided little local news, according to the authors). In their analysis of the second step (the outcome model) they found that VHF status, station revenues, and big four network affiliation had a significantly positive relation with the amount of local news programming provided, while duopoly ownership had a negative relationship. From these results they concluded that a station's financial strength played an important role in determining the probability that a station would provide local news, and the amount of local news it provided. They also concluded that with the exception of the increase in probability of providing local news from local ownership and larger station ownership national reach, that ownership factors did not generally encourage the provision of more news, and that big four ownership and duopoly ownership had a negative impact.

Yan & Napoli (n.d.) use the same data set as in Napoli & Yan (2007) in their working paper, but focused their analysis on just local news and public affairs programming for broadcast television stations. They analyzed the two separately. Based on an OLS analysis of local news, they found that stations that had high revenue, were VHF, were big four network-affiliated, and had more competitors, had more local news. Their analysis of local public affairs minutes was complicated by the fact that 60% of the commercial stations aired no public affairs programming, which could significantly bias the results of an OLS regression. They suggested that the large number of zero values for the dependent variable may be generated by two different processes, one in which the station may never want to air local public affairs programming due to some unobserved factor, and the other due to random chance because they are only taking a sample of the population and the station had a positive probability of airing such programming. To account for these possibilities, they used two alternative models to analyze the data. First they employed a two-step hurdle model in which they first estimate the probability of a station providing any local public affairs programming, using a probit model to estimate the probability of crossing the hurdle. In the second step they estimated a zero-truncated negative binomial model, conditional on stations providing a positive amount of local

public affairs programming. The probit analysis found that being VHF, locally-owned, owned by a group that reached a large number of television households nationwide, and located in a market with a large number of commercial stations, had a positive, statistically significant impact on a station's likelihood of carrying any local public affairs programming, while ownership by the big four networks (the O&Os) and larger television market size had a negative, statistically significant impact. In the second step for the zero-truncated negative binomial model they found that the only factor that was statistically significant was ownership by the big four networks (the O&Os), which had a negative impact on the amount of local public affairs minutes. As an alternative to the hurdle model, they employed a zero inflated negative binomial regression model, which assumes that the large number of zeros in the dependent variable is due to the two processes described above, and controls for over-dispersion and unobserved heterogeneity of the data. This yielded very similar results to the zero-truncated negative binomial model of the second step in their hurdle model.

In his working paper, which was submitted to the Commission, Yan (2006) analyzes the impact of newspaper-television cross-ownership on the production of local news and public affairs on television stations using the same dataset of 233 commercial television stations used in the previous papers of Yan and Napoli, supplemented with data on 20 additional television stations that owned newspapers. Because 22% of the stations did not have any local news programming during his sample period, Yan used a sample selection model, in which he first estimated the probability that a station would choose to provide any local news or local public affairs programming, and then estimated the amount of local news or local public affairs programming that stations would provide conditional on their choosing to provide at least some local news or local public affairs programming. From the first step of his analysis Yan found that cross-owned stations, VHF stations, big four network (ABC, CBS, NBC, Fox) affiliated stations, and stations in larger station groups were more likely to offer at least some local news programming, since their coefficients were statistically significant. In the second step of his analysis, of stations that were already providing some news, he found that VHF status, big four affiliation, big four ownership of the stations (the O&Os), and larger station revenues increased the minutes of local news provided, while the presence of other stations in the market with the same owner reduced the minutes of local news. Cross-ownership with newspapers was not statistically significant in this second step. His analysis of public affairs programming showed

that cross-ownership lacked a statistically significant relationship in both steps. Yan concluded that cross-ownership is not associated with a meaningful improvement in station performance in local news and public affairs.

In their working paper, Alexander and Brown (2004) examine how station ownership characteristics affected the provision of news and local news programming using a database originally compiled by the Project for Excellence in Journalism, of 4,078 news stories from each market's highest-rated half hour news timeslot for each of five different days in 1998, drawn from 60 stations across 20 randomly selected DMAs. Alexander and Brown categorized the stories as to whether they were local and whether the station utilized live location reporting on those stories. They controlled for unobservable factors by including dummies for the interaction of the day and DMA, thus accounting for any unusual events affecting the news in any DMA day. They then regressed the number of seconds of total news, local news, and on-location local news on 13 station characteristics. They estimated OLS and Tobit models. They found that local ownership added almost five minutes of local news, and almost three minutes of local on-location news. They also found that local news coverage was reduced for local owners by radio cross-ownership in one of their specifications.

Adilov, Alexander and Brown (2006) in their working paper use the same data employed by Alexander and Brown (2004) to examine the impact of cross-ownership and market size on the number and length of local and non-local news stories. They used a structural model to estimate the effect of cost and demand parameters on the marginal net benefit of airing another second of a story. They provide the results of OLS, Tobit, and negative binomial regressions, using two specifications, one with day dummy variables, the other with market-day interaction dummy variables, to control for unobserved effects. They found that in-market cross-radio ownership and out-of-market cross-newspaper ownership generated fewer but longer local TV news stories, suggesting that these raise the fixed cost and marginal benefit of producing local news. They also found the presence of scale economies from market size for non-local news stories in terms of their length and number, but not for local news stories.

Other studies have been performed examining the impact of market and ownership characteristics on stations' programming, but did not focus on the quantity of programming as the dependent variable. For example, Parkman (1982) examined ownership characteristics' impact on TV news ratings for the early evening (5-7 pm) and late evening (9:30-11:30) local

television news programs for the top 100 markets, for 1965 and 1975 (the period when cross-ownership restrictions on newspaper-TV and AM radio-TV combinations increased substantially). He found that cross-ownership with newspapers and AM radio stations, and group ownership, increased a station's ratings. The influence of group ownership increased during this period, while the other two factors decreased.[2]

3. Theoretical discussion

Our analysis attempts to determine the impact of certain factors on the quantity of news programming provided by each domestic full-power broadcast television station. Similar to our analysis of radio stations, we assume that the extent of news programming provided by a television station depends on the structure of demand for news versus other programming, the cost of producing news programming, the competition the station faces, and on the ownership of the station. Like a radio station, at any given time of day a television station must decide which kind of programming it will provide to maximize its audience.[3]

We assume that stations provide scheduled news programming to maximize profits,[4] and that stations maximize their profits by maximizing their audience.[5] Assuming that the potential viewing audience has different tastes, stations in general want to position themselves to maximize their audience within their market. How a station positions itself relative to competing independent stations in its market depends on a number of factors, including the size of the audience for news. If the demand for news is relatively high, then a station may want to provide news programming even though its competitors are providing the same kind of programming, and split the audience. If the demand for news is no greater than that for other programming, then a station may want to provide alternative programming and capture the audience for that

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[2] There are also a number of studies that have examined how television programming content and television news affects consumer behavior and attitudes, for example Gentzkow (2006), Oberholzer-Gee & Waldfogel (2006), and DellaVigna & Kaplan (2007), and how consumer preferences affect the kinds of television programming made available (Waldfogel 2004).

[3] There are some differences with the radio market described in the previous sections, however, which should be taken into consideration. The much higher revenues of television stations, and the visual nature of the medium, could lead to higher investment in quality and branding in the production of news, including hiring high-quality (and perhaps attractive) reporters and providing on-site reporting, in an attempt to differentiate their product.

[4] Extended special news reports in times of crisis might not be profitable (even the advertising is often preempted), and may be provided as a community service, perhaps providing the station some goodwill from viewers.

[5] Commercial stations typically depend on advertising revenues, and advertisers tend to spend more to advertise with highly rated stations, since their advertisements will be seen by more viewers. Non-commercial stations depend mostly on viewer and corporate contributions, but these are likely to be larger with a larger audience.

kind of programming. The demand for news programming is likely to change during the day, so the potential audience for news programming could substantially change. Thus at hours when much of the viewing audience wants news (early evening at 6:00 and late night at 11:00) a station is willing to split the audience with many other stations. At other times, such as at prime time, a news program (such as a news magazine show) competes with many other kinds of programming.

A key factor to consider is that the large majority of television stations are affiliated with a national network which provides programming. In our dataset of 1,697 stations for 2005 alone, 1,511 (89%) of them were affiliated with a network identified by BIA (see Table I.3), which is likely an undercount.[6] 1,178 (69%) stations were affiliated with the five biggest networks, consisting of PBS, NBC, ABC, CBS and Fox. These stations, for the most part, air programming generated by their network during much of the day. Since they do not have to air the network programming all of the time, they still have the ability to choose their programming for portions of the day. Thus, for much of the day, television stations effectively have their schedule determined for them by what the network is providing. Still, local television stations have the freedom to program at least part of their schedule, particularly during those times when the network programming is not available or is less compelling (Waldfogel 2004, p. 259).

Stations' affiliation with networks raises two issues for our analysis: (1) how do stations choose their network, to the extent that they have the ability to choose; and (2) how much news programming do they decide to air outside of their commitment to carrying network programming. It seems likely that the desirability of carrying a network's news broadcasts will figure into a station's decision concerning whether to become and remain a network affiliate. Later we discuss how the complication of stations having a choice of their network in the long run, and programming in the short run, can be accounted for, and should not significantly affect our analysis. The choice of network can be treated as exogenous for our analysis, because in most markets, stations do not have the option of switching to one of the networks that provide a lot of news.

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[6] BIA provided a code describing which networks a station was affiliated with. While the code "IND" clearly identified independent stations, other codes did not indicate whether the stations were affiliated with a network. Since codes such as "REL" = religious, "PUB" = public, and "SHP" = shopping did not identify a specific network and could include unaffiliated stations, they were not included in the totals for network-affiliated stations. Some stations in these categories, however, were likely affiliated with a small network not identified here.

The cost of providing news will also affect the quantity of news provided. If news programming is cheap to produce relative to other kinds of programming, then stations will have an incentive to provide more news programming. More expensive news programming may attract a larger audience and help establish a brand identity for the television station, however. In general there are significant fixed costs to producing news programming, and much lower physical costs to distributing the programming using the equipment the station has invested in. There are different kinds of news programming, with some kinds of news programming more expensive to produce (e.g., on-site news reporting, original investigative analysis, foreign reporting) than are other kinds of news programming (e.g., rebroadcast of previously aired programming, network news feeds, anchorperson reading news wire stories). If the television station is affiliated with a national network, it may also have the ability to provide network news programming. For this study we would expect that stations with lower average costs of producing news will provide more news programming.

The ownership structure of the firm is also likely to affect a station's programming, for two basic reasons, one relating to the demand in the market, the other relating to the cost of producing news. Concerning the demand side, much has been written in the economics literature about how a station would be expected, ceteris paribus, to want to position its programming further apart from the programming of a co-owned station, in order to maximize the joint audience of the two stations, even if this lowers somewhat the audience of the given station (Steiner 1952, Beebe 1977, Spence and Owen 1977 – *see* Owen & Wildman 1992 and Sweeting 2004 for a review of the literature).

Independent of the impact on cost, whether the television station group's audience would rise or fall by providing more news depends on the nature of demand for news within each market. If there is a large demand for news in the market, then independent stations may be inclined to split the audience of people interested in news programming by each providing a lot of news, while co-owned stations might instead specialize by having one station provide less news to attract those viewers who are less interested in the news. If, on the other hand, news is a low demand product compared to other kinds of programming, then independent stations would not want to provide much news because of the small audience, while co-owned stations might again choose to specialize, with one station providing more news to attract the smaller audience of people interested in news, while the other station continues to broadcast less news. Thus,

whether a multi-station owner can increase its audience by providing more news or less for some stations depends on the nature of demand for news in the market. This effect may be reduced, however, if there are many unrelated stations in the market, which reduces the benefits of positioning the stations far apart. The presence of co-owned stations in the same market therefore is expected to increase specialization of the programming of these stations, but whether this increases or decreases the quantity of news provided depends on whether news is a high demand or a low demand product.

Ownership can also affect programming decisions of a station through its impact on the cost of obtaining news programming. There may be economies of scale of providing news programming, such that the average cost of providing news concerning a larger geographic area (i.e., regional, domestic, and foreign news) is lower for owners of many stations. This lower cost may also be obtained from economies of scope obtained from sharing news stories with co-owned radio stations and newspapers. Note that this scale economies effect may not be important to the extent that independent stations can enjoy the same benefits by affiliating with a national network, or if viewers value only local reporting or reporting concerning the local impact of a story. The scale economies effect may even work against increased news programming if it lowers the cost of other kinds of programming even more than for news programming. The extent to which scale economies affects the quantity of news programming should show up in the coefficients to the variables measuring the size of the owner in terms of the number of stations it owns both within the market and nationally, and the amount of news programming the co-owned stations provide within the market. The variables for cross-ownership with radio stations and newspapers within the market should capture whether there are economies of scope of news programming.[7]

4. Data used

For this analysis we used the schedule data provided by Tribune Media Services (TMS), containing the programming schedule for every broadcast station in the U.S. The schedule data was collected for one week in May and November of each year from 2000 to 2007. Information about each station, including each station's characteristics (for example, commercial vs.

[7] We assume that radio stations and newspapers do not compete with television stations for audience, and therefore product placement does not affect their demand.

noncommercial), and its owner, was obtained from BIA and *FCC Media Ownership Study Number 2: Ownership Structure and Robustness of Media* for the period 2002 to 2005. Some basic demographic data concerning the population size, racial and ethnic composition, and income, were obtained from the Census Bureau.

From this data a panel data set was constructed with four years data, for 2002-2005, with one observation per station per year, for each station. The sample was restricted to U.S. stations[8] broadcasting with an analog signal, classified by TMS as full power broadcasting stations,[9] that had matching data in the BIA database. Thus we excluded foreign stations, digital stations, and low power television and cable-only stations and channels.[10] We only included data for the period 2002 through 2005 because that was when matching data from the BIA database was available. For the analysis we also removed data for a particular year for any stations that lacked corresponding ownership and other station data in the BIA database for that year. The resulting panel data set is unbalanced, with some stations present for less than four years, because they either did not exist for all four years, or we lacked complete data on them for all years. The panel data set has 1,703 stations, with 6,722 observations for the four years. However, one variable, the local ownership variable, was missing values for 19 observations, so only the remaining 6,703 complete observations were in the final dataset that was used for the analysis. 1,642 stations have data for all four years in the final dataset. A list of variables used in the analysis and their descriptions are provided in Table I.1. Summary statistics are provided in Table I.2 for both continuous and dummy (binary) variables based on this dataset.

The ownership and station characteristics data from BIA and *FCC Media Ownership Study Number 2: Ownership Structure and Robustness of Media* included dummy variables[11] that indicated: (1) whether the station was locally owned;[12] (2) whether the station was minority owned; (3) whether the station was female owned; (4) whether the station was participating in a local marketing/management agreement (LMA) with another station in the same market, in

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[8] The TMS dataset included a few foreign (Canadian and Mexican) stations that broadcast into U.S. markets. These were excluded from the analysis. Also excluded were stations in Puerto Rico, for which we lacked demographic data.

[9] The TMS dataset included national cable channels, premium cable channels, low power channels, and local channels distributed only on cable networks. These were excluded from the analysis.

[10] Stations indicated as "satellite stations" in the BIA dataset were included in the data.

[11] Dummy variables have the value of either 1 or 0. Thus, for example, for each station in the dataset the local ownership variable is 1 if locally owned, or 0 if not locally owned.

[12] A station is considered to be locally owned if its parent was located in the same DMA as the station.

which one station's operations were managed by the other station, or it was managing the operations of another station;[13] (5) whether the station was a non-commercial station; (6) whether the station was on a VHF frequency (channels 2-13); (7) whether the station was owned and operated (an "O&O") by one of the big four networks (CBS, ABC, NBC, FOX); (8) whether the station was cross-owned with a radio station in the same city; and (9) whether the station was cross-owned with a newspaper in the same city.[14] The ownership measures were constructed according to the ultimate parent of the station. Other data that was taken from the BIA database included the revenues of the parent, and the station's primary and secondary network affiliation. Two other measures were constructed for each station, one that measured the number of TV stations the station's parent owns nationally (i.e., the size of the station group), and one that measured the number of co-owned stations within the station's DMA (which is sometimes referred to as its duopoly status).[15] To measure the degree of competition in each market, for each station we counted the number of other unrelated stations in the market, excluding co-owned stations. Some of this data was corrected for omission and obvious errors in the data set, in particular for the local ownership and the network affiliation fields.[16]

The market definition is the DMA, as defined by Nielsen for its ratings service. Almost all broadcast television stations are carried by their local MVPDs, including cable companies and (for many local stations) the DBS providers, and thus their geographic reach is much larger than for radio stations. This is why the market definition used by Nielsen for measuring ratings for

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[13] Following the Commission's rules of attribution, stations managed under an LMA were considered to have as their parent the parent of the managing firm, and not their own parent.

[14] A TV station is considered to be cross-owned with a newspaper under the Commission's rules "if the broadcast station's service contour completely encompasses the newspaper's city of publication." *2006 FNPRM on Media Ownership*, at para. 24; 47 C.F.R. Sec. 73.3555(d)(3) (2002).

[15] Owners are limited in the number of stations they may own in a DMA. According to the Commission's rules, "an entity may own two television stations in the same designated market area ("DMA") if (1) the Grade B contours of the stations do not overlap; or (2) at least one of the stations in the combination is not ranked among the top four stations in terms of audience share, *and* at least eight independently owned and operating commercial or non-commercial full-power broadcast television stations would remain in the DMA after the combination." *2006 FNPRM on Media Ownership*, at para. 11; 47 C.F.R. Sec. 73.3555(b) (2002). Some owners may own more than two television stations in a DMA if the stations are non-commercial or are satellite stations. 47 C.F.R. Sec. 73.3555(f) and Note 5 (2002). This measure was constructed using the original BIA database. Not all of the stations counted for this variable were included in the final dataset, if they lacked matching data in the TMS database.

[16] The local ownership fields from the BIA data lacked values for a number of stations for some of their years. If a station's parent did not change from one year to the next and the local ownership code was available for one year, it was presumed that its value did not change. Out of 95 missing values in the original BIA dataset, 63 were determined using this method.

television stations, the DMA, is much larger than the markets used by Arbitron for rating radio stations, the Arbitron radio metro market.

Demographic data about the market was constructed from county-level Census Bureau data about population and income, which we aggregated to the DMA level. The data that we used are the total population of the DMA, the DMA's per capita income, and the percent of the population that was classified as black and as Hispanic. DMAs with large populations likely have greater aggregate demand for news. Demand may also be affected by the ethnic background and the average income of people in the market.

The total scheduled news and public affairs minutes for each station for the sample period in each year was constructed from the TMS schedule data. The TMS database lists every show for every station in the database for two weeks in each year. Thus, eight weeks of data were used for the analysis, which were one week in May and November for the four years of the study, 2002-2005.[17] The weeks were the seven days beginning with 5/10/2002, 11/08/2002, 5/09/2003, 11/07/2003, 5/14/2004, 11/12/2004, 5/13/2005, and 11/11/2005. These were the years in the TMS schedule data for which we had corresponding ownership information from BIA. The shows described by TMS as news or public affairs were selected,[18] and their durations for each station, as listed by TMS, were added up for the two weeks in that year. On average stations scheduled 165 minutes of news programming and 23 minutes of public affairs programming per day,[19] although this includes non-program material such as advertisements and PSAs that are typically included in programs on commercial (and many non-commercial) stations. From these data we also constructed two measures of the number of minutes of

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[17] From Table 2 it is evident that some stations had more than the maximum possible 20,160 minutes for the two weeks. This was caused by an occasional inconsistency in the TMS database concerning the assignment of times for when a station was listed as "signing off", causing some of this time to be double-counted. Since the station was off the air during these times, this error should not effect the calculation of news and public affairs programming minutes.

[18] Shows were identified as news if they had the news code "NE" in the Program Type field, or had "news" or "nouvelles" or "noticias" in the Program Category field (e.g., "newsmagazine" was counted as news). Shows were identified as public affairs if they had the public affairs code "PU" in the Program Type field, or had "politics" /"politique" / "politica" / "Public Affairs" / "Affaires publiques" / "Asuntos publicos" in the Program Category field. A show might be included as both news and public affairs, if, for example, a show included "news" in the program category field and "PU" in the program type field. Only 0.3% of the total news and public affairs minutes were included in both categories of programming. The addition of shows that were included solely because of their Program Category constituted 10.0% of the total measured news time, and 1.5% of the total measured public affairs time.

[19] Calculated by dividing the mean number of minutes of news and public affairs programming in Table 2 by 14, which is the number of days in the sample per year.

news/public affairs provided, first by other unrelated stations in the market, and second by other co-owned stations in the market. The first measure reflects the competitive environment in which the station is operating, on the assumption that the amount of news the station will provide depends in part on how much news other stations are providing in its market. Presumably the more news other stations make available to consumers, the lower the marginal benefit to the station of providing one more unit of news. The second measure could reflect the scale and scope economies of sharing news, in addition to the declining marginal benefit of providing news in the market.[20] Both measures excluded the station's own minutes of news/public affairs, such that in a market with no other stations these measures would be zero.

5. Methodology for analysis

For our analysis the dependent variables are the number of minutes of scheduled news programming and the number of minutes of scheduled public affairs programming provided by a full power domestic broadcast television station for the two weeks in the sample for each year. Because of the small number of stations that had zero minutes of news or public affairs, news minutes and public affairs minutes were treated as continuous variables in the analysis, in contrast to Yan & Napoli (n.d.). In our sample period for 2002 to 2005, only 12.6% of the stations lacked news minutes for our sample two weeks for any given year, and 10.9% lacked public affairs minutes, in our final dataset.

For this analysis we used OLS with a three-way group fixed effects model to account for unobservable factors that we believe to be associated with the market and network of the station and the time period. A group fixed effects model is useful for panel data sets in which there is concern that there are unobserved factors that are correlated with the explanatory variables, but which vary only by the group that the panel data set subjects belong to, and not between individual subjects within each group. The group fixed effects model removes the potential bias these omitted variables can cause by assigning a dummy variable to each group, which will pick up unobserved effects that are specific to each group. The advantage of using group fixed effects over OLS on pooled data is that it prevents omitted variables which are correlated with the regressors from biasing the results. The advantages of this technique over a traditional fixed

[20] It may also reflect the commitment of the parent to the production of news/public affairs by its stations. It is possible that parents could specialize in particular kinds of stations.

effects model, in which a dummy is assigned to every subject, are (1) it increases the number of degrees of freedom for the regression (since a dummy is assigned only to every group of subjects, rather than to each subject), and more importantly for our purposes, (2) it allows estimation of the impact of time-invariant explanatory variables on the dependent variable, since the subjects are still compared within each group. In a traditional full fixed effects model only changes for each subject over time are considered in the calculations, which limits the analysis to variables that have many changes over time for many subjects. For some of the variables we are interested, in particular television-newspaper cross-ownership, there have been no changes in status during the time period for our study, of 2002-2005, and thus we would be unable to learn much about their impact using a full fixed effects model.[21] The group fixed effects analysis permits a limited cross-sectional analysis for subjects within each group.

Because of the likelihood that markets may vary in unobserved ways, we accounted for the effects of unobserved market factors with the use of market dummies, one for each DMA. The inclusion of these dummies effectively prevents time-invariant intermarket unobserved effects from affecting our results, while still allowing television stations to be compared within each market. We expect that these dummies would take care of most of the unobserved factors reflecting demand idiosyncrasies, because stations provide their programming to their market, and are directly competing for viewers within that market. Indeed, their ratings, upon which their advertising rates are based, are measured based on their performance in their market, and their measured shares reflect their relative success compared to other stations in the market. We included time dummies to account for the possibility that there may be a special news-generating event one year. A news-worthy event could have a large impact on our dataset because we rely on data measuring stations' output for two weeks per year, in May and November. Because of the possibility that there may be some unobserved time-invariant factors that are affecting each station's programming, we also did a full two-way fixed-effects analysis with dummies for each station and time period, to see if removing station-specific time-invariant factors significantly impacts our results.

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[21] Other variables of interest are also time-invariant, namely noncommercial status and whether the station is on a VHF frequency. Other dummy variables have only a small number of changes, in particular local ownership (80 changes), TV-radio cross-ownership (100 changes), local marketing agreement status (87 changes), and primary network affiliation (186 changes). The small number of changes would make it more difficult to get statistically significant results for these variables in a full fixed effects analysis.

It was also necessary to account for the network affiliations that most stations have, since the networks often determine what programming each station will show for a good portion of the day. Therefore dummies to reflect the possible primary network affiliations were introduced into the main regression, with each station assigned to just one network affiliation or BIA network category (including "Independent"). Statistics concerning how many stations were affiliated with each network are provided in Table I.3, and the average number of minutes of news and of public affairs for the two weeks covered each year per station in each network are given in Tables I.4 and I.5. As discussed before, stations have two choices that affect the quantity of news they provide, concerning (1) the choice of network, and (2) the choice of programming outside the network programming to which they are committed. With the inclusion of network dummies our focus is on (2), station's choice of programming after joining a network, and we do not examine how stations choose their network. This latter issue is unlikely to significantly affect our analysis, for two reasons. First, stations' ability to switch networks is severely limited by the lack of open affiliations available. Especially important is that stations in larger cities cannot switch to the networks with the most news, which are the three largest commercial networks ABC, NBC, and CBS, since these networks are likely to have no openings for new affiliates in these cities. Most other networks provide a much more limited programming schedule and much less national news to air, with the exception of PBS, which is limited to non-commercial member stations (see Table I.4). Networks with openings for new affiliates in established cities do not usually provide much news programming, and they do not usually provide an extensive or highly-rated programming schedule, leaving affiliate stations the ability to provide their own news programming. Second, their choice of a network may also hinge on the amount of news programming that the network provides. It seems likely that stations choose networks (when they can) for the same reasons that they choose other programming to air, on the basis of the audience it provides.

We assume the following linear model to describe the provision of news and of public affairs programming y_{it} for each station i at time t:[22]

$$y_{it} = \mu_t + \beta\, x_{it} + \gamma\, z_i + \alpha_k + \varepsilon_{it}\,, \qquad (1)$$

[22] This formulation is taken from Allison's discussion of fixed-effects models in Allison (2005). For more information on the analysis of panel data sets and fixed-effects models, see Allison (n.d.); Wooldridge (2002), ch. 10; Kennedy (2003), ch. 17; Greene (1997), ch. 14.

where μ_t is an intercept that may vary over time, x_{it} are observed time-varying independent variables, z_i are observed time-invariant independent variables, α_k are unobserved time-invariant effects that can vary for each market/station k, and ε_{it} are independent and identically distributed (iid) error terms. We assume that α_k are the result of unobserved demand factors (and, possibly, supply factors such as the cost of labor) that vary from market to market.

The problem with estimating this equation is that α_k may be correlated with the x_{it}, leading to bias in our results if it is not corrected for. By including a dummy for each market the differences in α_k between markets are picked up. The equation we estimate is therefore, in general terms,

$$y_{it} = m_t + \beta\, x_{it} + \gamma\, z_i + \delta\, D_k + \varepsilon_{it} \qquad (2)$$

where D_i are separate dummies for each market and m_t are time dummies (one for each year). The inclusion of market dummies still allows us to analyze the impact of the time-invariant observable variables z_i, because stations are still being compared within each market for within-market differences. The dummies just remove the between-market effects, which we presume to be caused by unobserved market demand effects, while keeping within-market effects as part of the model. In effect, we are assuming that the impact of differences in x_{it} (= β) and z_i (=γ) are the same across all stations, while stations in different markets may differ in their production of news for other, unobserved factors (picked up by δ). The standard fixed-effects model, with a dummy variable for each station (so D_k is replaced by D_i), also removes the effects of the time-invariant market effects α_k, but at a cost. In the fixed effects model the impact of z_i on y_{it} cannot be directly estimated, because z_i cannot be distinguished from D_i. z_i can be included, however, as an interactive term with the other variables, such as the time dummies μ_t. Thus, the impact of time-invariant factors cannot be estimated, because the model only takes into consideration within-station changes. In addition, there must be substantial variation in the values of x_{it} over time to enable estimation of β. The standard fixed-effects model also has the well-known drawback that it considerably reduces the degrees of freedom for analysis.[23]

The main equation we estimate is therefore:[24]

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[23] Kennedy 2003, p. 304; Allison 2005.

[24] We did not include the female and minority ownership dummy variables because of concerns about the quality of the data. We also ran the regressions including these variables and obtained similar results to what is presented, but the coefficients on these two variables were not significant. A dummy for non-big four O&Os (i.e., Owned and Operated stations owned by other networks besides CBS, NBC, ABC and Fox) was also not significant, when we

$$
\begin{aligned}
y_{it} = {} & m_t \\
& + \beta_1 \, Pop_{kt} + \beta_2 \, PercentBlack_{kt} + \beta_3 \, PercentHisp_{kt} + \beta_4 \, PerCapitaIncome_{kt} \\
& + \beta_5 \, OtherStationsinDMACount_{it} + \beta_6 \, OtherStationsinDMANewsMin_{it} \\
& + \beta_7 \, ParentStationsCount_{it} + \beta_8 \, ParentRev_{it} \\
& + \beta_9 \, OtherCoOwnedStationsinDMACount_{it} + \beta_{10} \, OtherCoOwnStationsinDMANewsMin_{it} \\
& + \beta_{11} \, LocallyOwned_{it} + \beta_{12} \, Big4O\&O_{it} + \beta_{13} \, VHF_{it} + \beta_{14} \, LMA_{it} \\
& + \beta_{15} \, TVRadioCrossown_{it} + \beta_{16} \, TVNewspaperCrossown_{it} + \beta_{17} \, NonCommercial_{it} \\
& + \beta_{18} \, MultiNetworkAffil_{it} + \delta_k \, DumMkt_k + \theta_j \, DumNetwk_j + \varepsilon_{it} \qquad (3)
\end{aligned}
$$

The market dummies, $DumMkt_k$, included dummies for all 210 DMAs. The m_t variables are dummies for the year t. Dummies $DumNetwk_j$ were also added for each network j identified in the BIA database as the station's primary network affiliation. Note that some of these dummies refer to the type of station, rather than a specific network, such as public (PUB) and religious (REL) stations, that were not otherwise affiliated with a BIA-listed network. We added one less dummy than there are years and networks, and omitted an intercept term, to avoid the problem of multicollinearity with the dummies for the market.[25] The variable $MultiNetworkAffil_{it}$ indicates whether the station was affiliated with more than one network at the same time, in case the availability of an additional network's programming affects the station's choice of what programming to air. The demographic variables in the second line vary only by market, so they are subscripted by the market k.

6. Results of the analysis

We estimated the model in equation (3) above for the provision of total news minutes and total public affairs minutes for each station in each year using ordinary least squares (OLS). The results of our analysis are presented in Tables I.6 through I.9. For each regression we report the number of observations, the R^2, and the coefficient estimates and standard errors for each independent variable, along with whether the coefficient is statistically significant.[26] Based on our theoretical analysis, our primary focus is on the three-way group fixed effects model, with results reported in regressions N1 and PA1 in Tables I.6 and I.8, in which unobserved effects are

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controlled for the network in our three-way group fixed effects regressions for news and for public affairs. When it was significant for other regressions, the coefficient was always negative.

[25] The dummies for the year 2002 and the network TBS were omitted. The effects of these values are picked up in the dummy variables for the markets.

controlled for with market, network and time dummies. We also report the regression results for the model in which only market and time dummies are included, in the second regression for each kind of programming, N2 and PA2 in Tables I.7 and I.9. This allows us to consider what happens if stations can choose their network, in reduced form.[27] The third reported model (N3 and PA3) controls for unobserved effects with station dummies as well as time dummies, which is the standard fixed-effect analysis. This model provides a robustness check, if there is concern that the market dummies in the main regression (N1 and PA1) have not accounted for all of the station-specific unobservable time-invariant effects. The coefficient estimates for the dummy variables for the market are not reported, because of the large number of them.[28]

Tests were performed to determine if fixed effects is an appropriate model to use, by testing the null hypothesis that the dummies' coefficients on the groups (markets, time, and networks) are equal. If the null is not rejected, such that all of the dummies on the different groups can be considered to have an equal impact, then fixed effects is not needed, and OLS on the pooled data would be appropriate.[29] We compared the three-way group fixed effects, two-way group fixed effects, and full fixed effects models versus an OLS on pooled model for both news and public affairs, as well as the three-way group fixed effects model versus the two-way fixed effects model, to determine if the additional dummies had equal coefficients. The tests all decisively rejected the null that the coefficients are equal, supporting our use of the three-way group fixed effects model.[30]

Since market dummies are included in our three-way group fixed effects model, the coefficients on the demographic variables, which are DMA-wide measures, effectively measure the impact of differences in changes in population or income within a DMA on changes in the amount of news or public affairs provided during this time period. In Table I.6 we see that a

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[26] The regression analysis was performed using the SAS statistical software package.

[27] If stations can choose their network, then as discussed above, they can determine both which network they want to affiliate with and how much news programming they want to air. The choice of network, however, may be influenced by the amount of news the network provides and the station wants to air. The second regression (N2 and PA2) provides this in reduced form.

[28] There are 210 DMAs and 22 primary networks in the population being analyzed.

[29] The test uses an F-test of $[(R^2_{fe} - R^2_{pooled}) / (n-1)] / [(1 - R^2_{fe}) / T - K - n)] \sim F(n-1, T-K-n)$, where R^2_{fe} and R^2_{pooled} are the R^2 for the fixed effects (unrestricted) model and the pooled (restricted) model, n are the number of groups, T is the number of observations, and K is the number of other independent variables in the regression. Greene (1997), pp. 617-18; Kennedy (2003), pp. 306, 312; Allison (2005), p. 41.

[30] We also performed a Hausman test on the two-way full fixed effects model, to determine whether a random effects model would be appropriate. The test rejected the random effects model for both news and public affairs programming.

faster rise in population, and slower rise (or a drop) in per capita income, for the station's DMA are associated with the provision of more news.[31] The coefficients on variables measuring competition suggest that providing news may be a way for stations to differentiate their product, since it rises when there are more competitors, and that stations will specialize somewhat in the production of news, since they will decrease their output of news in the face of an increase in competitors' production of news.

As we would expect from Table I.4, the coefficients on dummies for the networks are largest for the three commercial networks, ABC, CBS, and NBC. Only these three and six other network dummy coefficients are statistically significant at the 10% level, with the other six including Fox, the non-commercial stations (PBS and public non-commercial), and three Spanish-language networks (Univision, Telemundo, and Azteca America). Stations with multiple network affiliations provide somewhat less news, as indicated by the coefficient on MultiNetworkAffil.

Turning to the ownership factors, we find that financial strength of the parent, measured by its revenues, is associated with a larger news output, while larger station groups tend to have less news output. Having co-owned stations in the same market, which is sometimes referred to as duopoly status, has a large, positive, statistically significant impact on the quantity of news programming. For each additional co-owned station within the market, there is an increase in the amount of news minutes by 24 per day, about a 15% increase,[32] while stations in larger station groups provide a quarter minute per day less of news programming, per additional station owned nationally by their parent. Owned and Operated stations (O&Os) for the big four (CBS, NBC, ABC, Fox) were also associated with a large, positive impact on news programming of 22 minutes per day (13% increase), which was also statistically significant. Local ownership, on the other hand, appears to reduce news production, although the effect appears to be relatively small, only a 6 minute per day reduction (4% decrease). While TV-radio cross-ownership has no significant impact, TV-newspaper cross-ownership is associated with a large increase in the

[31] Since the demographic variables are the same for all stations within each DMA, the dummies for the DMAs should pick up most inter-market demographic effects caused by differences in income or population between DMAs. Thus, the included demographic variables only pick up the impact of intra-market demographic effects, caused by changes in income or population over time, on the quantity of news and public affairs programming provided.

production of news of 18 minutes per day (11% increase), which was statistically significant.[33] This is in contrast to Yan's result (2006) which found that TV-newspaper cross-ownership did not have a statistically significant impact on the production of minutes.

Results for the two other models used for analyzing news are reported in regressions N2 and N3 in Table I.7. Removing the network dummies, for N2, effectively assumes either that stations' decision on the quantity of news to air is unaffected by the programming their network provides, or that they have chosen their network on the basis of the amount of news it carries. We find here, however, almost the same results in terms of signs and statistical significant as for our analysis in N1. There is one major difference, though, in that the TV-radio cross-ownership dummy is statistically significant and positive when we do not control for the network, in N2.

While the full fixed effects analysis controls for more unobservable effects that could affect the production of news, it also significantly reduces the degrees of freedom of our analysis, both for the overall regression and for estimating the coefficient of particular variables that change little over time. As observed in regression N3 there are fewer statistically significant coefficients, as would be expected for a fixed effects model, although the R^2 is very high because of the numerous (1703) dummies included. Because there were no stations that changed their noncommercial status, or their cross-ownership of a newspaper, during this period, the dummy variables for these two indicators would be unable to yield estimates of their impact in the full fixed effects model.[34] Their interaction term with the time variables was used instead to measure their impact on news production for regression N3. While the non-commercial status continued to have a negative impact on the output of news, the coefficient on the TV-Newspaper cross-ownership interaction terms were not statistically significant, although they remained positive. However, these coefficients do not have the same meaning as in models N1 and N2, since they would pick up whether non-commercial or cross-owned stations increased their news production over time more than other stations, and not whether being non-commercial or cross-owned

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[32] The estimates of the additional amount of news minutes per day are obtained by dividing the coefficients from regression N1 by 14, since the data contains the number of minutes of programming for a 14 day period for each station. The percentage increase is based on the average number of news minutes in Table 2.

[33] Assuming there are economies of scope in news gathering, it might not be considered surprising that newspaper cross-ownership provides a much larger increase in television news reporting than does radio cross-ownership, because newspapers typically generate a great deal of original news reporting, while most radio stations likely do much less original news reporting. Thus, when there is cross-ownership there might be a significant one-way flow of original news stories from newspapers to television stations, and from television stations to radio stations.

implies a higher level of news production. The presence of co-owned stations has here a large negative impact on news programming, the opposite of what we saw in the two other models. No other ownership variable had a statistically significant impact on news programming in this model. Therefore, most of the results obtained from our main model N1 concerning the ownership variables do not appear to be robust to a full fixed effects analysis. This suggests that further investigation would be desirable to determine whether it is the smaller degrees of freedom available, both overall and for analysis of specific ownership variables that change little over time,[35] that is preventing us from getting statistically significant results, or instead that unobserved station-specific effects, not associated with market demand or network affiliation, affected our main results from the three-way group fixed effects model. Note that it is not necessary to control for the network affiliation in the fixed effects model, since the station dummy variables should pick up almost all of the impact of network affiliation.[36]

The analysis of public affairs minutes, shown in Tables I.8 and I.9, yield quite dissimilar results in certain areas compared to the results for news programming. Examining our main model in PA1 in Table I.8, the impact of competition in the DMA is consistent with our results for news programming, with a greater number of unrelated stations in the same DMA increasing the number of minutes of public affairs, while unrelated stations' increased production of public affairs minutes in the same DMA reduces the station's own minutes. We should take care in comparing coefficients on these variables with the coefficients from our models of news programming, because the quantity of public affairs programming is much smaller, with the average amount of public affairs minutes provided per television station just 14 percent of the average news minutes provided (see Table I.2). Thus, each additional minute of public affairs programming generated by an explanatory variable has a proportionally greater impact on the quantity of total public affairs programming available than would an additional news minute on the total amount of news programming extent.

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[34] As discussed above, fixed effects models require that variables have some change over time for at least some of the stations to be able to determine their impact.

[35] Further discussion of the problem of estimating the coefficients on variables that change little over time in a full fixed effects regression is provided in the next section.

[36] With the exception that the station dummy variables will not pick up the impact of network affiliation for those stations that changed networks. Of the 1,703 stations in the dataset, there were 110 stations that changed primary network at least once during the four years (excluding those stations that moved from the Pax to i (ION) network when the network changed its name). Only eight stations in the top 100 DMAs switched to or from the big four

The size of the parent appears to matter less here, with the number of parent stations not affecting the number of minutes of public affairs in a statistically significant way, while the impact of parent revenue is now negative. The amount of co-owned stations' public affairs programming within the same DMA still has a significant and negative impact. The only network (station category) dummies that were statistically significant were public and educational stations, with public non-PBS television stations providing significantly more public affairs programming.

The station's characteristics have less impact here than they did for news. Local ownership and non-commercial stations do not provide fewer public affairs minutes, which they did for news. In the production of public affairs minutes TV-Radio cross-ownership now has a positive and statistically significant impact of 3 minutes per day, a 15% increase, while TV-Newspaper cross-ownership is not statistically significant. O&Os for the big four were not associated with a statistically significant increase in public affairs programming. Thus, it is TV-radio cross-ownership that is the ownership factor that influences public affairs programming.[37]

7. Limitations of the analysis

There are certain limitations to our analysis of the provision of news programming that should be kept in mind. First, despite the use of over 6,700 observations for more than 1,700 unique stations, the effective sample sizes are sometimes rather small for some of the variables of interest. For example, only 30 stations were jointly owned with a newspaper within the same city (for 120 observations), a small number. The problem is exacerbated by the inclusion of market dummy variables, which can significantly reduce the degrees of freedom for analysis of these variables, since the dummies prevent estimation of between-market effects. Thus, the coefficients on these variables are based only on comparison with other stations in the same market[38] and on within-station changes in status over time, if there are any. For the analysis of

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networks (NBC, ABC, CBS, Fox), out of 460 stations in those markets affiliated with those networks (five stations in the top 50 DMAs out of 213 stations with the big four).

[37] We also examined the impact of our variables of interest on stations' news and public affairs minutes combined, using the same models. Not surprisingly, given that news minutes outnumber public affairs minutes by more than 7 to 1 (see Table 2), we obtained very similar results to the analysis of news minutes alone. The exception was that TV-radio cross-ownership was significant at the 1% level, with a coefficient of 75. This may have been due to its evident impact on public affairs minutes, as we saw in Table F.

[38] To see this consider what happens if a station cross-owned with a newspaper is the only station in the market. Then if the station is producing more news than similar stations in other markets, this could be due to either the cross-ownership or the unique characteristics of that market. Because the market dummy will pick up this effect,

the TV-newspaper cross-ownership variable there are about 306 stations each year in markets with a station that is cross-owned.[39] For a full fixed effects analysis, with dummies provided for each station, the problem is worse, since only stations that change values for a particular variable matter. For two dummy variables (TV-newspaper cross-ownership and non-commercial status) there were no changes over time, and their impact on the amount of news for a station therefore could not be estimated in the full fixed effects regressions N3 and PA3. For other dummy variables there were sometimes only a small number of changes observed.

Second, we did not include digital stations and cable channels in our analysis. The omission of digital stations is not serious given the time period involved (2002-2005), when digital stations were just starting up and there were few viewers. Digital stations should be expected to be an important factor in the future, however. The existence of large numbers of cable channels provides a greater concern. Certain channels in particular (e.g., CNN, Fox News, MSNBC) provide 24 hour national news, while others provide weather (e.g., The Weather Channel) and sports (e.g., ESPN News and others) news. The constant availability of news on these channels is likely to affect the audience interested in local broadcast stations' news shows, most likely reducing it. The growing availability of and consumers' reliance on news on the Internet is likely to have a similar impact, although television retains the ability to show high-quality video.

Third, we did not distinguish between local and non-local news programming, even though the supply and demand factors involved may differ in size and kind for the two types. The cost of obtaining non-local news programming is probably much lower, on a per station basis. The cost of obtaining news stories that cover large geographical areas can be shared with other stations, such that the cost of supplying non-local news can be fairly low. Meanwhile, as discussed above, consumers have alternative means of getting national and foreign news, such as from cable channels and the Internet, thus keeping demand low for this programming. Local news,[40] on the other hand, while it is much more expensive for stations to obtain (since stations cannot easily sell it to non-competitors in order to lower its average cost), has much fewer

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this station adds no degrees of freedom to the analysis of the coefficient on TV-newspaper cross-ownership. Fortunately there are no stations cross-owned with newspapers in markets with no other stations.

[39] In the 27 markets in which a TV station is cross-owned with a newspaper, the number of stations ranges from 4 to 26, with an average of a little more than 10 stations per market.

alternative sources, and thus is likely to be more highly valued by consumers. Thus, the economics of local news could be significantly different from that of non-local news of greater geographic scope. Our data set did not provide the means to distinguish between local and non-local news, and thus we cannot analyze them separately.

The fourth limitation of this study is that it concerned the quantity of news programming, and not its quality. Stations finding a high demand for news programming might decide to invest in news programming of higher quality, rather than more news programming. The time constraints on when potential viewers want to watch news programming (early morning, late afternoon, and late at night) might discourage stations from providing a larger quantity of news, at times when viewer interest in news programming is low. In addition, some of the news and public affairs programming included in this study might reflect programming of lower quality that yields low demand, such as rebroadcast news reports in the middle of the night, or someone reading wire service reports. We lacked data that would enable us to account for the quality of programming, especially concerning its changing value to viewers over the course of the day.

8. Conclusion

Using a four-year panel data set covering virtually all analog broadcast television stations in the U.S., we have been able to examine the impact of station ownership characteristics on station's provisioning of news programming, while taking into account demographic and market competition factors and other factors affecting the supply and demand for informational programming. The use of a large panel data set has allowed us to employ a three-way group fixed effects model, which has enabled us to control for three kinds of unobserved effects that we have identified as likely to be important, relating to differences in demand between markets, the supply of programming by networks, and changes over time in the demand for news and public affairs programming. These unobserved effects would likely have biased our estimates if we had employed just an OLS analysis on a pooled dataset.

Consistent with previous studies (Napoli 2004), we find that ownership factors have a quite different impact on the provision of news programming and public affairs programming, and that it is appropriate to analyze their impact separately. TV-newspaper cross-ownership,

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[40] We are defining local news here as news of interest only to the local community, and not to other geographic areas.

ownership by a big four network (the O&Os), and the presence of co-owned stations in the same market are associated with a large, positive, statistically-significant increase in news programming. TV-newspaper cross-ownership is associated with an 18 minute increase per day in news programming, about an 11% increase, while O&Os tend to have 22 minutes more (a 13% increase). For each co-owned station within the market a station tends to have 24 minutes more per day of news programming, a 15% increase. Meanwhile, larger station groups, that own more stations, and local ownership are associated with less news programming. For each additional station there tends to be a quarter minute less of news programming, and local ownership is associated with 6 minutes less news programming (a 4% decrease). TV-radio cross-ownership did not have a statistically significant impact in our main model.

In contrast, most of the ownership characteristics did not have a statistically-significant impact on the provisioning of public affairs programming. We did determine, though, that higher parent revenues are associated with lower public affairs programming. In contrast to our results with news programming, we found that TV-radio cross-ownership has a positive, statistically significant impact on public affairs programming, and this result is robust to our other model specifications. TV-radio cross-ownership was associated with 3 minutes more per day of public affairs programming, a 15% increase.

Our results are consistent with those of many previous studies, for example Spavins et al. (2002) and Napoli (2004). Consistent with Spavins et al., we found that big four owned and operated's (O&Os) and stations cross-owned with a newspaper provided more news programming, although this effect did not carry over to public affairs programming. Our results agree with Napoli's conclusion that news and public affairs programming have different economic characteristics and are affected differently by ownership factors. We found the same result that ownership characteristics appear to have less impact on public affairs programming, with the exception of TV-radio cross-ownership.

The result that cross-ownership with newspapers affects the quantity of news provided appears to conflict with Yan's conclusion in his 2006 paper that it has no meaningful impact. We note that he focused on local news programming, while we examined all news programming. We also point out two other aspects of his analysis that may help to explain the differences in results. First, Yan's conclusion was based on the analysis he performed that showed that cross-owned stations did not provide more local news than other stations that were already providing

some local news. He had already determined that cross-owned stations were more likely to provide some local news. Thus, his results showed that cross-owned stations provided more news compared to all other stations. Second, his results were based on a much smaller dataset, for just a cross-section of stations for one year, with no controls for market effects. Our analysis was based on a larger panel set with controls for market effects. We note that his coefficient on the cross-ownership variable was positive, but not statistically significant. The larger size of our dataset and the added controls for unobserved effects may have enabled us to gain statistically significant results.[41]

[41] As a check we ran a regression analysis similar to Yan's second step analysis that was conditional on stations providing some news, using only stations within our dataset that provided some news (yielding 5861 observations), for the same variables we used in regression N1 in Table F. The results were very similar to those obtained in N1 using our full data set, with the cross-ownership variable coefficient remaining large and statistically significant at the 5% level.

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Table I.1
Description of Variables

Variable	Description
NewsMin (Dependent Variable)	News Minutes of Programming for Sample 2 Weeks in Year
PubAffMin (Dependent Variable)	Public Affairs Minutes of Programming for Sample 2 Weeks in Year
TotPop1000s	Total DMA Population, in thousands
PopPercentBlack	Percentage of DMA Population that is Black
PopPercentHisp	Percentage of DMA Population that is Hispanic
DMAPerCapitaIncome	DMA per Capita Income
UnrelatedStationsinDMACount	Number of TV Stations in the DMA Unrelated to the Station
UnrelatedStationsinDMANewsMin	News Minutes of Unrelated Stations in the DMA
UnrelatedStationsinDMAPubAffMin	Public Affairs Minutes of Unrelated Stations in the DMA
ParentStationsCount	Number of Stations Owned by Parent
ParentRevenueMillions	Revenue of Parent in millions $
OtherCoOwnedStationsinDMACount	Number of Other Co-owned Stations in the Same DMA
OtherCoOwnStationsinDMANewsMin	News Minutes of Other Co-owned Stations in DMA
OtherCoOwnStationsinDMAPubAffMin	Public Affairs Minutes of Other Co-owned Stations in DMA
Local Marketing Agreement	Dummy: Whether the Station is Participating in a Local Marketing/Management Agreement (LMA) within the DMA
MultiNetworkAffil	Dummy: Whether the Station is Affiliated with more than One Network
Locally Owned	Dummy: Whether the Station is Owned by a Parent Located in the Same DMA
O and O Big Four	Dummy: Whether the Station is Owned by a Big Four Network (O&O)
TV-Radio Crossowned	Dummy: Whether the Station is Cross-owned with a Radio Station in the Same City
TV-Newspaper Crossowned	Dummy: Whether the Station is Cross-owned with a Newspaper in the Same City
NonCommercial	Dummy: Whether the Station is Non-Commercial
VHF Channel	Dummy: Whether the Station is on a VHF Channel
Dummy2003	Dummy: For Year 2003
Dummy2004	Dummy: For Year 2004
Dummy2005	Dummy: For Year 2005
ABC, CBS, PBS, NBC, FOX, IND, etc.	Dummy: For Affiliation with Network/Station Category[t]

Dummy variables have the value of either 1 (yes) or 0 (no).

[t] All stations were assigned to a network / station category according to BIA's listed network affiliation.

Table I.2
Summary Statistics

Continuous Variable	Mean	Std Dev.	Min	Max
TotalMin	20,158	31	19,740	21,180
NewsMin	2,316	2,117	0	8,685
PubAffMin	324	512	0	11,400
News + Public Affairs Minutes	2,632	2,122	0	11,520
Number of Shows	449.8	75.3	14.0	699.0
Number of News Shows	53.3	48.4	0	254.0
Number of Public Affairs Shows	9	11	0	120
TotPop1000s	2,318.4	3,370.9	9.8	20,687.4
PopPercentBlack	11.2	10.8	0.3	63.1
PopPercentHisp	11.1	14.7	0.5	94.5
DMAPerCapitaIncome	29,680	5,339	14,882	49,582
UnrelatedStationsinDMACount	9.64	5.62	0	26
UnrelatedStationsinDMANewsMin	20,784	11,821	0	71,787
UnrelatedStationsinDMAPubAffMin	3,053	2,736	0	17,064
UnrelatedStationsinDMANewsPAMin	23,755	13,525	0	74,799
ParentStationsCount	16.27	15.99	1	61
ParentRevenueMillions	296	518	0	2330
OtherCoOwnedStationsinDMACount	0.52	0.82	0	5
OtherCoOwnStationsinDMANewsMin	1,165	2,590	0	18,585
OtherCoOwnStationsinDMAPubAffMin	174	462	0	4,320
OtherCoOwnStationsinDMANews&PubAffMin	1,335	2,778	0	18,894

	Values		
Counts for Dummy Variables	**0=No**	**1=Yes**	**%=Yes**
Locally-owned	5,088	1,615	24.1%
TV-Radio Cross-Ownership	5,541	1,162	17.3%
TV-Newspaper Cross-Ownership	6,583	120	1.8%
LMA	6,264	439	6.5%
Non-Commercial	5,225	1,478	22.0%
VHF	3,951	2,752	41.1%
Big Four O&O	6,421	282	4.2%
SingleNetworkAffil	869	5,834	87.0%
MultiNetworkAffil	6,543	160	2.4%
NetworkAffilNotIdentified	5,994	709	10.6%

From annual data for each station, based on two weeks scheduled programming per year.
Number of observations was 6,703 for all variables. Each observation is the data for one station for one year.

Table I.3
Number of O&O and Affiliate Stations in Each Network / Station Category

		2002			2003			2004			2005			All Years		
	Network / Station Category	Affil	O&Os	All	Affil	O&Os	All	Affil	O&Os	All	Affil	O&Os	All	Affil	O&Os	All
PBS	PBS	332		332	334		334	339		339	339		339	1,344		1,344
NBC	NBC	200	14	214	205	14	219	205	14	219	205	14	219	815	56	871
ABC	ABC	206	10	216	207	10	217	205	10	215	205	10	215	823	40	863
CBS	CBS	191	20	211	191	20	211	191	21	212	195	21	216	768	82	850
FOX	FOX	155	26	181	155	26	181	160	26	186	163	26	189	633	104	737
IND	Independent	110		110	119		119	147		147	143		143	519		519
UPN	Paramount Netwk	65	16	81	64	16	80	70	16	86	76	12	88	275	60	335
WB	Warner Bros.	61	15	76	66	16	82	67	16	83	68	16	84	262	63	325
PAX	Paxson / i (Ion)	27	48	75	25	46	71	22	46	68	18	46	64	92	186	278
UNI	Univision	16	15	31	16	16	32	17	16	33	17	18	35	66	65	131
TBN	Trinity Broadc. Netwk	5	22	27	8	20	28	4	13	17	4	13	17	21	68	89
REL	Religious	27		27	27		27	17		17	15		15	86		86
TEL	Telemundo	7	11	18	7	13	20	7	13	20	8	14	22	29	51	80
TLF	TeleFutura	1	13	14	2	16	18	3	16	19	4	15	19	10	60	70
PUB	Public, non-commercl.	20		20	17		17	8		8	8		8	53		53
INS	Ind. Spanish	3		3	1		1	9		9	11		11	24		24
EDU	Educational	9		9	7		7	2		2	3		3	21		21
AZT	Azteca America				4		4	2		2	3		3	9		9
SHP	Shopping Netwks										6		6	6		6
HSN	Home Shopping Netwk	3		3	1		1							4		4
HTV	Hispanic TV Netwk	2		2	2		2							4		4
TBS	Turner Broadc. System		1	1		1	1		1	1		1	1		4	4
All		1,440	211	1,651	1,458	214	1,672	1,475	208	1,683	1,491	206	1,697	5,864	839	6,703

Numbers of stations in final dataset, which may differ from actual number of stations.
Stations were assigned to a network / category according to BIA's listed network affiliation. Some stations had multiple network affiliations, in which case the primary network affiliation was used. Some stations were assigned to a category (Independent, Public Non-commercial, Independent Spanish, Religious, Educational, Shopping Networks) rather than a network by BIA.

Table I.4
Average News Minutes per Network Station, Broken Down by Network Affiliate/O&O

	2002			2003			2004			2005			All Years		
Network	**Affil**	**O&Os**	**All**	**Affil**	**O&Os**	**All**	**Affil**	**O&Os**	**All**	**Affil**	**O&Os**	**All**	**Affil**	**O&Os**	**All**
PBS	984		984	1,008		1,008	969		969	990		990	988		988
NBC	3,688	4,625	3,750	3,930	4,926	3,993	3,893	4,805	3,951	3,892	4,812	3,950	3,852	4,792	3,912
ABC	4,796	6,231	4,863	4,782	6,083	4,842	4,919	6,261	4,982	4,857	6,357	4,927	4,839	6,233	4,903
CBS	4,777	5,428	4,839	4,847	5,510	4,910	4,951	5,623	5,017	4,982	5,537	5,036	4,889	5,526	4,951
FOX	826	3,559	1,219	918	3,864	1,341	947	4,187	1,400	945	4,802	1,475	910	4,103	1,360
IND	742		742	681		681	613		613	686		686	676		676
UPN	200	284	216	179	446	233	250	1,116	411	337	1,735	528	246	839	352
WB	275	1,271	472	522	1,125	639	642	1,172	744	665	1,204	768	532	1,192	660
PAX	327	400	374	402	368	380	483	299	359	477	165	253	414	309	344
UNI	1,952	2,286	2,114	1,761	1,997	1,879	1,703	2,014	1,854	1,795	2,050	1,926	1,801	2,082	1,941
TBN	12	0	2	45	60	56	0	0	0	0	0	0	20	18	18
REL	8		8	70		70	129		129	108		108	69		69
TEL	1,487	1,890	1,733	2,010	2,504	2,331	2,041	2,472	2,321	2,220	2,773	2,572	1,949	2,437	2,260
TLF	0	0	0	0	32	28	0	19	16	375	308	322	150	91	99
PUB	1,456		1,456	1,461		1,461	1,745		1,745	1,672		1,672	1,534		1,534
INS	705		705	0		0	737		737	404		404	550		550
EDU	227		227	424		424	405		405	280		280	317		317
AZT				1,825		1,825	1,445		1,445	1,600		1,600	1,666		1,666
SHP										0		0	0		0
HSN	300		300	0		0							225		225
HTV	900		900	225		225							563		563
TBS		300	300		300	300		300	300		300	300		300	300
All	2,285	2,020	2,251	2,344	2,098	2,312	2,348	2,270	2,338	2,352	2,429	2,361	2,333	2,202	2,316

Ordered by number of affiliates for all years.

Table I.5
Average Public Affairs Minutes per Network Station, Broken Down by Network Affiliate/O&O

	2002			2003			2004			2005			All Years		
Network	**Affil**	**O&Os**	**All**	**Affil**	**O&Os**	**All**	**Affil**	**O&Os**	**All**	**Affil**	**O&Os**	**All**	**Affil**	**O&Os**	**All**
PBS	695		695	696		696	848		848	704		704	736		736
NBC	314	402	320	321	440	329	329	466	338	328	490	339	323	449	332
ABC	243	268	244	232	257	233	248	257	249	236	251	236	240	258	241
CBS	148	105	144	138	91	133	179	126	174	134	104	131	150	107	146
FOX	169	143	165	177	141	172	175	148	171	175	155	172	174	147	170
IND	319		319	280		280	316		316	406		406	333		333
UPN	76	47	70	44	58	47	73	92	77	60	63	60	63	65	64
WB	115	100	112	87	96	89	105	96	103	121	73	112	107	91	104
PAX	107	125	118	227	147	175	265	159	193	262	216	229	207	161	177
UNI	15	80	46	15	79	47	18	79	47	14	70	43	15	77	46
TBN	48	14	20	131	21	53	38	35	35	98	132	124	87	42	53
REL	231		231	179		179	259		259	294		294	231		231
TEL	129	145	138	137	155	149	129	162	150	0	9	5	95	114	107
TLF	0	16	15	0	56	50	0	13	11	0	14	11	0	26	22
PUB	1,646		1,646	1,657		1,657	2,426		2,426	2,350		2,350	1,873		1,873
INS	640		640	120		120	34		34	85		85	136		136
EDU	753		753	1,011		1,011	270		270	340		340	734		734
AZT				0		0	0		0	360		360	120		120
SHP										30		30	30		30
HSN	90		90	0		0							68		68
HTV	780		780	0		0							390		390
TBS		90	90		60	60		90	90		30	30		68	68
All	347	122	318	336	131	310	379	144	350	343	149	320	351	137	324

Ordered by number of affiliates for all years.

Table I.6
Analysis of News Minutes Provided - Three-Way Group Fixed Effects Model

Variable	N1: Controlled for Market & Network Coefficient		Std. Error	p-value
TotPop1000s	2.06	***	0.25	0.000
PopPercentBlack	916.06	***	90.08	0.000
PopPercentHisp	-31.55		45.11	0.484
DMAPerCapitaIncome	-0.07	***	0.02	0.000
UnrelatedStationsinDMACount	394.74	***	33.00	0.000
UnrelatedStationsinDMANewsMin	-0.37	***	0.01	0.000
ParentStationsCount	-3.72	***	0.91	0.000
ParentRevenueMillions	0.27	***	0.04	0.000
OtherCoOwnedStationsinDMACount	338.43	***	37.56	0.000
OtherCoOwnStationsinDMANewsMin	-0.34	***	0.01	0.000
Local Marketing Agreement	10.67		40.28	0.791
MultiNetworkAffil	-123.64	**	62.03	0.046
Locally Owned	-88.03	***	25.56	0.001
O and O Big Four	307.00	***	64.88	0.000
TV-Radio Crossowned	29.52		25.84	0.253
TV-Newspaper Crossowned	247.43	***	68.38	0.000
NonCommercial	-177.94	*	97.63	0.068
VHF Channel	442.61	***	24.64	0.000
Dummy2003	345.85	***	27.93	0.000
Dummy2004	550.86	***	45.12	0.000
Dummy2005	697.29	***	64.09	0.000
ABC	2,768.96	***	351.12	0.000
CBS	2,719.54	***	351.41	0.000
PBS	706.08	*	364.88	0.053
NBC	2,085.50	***	350.78	0.000
FOX	672.38	*	350.18	0.055
IND	279.04		350.12	0.426
WB	155.43		350.95	0.658
REL	-38.81		357.60	0.914
UPN	-82.55		351.36	0.814
UNI	1,062.65	***	353.95	0.003
PAX	167.70		351.79	0.634
PUB	1,165.24	***	376.78	0.002
TBN	1.34		355.69	0.997
INS	-185.36		375.99	0.622
TEL	978.17	***	359.00	0.006
AZT	995.32	**	416.22	0.017
TLF	-195.31		359.25	0.587
SHP	-358.60		444.65	0.420
EDU	258.29		393.84	0.512
HSN	108.64		485.72	0.823
HTV	362.51		492.80	0.462

Additional Dummy Variables Used: (not shown in table)	Every Market
Number of Observations	6,703
R^2	0.90

*** indicates significance at the 1 percent level
** indicates significance at the 5 percent level
* indicates significance at the 10 percent level

Table I.7
Analysis of News Minutes Provided – Additional Regressions

	N2: Controlled for Market			N3: Full Fixed Effects		
Variable	Coefficient		Std. Error	Coefficient		Std. Error
TotPop1000s	3.71	***	0.32	-0.19	***	0.03
PopPercentBlack	1,459.09	***	116.13	191.54	***	34.75
PopPercentHisp	-53.07		58.37	30.64	**	14.09
DMAPerCapitaIncome	-0.13	***	0.02	-0.01		0.01
UnrelatedStationsinDMACount	709.98	***	42.27	26.20	*	13.92
UnrelatedStationsinDMANewsMin	-0.67	***	0.01	0.00		0.00
ParentStationsCount	-3.09	***	1.03	-0.09		1.31
ParentRevenueMillions	0.00		0.04	-0.14	**	0.06
OtherCoOwnedStationsinDMACount	586.30	***	48.11	-220.37	***	34.14
OtherCoOwnStationsinDMANewsMin	-0.60	***	0.01	0.12	***	0.01
Local Marketing Agreement	-57.00		51.55	60.23		40.66
MultiNetworkAffil	-239.03	***	79.01	-75.91		62.11
Locally Owned	-130.97	***	32.51	25.80		43.38
O and O Big Four	474.19	***	76.71	-241.96		320.03
TV-Radio Crossowned	82.85	***	32.02	-6.26		35.32
TV-Newspaper Crossowned	212.44	**	87.65			
NonCommercial	-434.57	***	34.17			
VHF Channel	824.17	***	29.74			
Dummy2003	575.04	***	35.88	76.66	***	14.04
Dummy2004	910.26	***	57.96	136.47	***	20.82
Dummy2005	1,162.91	***	82.46	163.07	***	28.57
Dummy2003*NonCommercial				-64.78	**	26.11
Dummy2004*NonCommercial				-168.28	***	26.25
Dummy2005*NonCommercial				-187.70	***	26.56
Dummy2003*TV-Newspaper_Crossown				54.24		81.39
Dummy2004*TV-Newspaper_Crossown				98.06		81.49
Dummy2005*TV-Newspaper_Crossown				50.76		81.50
Additional Dummy Variables Used: (not shown in table)	Every Market			Every Station		
No. Observations	6,703			6,703		
R^2	0.84			0.98		

*** indicates significance at the 1 percent level
** indicates significance at the 5 percent level
* indicates significance at the 10 percent level

Table I.8
Analysis of Public Affairs Minutes Provided - Three-Way Group Fixed Effects Model

Variable	PA1: Controlled for Market & Network			
	Coefficient		Std. Error	p-value
TotPop1000s	-0.41	***	0.13	0.002
PopPercentBlack	225.78	***	47.82	0.000
PopPercentHisp	-47.25	**	24.09	0.050
DMAPerCapitaIncome	-0.01		0.01	0.398
UnrelatedStationsinDMACount	85.47	***	17.29	0.000
UnrelatedStationsinDMAPubAffMin	-0.31	***	0.01	0.000
ParentStationsCount	-0.04		0.48	0.930
ParentRevenueMillions	-0.04	**	0.02	0.024
OtherCoOwnedStationsinDMACount	15.21		19.56	0.437
OtherCoOwnStationsinDMAPubAffMin	-0.13	***	0.02	0.000
Local Marketing Agreement	13.92		21.59	0.519
MultiNetworkAffil	-6.52		33.11	0.844
Locally Owned	19.26		13.67	0.159
O and O Big Four	21.52		34.40	0.532
TV-Radio Crossowned	47.12	***	13.80	0.001
TV-Newspaper Crossowned	-44.45		36.47	0.223
NonCommercial	48.95		52.14	0.348
VHF Channel	4.81		12.92	0.710
Dummy2003	-32.44	**	14.69	0.027
Dummy2004	154.46	***	23.83	0.000
Dummy2005	77.01	**	33.82	0.023
ABC	103.91		186.85	0.578
CBS	52.55		187.02	0.779
PBS	304.83		194.84	0.118
NBC	174.01		186.95	0.352
FOX	79.00		186.94	0.673
IND	134.28		186.95	0.473
WB	19.65		187.38	0.916
REL	39.10		190.94	0.838
UPN	-10.77		187.61	0.954
UNI	-43.34		188.90	0.819
PAX	58.43		187.83	0.756
PUB	1,009.02	***	201.40	0.000
TBN	-52.77		189.92	0.781
INS	-14.14		200.76	0.944
TEL	19.41		191.64	0.919
AZT	-75.46		222.24	0.734
TLF	-93.70		191.82	0.625
SHP	-69.78		237.41	0.769
EDU	367.93	*	210.30	0.080
HSN	-219.27		259.27	0.398
HTV	345.67		263.13	0.189

Additional Dummy Variables Used: (not shown in table)	Every Market
Number of Observations	6,703
R^2	0.53

*** indicates significance at the 1 percent level
** indicates significance at the 5 percent level
* indicates significance at the 10 percent level

Table I.9
Analysis of Public Affairs Minutes Provided – Additional Regressions

Variable	PA2: Controlled for Market Coefficient		PA2: Controlled for Market Std. Error	PA3: Full Fixed Effects Coefficient		PA3: Full Fixed Effects Std. Error
TotPop1000s	-0.45	***	0.14	-0.02		0.02
PopPercentBlack	235.82	***	48.93	40.53	**	17.11
PopPercentHisp	-47.45	*	24.63	-20.73	***	6.86
DMAPerCapitaIncome	-0.01		0.01	0.00		0.00
UnrelatedStationsinDMACount	90.84	***	17.69	12.97	**	6.45
UnrelatedStationsinDMAPubAffMin	-0.33	***	0.01	0.00		0.00
ParentStationsCount	-0.38		0.43	-0.36		0.65
ParentRevenueMillions	-0.05	***	0.02	-0.02		0.03
OtherCoOwnedStationsinDMACount	10.97		19.96	-50.53	***	13.83
OtherCoOwnStationsinDMAPubAffMin	-0.13	***	0.02	0.30	***	0.02
Local Marketing Agreement	18.95		21.83	3.68		19.97
MultiNetworkAffil	-34.68		33.32	18.68		30.58
Locally Owned	27.37	**	13.70	56.78	***	21.35
O and O Big Four	62.90	**	32.02	-26.72		157.68
TV-Radio Crossowned	26.42	*	13.50	68.84	***	17.43
TV-Newspaper Crossowned	-30.85		36.94			
NonCommercial	265.88	***	14.88			
VHF Channel	30.78	***	10.64			
Dummy2003	-35.42	**	15.02	-6.31		6.78
Dummy2004	158.40	***	24.37	13.51		10.08
Dummy2005	78.81	**	34.58	16.42		13.77
Dummy2003*NonCommercial				2.09		12.85
Dummy2004*NonCommercial				79.51	***	12.99
Dummy2005*NonCommercial				-29.30	**	13.06
Dummy2003*TV-Newspaper_Crossown				22.28		40.07
Dummy2004*TV-Newspaper_Crossown				12.61		40.11
Dummy2005*TV-Newspaper_Crossown				-3.90		40.12
Additional Dummy Variables Used: (not shown in table)	Every Market			Every Station		
No. Observations	6,703			6,703		
R^2	0.51			0.93		

*** indicates significance at the 1 percent level
** indicates significance at the 5 percent level
* indicates significance at the 10 percent level

Section II
Ownership Structure, Market Characteristics and the Quantity of News and Public Affairs Programming: An Empirical Analysis of Radio Airplay

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July 30, 2007

Abstract

This section of the study is devoted to an empirical examination of the extent to which there is a relationship between the ownership characteristics of a radio station and the quantity of informational programming (news and public affairs) it broadcasts. Using a sample of more than 1,000 radio stations, we regressed the number of sample minutes of airplay devoted to informational programming on variables intended to capture the ownership and market characteristics of the station, as well as some appropriate control variables. The existence of economies of scope in production and distribution is supported by the findings that stations owned by parents having more pervasive radio operations are more likely to air informational programming. Radio stations cross-owned with nearby television stations are less likely to air news programming. However, among stations that aired such programming in the sample, those owned in combination with a nearby television station aired significantly more news. The latter effect is stronger than the former such that the overall marginal effect is positive. The estimations also provide some evidence that stations with nearby owners air more news and more local news. Each of these findings is subject to some caveats.

* The opinions expressed herein are those of the authors and do not necessarily reflect those of the Federal Communications Commission or any of its other employees. All remaining errors are our own.

1 Background

Concerns about the homogenization of airplay are not new, although such concerns were in the past related more to network affiliation than to group ownership. Even though most stations at the time were independently owned "mom and pop" shops, the FCC in 1941 issued its *Report on Chain Broadcasting* restricting the number of stations that could be owned and operated by a network in an area and loosening the types of contract arrangements that could be entered into by networks and affiliates. The report ultimately forced NBC (RCA) to sell off one of its two networks (NBC-Blue, which became ABC). Nonetheless, by 1945 about 95% of stations were affiliated with one of the three (rather than just two) major networks.[1] More recently, the merger wave resulting from the relaxation of ownership rules codified in the Telecommunications Act of 1996 has focused attention on group ownership of radio stations.[2]

How does ownership consolidation affect airplay? In explaining his theoretical model of the music radio industry, Sweeting (2005) notes that it likely depends on how commonly owned stations are situated. Specifically, within-market common ownership will have different effects than cross-market common ownership. Looking at both sides of this two-sided market, Sweeting reasons that if advertising rates are set in a wider – perhaps nationwide – market, commonly owned stations in the same market will likely air more advertising. A group owner will presumably be able to consolidate the sale of advertising, reduce the cost of selling ad time, and therefore sell more. As far as airplay, commonly owned stations in the same market are likely to differentiate their airplay to avoid stealing each others listeners, thus either increasing total variety or simply moving their content closer to their competitors. Shifting to the cross-market analysis, group owners may play more commercials if the cost of selling commercial time falls or listeners become less sensitive to enduring commercials. Because stations in different markets don't compete for listeners, one would expect that owners could cut costs by airing similar content across markets. Such economies of scope imply that commonly owned stations in different markets will have similar airplay characteristics.

The appealing and straightforward intuition behind the model described above is backed up by Sweeting's examination of airplay data from music radio stations. When examining the

[1] See Starr(2004), p. 380-1.
[2] Williams and Roberts (2002) provide a summary of the short-run effects of the 1996 Act on the radio industry, noting in particular that between 1996 and 2002 the number of stations increased by 5.4%, the number of owners fell by 34%, overall variety of formats was essentially unchanged, and ad rates increased by 90%.

"distance" between playlists, the author finds that, within a format, stations that become commonly owned in the same market place their output farther apart from each other and closer to their competitors. He also finds that stations in different markets that become commonly owned play more of the same songs and have shorter playlists. The idea of examining the diversity of airplay in this manner had also been used in an earlier effort by Williams, et al. (2002). Using top 10 playlist data from a smaller sample of stations over the period from March 1996 to March 2001, the authors found that playlists within a format diverged within markets and converged across markets but that the effects of common ownership on the diversity of airplay were inconclusive.

Although the preceding discussion is focused on the incentives for differentiation or homogenization among playlists in music radio, the reasoning could be applied to other content, including news. Commonly owned stations *in the same market* would be expected to differentiate the type of news they air and the manner in which it is reported. However, the manner in which an owner might choose to differentiate his or her stations in a particular market is not certain. Imagine that, either by collecting it themselves or subscribing to a news service or being affiliated with a news network, stations are presented with a portfolio of news stories at some regular interval. An owner of multiple stations in the same market might differentiate the news output of each of her stations to avoid cannibalization. Commonly owned stations might air different story lineups in different ways for different amounts of time. In this manner, a particular owner could have many news-format stations in a market, each airing a similar amount of news (in time) but tailored to appeal to a different segment of the news audience. Following this strategy could allow the owner to preempt the entry of other news-format stations. At the extreme however, commonly owned stations could be specialized such that almost all news is aired over a single outlet, leaving the other stations to compete in different formats. It would thus be rare for a particular owner to have multiple news-format stations in a single market, and the amount of news broadcast across commonly owned stations would be concentrated. The implications for the amount of news aired by commonly owned stations in the same market are therefore ambiguous. The story applied to commonly owned stations *in different markets* however is more straightforward. Just as in the case of music, we would expect the economies of scope logic to dominate, driving such stations to homogenize the type and amount of news they broadcast.

Existing literature attempting to quantify the relationship between station ownership and informational programming is focused on television broadcasting. Alexander and Brown (2004) used a dataset originally created by Project for Excellence in Journalism (PEJ) comprised of over 4,000 television news stories (excluding sports and weather) aired by 60 NBC, ABC and CBS affiliates across 20 DMAs during the highest-rated half-hour for news. The stories were categorized by the authors as local or non-local, as well as whether the stories were reported live, on-location. The authors regressed the number of news seconds, local news seconds and local on-location news seconds broadcast by each station in the sample on station characteristics while controlling for DMA and time of day effects. They found that locally owned stations aired more local news and more local on-location news. In the context of that paper, a station was considered locally owned if the station owner was headquartered in the same DMA. Notably, the authors state that their results were sensitive to the specification and that certain changes rendered the local ownership effect on local news insignificant. Neither of the cross-ownership terms – whether the station owned a newspaper in another DMA and whether the station owner also owned a radio station in the same DMA – by themselves had a significant effect on the dependent variables in any of the specifications.

In Adilov, Alexander & Brown (2006), the authors expanded significantly on Alexander and Brown (2004) by employing a structural model and by breaking down the characteristics of the stories that were broadcast. The authors fit a similar specification to not only the total number of local news minutes (as in Alexander and Brown (2004)) but also to the number of local news stories and the length of the longest local news story. As was the case in their previous work, the cross-ownership variables do not seem to be significantly related to the total minutes of local news aired by stations in their sample. However, their results provide some evidence that, for example, a TV-radio cross-ownership (within a DMA) decreased the number of local news stories broadcast, but had a positive and significant effect on the maximum duration of local news stories. The implication being that TV stations in such combinations covered a smaller number of stories, but devoted more time to the stories they did cover, relative to their counterparts. Out-of-market TV-newspaper cross-ownership was found to have the same effects, while out-of-market TV-radio cross-ownership was found to have no significant effect on either the number of stories or the maximum length, when controlling for day and market characteristics. Substituting the characteristics of non-local news programming as dependent

variables, the authors found that within-market TV-radio cross-ownership is associated with broadcasting fewer non-local stories for shorter lengths of time. Alternatively, out-of-market TV-radio cross-ownership was found to be positively associated with the number of non-local stories and total non-local news minutes, indicating that there are some economies of scale for non-local news. This finding is bolstered to some extent by the finding that out-of-market TV-newspaper cross-ownership has a positive effect on the number of non-local news stories. In a significant departure from their earlier work, the authors in Adilov, Alexander & Brown (2006) omit from the specifications a measure of the proximity of the station owner to the station.

Yan and Napoli (Undated) expands upon Napoli (2004), which is itself an extension of Spavins et al. (2002).[3] The authors extracted a systematic sample of 289 broadcast television stations (every fifth station drawn from a market-ranked list of 1,447 stations) and built a dataset including ownership and market characteristics from BIA Financial Network (BIA) and broadcast schedule information from Tribune Media Services (TMS). The program characteristics coded by TMS were then used by the authors to determine the number of minutes of local news and local public affairs broadcast by each station over a constructed two-week period. Using a sample of 221 stations, reduced from the original 289 due to some missing values, Yan and Napoli regressed (separately) the amount of local news and local public affairs broadcasting on ownership and market characteristics. They found that the amount of local news programming was positively related to the overall financial strength of the station and the amount of competition from other broadcast stations, but that "none of the station ownership characteristics analyzed in this study are related to a station's provision of local news programming." The authors found that both the size of the market and ownership by one of the Big Four networks were inversely related to the quantity of local public affairs programming. None of the other ownership variables (including whether the station is a local duopoly, whether the station is owned by a local media company, whether the station is a Big Four affiliate, and the percentage of national television households reached by the station's parent company) had a

[3] Spavins et al. (2002), using data from Big Four affiliates in markets containing at least one network owned and operated (O&O) station, find that network O&O stations on average broadcast more local news and public affairs programming than do affiliates in such markets and that affiliates that are co-owned with a newspaper publisher outperform other affiliates in both quality and quantity of such programming. Napoli (2004) uses the dataset from Spavins et al. (2002) and, while confirming the earlier findings when taking local news and public affairs programming together, Napoli notes that if public affairs programming is segregated from local news programming and regressed separately on station ownership and market characteristics, the relationships found in Spavins et al. (2002) hold for local news but not for public affairs programming.

significant effect on the amount of local public affairs aired by stations in the sample. In the recently published Napoli and Yan (2007), the authors narrow their focus to consider local news only. Taking advantage of the same dataset, they estimated the relationship between the quantity of local television news and station characteristics with a sample selection model.[4] Despite the change in method, the author's findings are similar to those of Yan and Napoli (Undated).

A contemporaneous study, Milyo (2007), examined the effects of cross ownership on the political slant and, of particular relevance here, the local content of local television news programming. Over 300 recordings of local newscasts were collected and coded for content. To focus on the within-market effects of cross-ownership, the recordings came from the 29 TV stations that are cross-owned with a within-market newspaper and network affiliates in the 27 DMAs that contain such a cross-owned station. To provide ample data to measure political slant, the recordings of late-evening newscasts were made on the Wednesday, Friday and Monday immediately preceding Election Day (November 7th) 2006. While the paper presents a number of estimations, of interest here are those in which the quantity of news coverage (in seconds) and local news coverage were separately regressed on variables representing station cross-ownership and network affiliation characteristics. The estimates represent within-market effects only, since the author included dummy variables for all but one of the 27 DMAs represented in the sample. When using a full set of covariates, as well as time and length of broadcast dummies, Milyo found that relative to stations in the same DMA that are not cross-owned with a newspaper, cross-owned stations broadcast about 1 additional minute of news (4%), "while radio cross-ownership and other ownership and network characteristics are not significant determinants of total news coverage." The same specification was also fit to the quantity of local news and the quantity of local news exclusive of sports and weather. The estimations indicated that the quantity of local news (including sports and weather) was significantly affected by both newspaper cross-ownership and network affiliation, the former of which increased the quantity of such programming by about 80 seconds (about 6%). Stations affiliated with one of the three older networks (NBC, CBS and ABC) aired more than five minutes of additional local news relative to the newer CW and MyNetwork affiliates in the same DMA. When sports and weather were excluded from the quantity of local news programming, the newspaper cross-ownership

[4] A sample selection model uses a binomial probability model to estimate the probability of a non-zero outcome over the entire sample and then a zero-truncated model is fit on the positive realizations. This is similar to the hurdle models described below.

effect became insignificant and the network affiliation effects were positive and significant but of a smaller magnitude. Interestingly, cross-ownership with a radio station has a negative and significant effect, such that the cross-owned stations broadcast almost three minutes less local news relative to those in the same DMA that are not cross-owned with a radio station.

The remainder of the paper is organized as follows. Section 2 describes the data, as well as the sample selection method used to collect the radio airplay. Section 3 discusses various estimation techniques and their appropriateness for this study. This is a technical discussion intended for those particularly interested in the estimation technique used here. In Section 4 we present and interpret the estimation results. Finally, Section 5 offers some conclusions.

2 Data

The data used for this portion of the study can be broadly divided into two categories: those describing airplay characteristics and those describing the radio station. Airplay data were collected and organized by Edison Media Research (EMR) under the supervision of the FCC's Localism Task Force (LTF). The following is a brief description of how those data were collected. We anticipate the FCC will release a comprehensive description at a later date. The parameters of the data collection were established by a two-stage sampling design. The first step involved selecting a stratified sample of radio stations for recording. The sampling frame was composed of the 13,241 stations in the BIA MAPro Database on November 26, 2003 that were not listed as "dark" or not on the air. The stations were divided across four broad categories, each containing a different number of subcategories – (1) Band: AM, FM; (2) Format: Music, News-Talk, Non-English, Religion, Sports, and Miscellaneous; (3) Owner size and structure: large commercial, medium commercial, small commercial, and noncommercial; (4) Market size: large Arbitron Metro, small Arbitron Metro, and out-of-Metro – based on associated BIA data. This process originally created 144 strata (2 Band · 6 Format · 4 Ownership · 3 Market), plus one additional stratum for the 172 then-operating low-power FM stations (LPFM) of all stripes. Strata containing very few or no stations were combined with adjacent strata, ultimately leaving 35. A quasi-proportional strategy was then used to randomly draw stations from each of the 35 groups, sampling a larger proportion of some groups so that the sample sizes would be large enough to produce reliable estimates of the variables of interest within each group. Ultimately, 1,098 full-power and 30 LPFM stations were selected for a total sample of 1,128. The second

stage of the sampling process was to randomly select the times of day airplay was to be recorded. The 24 hours of the day were broken up into 72 segments of 20-minutes each, beginning at 12:05 AM. Six 20-minute segments were randomly selected for recording from each station. The segments chosen for a particular station were generally recorded entirely on a randomly selected day.

Once the stations, days, and times were set, EMR was employed to record and code the airplay. While the day of the week had been set by the sampling methodology, the date on which each recording was made was determined by EMR. The vast majority of the airplay was recorded between June and October 2005, although some stations were recorded as late as December 2006. EMR then reviewed the airplay and coded the broadcasts – according to predetermined characteristics – for each five-second interval in the two hours recorded. The coding provides a rich characterization of airplay content by categorizing the broadcast in general terms, noting the name of the speaker or the name of the song and more than ten other variables, including the extent to which the broadcast discussed a "local" topic. At this time, we are unaware of any other dataset that provides such a comprehensive picture of radio broadcasting. So, despite the fact that the database was specifically designed to collect the data necessary to inform the FCC about "localism" in radio broadcasting, the EMR data is not restricted to that end. A sample record is shown in **Table II-1**.

The categorization of the content of each five-second interval of airplay deserves some additional attention, particularly when it comes to syndicated broadcasts. Syndicated programs were generally coded by EMR as General Category=5 (Entertainment and Leisure), Subcategory=2 (Entertainment DJ/Advice/Call-In) regardless of program content. FCC staff conducted an audit of the audio associated with these programs in an effort to more specifically identify the subject matter of the broadcast. **Table II-2** shows the overall effects of this effort. About 80,000 intervals (approximately 5% of the interval records) were categorized out of General Category 5 and into various other categories. Of particular importance here is the fact that over 35,000 of the intervals were reassigned into the public affairs category. We conducted all estimations using dependent variables derived from both sets of categorizations. While the effects of the audit are negligible when the analysis is focused on news programming, it is not too surprising that some differences in the estimation results arise when focusing on public affairs programming.

Our measures of the quantity of news were developed from the EMR airplay dataset in the following manner. Of the 1,128 stations in the sample, EMR was able to successfully record audio and create associated coding for 1,039. We thus began with an airplay dataset containing 1,496,160 observations: 240 coded five-second intervals for six 20-minute time segments for each of the 1,039 stations. The quantity of news was measured as the number of five-second intervals over the six 20-minute time segments (two hours) for which the general categorization was news. Similarly, the quantity of local news was measured as the number of five-second intervals for which the general categorization was news *and* where the news story had a local component. For both measures the original EMR and the audited data were used to create two versions of each quantity. We generated variables measuring the amount of public affairs broadcasting in an analogous manner. Summary statistics for each of the dependent variables are shown in **Table II-3** below.

We ultimately examine the nature of the relationship between the quantities of news and public affairs programming aired by a radio station and its ownership structure by regressing our measures of the quantities of such informational programming on variables representing station ownership and market characteristics, as well as some necessary control variables. This brings us to the second broad category of data, station characteristics. Station characteristics for each of the stations in the airplay dataset were drawn largely from BIA Financial Network's MAPro Database for 2005, so that they would be at least loosely contemporaneous with the recorded airplay. These independent variables and brief descriptions are shown in **Table II-4** and summary statistics are shown in **Table II-5**.

The definition of "market" used when developing the independent variables deserves some attention. The nature of the data led to a situation where market-level independent variables may be defined across differing market concepts. The newspaper and TV cross-ownership dummies were defined at the DMA level. For example, the variable representing TV cross-ownership is assigned a value of one if the owner of the radio station also owns a TV station in the same DMA.[5] The remaining market-level variables were created as follows. For about 70% of the stations in the sample, the market is simply the Arbitron Metro. In those cases, the market-level variables, including the number of stations the parent owns in the market, the number of news-format stations owned by the station's parent in other markets, the share of

[5] For more information about the construction of these variables, see Duwadi, Roberts & Wise (2007).

stations in the market that are news-format, and the number of stations in the market, were generated by aggregating BIA data across the Arbitron Metro. The 2000 Census of Population and Housing data were used to generate the variables representing the demographic characteristics of the market by associating each station with a Metropolitan Statistical Area or Primary Metropolitan Statistical Area or New England County Metropolitan Area (MSA/PMSA/NECMA) based on its county of license.

For stations outside of an Arbitron Metro, the station's county of license served as a proxy for its market. BIA and Census data were aggregated to the county level to generate the market-level variables representing ownership and demographic characteristics for out-of-Metro stations. This approach represents a simple, easily implemented solution to the problem of empirically defining the market for the purposes of this study.[6] Certainly the county of license could be far larger or much smaller than the listening area of the station, but it is unclear which case is more prevalent. One might imagine that in-Metro counties are generally smaller than out-of-Metro counties, and therefore the proxy used here might generally be over-inclusive.[7] Without a comprehensive analysis, however, it is impossible to determine if this intuition holds.

Our measure of the proximity of the station's owner to the station was generated without reference to the station's market. The distance between the station and the parent is an approximation based on the station's county of license and the ZIP code of the parent. The location of the station was defined as the latitude and longitude of the "internal point" of the station's county of license. An internal point is simply a point within the geographic entity and in many cases is the geographic centroid.[8] These data came directly from the Census 2000 Summary File 3 geography file. The location of the parent was defined as the geographic ZIP code centroid of the parent's headquarters address (from BIA). The latitude and longitude of the

[6] This is not a normative statement and we are not advocating any particular approach to defining out-of-Metro radio markets. A portion of the *2002 Biennial Review Order* (18 FCC Rcd at 13870-73 paras. 657-70) requested comment on potential methods for defining out-of-Metro markets, including county-based approaches. The method used here is a simplified, county-based approach. Estimating out-of-Metro markets based on the FCC's interim modified radio contour overlap rule (*Id*. at 18 FCC Rcd at 13729 para. 285) was not feasible for this study. It would require generating the principal community contour for each of the 308 out-of-Metro stations in the sample, as well as for every other station that could potentially overlap the 308, as a function of station characteristics contemporaneous with the airplay data. Associating the necessary demographic information with each of these markets would then require geographically merging the markets and Census block-group data.

[7] Whether or not this is generally the case is beyond the scope of this paper. Exceptions to this generalization are easy to find. For example, Coconino County, AZ, with an area 18,617 square miles (maximum dimensions of about 180 miles north-to-south and about 140 miles east-to-west, covering around 16% of the state), is in the Flagstaff-Prescott, AZ Arbitron Metro.

[8] See U.S. Census Bureau (2002), p. A-15.

each ZIP code was taken from ZIP code inventory files provided by Tele Atlas. The distance between the two points was defined as the Great Circle distance, rounded to the nearest mile.[9]

The other control variables are unique to the station and generally came directly from the BIA data. Specifically, dummy variables indicating the commercial status of the station, whether it is within an Arbitron Metro and its band (AM/FM) were all taken directly from the BIA data. The variables indicating the numbers of recorded segments beginning during morning and evening drive-time were constructed based on the airplay data from EMR.[10]

Missing information ultimately reduced the sample size used in estimation from 1,039 to 1,013. One station, WGAC-FM, was dropped from the estimation because the audio files did not contain the necessary header information required to build the drive-time variables. Further, the BIA station-level data contained no information for Low-Power FM stations, making it impossible to generate the independent variables. Of the 1,038 remaining stations in the EMR sample, it was therefore necessary to drop the 25 Low-Power FM stations from the analysis, bringing the sample size to 1,013.

3 Method

The characteristics of the dependent variables dictated the estimation method. First, the dependent variables are count data – non-negative, integer tallies of the number of five-second intervals coded as news or public affairs. Second, the dependent variables contain a significant number of observations for which the number of observed intervals (either news or public affairs) was zero, rendering least squares regression inappropriate.[11] Depending on the variable in question, the percentage of zeros in the dependent variables ranges from 23% to 93% (See Table II-3). Finally, in addition to being "piled up" at zero, the distributions of the dependent variables, for both news and public affairs, are heavily right skewed. That is, the mean is

[9] Distance = 3963.0 * arcos ($\sin(lat_a) \sin(lat_b) + \cos(lat_a) \cos(lat_b) * \cos(long_a - long_b)$). See SAS Sample 373 at http://support.sas.com/ctx/samples/index.jsp?sid=373.

[10] To determine whether a segment was recorded during drive-time, we needed day of the week information for each segment. The EMR data does not contain a field to show the date on which each airplay segment was recorded, only the time of day that the segment began. Further, in examining the recorded audio (which exists in the form of 6 mp3 files for each station), it became clear that in a few cases the audio was recorded at a different time of day than that listed in the EMR database. We found that the date and time information on the mp3 file header matched the recording. As a result, we merged the mp3 file header information into the data and used it to generate the drive-time variables.

[11] Wooldridge (2002) p. 565 notes that in situations where the dependent variable is heavily distributed at zero, ordinary least squares will generally generate some negative fitted values and that the distribution of the dependent variable will likely be significantly different from the conditional normal distribution.

inflated by a small number of large observations, rendering it much larger than the median. These factors, combined with assumptions about the data generating processes, led to the conclusion that a zero-inflated negative binomial model (ZINB) is the best estimation method.

There are a number of techniques available for estimating count data, the most basic of which is the Poisson regression model (PRM).[12] Although inappropriate for estimating many types of count data – including the data at hand – for reasons we are about to discuss, the PRM provides a good point of departure when discussing other models, many of which are extensions of the PRM designed to overcome some of its limitations. Gurmu and Trivedi (1996) note that the PRM is often rendered inappropriate because count data are characterized by *overdispersion* relative to the Poisson probability density function (pdf). The mean and variance of the Poisson distribution are equal (a property known as *equidispersion*) and thus in situations where the variance is considerably larger than the mean, such data series are said to feature overdispersion. Use of the PRM in modeling data with overdispersion leads not only to poorly fitting predicted counts but also to downward biased standard errors. Overdispersion is a characteristic of data that are "zero-inflated" – the frequency of zero counts in the data is inconsistent with the Poisson distribution. Note also that in a "Poisson process" each occurrence is an independent event, unaffected by the number of previous occurrences. In practice, occurrences are often temporally linked, such that the probability of an event is linked to the number of events that already occurred.[13] This temporal dependence can essentially stretch the distribution of events, leading once again to overdispersion.

It is possible that overdispersion can be accounted for by unobserved factors. The PRM accounts for *observed* heterogeneity across observations by viewing each observed count as a random draw from a Poisson pdf with a mean μ_i that is unique to that observation i. Each μ_i is therefore conditional on the independent variables (generally it is estimated in the form $\mu_i = \exp(x'_i\beta)$). The negative binomial regression model (NBRM) is an extension of the PRM that permits overdispersion by introducing additional variance in the conditional mean through the inclusion of a stochastic term to account for *unobserved* heterogeneity across observations. Generally, the NBRM will provide a better fit than the PRM when overdispersion is present.

[12] Regression techniques for count data are discussed in detail in Cameron and Trivedi (1998) and Long and Freese (2006).

[13] In addition to the possibility that the probability of an occurrence might be linked to the number of previous occurrences, the chance of an occurrence in a certain interval may also be linked to the amount of time since the last occurrence. See Winkelmann (1995).

Because the two models are nested alternatives (i.e., the NBRM reduces to the PRM), a log-likelihood test can be used to determine if the NBRM is a better fit than the PRM. The NBRM is limited, however, since it is unable to specifically investigate the nature of overdispersion. That is, the model does not explore the nature of the unobserved heterogeneity. If the presence of excess zeros contributes overdispersion, the NBRM does not allow one to draw inference on the process generating excess zeros. Further, the model cannot inform the researcher whether unobserved heterogeneity is simply that, or whether the occurrences are dependent on each other in some meaningful way.

Hurdle and zero-inflated models are can provide improved fit in situations when overdispersion is attributable to excess zeros. Both models envision the count data as being generated by a *mixture* of at least two data generating processes (i.e., underlying, unobservable mechanisms that determine the number of occurrences). The popular example of the number of fishing trips taken over some period of time is particularly appealing here.[14] In such a case, observed zeros come from two sources, those who would never fish under any circumstances and those who would fish but did not have the opportunity to do so during the sample period. A hurdle model takes this into account by modeling the decision of whether or not to fish as a binomial process, determining whether the observed number of trips is zero or positive. For the set of positive outcomes, it is assumed that those subjects have *crossed the hurdle* into a state wherein those positive counts can be modeled separately as a zero-truncated count model. As a practical matter, one would generate a logit or probit estimate of the probability of a zero outcome over the entire dataset and then use a zero-truncated PRM or zero-truncated NBRM to estimate the positive counts. In addition to incorporating overdispersion, a hurdle model makes it possible to separately draw inferences on the factors that affect the probability of never taking a trip and those that affect the number of trips taken.

Zero-inflated models also envision count data as a mixture of multiple data generating processes, but are subtly different from hurdle models. The zero-inflated Poisson or ZIP model is generally attributed to Lambert (1992). In examining the number of defects encountered in the

[14] See Cameron and Trivedi (1998) p. 123. Pohlmeier and Ulrich (1995) provides another example. The authors apply a negative binomial hurdle model to the demand for medical services in Germany as measured by the number of visits to general practitioners and medical specialists. Here, the nature of medical care as a principal-agent problem provides economic justification for examining the data as generated by two distinct processes. A subject decides whether to go to the doctor, but the number of subsequent visits are likely determined, at least in part, by the doctor.

process of attaching components to printed circuit boards, Lambert notes that in some processes there are considerably fewer defects than one would anticipate given that the number of defects in the process should be Poisson-distributed. "One interpretation," states the author, "is that slight, unobserved changes in the environment cause the process to move randomly back and forth between a perfect state in which defects are extremely rare and an imperfect state in which defects are possible but not inevitable." Loosely, the data can be divided into two regimes, one in which the number of occurrences is zero with probability = 1 and one in which the number of occurrences is sometimes zero but has some non-zero probability of being positive. This seems to be much the same type of division envisioned by the hurdle model, and indeed the zero-inflated models are estimated in a similar way, modeling the dgps of the zeros as a binomial process and the positive counts as a PRM or NBRM separately. An important difference between the two approaches is how the data are split. As mentioned above, a hurdle model is estimated as a binomial process generating the zeros over the entire sample and then a truncated count model is estimated over the positive counts. The zero-inflated models instead parameterize the parsing of the sample into always zero and sometimes zero groups or regimes.

Adopting the notation of Long and Freese (2006), let the two regimes be the always zero (A) and the sometimes zero (~A) and assume that among those observations with a count of zero, group membership is unobservable. Since the two groups are mutually exclusive and collectively exhaustive, let membership in A be A=1 and membership in ~A be A=0. For each individual observation zero-inflated models estimate the probability of membership in A, ψ_i, using a logit or probit model based on a vector of independent "inflation" variables $\mathbf{z}_i$.

$$\psi_i = \Pr(A = 1 \mid \mathbf{z}_i) = F(\mathbf{z}_i \boldsymbol{\gamma})$$

Then the probability of an observation being in A is ψ_i and the probability of being in group ~A is 1- ψ_i. The probability of observing a zero overall is then the weighted sum of the probability of observing a zero in each group. The probability of observing a zero in A is of course 1 and the probability of observing a zero in group ~A is determined by fitting the data in group ~A to a PRM or NBRM. In other words,

$\Pr(y_i = 0 \mid A = 1, \mathbf{x}_i, \mathbf{z}_i) = 1$ by definition;

$\Pr(y_i = 0 \mid A = 0, \mathbf{x}_i, \mathbf{z}_i) =$ determined by PRM or NBRM; therefore,

$$\Pr(y_i = 0 \mid \mathbf{x}_i, \mathbf{z}_i) = \psi_i + \{(1 - \psi_i)(\Pr(y_i = 0 \mid \mathbf{x}_i, A = 0)\}.$$

The probability of observing something other than a zero overall is likewise the weighted sum of observing a non-zero observation in each group. Since the probability of observing a non-zero observation in A is zero, the overall probability of observing a non-zero value *k* is then the probability of observing *k* in the sometimes-zero group weighted by the probability of being in that group,

$$\Pr(y_i = k \mid \mathbf{x}_i, \mathbf{z}_i) = (1 - \psi_i)(\Pr(y_i = k \mid \mathbf{x}_i, A = 0).$$

As was the case for the hurdle model, it is not necessary for the "inflation" variables (those that used to estimate the probability of an always-zero condition ψ_i) to be the same as those that determine the number of occurrences among the sometimes-zero group. Another similarity is that zero-inflated models allow one to separately draw inference on the factors that determine the probability that one will never go on a fishing trip and the factors that determine the number of trips taken among the group with a non-zero probability of taking a fishing trip.

4 Specifications and Results

In this section we discuss the results of estimating news, local news, public affairs and local public affairs programming output as a function of covariates representing station characteristics. Since each of the four dependent variables was originally generated separately using the data as delivered by EMR and the audited data, we fit the model over both versions for a total of eight estimations. A zero-inflated negative binomial model (ZINB) was used. The following line of reasoning led us to choose this method. The overdispersion present in the data indicated that the PRM would be a poor choice. Likelihood ratio tests comparing the PRM to the NBRM confirm that the latter is preferred in each case.[15] The ZINB model cannot be compared to the NBRM using a likelihood ratio test since the models are not nested. A number of sources recommend the use of a Vuong test of non-nested alternatives in this case.[16] For the news and local news models, Vuong tests support the ZINB model over the NBRM overwhelmingly.

[15] The likelihood ratio test between the PRM and NBRM is essentially a test of the significance of the overdispersion parameter that allows for the additional variation in the NBRM.

[16] See Greene (1997) p. 944. If the estimated probability of observing y in model 1 is $\Pr_1(y_i|x_i)$ and the estimated probability of observing y in model 2 is $\Pr_2(y_i|x_i)$, then Vuong's test statistic is calculated as

$$v = \frac{\overline{m}\sqrt{n}}{s_m} \sim \text{N}(0,1) \text{ where } m_i = \ln\left(\frac{\Pr_1(y_i \mid \mathbf{x}_i)}{\Pr_2(y_i \mid \mathbf{x}_i)}\right), \overline{m} \text{ is the mean of } m_i, \text{ and } s_m \text{ is the standard deviation of } m_i$$

Values if *v* significantly greater than zero favor model 1 where values significantly less than zero favor model 2.

However, for public affairs and local public affairs the support for the ZINB model is sometimes tepid. When estimating public affairs programming, the p-values of Vuong tests were between 0.05 and 0.06 for both versions of the quantity variable, indicating weak support for the ZINB model over the NBRM. The Vuong test statistics derived from the local public affairs specifications were between 2.6 and 3 depending on the data used to construct the dependent variable, indicating that the ZINB model is favored. Testing aside, we have a preference for estimation techniques that envision the data as being created by more than a single data generating process. It makes intuitive sense that there are certain stations in the sample that have a zero probability of airing news or public affairs while there are other stations that might air news or public affairs but failed to show any such occurrences in our sample.

The estimation results can be found in Tables II-6 through II-13. All specifications were estimated using the associated probability weights (the reciprocal of the probability of selection) and the p-values shown are a function of robust standard errors. For each of the tables, the first three columns show the NBRM estimates for the "sometimes-zero" group, the next three columns show the logit estimates of the probability a station is in the "always-zero" group, and the final column shows the overall marginal effect of each covariate on the expected quantity of informational programming. The NBRM estimates, in the first three columns, show the parameter estimate, p-value, and factor change on the number expected quantity of informational programming that would result from an incremental change in the independent variable. For the NBRM, a factor change of 0.95, for example, implies that a unit increase in the covariate decreases the quantity of informational programming by 5%. Similarly, the inflated model estimates, shown in the next three columns, display the parameter estimate, p-value, and factor change on the expected probability that a station does *not* air any informational programming. A factor change of 0.95, in this case, implies that a unit increase in the independent variable decreases the odds a station does not air news by 5%. Again, the inflated model is designed to predict the probability the station will air no news, not the probability that the station will air some positive amount of news. While this is technically the case, in our discussion of the results we reverse the "polarity" of the estimates for ease of presentation. To calculate the factor change in the other direction, we just take the antilog of -1 multiplied by the parameter estimate. For example, if the inflated model shows a parameter estimate of 0.12, the interpretation is either that a unit change in the covariate *increases* the odds a station will air *no* informational programming

by a factor of exp(0.12) or 1.13, or that a unit change in the covariate *decreases* the odds a station will air *some* informational programming by a factor of exp(-0.12) or 0.89. The overall marginal effect, presented in the last column, represents the predicted increase or decrease in the expected quantity of informational programming (in seconds) over a two-hour period that would result from a unit increase in each independent variable. Note that the marginal effect is a function of the impact of each covariate on both the expected count of intervals in the "sometimes-zero" group and the effect of the covariate on the probability a station falls into the "always-zero" group. For dummy independent variables, the marginal effect is the change associated with a change of the dummy variable from 0 to 1.

4.1 News

ZINB model estimates of the quantities of news based on the EMR data and the audited data are shown in **Tables II-6 and II-7**, respectively. **Tables II-8 and II-9** present the analogous estimations for local news. We limit our discussion here to the results of the estimates of the EMR data since the audited data are not significantly different in this case.[17] **Table II-6** shows that several of the independent variables related to station ownership significantly affected the observed count of news intervals in the sample. Neither the number of in-market and out-of-market stations owned by the parent had a significant effect on the expected count of news intervals among those stations that might air news, but each had a positive and at least marginally significant effect on the probability of airing news. Specifically, ownership of an additional in-market station by the parent increased the probability the station aired news by a factor of exp(0.0966) or 1.1, holding the other covariates constant. Ownership of an additional out-of-market station similarly increased the odds of airing news by a factor of exp(0.0007), less than an tenth of a percent. In both cases, the overall marginal effect on the quantity of news is insignificant. This is due, at least in part, to the fact that it incorporates the effect of the covariates on the probability a station aired news, and on the quantity of news aired by those stations that did air some news in the sample. The NBRM estimates for these covariates are not statistically significant by any accepted standard, but they are both negative and large enough that they overwhelm the positive impact of the inflated model estimates. The implication is that as owners expand their radio operations by acquiring more stations (either in- or out-of-market),

[17] Note that the audit eliminated only five zero-news observations for both sets of estimations.

the stations they own are more likely to air news, but the quantity of news aired on each station may fall such that the overall quantity of news is not significantly affected.[18]

Moving on to the remaining ownership variables, the estimation shows that the distance between the parent and the station did not significantly affect the quantity of news aired by stations in the group that might air news, but it had a negative and significant effect on the probability stations aired news. As the distance between parents and the stations they own increased, the chance that the station aired news decreased by a factor of exp(-0.11) or 0.89 for each percentage increase in distance (recall that the distance is in ln(miles)). This boils down to a statistically significant expected decrease of about 15 seconds of news (about 5%) for each percentage increase in the distance between the station and its parent.[19] Similarly, it appears that stations that received a waiver of FCC rules covering certain radio-newspaper combinations were significantly more likely to air news. This result is, in this specification and the others to follow, not particularly meaningful for two reasons. On the inflated side of the model, the variable perfectly predicts the probability of success since every station for which the dummy is equal to 1 broadcast some quantity of news during the sampled airplay. Further, as a general matter, *only three* of the 1,013 stations used in estimation were cross-owned with a nearby newspaper in such a way that a waiver was necessary.[20] For two of the three, the quantity of news aired during the sampled airtime was relatively large (around 20 minutes) and all of the three aired some news programming in the sample. As such, any inferences drawn from the parameter estimates for this covariate are essentially anecdotal.

In-market cross-ownership with a TV station had some interesting effects. First, the negative binomial regression results indicate that among stations that might air news, those

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[18] As an experiment, the specification was also estimated including instead the count of <u>other</u> in-market news-format stations owned by the parent and the overall number of out-of-market news-format stations owned by the parent. The parameter estimates were not substantially different, except that the sign on the number of other in-market news-format stations owned by the parent became positive in the NBRM part of the model. Although not statistically significant, the effects of the covariate on the two parts of the model move in the same direction, providing some weak evidence that more pervasive in-market radio operations (if they are news-oriented) might air more news overall. The overall marginal effect was about 13 seconds, but not statistically significant.

[19] In this case, the expected number of news intervals predicted by the model at the means of the independent variables is about 58. That translates to 290 seconds, or 4.8 minutes, of news over a two-hour period. A 15 second decrease in the quantity of news aired is approximately 5% since 15/290 = 0.052.

[20] WSBT-AM (South Bend, IN) is owned by Schurz Communications, which also owns the South Bend Tribune, with circulation of about 73,000; WIBW-AM (Topeka, KS) is owned by MCC Radio (Morris Communications), which also owns the Topeka Capital-Journal, with circulation of about 64,000; and WBNS-FM (Columbus, OH) is owned by RadiOhio, Inc. which is part of the Dispatch Printing Co., which also owns The Columbus Dispatch, with circulation of about 350,000.

cross-owned with an in-market TV station aired about 59% more news (exp(0.46) = 1.59) than their counterparts. At the same time, however, such a cross-ownership arrangement decreased the odds that a station aired news by a factor of 0.56 (exp(-0.58) = 0.56). These effects imply that a radio station cross-owned with an in-market TV station is less likely to air news, but if it does air some news the quantity will be relatively larger than stations that are not cross-owned. The overall marginal effect is a function of both effects, but the effect implied by the inflated model was swamped by that of the negative binomial model such that in-market TV cross-ownership increased the expected quantity of news programming by about 110 seconds (almost 2 minutes or 38%) in a two-hour period holding other covariates constant. Despite the fact that the effects are going in opposite directions, the overall effect is still statistically significant (p-value = 0.099).

Turning to market characteristics, the estimations indicate that four of the market-level covariates had a significant effect on news programming, but only among the stations in the "sometimes-zero" group. Stations in markets that had a more crowded news format space, as measured by the share of other stations in the market that had a news format, aired significantly fewer news intervals. The overall marginal effect is statistically significant, indicating a decline in the expected amount of news by about 3 seconds (about 1%) for each percentage point increase in market crowdedness. Market size, as measured by the number of stations, had a small (less than 1%) but statistically significant positive effect on the quantity of news. The percent of the market population in the 18 to 24 age bracket and the percent of college graduates in the market population had offsetting significant effects on the quantity of news aired by those stations that might air news. For each additional point increase in the percentage of the population in the 18 to 24 group, the expected quantity of news aired by stations that might air news fell by about 4%, holding other factors constant. The overall marginal effect was not statistically significant. Meanwhile, for each additional point increase in the percentage of the population with a college degree, the expected quantity of news aired by stations that might air news increased by 2%. In this case, the overall marginal increase of 6.5 seconds was statistically significant.

Variation in the control variables was responsible for a considerable amount of variation in the dependent variable. Noncommercial stations, while no more or less likely to air news, aired significantly more (by a factor of 3.8) news than commercial stations among the group of

stations that might air news. This translates to about 10½ minutes of additional news (216%) in a two hour period, holding other factors constant. Stations situated in Arbitron Metros were significantly less likely to have aired news (by a factor of exp(-1.4) or 0.25) and among stations that might air news, being in-Metro had a negative, marginally significant effect (p-value = 12%).[21] Overall, in-Metro stations would be expected to air about 46% less news than out-of-Metro stations, holding other factors constant. The extent to which the sampled airtime was recorded during morning or evening drive had the effects one would anticipate. Each additional segment recorded during morning drive increased the odds a station aired news by a factor of 1.59 and increased the expected count of news intervals by a factor of 1.27 among stations in the "sometimes-zero" group. This translates to about an additional 95 seconds (33%) for every additional 20-minute segment recorded during morning drive. The number of evening drive segments increased the odds a station aired news by a factor of about 1.27 but had no significance in the negative binomial portion of the estimation. The overall marginal effect is small, about 25 seconds (8%) of additional news per additional segment recorded during evening drive. Finally, the estimation provides no evidence that FM stations were more or less likely to air news than AM stations. Among those stations that might air some news, however, FM stations aired significantly less news by a factor of exp(-0.97) or 0.38.

4.2 Local News

The results for the same specification estimated over local news are shown in **Table II-8**. We again focus on the case in which the EMR data were used to generate the dependent variable. Among the variables included to capture ownership characteristics, the parameter estimates are largely similar to those of the news estimations. As we saw in the news estimations, both the number of in-market stations owned by the parent and the number of out-of-market stations owned by the parent had positive and at least marginally significant effects on the odds of airing local news, but negative effects (insignificant, but with low p-values) on the expected quantity of local news aired. Again, the overall effects were insignificant.[22] Similarly, the distance between

[21] It is possible that the negative relationship between being in-Metro and airing no news is an artifact of the sample. If randomly choosing a station out of a large group of stations that are in-Metro, it seems likely that one would have a smaller chance of picking one that aired news than would be the case if randomly choosing from a much smaller group of out-of-Metro stations.

[22] Here again, we experimented with an alternative specification, including instead the count of other in-market news-format stations owned by the parent, and the overall number of out-of-market news-format stations owned by

the parent and the station had statistically significant parameter estimates of the same sign and similar magnitudes in both the local news and news estimations. In this case, distance had a negative impact on the odds of airing local news, decreasing the odds by about 14%, but the overall effect was not statistically significant. One difference in the results here relative to those found for news is that in-market cross-ownership with a TV station did not have a statistically significant effect on either the quantity of local news aired or the odds of broadcasting local news. Upon closer examination, the negative binomial portion of the estimation shows that cross-ownership with a nearby TV station had a large positive effect on the quantity of local news programming, and the p-value of 11.5% indicates marginal significance. The overall marginal effect of 23 seconds (about 22%) is not statistically significant, however.[23]

The market-level variables are generally exhibit a stronger relationship to local news relative to news. Both the percentage of other stations in the market with a news format and the percent of college graduates in the market had significant effects on local news, similar to those found on news. Though having no significant effect in the news regression, the median commute time in the market had a small but significant positive effect on the expected count of local news intervals. Another difference between the news and local news results is that both the black and Hispanic percentages of the market had a negative and significant effect on the odds of airing local news, decreasing the odds by factors of 0.96 and 0.97, respectively. There is also some evidence that variation in the share of the Hispanic population across markets had a negative and significant relationship to the expected count of local news intervals, decreasing the expected number of intervals by a factor of 0.99 among stations in the group with some possibility of airing local news.

The parameter estimates and associated hypothesis testing for the control variables were largely the same for news and local news. One interesting difference is that, for the news regressions, the results indicate that noncommercial stations were not significantly more or less

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the parent. As was the case in the news estimations, the number of out-of-market news-format stations acted much like the number of out-of-market stations (indeed, the two have a strong positive correlation). The results further showed that each additional in-market news-format station owned by a station's parent increased the odds of airing news (in the inflated model) and had a positive (but statistically insignificant) rather than negative impact on the expected quantity of news (in the NBRM model). For local news, the overall marginal effect was about 16.5 seconds and marginally significant.

[23] Here, the expected number of local news intervals predicted by the model at the means of the independent variables is about 21. That translates to 105 seconds, or 1.75 minutes, of news over a two-hour period. A 23 second increase in the quantity of local news programming is approximately 22% since 23/105 = 0.219.

likely to be in the zero count group, but that being a noncommercial station increased the expected quantity of news by a factor of 4. The results for local news, on the other hand, indicate that noncommercial stations were considerably less likely to air local news, by a factor of 0.41, but that the commercial status of the station had no significant effect on the quantity of local news aired among stations in the sometimes-zero group. The negative and statistically marginal effect indicates that noncommercial stations aired a lower quantity of local news programming than their commercial counterparts, holding other factors constant.

4.3 Public Affairs

The results of the public affairs estimations are shown in Tables II-10 and II-11, while those for local public affairs are shown in Tables II-12 and II-13. Unlike news, the results here are sensitive to the data used to create the dependent variables. Recall that the FCC's audit of the EMR data, focused primarily on syndicated airplay. In reviewing the recorded airplay and reevaluating the associated categorizations, the auditors recoded over 35,000 records into the public affairs category. As a result there are 59 more stations that aired some quantity of public affairs programming in the audited data relative to the EMR data as delivered. The effect of the audit is noticeable in the estimations. The parameters found to be significant when the specification was estimated over the EMR data were, when the audited data were used, similarly significant with similar signs and magnitudes. However, use of the audited data resulted in many additional significant parameter estimates. The approach for the purposes of discussion is to examine the public affairs results from the audited data, shown in **Table II-11**, highlighting significant parameter estimates and noting if they were also significant when the EMR data were used in estimation.

Turning first to the covariates representing aspects of station ownership, stations owned by parents with more extensive radio operations, both in- and out-of-market, aired a significantly greater quantity of public affairs programming overall. Although neither covariate had a statistically significant (by any standard measure) parameter estimate in either part of the model, the p-values are relatively low and the effects are going in the same direction. Specifically, each variable's parameter estimate had a positive relationship with the probability a station aired news and a positive relationship with the quantity of news aired. Though not individually significant, the combined effects are, such that an additional in-market station owned by the parent increased

the quantity of public affairs programming by 16 seconds (about 10%).[24] The out-of-market effect, while statistically significant, is small, indicating that public affairs programming increased 0.10 seconds with each additional out-of-market station owned by the parent. Also, stations that received a waiver of FCC rules covering certain radio-newspaper combinations aired significantly more public affairs programming. As much our intuition would lead us to expect this outcome, it is important to remember that these results are based on only three observations. The caveats mentioned in the above discussion of the news results apply here as well.

Market characteristics seem to have more influence on the provision of public affairs programming than they do on news programming. The total number of stations in the market had a statistically significant negative effect on the odds of a zero count, indicating that stations in larger markets were more likely, by a small factor, to air some public affairs programming. Stations in markets characterized by longer commute times were significantly less likely, by a factor of 0.94, to air public affairs. Although the table does not display the associated p-value, the overall marginal effect of -8.4 seconds (5%) was found to be marginally significant with a p-value of 11%. Note that the controls for morning and evening drive were smaller in size and significance relative to the news estimations. It may be that news crowds out public affairs during drive time. The percentage of males in the market population had a significant and negative effect on the odds of a zero count. Though the parameter estimate is only marginally significant with a p-value of about 0.09, there is some weak evidence that as the male share of the population increases by a percentage point, the odds of a station in that market airing public affairs increase by a factor of 1.18. The overall marginal effect is large (21.3 seconds or 13%) and marginally significant with a p-value of 13%. The relative sizes of black and Hispanic populations in markets had confounding effects. Each variable had a negative and significant relationship to the quantity of public affairs programming among stations that may air such content. The effects are quite small, decreasing the expected count of public affairs intervals by 0.98 and 0.99, respectively. At the same time, changes in the black or African American percentage of the market population were inversely related to the probability of a zero count, such that if the black population of the market were increased by a percentage point, the odds a

[24] Here, the expected number of public affairs intervals predicted by the model at the means of the independent variables is about 33. That translates to 165 seconds, or 2.75 minutes, of news over a two-hour period. A 16 second increase in the quantity of public affairs programming represents approximately 10% since 16/165 = 0.097.

station aired public affairs would increase by a factor of 1.02. Changes in the Hispanic share had no significant effect on the chance of a zero count. Ultimately, the overall magnitudes of these effects are small. The variables included to capture the age distribution in a market are difficult to interpret. The estimations seem to reveal that stations aired fewer intervals of public affairs in markets with relatively higher shares of the population in the tails of the age distribution, as one might expect, but there are statistically significant negative effects in the middle of the age distribution as well. Specifically, among stations in the "sometimes air public affairs" group, the expected count of public affairs intervals was lower in markets with greater percentages of 18 to 24 year olds and in markets with greater percentages of those 65 and over. Further, there is some evidence that increases in the share of 18 to 24 year olds significantly decrease the odds a station aired public affairs programming by a factor of exp(-0.1274) or 0.88. It makes some sense that perhaps broadcasters may see these two groups as potentially less interested in public affairs relative to other programming. However, the strong negative effect associated with the percentage of the population in the 35 to 44 range is not in line with our expectations. Finally, the estimation provides some evidence that stations in markets heavy with college graduates had a greater chance, by a factor of 1.06, of airing some public affairs programming. Although the share of college graduates had no significant effect on the quantity of public affairs programming among stations that might air such content, the overall marginal effect is a statistically significant 9.6 seconds or 6%.

The control variables generally showed the same relationships to the quantity of public affairs programming as they had to news programming. The exceptions are the in-Metro dummy, which had no significant effect on public affairs programming, and the variables included to control for drive time, which showed weaker links to the dependent variable. An interesting difference, relative to the news estimations, is the nearly offsetting effects of noncommercial status and band. Recall the news estimations revealed that noncommercial stations aired significantly more news and were significantly less likely to have a zero count while FM stations aired significantly less news and were significantly more likely to have a zero count. In terms of marginal effects, the positive impact of noncommercial status was about twice the magnitude of the negative effect of FM status. In the public affairs estimation, the noncommercial dummy and band dummy affected the dependent variables just as they did in the news estimations, but the marginal effects just about offset each other.

4.4 Local Public Affairs

The results of estimating the specification with local public affairs as the dependent variable are shown in Tables II-12 and II-13. Our ability to draw meaningful inference from these results is limited because the data are sparse. Even though there are more records coded public affairs than coded news in the data, the distribution of the data across stations is different, such that public affairs programming is spread over fewer stations than news programming. Combining this with the fact that fewer than 15% of the records have any local content at all makes local public affairs a very fine cut. Only about 8% of the stations (about 6.4% based on the EMR data as delivered) in the sample aired any such programming during the sample period (See Table II-3).

We forge ahead nonetheless with a short discussion of the results. Again, we focus on the results derived from the audited data, shown in **Table II-13**. The dummy variable indicating those stations that were either grandfathered or received a waiver of the FCC rules prohibiting in-market newspaper cross-ownership was eliminated from the specification because it perfectly predicts the probability of a zero local public affairs realization. In other words, none of the three stations for which the variable was set to one broadcast any local public affairs in the sampled airplay. Since there is no variation, there is nothing to estimate.

Turning to the parameter estimates, none of the covariates significantly affected the quantity of local public affairs programming among those stations that might air such content. Among the whole sample of stations in the inflated model, the only ownership variable that had a significant (albeit marginal) effect on the odds a station aired no local public affairs was the distance between the station and its parent owner. A percent increase in the distance between the two decreased the odds a station aired any local public affairs programming by a factor of exp(-0.17) or 0.84. Recall that the distance variable was not significantly related to public affairs programming. The total number of stations in the market and the share of males in the market population each had a positive and significant effect on the chance a station aired any public affairs programming, just as they did in the public affairs estimations. The magnitudes of the effects were 1.02 and 1.47, respectively. The noncommercial and band dummies were related to local public affairs in much the same way as they were related to public affairs. A noncommercial station was significantly more likely to air local public affairs, by a factor of 3,

while an FM station was significantly less likely to air public affairs, by a factor of 0.18 (recall that noncommercial stations were significantly less likely to air local news).

5 Conclusions

This portion of the study discusses the results of our estimates of an empirical model that attempts to quantify the relationship between the amounts of time devoted to news and public affairs programming and radio station ownership and market characteristics. The use of a zero-inflated model allowed us to separate the effects of each covariate on the probability informational programming was aired and the expected quantity of such programming aired. This is valuable here since there are a number of cases in which the effects worked in opposite directions and therefore might be missed when examining the expected quantity only.

For example, the extent to which a radio station was commonly owned with other radio stations, both in- and out-of-market, had positive effects on the odds a station aired news and local news but negative (yet sometimes insignificant) effects on the quantity of news and local news. Specifically, an additional in-market station increased the odds of news and local news programming by 10% and 17%, respectively, while an additional out-of-market station owned by the parent increased the odds of news and local news programming by less than 1% in each case. A possible interpretation is that owners with more stations are better able to take advantage of scope economies in news production by spreading that content across more stations. At the same time, those same large owners may be able to exercise some degree of market power over both advertisers and listeners, land more advertising contracts and crowd out some news with commercials. In the end, these effects are working against each other in terms of predicting the expected count of news intervals, and the overall marginal effects of cross-ownership with a larger number of radio stations are insignificant. The dummy variable indicating whether a radio station is cross-owned with a nearby TV station presents the opposite situation. In the news estimation, the dummy simultaneously decreased the odds that a station aired news (a marginally significant estimate) and increased the quantity of news programming (a statistically significant estimate) among those stations that might air news by about 59%.[25] A possible interpretation is

[25] While the results here indicate that in-market TV-radio cross-ownership increased the odds of a no news condition (decreased the odds a station aired any news), Section III of this study found that stations in this type of combination were more likely to have a news format. We feel these results are not contradictory. The inflated portion of the ZINB model presented here is designed to estimate the probability a station will never air news, or that it is in the

that owners of such stations are specializing, consolidating news output to a single or small number of news stations. The overall marginal effect of 110 seconds (38%) was statistically significant, with p-values of 0.099 and 0.104, depending on which dataset was used to create the dependent variable.

The model also reveals some of the nuances behind the relationship between public affairs programming and station ownership. In this case, none of the reliable cross-ownership variables have a statistically significant effect in either the NBRM or the inflated model. Nonetheless, the variables indicating ownership of additional stations, both in- and out-of-market, had relatively low p-values in both parts of the model and the effects move together. The result is that the overall marginal effects are statistically significant, indicating that stations aired a greater quantity of public affairs programming if they were part of a larger group of co-owned stations. Additional in-market stations had a large effect, such that an additional in-market station owned by the parent increased the quantity of public affairs programming by 14 to 16 seconds (8% to 10%), depending on the data used. The out-of-market effect was small, indicating that public affairs programming increased 0.10 seconds with each additional out-of-market station owned by the parent. Note that the extent to which a radio station was cross-owned with a nearby TV station did not have a significant effect here.

Turning to market characteristics, it seems that overall market characteristics have a stronger relationship to the provision of local news than to the provision of news. We found some evidence that the crowdedness of the market for news, as represented by the share of other market stations with a news format, is negatively related to the amount of news aired by a particular station. This effect is small and is the result of a mixture of effects. Stations in more "newsy" markets were not significantly more likely to air news, but the parameter estimates in this part of the model were positive. At the same time, statistically significant parameter estimates imply that the group that might air news aired somewhat less in markets that were more news-heavy. It is difficult to infer the meaning behind this result. In markets in which more stations have a news format one would expect that stations – regardless of ownership structure – would endeavor to specialize their content. Such efforts may or may not be reflected

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"always-zero" group. Stations in that group, one would imagine, have no chance of being news format stations. Stations in the sometimes-zero group, however, have some chance of being news format stations. Among that group, the results here indicate that stations cross-owned with a nearby TV station aired significantly more news. It seems likely that as a radio station's news output increases, the likelihood it would consider itself a news station would also increase.

in the quantity of news or local news programming. Among the other market characteristics, there is some evidence that the Hispanic share of the market population and the black share of the market population have an impact on the provision of local news, but not on total news. Stations in markets where the Hispanic and black populations were relatively large were more likely to air no local news. A possible interpretation is that markets with greater shares of minorities are more likely to have a greater number of stations focused on attracting specific audiences. Perhaps such stations are more likely to be smaller enterprises, and therefore lack the resources to devote to producing local news.

Using the audited data, the results provide some evidence that a number of market characteristics have a significant impact on the quantity of public affairs programming. Competitive conditions in the market, captured by the number of other news-format stations and the total number of stations, each had significant and opposing overall marginal effects on the quantity of public affairs programming. Among the variables included to capture market demographics, the male share of the population, the black or African American share of the population, and the share of college graduates had statistically significant positive relationships with the probability a station aired public affairs programming. A somewhat perplexing result was that both the share of the population in the 18 to 24 age bracket, and the share in the 35 to 44 bracket had large and statistically significant negative overall marginal effects.

Ultimately this study provides some evidence that ownership and market characteristics have meaningful effects on stations' behavior with respect to informational programming. However, these effects are multifaceted and are not necessarily reflected in the overall observed quantity of informational programming.

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Table II-1 – Sample Airplay Record from EMR

Mnemonic	Sample Value	Definition	Interpretation
ID	4331	Sequential record number	Sequential record number
EMRIDNumber	1124	Station id number	KAAJ Low power FM, Monticello, UT
Starttime	1:04 AM	Starting time of the 20 minute segment	Started recording segment at 1:04 AM
AudioFileTime	1:50	Five second interval within the segment	Five second interval within the segment
GenCat	8	General category	8=Advertisement
SubCat	2	Subcategory	2=Promotions and Teasers (Station ID, Station Promo)
Live	2	Is the content live or taped?	2=Taped
Origination	1	Does the content originate at the station?	1=Originating at the station
BroadcastMode	1	Is the broadcast from the studio or remote?	1=In studio
LocalityofSpeaker	1	Is the speaker local?	1=Local speaker
LocalismMessage	1	Is the subject local?	1=Local speaker
Determination	4	Summary of the nature of local content	4=Local person and place
LocalismPersonCompany	103.5 KAAJ LP-FM	Local person or company mentioned if any	KAAJ is the local company mentioned
LocalismPlace	Monticello	Local place mentioned if any	Monticello is the local place mentioned
LocalismEventThing		Local event or thing mentioned if any	No event was mentioned
NameofProgram	0	Name of the Program	No program name
Speaker	1	Who is speaking, general?	1=DJ/Pundit/Host/Anchor
IdentitySpeaker		Name of the speaker	No speaker listed
Synopsis	Station promo	Synopsis	Station promo
Artist		Artist performing	No artist listed
Title		Title of musical work	No title listed
Transcription	No	Is a written transcript available?	No written transcript is available for this audio

Table II-2 – Effects of FCC Audit on Airplay Categorization

General Category Code	Description	Count of 5-Second Intervals			% Change
		EMR Data	Audited Data	Change	
.	Missing	1,040	1,040	0	0.00
01	News	99,145	102,792	3,647	0.24
02	Public Affairs	87,631	122,651	35,020	2.34
03	Announcements	13,926	18,675	4,749	0.32
04	Music	731,111	754,408	23,297	1.56
05	Entertainment & Leisure / DJ Banter or DJ station Teaser	191,296	111,773	-79,523	-5.32
06	Religious Broadcast (Non-music)	28,549	33,670	5,121	0.34
07	Fundraising & Charity	7,332	7,803	471	0.03
08	Advertisements	219,165	222,437	3,272	0.22
09	Sports	93,654	97,416	3,762	0.25
10	Other	142	142	0	0.00
11	Dead air/Unknown	5,453	5,512	59	0.00
12	Static/Interference	17,703	17,828	125	0.01
50	Undefined	13	13	0	0.00

Table II-3 – Summary Statistics of Dependent Variables

	Original Data		Audited Data	
	Intervals	**Minutes**	**Intervals**	**Minutes**
Quantity of News				
Mean	71.65	5.97	73.74	6.14
Median	27	2.25	28	2.33
Standard Deviation	446.72	37.23	462.95	38.58
Minimum	0	0	0	0
Maximum	1,134	94.50	1,134	94.50
Pr > 0	0.7670		0.7720	
Observations	1,013		1,013	
Quantity of Local News				
Mean	23.74	1.98	23.82	1.99
Median	9	0.75	9	0.75
Standard Deviation	166.95	13.91	167.13	13.93
Minimum	0	0	0	0
Maximum	514	42.83	514	42.83
Pr > 0	0.6634		0.6654	
Observations	1,013		1,013	
Quantity of Public Affairs				
Mean	49.75	4.15	70.01	5.83
Median	0	0.00	0	0.00
Standard Deviation	539.48	44.96	662.56	55.21
Minimum	0	0	0	0
Maximum	1,183	98.58	1,152	96.00
Pr > 0	0.2488		0.3070	
Observations	1,013		1,013	
Quantity of Local Public Affairs				
Mean	3.23	0.27	3.88	0.32
Median	0	0.00	0	0.00
Standard Deviation	88.36	7.36	100.27	8.36
Minimum	0	0	0	0
Maximum	610	50.83	610	50.83
Pr > 0	0.0642		0.0819	
Observations	1,013		1,013	

Table II-4 – Independent Variables

Ownership Variables	Description
In-Market Stations Owned by Parent	The number of radio stations owned by the station's parent in the station's market. (BIA)
Out-of-Market Stations Owned by Parent	The number of radio stations owned by the station's parent outside of the station's market. (BIA)
Distance between Station and Parent (in miles)	Distance between the centroid of the station's county of license and the ZIP code centroid of the Parent, rounded to the nearest mile. (BIA, Census & Tele Atlas)
Waived Prohibition on In-Market Newspaper Cross-ownership (1=yes)	A dummy variable equal to 1 if the station's parent owns a newspaper published in a city that is also covered by that station's signal, such that the signal is of sufficient strength to trigger a prohibition on cross-ownership. These are combinations that have been granted waivers or were grandfathered. (BIA & FCC)
Cross-owned with TV Station in DMA (1=yes)	A dummy variable equal to 1 if the station's parent owns a television station in the station's DMA and 0 otherwise. (BIA & FCC)
Market Variables	
Percentage of Other Market Stations with News Format	The percentage of other stations in the market with a news format. (BIA)
Total Stations in the Market	The total number of stations in the market. (BIA)
Market Median Commute Time	The median commute time in the market. (Census)
Percentage of Market Population Male	The percentage of the market's total population that is male. (Census)
Percentage of Market Population Black or African American	The percentage of the market's total population that is black or African American alone and not Hispanic or Latino. (Census)
Percentage of Market Population Hispanic or Latino	The percentage of the market's total population that is Hispanic or Latino. (Census)
Percentage of Market Population Aged 18 to 24 – Percent of Market Population Aged 65 or over	The percentages of the markets total population by age bracket. (Census)
Percentage of College Graduates in Market Population	The percentage of the market's population aged 25 and over that hold a college degree (including associates degrees). (Census)
Other Control Variables	
Noncommercial (1=yes)	A dummy variable equal to 1 if the station is non-commercial and 0 otherwise. (BIA)
In Arbitron Metro (1=yes)	A dummy variable equal to 1 if the station is in an Arbitron metro and 0 otherwise. (BIA)
Segments Aired in Evening (Morning) Drive	A categorical variable equal to the number of recorded segments that begin during evening (morning) drive time. Evening (morning) drive time was defined here as weekdays 3 pm to 8 pm (5 am to 10 am). (EMR)
Band (1=FM)	A dummy variable equal to 1 if the station broadcasts in FM and 0 for AM. (BIA)

Table II-5 – Summary Statistics of Independent Variables

Independent Variables	Min	Max	Mean	Weighted Mean	Standard Deviation
In-Market Stations Owned by Parent	1	14	3.15	2.91	2.21
Out-of-Market Stations Owned by Parent	0	1,246	201.73	151.80	422.80
Distance between Station and Parent (in miles)	0	4,502	439.71	394.89	643.09
Waived Prohibition on In-Market Newspaper Cross-ownership (1=yes)	0	1	0.00	0.00	0.05
Cross-owned with TV Station in DMA (1=yes)	0	1	0.10	0.07	0.30
Percentage of Other Market Stations with News Format	0	1	0.11	0.10	0.10
Total Stations in the Market	1	129	28.35	25.99	23.48
Market Median Commute Time	7	32	18.26	18.01	4.19
Percentage of Market Population Male	0.45	0.60	0.49	0.49	0.01
Percentage of Market Population Black or African American	0.00	0.71	0.09	0.10	0.11
Percentage of Market Population Hispanic or Latino	0.00	0.99	0.10	0.09	0.16
Percent of Market Population Aged 18 to 24	0.03	0.39	0.09	0.09	0.03
Percent of Market Population Aged 25 to 34	0.08	0.24	0.13	0.13	0.02
Percent of Market Population Aged 35 to 44	0.10	0.20	0.16	0.16	0.01
Percent of Market Population Aged 45 to 64	0.12	0.31	0.22	0.22	0.02
Percent of Market Population Aged 65 or over	0.03	0.35	0.13	0.13	0.03
Percent of College Graduates in Market Population	0.10	0.55	0.28	0.27	0.08
Noncommercial (1=yes)	0	1	0.22	0.17	0.41
In Arbitron Metro (1=yes)	0	1	0.70	0.64	0.46
Segments Aired in Morning Drive	0	5	0.97	0.97	1.10
Segments Aired in Evening Drive	0	6	0.91	0.93	1.00
Band (1=FM)	0	1	0.58	0.65	0.49
N=1,013					

Table II-6 - ZINB Regression Results: News

Dependent Variable	(1) Number of 5 Second Intervals Coded as News (EMR Data)						
	Negative Binomial Model			Inflated Model (Logit)[1]			Overall Marginal Effect (Seconds)
Independent Variables	Estimate	P-value	Factor Δ E[y|x]	Estimate	P-value	Factor Δ Pr(y=0|z)	
In-Market Stations Owned by Parent	-0.0410	0.1630	0.9598	-0.0966	0.1060	0.9080	-6.45
Out-of-Market Stations Owned by Parent	-0.0001	0.2220	0.9999	-0.0007 **	0.0260	0.9993	-0.01
Distance between Station and Parent (in ln(miles))	-0.0290	0.3280	0.9714	0.1145 *	0.0520	1.1213	-14.81 *
Waived Prohibition on In-Market Newspaper Cross-ownership (1=yes)	0.1461	0.5530	1.1573	-18.5571 ***	0.0000	0.0000	128.05
Cross-owned with TV Station in DMA (1=yes)	0.4642 ***	0.0020	1.5908	0.5755	0.1080	1.7781	109.52 *
Percentage of Other Market Stations with News Format	-0.0136 ***	0.0000	0.9865	-0.0177	0.2200	0.9824	-2.95 **
Total Stations in the Market	0.0045 *	0.1000	1.0045	0.0030	0.6260	1.0031	1.12
Market Median Commute Time	-0.0080	0.5760	0.9920	-0.0104	0.7790	0.9897	-1.75
Percentage of Market Population Male	0.0851	0.1780	1.0889	-0.0252	0.8120	0.9751	26.04
Percentage of Market Population Black or African American	0.0023	0.6310	1.0024	0.0067	0.5390	1.0067	0.30
Percentage of Market Population Hispanic or Latino	-0.0010	0.8310	0.9990	0.0147	0.1010	1.0148	-1.10
Percentage of Market Population Aged 18 to 24	-0.0453 *	0.0970	0.9557	-0.0599	0.3590	0.9419	-9.75
Percentage of Market Population Aged 25 to 34	-0.0768	0.1490	0.9261	0.0961	0.4160	1.1009	-27.59 *
Percentage of Market Population Aged 35 to 44	-0.1331	0.1130	0.8753	-0.2827	0.1300	0.7537	-22.66
Percentage of Market Population Aged 45 to 64	-0.0001	0.9970	0.9999	0.0176	0.8330	1.0177	-1.02
Percentage of Market Population Aged 65 or over	-0.0183	0.5220	0.9818	-0.0853	0.1990	0.9182	-0.52
Percentage of College Graduates in Market Population	0.0198 *	0.0810	1.0200	-0.0149	0.4740	0.9852	6.56 *
Noncommercial (1=yes)	1.3287 ***	0.0000	3.7761	0.0848	0.7930	1.0885	627.19 ***
In Arbitron Metro (1=yes)	-0.2047	0.1160	0.8149	1.3993 ***	0.0000	4.0523	-133.99 ***
Segments Aired in Morning Drive	0.2391 ***	0.0000	1.2701	-0.4631 ***	0.0000	0.6294	95.10 ***
Segments Aired in Evening Drive	0.0387	0.4170	1.0394	-0.2420 **	0.0230	0.7850	24.74 *
Band (1=FM)	-0.9663 ***	0.0000	0.3805	0.0661	0.7810	1.0683	-339.54 ***
Intercept	3.9503	0.1330		4.4024	0.4290		
Non-Zero Observations				777			
Zero Observations				236			
AIC				113			

1. The logit or inflated portion of the model estimates the probability the dependent variable is **zero**. To determine the factor change in the probability the dependent variable is non-zero, multiply the parameter estimate by -1 and take the antilog.

*** significance at the 1% level; ** significance at the 5% level; * significance at the 10% level

Table II-7 - ZINB Regression Results: News

Dependent Variable	(2) Number of 5 Second Intervals Coded as News (Audited Data)						
	Negative Binomial Model			Inflated Model (Logit)[1]			Overall Marginal Effect (Seconds)
Independent Variables	Estimate	P-value	Factor Δ E[y|x]	Estimate	P-value	Factor Δ Pr(y=0|z)	
In-Market Stations Owned by Parent	-0.0425	0.1490	0.9584	-0.0938	0.1200	0.9105	-7.34
Out-of-Market Stations Owned by Parent	-0.0002	0.2120	0.9998	-0.0006 **	0.0350	0.9994	-0.01
Distance between Station and Parent (in ln(miles))	-0.0267	0.3710	0.9737	0.0964	0.1010	1.1012	-13.30
Waived Prohibition on In-Market Newspaper Cross-ownership (1=yes)	0.1223	0.6160	1.1301	-19.5256 ***	0.0000	0.0000	118.84
Cross-owned with TV Station in DMA (1=yes)	0.4595 ***	0.0020	1.5834	0.5914 *	0.0990	1.8065	109.86
Percentage of Other Market Stations with News Format	-0.0139 ***	0.0000	0.9862	-0.0166	0.2510	0.9835	-3.20 **
Total Stations in the Market	0.0048 *	0.0850	1.0048	0.0037	0.5480	1.0038	1.21
Market Median Commute Time	-0.0071	0.6190	0.9929	-0.0104	0.7830	0.9897	-1.53
Percentage of Market Population Male	0.0937	0.1300	1.0983	-0.0134	0.9020	0.9867	28.52
Percentage of Market Population Black or African American	0.0020	0.6860	1.0020	0.0049	0.6660	1.0049	0.31
Percentage of Market Population Hispanic or Latino	-0.0019	0.6690	0.9981	0.0144	0.1110	1.0145	-1.38
Percentage of Market Population Aged 18 to 24	-0.0540 **	0.0450	0.9474	-0.0697	0.2900	0.9327	-12.10
Percentage of Market Population Aged 25 to 34	-0.0818	0.1200	0.9215	0.1019	0.3970	1.1073	-29.93 *
Percentage of Market Population Aged 35 to 44	-0.1627 **	0.0470	0.8499	-0.3041	0.1110	0.7378	-31.17
Percentage of Market Population Aged 45 to 64	-0.0026	0.9380	0.9974	0.0146	0.8620	1.0147	-1.58
Percentage of Market Population Aged 65 or over	-0.0271	0.3390	0.9733	-0.0887	0.1860	0.9151	-3.05
Percentage of College Graduates in Market Population	0.0219 **	0.0500	1.0221	-0.0116	0.5760	0.9884	7.14 **
Noncommercial (1=yes)	1.3631 ***	0.0000	3.9083	0.1185	0.7150	1.1258	664.44 ***
In Arbitron Metro (1=yes)	-0.1916	0.1450	0.8256	1.3454 ***	0.0000	3.8399	-128.61 ***
Segments Aired in Morning Drive	0.2377 ***	0.0000	1.2684	-0.4778 ***	0.0000	0.6202	97.21 ***
Segments Aired in Evening Drive	0.0457	0.3390	1.0468	-0.2568 **	0.0180	0.7735	27.93 *
Band (1=FM)	-0.9827 ***	0.0000	0.3743	0.0260	0.9140	1.0264	-351.64 ***
Intercept	4.2502	0.1060		4.3044	0.4490		
Non-Zero Observations				782			
Zero Observations				231			
AIC				113			

1. The logit or inflated portion of the model estimates the probability the dependent variable is **zero**. To determine the factor change in the probability the dependent variable is non-zero, multiply the parameter estimate by -1 and take the antilog.

*** significance at the 1% level; ** significance at the 5% level; * significance at the 10% level

Table II-8 - ZINB Regression Results: Local News

Dependent Variable	(3) Number of 5 Second Intervals Coded as Local News (EMR Data)						
	Negative Binomial Model			Inflated Model (Logit)[1]			Overall Marginal Effect (Seconds)
Independent Variables	Estimate	P-value	Factor Δ E[y|x]	Estimate	P-value	Factor Δ Pr(y=0|z)	
In-Market Stations Owned by Parent	-0.0606 **	0.0410	0.9412	-0.1724 ***	0.0050	0.8417	-1.20
Out-of-Market Stations Owned by Parent	-0.0001	0.2870	0.9999	-0.0004	0.1230	0.9996	0.00
Distance between Station and Parent (in ln(miles))	0.0075	0.8230	1.0076	0.1554 ***	0.0070	1.1682	-3.82
Waived Prohibition on In-Market Newspaper Cross-ownership (1=yes)	0.3276	0.3120	1.3877	-19.9752 ***	0.0000	0.0000	99.04
Cross-owned with TV Station in DMA (1=yes)	0.2785	0.1150	1.3212	0.2391	0.5060	1.2700	23.40
Percentage of Other Market Stations with News Format	-0.0161 ***	0.0010	0.9840	-0.0060	0.6470	0.9940	-1.50 **
Total Stations in the Market	0.0046	0.1110	1.0046	-0.0008	0.8940	0.9992	0.50
Market Median Commute Time	0.0321 *	0.0710	1.0327	-0.0170	0.6500	0.9831	3.85 *
Percentage of Market Population Male	0.0915	0.2150	1.0958	0.0241	0.8170	1.0244	8.81
Percentage of Market Population Black or African American	0.0001	0.9830	1.0001	0.0390 ***	0.0000	1.0398	-1.14 *
Percentage of Market Population Hispanic or Latino	-0.0129 ***	0.0020	0.9872	0.0283 ***	0.0020	1.0287	-2.18 ***
Percentage of Market Population Aged 18 to 24	-0.0514	0.1400	0.9499	-0.0598	0.3580	0.9420	-3.59
Percentage of Market Population Aged 25 to 34	-0.1497 **	0.0310	0.8610	-0.0308	0.7960	0.9697	-14.68 *
Percentage of Market Population Aged 35 to 44	-0.1501	0.1140	0.8607	-0.3017 *	0.0710	0.7395	-6.69
Percentage of Market Population Aged 45 to 64	-0.0262	0.5320	0.9741	0.1242 *	0.0860	1.1323	-6.41
Percentage of Market Population Aged 65 or over	-0.0285	0.4000	0.9719	-0.1156 *	0.0610	0.8908	0.46
Percentage of College Graduates in Market Population	0.0320 **	0.0250	1.0326	0.0059	0.7800	1.0059	3.17 *
Noncommercial (1=yes)	-0.0827	0.6300	0.9207	0.8894 ***	0.0040	2.4337	-35.84 **
In Arbitron Metro (1=yes)	-0.3137 **	0.0340	0.7307	1.3125 ***	0.0000	3.7156	-72.50 ***
Segments Aired in Morning Drive	0.2606 ***	0.0000	1.2977	-0.5046 ***	0.0000	0.6037	42.10 ***
Segments Aired in Evening Drive	0.0471	0.4050	1.0483	-0.2120 **	0.0280	0.8090	11.20 *
Band (1=FM)	-0.6504 ***	0.0000	0.5218	-0.7605 ***	0.0000	0.4674	-45.61 ***
Intercept	3.8191	0.1670		2.0405	0.7170		
Non-Zero Observations	672						
Zero Observations	341						
AIC	86						

1. The logit or inflated portion of the model estimates the probability the dependent variable is **zero**. To determine the factor change in the probability the dependent variable is non-zero, multiply the parameter estimate by -1 and take the antilog.

*** significance at the 1% level; ** significance at the 5% level; * significance at the 10% level

Table II-9 - ZINB Regression Results: Local News

Dependent Variable	(4) Number of 5 Second Intervals Coded as Local News (Audited Data)						
	Negative Binomial Model			Inflated Model (Logit)[1]			Overall Marginal Effect (Seconds)
Independent Variables	Estimate	P-value	Factor Δ E[y|x]	Estimate	P-value	Factor Δ Pr(y=0|z)	
In-Market Stations Owned by Parent	-0.0629 **	0.0340	0.9390	-0.1791 ***	0.0040	0.8360	-1.30
Out-of-Market Stations Owned by Parent	-0.0001	0.2970	0.9999	-0.0004	0.1810	0.9996	0.00
Distance between Station and Parent (in ln(miles))	0.0078	0.8140	1.0078	0.1469 **	0.0120	1.1583	-3.51
Waived Prohibition on In-Market Newspaper Cross-ownership (1=yes)	0.3260	0.3140	1.3855	-19.4672 ***	0.0000	0.0000	98.20
Cross-owned with TV Station in DMA (1=yes)	0.2773	0.1150	1.3196	0.2503	0.4850	1.2844	22.95
Percentage of Other Market Stations with News Format	-0.0162 ***	0.0010	0.9840	-0.0058	0.6600	0.9942	-1.52 **
Total Stations in the Market	0.0049 *	0.0910	1.0049	-0.0001	0.9850	0.9999	0.51
Market Median Commute Time	0.0319 *	0.0730	1.0324	-0.0195	0.6040	0.9807	3.91 *
Percentage of Market Population Male	0.0925	0.2080	1.0969	0.0388	0.7130	1.0395	8.52
Percentage of Market Population Black or African American	-0.0003	0.9660	0.9997	0.0382 ***	0.0000	1.0390	-1.15 *
Percentage of Market Population Hispanic or Latino	-0.0129 ***	0.0020	0.9872	0.0282 ***	0.0020	1.0286	-2.18 ***
Percentage of Market Population Aged 18 to 24	-0.0525	0.1320	0.9489	-0.0666	0.3070	0.9356	-3.52
Percentage of Market Population Aged 25 to 34	-0.1491 **	0.0320	0.8615	-0.0272	0.8200	0.9731	-14.78 *
Percentage of Market Population Aged 35 to 44	-0.1529	0.1060	0.8582	-0.3196 *	0.0570	0.7265	-6.57
Percentage of Market Population Aged 45 to 64	-0.0257	0.5390	0.9746	0.1291 *	0.0740	1.1378	-6.49
Percentage of Market Population Aged 65 or over	-0.0291	0.3880	0.9713	-0.1202 *	0.0530	0.8867	0.50
Percentage of College Graduates in Market Population	0.0324 **	0.0230	1.0329	0.0074	0.7230	1.0074	3.16 *
Noncommercial (1=yes)	-0.0835	0.6270	0.9199	0.9061 ***	0.0030	2.4747	-36.35 **
In Arbitron Metro (1=yes)	-0.3170 **	0.0330	0.7283	1.2996 ***	0.0000	3.6678	-72.41 ***
Segments Aired in Morning Drive	0.2619 ***	0.0000	1.2994	-0.5070 ***	0.0000	0.6023	42.30 ***
Segments Aired in Evening Drive	0.0461	0.4130	1.0472	-0.2252 **	0.0200	0.7983	11.45 *
Band (1=FM)	-0.6570 ***	0.0000	0.5184	-0.7930 ***	0.0000	0.4525	-45.47 ***
Intercept	3.8173	0.1660		1.6331	0.7720		
Non-Zero Observations	674						
Zero Observations	339						
AIC	86						

1. The logit or inflated portion of the model estimates the probability the dependent variable is **zero**. To determine the factor change in the probability the dependent variable is non-zero, multiply the parameter estimate by -1 and take the antilog.

*** significance at the 1% level; ** significance at the 5% level; * significance at the 10% level

Table II-10 - ZINB Regression Results: Public Affairs

Dependent Variable	(1) Number of 5 Second Intervals Coded as Public Affairs (EMR Data)						
	Negative Binomial Model			Inflated Model (Logit)[1]			Overall Marginal Effect (Seconds)
Independent Variables	Estimate	P-value	Factor Δ E[y|x]	Estimate	P-value	Factor Δ Pr(y=0|z)	
In-Market Stations Owned by Parent	0.0521	0.1550	1.0534	-0.0715	0.2550	0.9310	13.91 **
Out-of-Market Stations Owned by Parent	0.0001	0.4260	1.0001	-0.0002	0.4950	0.9998	0.04
Distance between Station and Parent (in ln(miles))	-0.0310	0.3590	0.9694	-0.0186	0.7390	0.9815	-1.76
Waived Prohibition on In-Market Newspaper Cross-ownership (1=yes)	-0.1039	0.7480	0.9013	-2.1333 ***	0.0100	0.1184	368.94
Cross-owned with TV Station in DMA (1=yes)	0.2034	0.3400	1.2255	-0.0422	0.8960	0.9586	32.30
Percentage of Other Market Stations with News Format	0.0016	0.8530	1.0016	0.0129	0.2310	1.0130	-1.18
Total Stations in the Market	0.0017	0.6660	1.0017	-0.0086	0.1540	0.9915	1.12
Market Median Commute Time	-0.0238	0.4150	0.9764	0.0404	0.2350	1.0412	-7.18
Percentage of Market Population Male	-0.0348	0.6480	0.9658	-0.1062	0.3410	0.8992	7.12
Percentage of Market Population Black or African American	-0.0160 **	0.0190	0.9842	-0.0131	0.3830	0.9870	-0.53
Percentage of Market Population Hispanic or Latino	-0.0057	0.4040	0.9944	0.0036	0.6700	1.0036	-1.07
Percentage of Market Population Aged 18 to 24	-0.0825 *	0.0610	0.9208	0.1148	0.1380	1.1216	-22.20 **
Percentage of Market Population Aged 25 to 34	0.0837	0.2170	1.0873	0.0104	0.9250	1.0104	9.01
Percentage of Market Population Aged 35 to 44	-0.2197 *	0.0870	0.8027	0.1465	0.3970	1.1577	-42.15 *
Percentage of Market Population Aged 45 to 64	0.0324	0.5360	1.0329	0.0029	0.9700	1.0029	3.60
Percentage of Market Population Aged 65 or over	-0.0575 *	0.0650	0.9441	0.0033	0.9570	1.0033	-7.30
Percentage of College Graduates in Market Population	0.0096	0.5010	1.0097	-0.0481 **	0.0360	0.9531	6.29 **
Noncommercial (1=yes)	0.5377 *	0.0970	1.7120	-2.1116 ***	0.0000	0.1210	617.14 ***
In Arbitron Metro (1=yes)	0.2600	0.2330	1.2970	0.3866	0.1940	1.4720	-9.60
Segments Aired in Morning Drive	0.0324	0.5600	1.0329	-0.2083 **	0.0210	0.8120	26.11 **
Segments Aired in Evening Drive	0.1165	0.1290	1.1236	0.0263	0.7870	1.0267	11.27
Band (1=FM)	-0.5560 *	0.0720	0.5735	2.3205 ***	0.0000	10.1810	-502.28 ***
Intercept	10.4547 ***	0.0080		3.5287	0.5170		
Non-Zero Observations	252						
Zero Observations	761						
AIC	38						

1. The logit or inflated portion of the model estimates the probability the dependent variable is **zero**. To determine the factor change in the probability the dependent variable is non-zero, multiply the parameter estimate by -1 and take the antilog.

*** significance at the 1% level; ** significance at the 5% level; * significance at the 10% level

Table II-11 - ZINB Regression Results: Public Affairs

Dependent Variable	(2) Number of 5 Second Intervals Coded as Public Affairs (Audited Data)						
	Negative Binomial Model			Inflated Model (Logit)[1]			Overall Marginal Effect (Seconds)
Independent Variables	Estimate	P-value	Factor Δ E[y|x]	Estimate	P-value	Factor Δ Pr(y=0|z)	
In-Market Stations Owned by Parent	0.0302	0.3310	1.0307	-0.0801	0.1740	0.9230	16.18 *
Out-of-Market Stations Owned by Parent	0.0002	0.2360	1.0002	-0.0005	0.1090	0.9995	0.09 **
Distance between Station and Parent (in ln(miles))	-0.0001	0.9990	0.9999	0.0103	0.8490	1.0103	-1.45
Waived Prohibition on In-Market Newspaper Cross-ownership (1=yes)	0.4783 ***	0.0080	1.6134	-1.7962 **	0.0380	0.1659	744.13 *
Cross-owned with TV Station in DMA (1=yes)	0.1324	0.4080	1.1416	0.1934	0.5530	1.2133	-5.48
Percentage of Other Market Stations with News Format	-0.0064	0.3150	0.9936	0.0132	0.2080	1.0133	-2.90 *
Total Stations in the Market	0.0014	0.6880	1.0014	-0.0108 *	0.0780	0.9892	1.75 *
Market Median Commute Time	0.0044	0.8460	1.0044	0.0654 **	0.0430	1.0676	-8.42
Percentage of Market Population Male	-0.0100	0.8620	0.9901	-0.1637 *	0.0880	0.8490	21.26
Percentage of Market Population Black or African American	-0.0162 ***	0.0090	0.9839	-0.0212 *	0.0990	0.9790	0.29
Percentage of Market Population Hispanic or Latino	-0.0075 **	0.0500	0.9926	0.0081	0.3290	1.0081	-2.36 **
Percentage of Market Population Aged 18 to 24	-0.0671 *	0.0710	0.9351	0.1274 *	0.0550	1.1359	-28.87 ***
Percentage of Market Population Aged 25 to 34	0.0143	0.8250	1.0144	0.0223	0.8220	1.0225	-0.76
Percentage of Market Population Aged 35 to 44	-0.1824 *	0.0580	0.8333	0.2308	0.1390	1.2596	-62.32 **
Percentage of Market Population Aged 45 to 64	0.0169	0.7450	1.0170	0.0130	0.8590	1.0131	0.97
Percentage of Market Population Aged 65 or over	-0.0630 **	0.0190	0.9390	0.0196	0.7280	1.0198	-13.12
Percentage of College Graduates in Market Population	0.0087	0.4760	1.0087	-0.0584 ***	0.0040	0.9433	9.60 ***
Noncommercial (1=yes)	0.6212 *	0.0520	1.8611	-2.1974 ***	0.0000	0.1111	849.90 ***
In Arbitron Metro (1=yes)	0.1307	0.4830	1.1397	0.2724	0.3360	1.3131	-16.55
Segments Aired in Morning Drive	-0.0589	0.2780	0.9428	-0.2740 ***	0.0030	0.7603	28.63 **
Segments Aired in Evening Drive	0.1009	0.1700	1.1061	0.1039	0.2790	1.1094	2.09
Band (1=FM)	-0.9295 ***	0.0020	0.3947	2.2105 ***	0.0000	9.1199	-786.56 ***
Intercept	9.8506 ***	0.0020		4.0313	0.4200		
Non-Zero Observations				311			
Zero Observations				702			
AIC				46			

1. The logit or inflated portion of the model estimates the probability the dependent variable is **zero**. To determine the factor change in the probability the dependent variable is non-zero, multiply the parameter estimate by -1 and take the antilog.

*** significance at the 1% level; ** significance at the 5% level; * significance at the 10% level

Table II-12 - ZINB Regression Results: Local Public Affairs

Dependent Variable	(3) Number of 5 Second Intervals Coded as Local Public Affairs (EMR Data)						
	Negative Binomial Model			Inflated Model (Logit)[1]			Overall Marginal Effect (Seconds)
Independent Variables	Estimate	P-value	Factor Δ E[y|x]	Estimate	P-value	Factor Δ Pr(y=0|z)	
In-Market Stations Owned by Parent	-0.0596	0.8110	0.9422	0.1333	0.2540	1.1426	-1.49
Out-of-Market Stations Owned by Parent	-0.0004	0.8560	0.9996	-0.0004	0.5700	0.9996	0.00
Distance between Station and Parent (in ln(miles))	-0.2669	0.2490	0.7658	0.0422	0.6940	1.0431	-2.44
Waived Prohibition on In-Market Newspaper Cross-ownership (1=yes)	--	--	--	--	--	--	--
Cross-owned with TV Station in DMA (1=yes)	-0.9246	0.3200	0.3967	0.3295	0.5440	1.3903	-6.15
Percentage of Other Market Stations with News Format	-0.0844	0.3500	0.9191	0.0251	0.4160	1.0254	-0.86 *
Total Stations in the Market	0.0032	0.7310	1.0032	-0.0124	0.1250	0.9877	0.12
Market Median Commute Time	-0.1226	0.1260	0.8846	-0.0626	0.1950	0.9394	-0.49
Percentage of Market Population Male	-0.5149	0.1770	0.5976	-0.3399	0.1680	0.7119	-1.47
Percentage of Market Population Black or African American	-0.0043	0.8970	0.9957	0.0159	0.4760	1.0160	-0.16
Percentage of Market Population Hispanic or Latino	0.0331	0.3390	1.0336	0.0143	0.3680	1.0144	0.15
Percentage of Market Population Aged 18 to 24	0.0617	0.7750	1.0636	0.1120	0.3760	1.1185	-0.37
Percentage of Market Population Aged 25 to 34	-0.5231	0.6820	0.5927	-0.0935	0.7660	0.9107	-3.43
Percentage of Market Population Aged 35 to 44	0.1793	0.6820	1.1964	0.2477	0.3740	1.2811	-0.48
Percentage of Market Population Aged 45 to 64	0.1546	0.6400	1.1671	-0.0147	0.8980	0.9854	1.34
Percentage of Market Population Aged 65 or over	-0.2910	0.6360	0.7475	-0.0081	0.9490	0.9920	-2.24
Percentage of College Graduates in Market Population	-0.0670	0.3500	0.9352	-0.0318	0.4950	0.9687	-0.29
Noncommercial (1=yes)	0.3643	0.5500	1.4395	-0.8464 *	0.0780	0.4289	14.46
In Arbitron Metro (1=yes)	1.9689	0.3550	7.1625	-0.1959	0.7120	0.8221	15.26
Segments Aired in Morning Drive	0.2559	0.5220	1.2916	-0.1739	0.3220	0.8404	3.36
Segments Aired in Evening Drive	0.1863	0.6870	1.2048	0.1938	0.2990	1.2138	-0.01
Band (1=FM)	0.7200	0.3190	2.0544	1.2815 ***	0.0010	3.6022	-4.36
Intercept	36.8694 ***	0.0010		17.5239 *	0.0680		
Non-Zero Observations				65			
Zero Observations				948			
AIC				9			

1. The logit or inflated portion of the model estimates the probability the dependent variable is **zero**. To determine the factor change in the probability the dependent variable is non-zero, multiply the parameter estimate by -1 and take the antilog.

*** significance at the 1% level; ** significance at the 5% level; * significance at the 10% level

Table II-13 - ZINB Regression Results: Local Public Affairs

Dependent Variable	(4) Number of 5 Second Intervals Coded as Local Public Affairs (Audited Data)						
	Negative Binomial Model			Inflated Model (Logit)[1]			Overall Marginal Effect (Seconds)
Independent Variables	Estimate	P-value	Factor Δ E[y|x]	Estimate	P-value	Factor Δ Pr(y=0|z)	
In-Market Stations Owned by Parent	0.0249	0.8760	1.0252	0.0032	0.9720	1.0032	0.15
Out-of-Market Stations Owned by Parent	-0.0010	0.5630	0.9990	-0.0007	0.2630	0.9993	0.00
Distance between Station and Parent (in ln(miles))	-0.1019	0.6890	0.9031	0.1702 *	0.0920	1.1856	-1.82
Waived Prohibition on In-Market Newspaper Cross-ownership (1=yes)	--	--	--	--	--	--	--
Cross-owned with TV Station in DMA (1=yes)	-1.0358	0.3440	0.3549	0.2337	0.6580	1.2632	-5.36
Percentage of Other Market Stations with News Format	-0.1076	0.1470	0.8980	0.0072	0.8140	1.0073	-0.78 **
Total Stations in the Market	0.0007	0.9660	1.0007	-0.0160 *	0.0740	0.9841	0.11
Market Median Commute Time	0.0292	0.8360	1.0296	-0.0120	0.8050	0.9880	0.28
Percentage of Market Population Male	-0.3251	0.4810	0.7224	-0.3852 *	0.0650	0.6803	0.31
Percentage of Market Population Black or African American	-0.0183	0.5570	0.9819	-0.0072	0.7580	0.9928	-0.08
Percentage of Market Population Hispanic or Latino	0.0457	0.1700	1.0468	0.0268	0.1140	1.0272	0.14
Percentage of Market Population Aged 18 to 24	0.0614	0.7610	1.0633	0.1380	0.2600	1.1479	-0.49
Percentage of Market Population Aged 25 to 34	-1.0162	0.3550	0.3620	-0.3503	0.2470	0.7045	-4.65
Percentage of Market Population Aged 35 to 44	0.1788	0.6890	1.1958	0.3506	0.2510	1.4199	-1.09
Percentage of Market Population Aged 45 to 64	0.1650	0.6400	1.1794	-0.0204	0.8640	0.9799	1.26
Percentage of Market Population Aged 65 or over	-0.3998	0.2800	0.6704	-0.0322	0.7640	0.9683	-2.53
Percentage of College Graduates in Market Population	-0.0046	0.9430	0.9954	-0.0189	0.5160	0.9813	0.09
Noncommercial (1=yes)	0.6763	0.6690	1.9666	-1.0931 **	0.0330	0.3352	23.03
In Arbitron Metro (1=yes)	1.7455	0.1270	5.7289	-0.1297	0.8010	0.8783	11.37
Segments Aired in Morning Drive	0.4737	0.1530	1.6059	-0.1495	0.3180	0.8612	4.23
Segments Aired in Evening Drive	0.2543	0.3700	1.2896	-0.0342	0.8050	0.9664	1.97
Band (1=FM)	-0.2019	0.8500	0.8171	1.7074 ***	0.0000	5.5145	-18.27 **
Intercept	30.3276 **	0.0110		20.4493 **	0.0160		
Non-Zero Observations				83			
Zero Observations				930			
AIC				11			

1. The logit or inflated portion of the model estimates the probability the dependent variable is **zero**. To determine the factor change in the probability the dependent variable is non-zero, multiply the parameter estimate by -1 and take the antilog.

*** significance at the 1% level; ** significance at the 5% level; * significance at the 10% level

Section III

Factors that Affect a Radio Station's Propensity to Adopt a News Format.

Craig Stroup

Executive Summary:

This study examines whether ownership structure and other factors affect a radio station's propensity towards adopting a news format. Because not all the factors influencing radio stations' format choices are observable, this study employs the fixed effects regression technique. The results suggest that if the parent is in the same state as the radio station, then it is associated with an increased likelihood to adopt a news format. Moreover, cross ownership with a newspaper or television station or another radio station in the same market significantly increases the likelihood that a radio station will be a news station.

Introduction

This portion of our study examines whether ownership structure affects a radio station's likelihood of choosing a news format. Do radio stations that are cross owned with newspapers or television stations choose a news format more often then other stations? If so, how large is the effect? This study attempts to answer those questions. In addition to cross ownership with other media, this study also examines whether a radio station's propensity to adopt a news format is related to other ownership structure variables such as the number of stations owned by a parent and the station's relationship, if any, to other stations in the market. Additionally, this study examines whether demographic factors in a market affect a station's likelihood of choosing a news format.

This format-based analysis is an entirely different approach from Kenneth Lynch's section of Study 4, which is an Edison Media Research (EMR)–based cross-sectional radio news study. Instead of examining actual radio broadcasts, as does Lynch's section of Study 4, this study considers a station's format and assumes that news format radio stations broadcast more news than stations with other formats. Although a format-based analysis has the disadvantage of using an indirect measure of news broadcasts (the format rather than actual broadcast information), it has the advantage of using data over time, and we have data on all full-power stations.

One of the advantages of having data over time is we can observe the format ramifications of stations that undergo ownership changes. Are stations with nearby parents more likely to be news stations? If a news station with a nearby parent is acquired by an out-of-area owner and becomes a music station, then our results will reflect that change. Similarly, we can observe the effects of changes that affect only the

parent, not the station itself. Do stations with more siblings in the market tend to be news stations? Format-based data shed light on these questions.

As described below in more detail, this study uses data from Arbitron markets from 2002 to 2005. We also have format data from 2001, but these are used as independent variables to identify the previous format of each radio station. These data form a panel, because there is both a cross sectional component to the data (there are data for each Arbitron Market) and a time series component (data from 2002 to 2005).

A benefit of using panel data is the ability to use the fixed effects regression technique. If there are unobservable time-invariant market-specific variables that affect a station's decision whether to choose a news format then the fixed effects technique produces unbiased and efficient estimators for the observable variables. For instance, the Washington DC metro area consistently has a much higher than average percentage of news-format radio stations.[1] Regardless of the nature of the cause of this phenomenon, a fixed effects analysis prevents it and other market-specific unobservable factors from biasing the results.

Existing Literature

This is not the first study to examine ownership changes on radio station formats. Steven T. Berry and Joel Waldfogel (2001) examined the formats and other information for 243 stations in 1993 and 1997, and found some evidence that ownership concentration increased the number of formats. This would suggest that as the number of sibling

[1] See Table 1.

stations (stations owned by the same parent) in the same market grew, the likelihood of one of those stations being a news-format station increased.

Romeo and Dick (2005) examined radio station format changes as a function of consolidation for ten radio markets between 1988 and 1998. They found that most major format changes (e.g., a change from Adult Contemporary to Country or from news to any form of music) are made by stations with very low ratings and that minor format changes (changes within a major format) tend to be made by stations with above average ratings.

Additionally, literature in the field of television may also shed some light on the radio industry. Alexander and Brown (2004) studied whether TV stations with nearby owners broadcast more seconds of news. They used a dataset created by Project for Excellence in Journalism (PEJ) that contains over 4,000 television news stories aired by 60 stations across 20 Designated Market Areas (DMAs). They find mixed results. When they include the local ownership dummy, a cross ownership dummy, and an interaction dummy, they find that stations with local owners broadcast significantly more seconds of local news, and that stations that are cross owned with radio stations tend to broadcast less news.[2] Conversely, when the interaction variable was not included, the local ownership and cross ownership dummy variables were insignificant. A similar specification for total news found that when cross-ownership of radio was included, local ownership significantly increased total news output. (The authors did not report what happened if the cross ownership with a radio station was not included in this regression.) In this paper, the authors do not state the number of stations that are cross owned, but in a follow-up paper with Nodir Adilov, (Adilov *et. al* 2006), where they use the same data

[2] The study authors interacted the two variables by multiplying them together. This has the effect of turning a dummy variable on and off based on the value of the other dummy variable.

set, they report that 22% of their 60 stations (*i.e.*, 13 stations) are cross owned with a radio station, so it is possible that their mixed result is the result of their small sample.

Model

This study examines a radio station's choice of a news format. We assume that stations choose their formats to maximize their parent's profits. Their choice of format is based on several factors: parent-specific information, market-specific information, and station-specific information.

Parent-specific information includes the size of the parent, whether the parent has news stations in other markets, and the number of markets the parent serves. Market-specific information (other than time-invariant market-specific information) includes the number of news stations already in the market, the number of parent stations in the market and demographics.[3] Finally, station-specific information includes variables such as whether the station is AM, its broadcast range, and its prior-period format.

Because we have annual station data, we model the station's choice of format as a simple game. Every year, stations simultaneously choose their format, based on all current information. Current information includes all current ownership data, and last year's format data for all other stations in the market. Stations are assumed to keep the format for the whole year, and their formats are observed at some point in the following year.

In reality, stations can change formats at any time of year, and in some cases, stations change formats multiple times in a year. This model is a reasonable

[3] As discussed below, we have some demographic data that varies over time.

approximation of reality, however, because stations rarely change formats multiple times per year. According to BIA's current database, which has past format information for spring and fall of every year going back to 2001, 1,092 stations changed formats between the Fall of 2001 and Fall of 2002. Of those, only 26 stations changed formats twice in that year. Further, of those 26 stations, only 4 were news formatted stations at any point in that year.

In this model, a station's format choice is very simple: news or other. A news station is one where news appears in its format. We recognize that some "talk" or "sports" content would surely be considered news by most people, and that music stations often broadcast at least some news.[4] We therefore recognize that we cannot perfectly quantify the total amount of time spent on news in a station's broadcasts based on the format alone. Also, no information in the station's format describes the type of news being broadcast. In particular, it is impossible to distinguish between local news and other news. Thus, this format-based study cannot be used to measure a radio station's propensity towards broadcasting local news.

Fixed effects

Most markets (which we define in the next section) have relatively consistent shares of news stations over time. Markets with the highest and lowest percentage of news stations in 2002 had also had among the highest and lowest news station percentages in 2005. Table 1 shows the percentage of news stations over time for several markets. In addition to the maximum, quartiles and minimum news markets in 2002, several other markets were chosen to add some insight.

[4] We also recognize that stations that normally broadcast little or no news may broadcast substantial amounts of news when events warrant it, such as after the September 11, 2001 attacks.

For example, Washington, DC consistently has a higher percentage of news stations than average.[5] Nearby Baltimore, MD was the median for 2002, and nearby Fredericksburg, VA had no news stations. There were 21 markets without any news stations in 2002, and over half of them never had a news station between 2002 and 2005. Although most markets have a relatively constant proportion of news stations, there are a few markets, such as Stamford-Norwalk, CT that have significant changes in the percentage of stations over this time frame.

Because the news percentage is relatively stable within a market, we use a fixed effects model. In this way, the factors that drive Washington, DC consistently to have a higher-than-average percentage of news stations do not bias the other coefficient estimates.[6] The fixed effects model essentially allows each market to have its own intercept, and assumes that the estimated slopes on the independent variables are otherwise constant across markets.

Data description

Table 2 lists the variable names used in this study, and Tables 3 and 4 show their descriptive statistics. Station-specific variables are separated out from market-level demographic variables.

[5] Table 1 shows that Washington, DC had the 31st highest proportion of news stations out of 298 markets.
[6] There is no need to consider using a random effects model, because the primary benefit using random effects is efficiency gain, and most of the results of this study are significant with fixed effects. Also, a random effects model would potentially bias the estimated coefficients. Similarly, generalized estimating equations (GEE) does not control for market-specific effects.

BIA data

The radio station-specific data for this study came from two sources. The first source of data was FCC Media Ownership Study #2, which compiled data supplied by BIA Financial Networks, Inc. (BIA). These data include information for each non-low power radio station in the United States. The information includes the station's format, the Arbitron markets the station serves, and many other station-specific variables. The authors of Media Study #2 added television station and newspaper cross ownership information for the years 2002 through 2005. Additionally, BIA supplied format data for each station for 2001.[7]

Radio station formats

We used two sets of BIA format information. The first set has three variables: "format1", "format2" and "format3". These variables list the primary, secondary and tertiary formats of a station. Some stations list only one format, while others list two or three formats. The second set of format information has just one variable: "format". The "format" variable contains up to three formats in a single variable. So a station that lists itself as talk, news and sports using "format1", "format2" and "format3", typically calls itself "talk/nws/sprt" in "format".

This study uses the "format1" and "format" variables. "Format1" provides a relatively narrow definition of news format. Presumably, radio stations that choose to list news as their primary format broadcast news during most of the day. For a second, broader, definition of news station, we use the "format" variable. If news appears anywhere in "format" we call it a news station. For this reason, we present two sets of

[7] BIA Financial Network, MAPro data base, June 1, 2007.

regressions, one based on the broad definition (format), and the other based on the narrow definition (format1) of news station.

Demographic data

Demographic information was downloaded from websites of the Bureau of Economic Analysis (BEA) and the Census Bureau.[8] Although the Census data include many racial and ethnic breakouts, in addition to total population, we focus on the demographics on which Arbitron focuses: blacks and Hispanics. The BEA county-by-county personal income estimates from 2002 to 2005 are used in this study. No year-by-year demographic data were available for Puerto Rico, so regressions with demographic variables excluded Puerto Rico.

Use of Arbitron's markets

This study's unit of analysis is the radio station. When choosing a format, radio station owners realize that their station does not exist in a vacuum; rather, the vast majority of listeners have a choice of radio stations. So the manager surveys the other radio stations that can be received within the station's footprint (contour), and takes their formats into account. It is impractical to map, for each of the nearly 14,000 radio stations in our dataset, individual station contours and the overlaps with the other radio stations that can be heard within that contour. Fortunately, an excellent proxy for this exists. Arbitron created its own list of markets based on common contour overlap for large population centers. Therefore, a station in an Arbitron market can be assumed to serve at least a substantial portion of that market. For this analysis, we assume that all radio

[8] The URLs for these websites can be found in the references.

stations in an Arbitron market completely overlap each other.[9] Whenever we use the word "market" in this portion of the study, it refers to the Arbitron market.[10]

Data Technical Section

This section discusses the details of the variable calculations and modifications to the data. This section will be of interest to those trying to replicate our work, or for those who wish to know exactly what was done to create the variables for this analysis.

Arbitron Markets

Arbitron markets are not necessarily static. Arbitron occasionally creates new markets and also occasionally cancels or redraws the boundaries of existing markets.[11] Between December 31, 2002 and December 31, 2005 Arbitron created nine markets, cancelled one market, and redrew three metro boundaries.[12]

When using fixed effects, it is important to keep the underlying market constant. We therefore considered the markets as of 2005 to be fixed. If a market was cancelled

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[9] A few stations serve multiple markets. Managers of these stations must take into account the formats of the stations in all the markets served by the station. Of the roughly 8,100 stations in our sample, 13 serve three markets, and 234 serve two markets. We estimated the regressions both with and without these stations, and the results were virtually identical, so we left the stations in the analysis.

[10] Arbitron has two definitions of its market: metro and TSA. We use the tighter "metro" definition. According to Arbitron, "Metro definitions generally correspond to the federal government's Office of Management and Budget's Metropolitan Statistical Areas, Primary Metropolitan Statistical Areas or Consolidated Metropolitan Statistical Areas. These areas are subject to exceptions dictated by historical industry usage or other marketing considerations as determined by Arbitron." (PPM Radio Market Report Summary Data Set Reference Manual). The total survey area (TSA) of a radio market is "a contiguous area consisting of the Metro Survey Area and all adjacent counties in which Metro-licensed stations achieve the level of listening required to meet the following criteria: A county or geographically split county from which a minimum of 10 in-tab diaries were returned will be added to the TSA of an existing market if: 1. the Metro-licensed stations cumulatively received a minimum of 10 diary mentions; and 2. the mentions to the Metro-licensed stations account for at least 15 percent of the total mentions to all stations from that county." (Spring 2001 Radio Presurvey Bulletin).
http://www.arbitron.com/radio_stations/presurvey_sp01.htm (visited Jun 18, 2007).

[11] Arbitron creates and cancels markets for a variety of reasons, so one should not assume that cancelled markets are in decline or that created markets are growing markets.

[12] Arbitron publishes a list of updates on its website. See list of references for URL.

before December 31, 2005, that market was deleted from the sample. Markets that were created after December 31, 2002 were kept, and the market was "back cast". In other words, stations that were in the new markets (those markets created after December 31, 2002) as of December 31, 2005 were considered to be a part of those same markets in earlier years (even though the market didn't technically exist yet) so long as the stations were in the BIA database for that year.

The reason we "back cast" newly created markets but didn't "forward cast" cancelled markets is that we needed information on stations that were physically located outside of a market but were broadcasting into a market with sufficient strength to warrant being included in the market by Arbitron. Thus, stations that went on the air in (say) 2004 and broadcast into multiple markets could be properly accounted for when back casting market definitions. But a similar station could not be properly accounted for when forward-casting a market, because the BIA database would not list the station as broadcasting into the cancelled market.

In an effort to conserve the number of markets in our sample, we included the four markets that expanded during the study time frame.[13] We couldn't back cast the new boundaries and be sure we were capturing stations that were physically located outside of the market but were broadcasting into the market. Therefore, for stations in these markets, we used the market information as it was listed in BIA. The use of these markets did not change the results.[14]

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[13] For three of these markets, Arbitron added one county to its market definition, the fourth added two counties.

[14] We ran the regressions both with and without these markets, and the results were essentially unchanged.

Missing stations

There are 56 stations that appear in the BIA database for one year, went missing for one or more years, and then later reappeared in the BIA database. These stations were not listed as being dark or otherwise not operating rather, there were just no entries for these stations for the intervening year(s). Because it is important to account for the formats of all stations in the markets, we created observations for these stations' missing years based on the prior year's data. Using current BIA information on past formats we examined semiannual format information for these stations for 2002 through 2005.[15] These data confirmed that these stations were operational during the years in question. Also, where necessary, these stations' formats were adjusted based on the formats listed in the BIA supplemental information. The results of this study are not affected by the inclusion of the missing stations.[16] No adjustment was made to stations that disappeared from the data and did not return, because we could not be certain that they did not shut down. Based on the stability of the coefficients in all our specifications, it is unlikely that stations erroneously missing from BIA's database cause any problems.

Demographic data

The demographic data are published at the county level. The population totals were summed up to the Arbitron market level as they existed in 2005. Blacks and Hispanics can report themselves to be of multiple races, so any combination that included black or Hispanic was considered to be black or Hispanic.[17]

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[15] BIA Financial Network, MAPro data base, June 1, 2007.
[16] The logistic regressions were run without the missing stations (but the formats of the missing stations were taken into account when calculating the percentage stations in the market with a news format).
[17] Individuals reporting themselves as both black and Hispanic were counted in both categories, because the categories are not considered to be mutually exclusive.

Per capita income estimates were also provided for each county. Because per capita income cannot simply be summed up to the market level, we used a weighted average based on the population of each county.

Results

Table 4 shows news station counts and other station characteristics broken out by AM and FM service. AM service offers inferior sound-quality than FM service, so we expect to see more talk and news stations (where sound-quality is typically less important) broadcasting in AM than in FM. Table 4 shows that even though 65% of the full power stations broadcast in FM, only about 25% of news stations broadcast in FM. Table 4 also shows that over half of the stations cross owned with newspapers broadcast in AM, and slightly more than a quarter of radio stations cross owned with television stations broadcast in AM. Both local ownership of radio stations and local marketing agreements appear to happen proportionately across AM and FM stations.

Table 5 presents the fixed effects logistic regression results for both the broad and narrow definitions of news stations.[18] Because logistic regression coefficients are not linear, odds ratios, which help quantify these parameters, are also listed. For those unfamiliar with odds ratio, an odds ratio of two means that a station with that attribute is twice as likely to be a news station as a station without that attribute.[19] Similarly, an odds ratio of 0.33 means that a station with that attribute is one third as likely to be a news station as a station without that attribute.

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[18] A logistic regression is used when the dependent variable is binary. For a brief discussion of logistic regression, see http://en.wikipedia.org/wiki/Logistic_regression.

[19] For a useful discussion of odds ratios, see Hosmer and Lemeshow (2000) pp 48-50.

The results on the left side of Table 5 are based on the broad definition of a news station, and the results on the right side reflect the narrow definition of news. As one can see, the results based on the broad definition of a news station and on the narrow definition are similar, so we discuss only the results based on the broad definition of news unless the results are significantly different.

By far, the most significant factor determining whether a station adopts a news format is its format in the previous year.[20] The odds ratio shows that a news station is over 700 times as likely to be a news station the following year as is a non-news station. This is expected, because it is costly to change formats.

The second largest effect influencing a station's format choice is its service band. Because of AM's inferior sound quality, AM stations are much more likely to be news stations than FM stations. The results indicate that holding other factors constant, AM stations are six times more likely to be news stations than FM stations.[21]

As one might expect, radio stations that are cross owned with a newspaper in the same city are significantly more likely to be news station.[22] Such a combination presumably has economies of scope: a manager of such a combined entity would have two outlets for a news story rather than just one. It would be easier to summarize a

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[20] The percentage of news stations the prior year had a much larger coefficient (in absolute magnitude), but as we discuss below, that variable suffers from multicollinearity with the market dummies, and so its coefficient is unreliable. The other variables do not suffer from this multicollinearity, and are unaffected by the above-mentioned multicollinearity.

[21] If the prior year's format is not accounted for, then an AM station is 18 times as likely to be a news station.

[22] No radio stations were acquired by a newspaper during our sample, so the positive and significant coefficient is not because we observed a newspaper buy a non-news station and convert it to a news station. Rather the positive coefficient stems from the fact that radio stations that are cross owned with newspapers are less likely to move away from a news format than other stations. Of the 155 news stations (using broad definition of news) that switched to a non-news format between 2002 and 2005, only 1 (0.65%) was cross-owned by a newspaper. Across our sample, 1.8% of news stations are cross owned with newspapers. Thus, it seems that radio stations that are cross owned with newspapers do indeed retain a news format longer than non-cross owned stations.

newspaper story for a radio broadcast than to send a second reporter out to acquire the same information. The observed effect is quite strong: the radio station that is cross owned with a newspaper is four to five times more likely to be a news station than a radio station that is not cross owned.[23]

Given that many television stations have news broadcasts and their own reporters, a radio station that is cross owned with a television station would appear to have the same economies of scope that cross owned radio and newspaper stations seem to have. This is borne out by a positive and significant coefficient estimate on the TV cross ownership dummy variable. Radio stations that are cross owned with TV stations are about twice as likely to be news stations than non-cross-owned stations.

According to the data, commercial stations are about 25% as likely to adopt a news format as noncommercial stations. This result is statistically significant. Although regression analysis by itself shows only correlation, not causation, in this situation, we think we have a causal relationship. Commercial radio stations cannot simply decide to become a noncommercial station after switching to a news format.[24]

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[23] The effect may be stronger than estimated here, because we may not know of all situations where radio stations are cross owned with same-city newspapers. Media Study 2 provided information for only those radio-newspaper cross ownerships that were grandfathered or received a waiver of FCC rules. Given that radio licenses must be renewed every eight years (47 CFR 73.1020(a)), and licensees are only required to inform the Commission of such cross ownership relationships at the time of license renewal (or when transfers of control or assignment applications are filed), there could be other radio stations that are cross owned with same-city newspapers that the Commission is unaware of. If so, our estimated coefficient could be biased towards zero (i.e., if we knew about all such cross ownerships, our estimated coefficient may well have been larger) and our results could be more even more statistically significant. See Goldberger, pp 282 – 284.

[24] Thus, the negative coefficient on commercial stations isn't because news stations decide to become noncommercial stations after they decide to be a news station. Instead, we believe that the negative coefficient is because commercial stations are less likely to be news stations. For rules on becoming a non-commercial station, see 47 CFR Section 73.503.

The regression results suggest that stations with a local marketing agreement may be less likely to be news stations.[25] The coefficient on the broad definition of a news station is negative and insignificant, but the coefficient on the narrow definition of a news station is negative and significant. As mentioned above, regression analysis by itself does not prove causation. This is another case in point. Further analysis of the data suggests that stations operating with a local marketing agreement may be slightly more likely to become a news station after signing the agreement.

We examined the formats of stations the year before they signed an agreement, during the first year of the agreement, and the following year. The respective percentages of stations that were news stations were 6.5%, 7.0% and 7.5%. So, it appears that having a local marketing agreement makes a station more likely to be a news station, and that the negative coefficient in the regression may result because news stations may be less likely to enter into local marketing agreements.

Having a sibling news station in the market appears to increase a station's propensity to adopt a news format by about 50%.[26]

Given that a nearby owner could plausibly monitor the quality of local news reporting more easily, stations with a nearby owner may be more likely to be news

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[25] A local marketing agreement is the sale by the licensee of discrete blocks of time to a "Broker" that supplies the programming to fill that time and sells the commercial spot announcements in it. 47CFR73.5555(j).

[26] We ran the regressions using FM-only stations, and found that most of the results were nearly identical to the rest, so they are not presented here, and we discuss the results only when they differ from the presented results. When only FM stations are considered, a station's likelihood of adopting a news format nearly doubles. The only FM-specific variable, broadcast distance, was positive and significant, but small. An extra kilometer of broadcast distance is associated with a 1.5% increase in likelihood of being a news station. The effects of multiple additional kilometers of broadcast radius are multiplicative, but even then, the effect is small. So a station with a broadcast radius 10 kilometers longer than an otherwise similar station is only 16% more likely to be a news station than the other station. Although only FM stations were used for this regression, the sibling news station could have been an AM station.

stations.[27] We have two variables that measure the proximity of the station's parent to the station. The first is whether the radio station's parent is in the same (TV) DMA. The second is whether the parent is located in the same state. On average, DMAs are smaller than states, so one may expect that having a parent located within a DMA would be more strongly correlated with being a news station.

Counterintuitively, stations with owners in the same DMA appear to be no more likely to be news stations than others.[28] Stations with owners in the same state, on the other hand, appear to be significantly more likely to be news stations regardless of which specification is used. One possible explanation for this result may be that the parent being within the same DMA is too restrictive an assumption.

Depending on whether we consider the broad or narrow measure of news stations, the number of parent stations in the market was or was not significantly related to being a news station. Using the broad definition of news, the coefficient was not significant, but using the narrow definition of news, the coefficient was positive and significant. Whether significant or not, the effect is small, however. For the narrow definition of news, each additional parent station increases a station's likelihood of being a news station by only 7%.

An important factor in determining a station's likelihood of choosing a news format is the crowdedness of the format. We accounted for this by including the percentage of news format stations in the prior period (excluding the station itself). We anticipated a strong negative coefficient on this variable, but were surprised by its

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[27] For instance, a nearby owner may more easily obtain the results of other sources reporting and compare them to what was broadcast.

[28] The coefficient was negative but not significant.

apparent explanatory strength. It turns out that this variable is highly collinear with the market dummy variables, and that both the coefficient and P-value were severely affected. Fortunately, multicollinearity affects only the coefficients (and P-values) of the collinear variables, so the other statistics are unaffected.[29] The purpose of this study is not to quantify the effect of the crowdedness of the news format, so we leave it in the model as is.

Demographic variables and other variables

As one might expect with a panel data set with four years of data, demographic variables are highly collinear with the market dummy variables. Although we have demographic data that changes over time, the variability was insufficient to allow reasonable estimates to be obtained. Because we could not get reliable estimates on them and because the other coefficients were essentially unaffected by their absence, we dropped the demographic variables from the analysis.

We also have some data on minority and female owned firms from Media FCC Ownership Study #2. Unfortunately, due to the inherent problems with the underlying data which Media Study 2 had to rely upon to create the minority and female ownership data (see the Technical Appendix of FCC Media Ownership Study 2), we can not be completely confident in the accuracy of these data. We ran the same regressions using these variables, and female ownership was totally insignificant in all of them. Minority ownership was usually negative and significant, but that relationship was an artifact of how our dependant variable was constructed. Many minority-owned radio stations are owned by Hispanics and broadcast news in Spanish, but our dependent variable is

[29] See Allison, *Logistic Regression Using the SAS System* p. 48.

English-language news stations. When the English-language requirement was dropped, the minority ownership variable became totally insignificant. Inclusion of these data did not significantly affect our overall results presented in Table 5.

Conclusions:

This analysis suggests, but does not prove, that ownership characteristics influence a station's propensity to choose a news format. Newspaper and television station cross ownership both seem to increase a station's likelihood of being a news station. Also, the presence of a sibling news station in the market seems to increase a station's propensity to choose a news format. Other demographic factors, such as total population, and black and Hispanic share of the population were not significant in our analysis.

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Table 1

Percentage of News Stations Over Time for Selected Markets[1]

Market	2002	2003	2004	2005	Rank in 2002 (by % of News Stations)
Sarasota - Bradenton, FL	31.8%	30.4%	30.4%	26.1%	1
Stamford-Norwalk, CT	18.2%	18.2%	27.3%	45.5%	24 (biggest increase from 2002 to 2005)
Washington, DC	16.9%	15.3%	16.9%	16.7%	31
Baltimore, MD	12.8%	13.2%	13.2%	10.5%	75 (First Quartile)
Boston, MA	11.1%	11.8%	14.0%	15.8%	96
Little Rock, AR	9.1%	10.0%	7.5%	7.3%	149 (Median)
New York, NY	8.5%	8.5%	9.0%	9.3%	156
Los Angeles, CA	7.9%	8.0%	9.0%	9.1%	175
Corpus Christi, TX	5.6%	5.9%	5.9%	5.9%	224 (Third Quartile)
Dallas - Ft. Worth, TX	4.0%	3.9%	6.3%	7.5%	259
Fredericksburg, VA	0.0%	0.0%	0.0%	0.0%	278 - 298 (21 tied for last place)

[1] Based on the broad definition of news station.

Table 2
List of Variables

AM station	Equals one for AM stations and 0 for FM stations.
Broadcast Distance	The maximum broadcasting distance for each FM station (in kilometers), based on its class as reported by BIA
Commercial Station	BIA receives Arbitron ratings for only commercial stations. For this dummy variable, those stations with Arbitron ratings (even those ratings equal to zero) were considered a commercial station.
Cross Owned with Newspaper	This dummy variable equals one when the radio station is cross-owned with a newspaper and the station's signal covers the newspaper's city with sufficient strength that it would otherwise trigger the "cross-owned" prohibition. These combinations are 'grandfathered' or received waivers of the "cross-owned" prohibition.
Cross Owned with TV Station	This dummy variable equals one if the radio station is owned by a parent corporation (or owner if the parent corporation was unidentified) that also owns TV station(s) that are physically located in the same TV DMA as the radio station.
Female-owned Radio Station	This dummy variable equals one when the owners of the stations are female.
Local Marketing Agreement	If the BIA data indicate that a station was part of a local marketing agreement (LMA) then Local Marketing Agreement dummy variable equals 1.
Minority-owned Radio Station	If the owners of a radio station are minorities, then the dummy variable equals 1.
News Format Station (broad)	This dummy variable equals one when an English-language station lists news anywhere in its format.
News Format Station (narrow)	This dummy variable equals one when an English-language station lists news as its primary format.
News Format Prior Period	This dummy variable equals one when the station was a news station in the prior period.
Parent in Same DMA	This dummy variable equals one if Study #2 authors determined that the owner of the station was located within the same Designated Market Area as the radio station.
Parent in Same State	This dummy variable equals one if the station's parent is located in the same state as the radio station. Because of the nature of nearby suburbs, stations anywhere in DC, MD and VA with parents anywhere in those states were also coded with a one. We similarly coded station and parent combinations in NY, NJ and CT.
Parent Owns News Station	This dummy variable equals one when any sibling station has a news format.
Parent Stations in Market	For each station, the number of sibling stations in the same market.
Percent News Stations in Market Previous Period	For each station and year, this equals percentage of news stations in the market for the prior year (excluding the station itself). Dark stations (stations not broadcasting) were included in the denominator because most dark stations appear to be dark for only a short period of time.
Sibling News Station in Market	For each station, this dummy variable equals one if an in-market sibling station has adopted a news format.

Table 3
Descriptive Statistics for the Stations in this Study
For the Year 2005

Station Characteristics (n=8196 in 2005)					
Variable	Min	Mean	Median	Max	Stations
AM Station	0.00	0.35	0.00	1.00	2,852
Broadcast Distance (FM stations only)	5.60	52.6	72.3	91.8	
Commercial Station	0.00	0.81	1.00	1.00	6,653
Crossowned With Newspaper	0.00	0.00	0.00	1.00	38
Crossowned With TV Station	0.00	0.08	0.00	1.00	643
Female-owned Radio Station	0.00	0.02	0.00	1.00	168
Local Marketing Agreement	0.00	0.05	0.00	1.00	387
Minority-owned Radio Station	0.00	0.03	0.00	1.00	262
News Format (broad)	0.00	0.10	0.00	1.00	835
News Format (narrow)	0.00	0.09	0.00	1.00	733
Owner in Same DMA	0.00	0.40	0.00	1.00	3,304
Owner in Same State	0.00	0.52	1.00	1.00	4,224
Parent Owns News Station (broad)	0.00	0.54	1.00	1.00	4,437
Parent Owns News Station (narrow)	0.00	0.52	1.00	1.00	4,237
Parent Stations in Market	1.00	3.49	3.00	14.0	
% News Stations in Market (broad)	0.00	0.10	0.10	0.45	
% News Stations in Market (narrow)	0.00	0.09	0.09	0.36	
Sibling News Station in Market (broad)	0.00	0.21	0.00	1.00	1,708
Sibling News Station in Market (narrow)	0.00	0.20	0.00	1.00	1,630
Demographics (excludes Puerto Rico)					
Variable	Min	Mean	Median	Max	Total
Percapita Personal Income (000s)	16.36	31.41	30.20	67.3	
Share Black	0.01	0.13	0.09	0.53	
Share Hispanic	0.01	0.11	0.05	0.95	
Total Population (millions)	0.07	1.52	0.57	15.04	241

Table 4
Characteristics of AM and FM Stations in 2005

Variable	AM Stations	AM (%)	FM Stations	FM (%)	Total Stations
Commercial Station	2,747	41	3,906	59	6,653
Crossowned With Newspaper	20	53	18	47	38
Crossowned With TV Station	169	26	474	74	643
Female-owned Radio Station	80	48	88	52	168
Local Marketing Agreement	126	33	261	67	387
Minority-owned Radio Station	172	66	90	34	262
News Format (broad)	616	74	219	26	835
News Format (narrow)	579	79	154	21	733
Parent in Same DMA	1,320	40	1,984	60	3,304
Parent in Same State	1,578	37	2,646	63	4,224
Parent Owns News Station (broad)	1,518	34	2,919	66	4,437
Parent Owns News Station (narrow)	1,455	34	2,782	66	4,237
Sibling News Stations in Market (broad)	444	26	1,264	74	1,708
Sibling News Stations in Market (narrow)	426	26	1,204	74	1,630
Number of Stations	2,852	35	5,344	65	8,196

Table 5
Logistic Fixed Effects Regression Results
(Broad Definition of News Station)

	Broad Definition of News Format			Narrow Definition of News Format		
Variable	Coefficient	P-value	Odds Ratio	Coefficient	P-value	Odds Ratio
News Format Prior Period	6.59 ***	0.000	727.33	6.61 ***	0.000	744.29
AM Station	1.81 ***	0.000	6.09	1.83 ***	0.000	6.23
Crossowned With Newspaper	1.47 **	0.035	4.34	1.68 **	0.017	5.39
Crossowned With TV Station	0.75 ***	0.000	2.11	0.58 ***	0.009	1.78
Commercial Station	-1.45 ***	0.000	0.23	-1.27 ***	0.000	0.28
Local Marketing Agreement	-0.42	0.147	0.66	-0.84 ***	0.007	0.43
Sibling News Station in Market	0.39 ***	0.010	1.48	0.35 **	0.032	1.42
Owner in Same State	0.23 *	0.067	1.26	0.19	0.183	1.20
Parent Stations in Market	0.04	0.155	1.04	0.07 **	0.035	1.07
% News Stats in Mkt Previous Period	-28.46 [1]	0.000 [1]	0.00 [1]	-30.86 [1]	0.000 [1]	0.00 [1]
Fit Information	Intercept Only	With Covariates		Intercept Only	With Covariates	
Akaike Information Criterion	19,035	3,040		17,640	2,586	
Schwarz Criterion	19,035	3,149		17,640	2,696	
-2 Log Liklihood	19,035	3,014		17,640	2,560	
Number of Observations	32,681			32,681		

[1] This variable is collinear with the market dummies, so these values are meaningless. All other estimates are unaffected by this multicollinearity. This variable is included in the regression because it is an economically important variable, so dropping it could bias the other variables.

[*] Significant at the 0.1 level.

[**] Significant at the 0.05 level.

[***] Significant at the 0.01 level.

Section IV

The Effect of Ownership and Market Structure on News Operations[1]

Pedro Almoguera

Executive Summary:

In this section of FCC Media Ownership Study #4, the effect of ownership on newspapers news operations is studied. Using a sample of 134 newspapers for the year 2005 from the top 60 Designated Market Areas (DMA), we use the absolute amount of space allocated for news in the "General News" section as a measure of news operation. We do not observe a relationship between news operations and cross-ownership with a TV station or radio station in the same market. On the other hand, newspapers that are co-owned with other newspapers within the same Metropolitan Statistical Area (MSA) are associated with a 5% drop in the absolute amount of news. Co-owned newspapers outside the market present no effect on news operations. The effect of the level of concentration in the market (measured by the HHI) has no effect on news operations; a similar result is found for papers belonging to a Joint Operating Agreement (JOA). Lastly, results show that Sunday is the day of the week that presents the largest amount of news (approximately 23% over an average Wednesday), followed by Friday (12%) and Thursday (8%); Tuesday, Wednesday and Saturday present similar amount of news; lastly, Monday is the day of the week with the smallest amount of news with a 9% decrease over an average Wednesday.

[1] We would like to thank Christopher Scherbel, Joshua Block and Garret Fittizzi for their assistance on this project.

Introduction

Within the media industry, the newspaper market shares few similarities with the radio and TV industries. Therefore, measuring quality and/or quantity of newspapers' news also follows a different approach than broadcast media. As explained in the previous sections of FCC Media Ownership Study #4, over-the-air news can be observed as a percent of total daily programming, or in terms of programming formats. With a TV or radio station it is important to estimate the chances of selecting a station with news program, whereas, the newspaper industry works in a different manner. Consumers purchasing a newspaper primarily to read news know that the extra benefit is limited, and that the format of the newspaper is fairly predictable. For example, if there is a developing story or breaking news, the newspaper is unlikely to stop having one of the other sections, it will simply publish a larger newspaper, whereas with a radio or TV station, when there is a developing story the previously scheduled programming might be jeopardized. Being able to manage the format, size and circulation of the next day's publication could be interpreted as an advantage that newspapers have over broadcast media. But in reality newspapers have a more complicated decision because they have to manage not only other news articles, but also the amount of advertising space. Even though subscribers are charged for a newspaper, the main source of revenue for a newspaper comes from advertisements. Hence the newspaper must maximize the number of pages with news and ads, conditional on how many pages they can afford.

The amount of ads also reflects the number of pages that the newspaper will be able to afford. Therefore, the decision of how much news is circulated in a newspaper is not an easy task; some of the most important factors include newspaper management, staff size, and budget. If a newspaper is co-owned with other newspapers, should they have a different strategy for their news operations? Is it different if the newspaper is co-owned with a TV or radio station? Does the newspaper's market provide any additional information? This section of the study focuses on answering these questions. News operations will be measured by the absolute and relative amount of news published in each of the newspapers in the sample. It most be noted that the absolute amount of news measures the amount of news published; hence, newspapers with more pages or a bigger page size will tend to have a higher amount of column inch news compared to other

newspapers. As will be explained below, measuring news operations with this variable has its limitations and disadvantages, but seems to be the best variable available to measure the amount of news that is been published, which is the main research question of this FCC Media Ownership Study.

Another often used measure of news is the relative amount of news (rather than the absolute amount), which is often referred to within the industry as the Newshole. This term is defined as the percentage of news compared to ads (e.g. a 60% Newshole implies that 60% of the paper consists of news and the remaining 40% are ads). The Newshole is not a measure for the amount of news been published; rather it measures the space allocated for news compared to ads. The correlation between the absolute amount of news and the Newshole could be positive or negative. It seems logical to think that the quantity of news and the Newshole are positively correlated since the more news published should take more space; however, this is not true if the number of ads increase faster than the number of news being published. The space allocated for news could have to be decreased on a day with several news articles. The solution might be to reduce the length of the articles, resulting in a smaller Newshole with a greater number of articles. Moreover, the Newshole does not only depend on the number of pages available but also on the number and size of ads to be published since it is a proportion measure; while the amount of news is indirectly related with the number of ads. It is worth mentioning that both variables provide a measure of the quantity of news, but they remain separate from any analysis on the quality of the news.

The purpose of this study is to "analyze the relationship between the nature of the news operations and market characteristics, including ownership structure and robustness";[2] this is done by estimating the effect of market structure and newspaper specific variables on the absolute amount of news rather than the relative amount of news. Estimations involving the Newshole are included in the Appendix. The rest of the study is divided as follows; Section V.2 presents the most relevant literature with respect to our study. Section V.3 describes the data and the model to be used. Section V.4 shows the main results. Section V.5 presents the concluding remarks.

[2] http://www.fcc.gov/ownership/studies.html

Literature Review

The early work in DuBick (1978) finds that in order to estimate news operation effects, the level of competition among newspapers is a more relevant variable than the market attributes. His study is based on a sample of 67 morning newspapers published daily. While the study does not control for ownership, the level of competition was measured using the proportion of the two largest newspapers in the market, suggesting a negative effect on staff distribution. Litman and Bridges (1986) study how news operations are affected by ownership and cross ownership measured with indicator variables, market conditions, and specific newspaper attributes. Their data consists of 101 newspapers surveyed by a private questionnaire. News operation is measured with three different dependent variables: paper's Newshole, full time news staff and the number of subscriptions to news services (e.g. Associated Press). With respect to the Newshole findings, their results show that joint newspapers have a lower amount of news, while competitive newspapers have a larger number of news articles compared to monopolists and two-edition monopolist newspapers (which will be defined below). Also, newspapers with Sunday publications are estimated to have a Newshole between 2.7% and 4.4% less than papers without a Sunday edition. Dertouzos and Trautman (1990) estimate a simultaneous equation model for the demand and supply of advertising space. Its main finding is that lack of competition in the same market is a source of economies of scope for news and advertisement, which implies that the fewer newspapers available in one market, the more market power they have over the advertising companies to negotiate ad rates. Also, for their sample, local media broadcast does not affect news operation. It must be noted that competition was calculated as the proportion of households in the primary geographic market of the newspaper in which competing newspapers have penetrated. Broadcast media is measured as the number of radio and TV stations, representing a penetration rate of this market which is taken as the substitute good. That differs from our study as our main interest is in cross ownership, which is the effect of sharing the same owner rather than the effect of the presence of other media on news operation. Lacy (1991) finds that newspaper ownership has no effect on news allocation, but large newspapers tend to use less space per story. This study uses a random sample of 115 national newspapers. It presents some ambiguity, as in previous literature, with

mixed results in answering the question of the relationship between newspaper group ownership and news content. Edmonds (2004) suggests that besides newspaper staff or revising newspapers' budget, a third approach to measure news operations is with the Newshole. Another important remark of this work is that the size of the Newshole has almost doubled from 1964 to 1999.

Our study resembles that of Litman and Bridges (1986). However, instead of estimating the other media penetration rates, our main research question is calculating the effect of media cross ownership on newspapers' news operations, which is calculated as the absolute amount of news rather than the Newshole.

Data and the Model

The data consists of 134 daily newspapers for the year 2005. TNS provided the data on advertisements. It originally consisted of 210 newspapers, including Hispanic newspapers, but the BIA data which provides all the relevant information needed with respect to ownership, does not include Hispanic newspapers. Hence, the sample had to be limited to the newspapers that appeared in both datasets.[3] The newspaper data was collected by TNS from the top 60 Designated Market Areas (DMA). In order to provide a more comprehensive analysis in this section of the FCC Media Ownership Study #4, instead of defining markets by DMA, they are defined by Metropolitan Statistical Area (MSA). This definition allows for a more realistic representation of the market structure where each newspaper circulates, since using a DMA definition is too broad for the newspaper industry. For example, at the DMA level the Winchester Star circulates in Washington DC, but when we look at the MSA level, the Winchester Star belongs to Winchester which is roughly 70 miles from Washington DC. Hence, it keeps its monopoly status in the Winchester MSA, instead of being a newspaper in the Washington DMA with a very small circulation compared with the big competitors of the MSA like the Washington Post and the Washington Times.

[3] There are roughly 2,000 newspapers in the US. BIA had data for 1,452 newspapers across the country.

Following Riffe, Aust and Lacy (1993), a sample of 14 random days was chosen in order to construct two random weeks of observations.[4] The random selection criteria excluded Christmas day, Thanksgiving and the day after each of the two holidays to avoid outliers in the sample. The chosen dates are shown in Table IV.1.

The effect of the amount of news is measured by the total amount of column inches allocated for news of the "General News" section.[5] Equations 1 presents the expression to be used:

$$Amount\_news_i = size\ of\ page_i * number\ of\ pages_i - ads_i \quad (1)$$

where $size\ of\ page_i$ is the size of the page for newspaper i, $number\ of\ pages_i$ is the number of pages of the "General News" section for paper i in a specific publication, and ads_i is the sum of the size of the ads measured in column inches for that same observation.[6]

TNS provided advertising data. The data list the page number and size of each advertisement, but it has limitations. First, the data are classified by the cost of each ad; hence, editorials or ads with no cost (e.g. subscription "house ads") are considered part of the news space. We anticipate that this limitation should not account for little more than 3% of the total quantity of news space.[7]

Second, the provided classification of multi-page ads was not always consistent with the actual publications.[8] Where possible, those observations that looked problematic were compared to the microfilms from the Library of Congress and corrected as needed.

Third, this study is based only on the portion of the paper that TNS identified as "General News "section, which typically covers approximately the first 10 pages, or the first section, of the newspaper. This choice was made in order to obtain consistency across newspapers and the data classification (e.g. some newspapers might consider the "Metro" section as part of the "National" section, but for others the "Nightlife" section is part of "Metro" section). Moreover, some sections like "Sports" might circulate with an

[4] Riffe, Aust and Lacy (1993) compares simple random, constructed week and consecutive day samples on news content finding that a two-week constructed sample was the superior method.
[5] See below for explanation.
[6] The use of column inches is explained below.
[7] Drew and Wilhoit (1976) find that the average editorial space devoted to editorial articles is 3%.
[8] The most common issue involved two-page ads: The total ad space was often listed on each space, which resulted in double counting of ad space.

extra insert depending on special events. Examples include the day before the Super Bowl, Final Four, or other college events, where there might be a separate insert with more in depth coverage. This can be problematic because TNS often classifies such additional sections simply as "Sports", which is indistinguishable from the normal sports section. This would then cause us to overestimate the ad space in the Sports section. Some tabloids were harder to classify since sometimes their "General News" section were not continuous. For example, it could start on page 1 continuing until page 3, followed by "Metro" section news from pages 4 to 6, and then resume the "General News" section from pages 7 to 12. To maintain consistency among newspapers, for this example if the "Metro" section was not clearly defined, then pages 1 through 12 were redefined as "General News".[9]

Finally, TNS data does not differentiate preprints from regular ads on the pages. Preprint ads are advertising pages included inside a newspaper, however, they are not part of the configuration of the page (e.g. pizza specials or coupons). This generalization was addressed as well since, in some cases, this problem invoked pages where the sum of the ads exceeded the size of the page. For the cases where a microfilm of the page was unavailable, and the total sum of ads for that page exceeded the page size, then the sum of the ads was set to the size of the page. Despite these limitations, to the Commission's knowledge, the TNS database is the most reliable source of data available to construct the news operation variable.

Setting the total amount of news in column inches ($amount\_news$) as the dependent variable, the model will be specified as defined in Equation 2, where the explanatory variables can be separated into two groups, and are defined below.

$$\begin{aligned}\ln(amount\_news)_i &= \alpha_0 + \alpha_1 daily\_within\_market_i + \alpha_2 daily\_outside\_market_i \\ &+ \alpha_3 same\_city\_tv_i + \alpha_4 same\_city\_radio_i + \alpha_5 JOA_i + \alpha_6 HHI_i + \\ &+ \alpha_7 \ln(income_i) + \alpha_8 \ln(household_i) + \alpha_9 monday_i + \alpha_{10} tuesday_i + \alpha_{11} thursday_i + \\ &+ \alpha_{12} friday_i + \alpha_{13} saturday_i + \alpha_{14} sunday_i + \alpha_{15} market\_dummies + u_i\end{aligned} \tag{2}$$

[9] If the "Metro" Section was explicitly defined, then "General News" for this example would be pages 1-3 and then 7-12 for a total of 9 pages with their corresponding ads.

The first group consists of newspaper ownership attributes: newspaper ownership is divided into the number of other daily newspapers owned by the same consortium within the same MSA ($daily\_within\_market_i$) and the number of dailies owned by the same group outside the MSA ($daily\_outside\_market_i$). These variables were constructed using the ownership information from the BIA dataset, and then matched with the MSA circulation information from the SRDS Circulation book. If a group owns several newspapers, then we expect the consortium will benefit from economies of scope in terms of news articles. Moreover, the consortium might obtain cheaper news if there is any overlap on the editorial staff, or they could obtain bundled wired news (e.g. Associated Press). The consortium may also have the power to raise ad prices, so *a priori* the effect of α_1 is not clear. A cross-ownership indicator variable with TV stations ($same\_city\_tv_i$) is included to measure the effect of a group that owns a newspaper and a TV. This variable is a cross-owned newspaper/TV station combo that would violate current FCC's cross-ownership rule. This rule is triggered if the co-owned TV station signal contour covers the city where the co-owned newspaper is published. Therefore, a 1 in this variable indicates a grandfathered combination or a permanent/temporary waiver of the cross-ownership rule within the same city.[10] The variable $same\_city\_radio_i$ equals 1 if there is a similar agreement between a newspaper and a radio station and 0 otherwise.[11] We have no *a priori* prediction on the sign of these variables; because we do not know how much benefit cross ownership with other media helps the newspaper.

The next variable in Equation 2, JOA_i, controls for the effect of Joint Operating Agreements on the amount of news. The biggest difference between a JOA and two newspapers owned by the same group, is that the former combines assets, circulation and advertisement of two newspapers in the same geographic market but does not share editorial staff, whereas the latter has merged its editorial staff. The purpose of creating such an agreement is to keep diversity among newspapers in the same market. JOAs are time constrained, assets and revenues are divided and, while the two newspapers share

[10] See FCC Media Ownership Study #2 for more information on how these variables were created.
[11] TV and Radio cross-ownership variables were not available at MSA level.

ads and circulation, they still compete for editorials.[12] In the Detroit JOA, for example, the division of assets and revenues is 50% between the Detroit News and the Free Press, whereas, with the Cincinnati JOA assets and revenues are divided with 80% for The Enquirer and 20% for The Post. While a JOA's circulation and advertising pricing might be different than that in a competitive market, it is uncertain if they can still reproduce a competitive market's environment, and how they allocate their news space might be more complicated. As previously mentioned, JOAs share ads but not editorials; hence, while they could accomplish economies of scope as a monopolist, there is also the possible tradeoff of having fewer editorials and becoming a less attractive newspaper.

The second group observes market specific attributes that includes the Herfindahl-Hirschman Index (HHI_i) to control for the market structure concentration. This variable was chosen over the number of competing newspapers since its measure considers not only the number of total newspapers in the market, but also its market share, which is the ultimate and often most accurate measure for competition in a market. This concept is best illustrated with an example: in the Albany-Schenectady-Troy MSA, 11 newspapers circulate. The Times Union presents a market share of 42%, the next closest newspaper is the Daily Gazette with a share of 23%, followed by the Record with a share of roughly 10.1%, after that no other newspaper has a share larger than 6%. Clearly, the Times-Union has control over the market, but if we use the number of competitors as the concentration measure, it would be misleading to say that 10 more newspapers compete with the Times Union. On the other hand, the HHI for this market is 3312, showing a concentrated industry.[13] The HHI was constructed using the circulation information

[12]When the Congress enacted the Newspaper Preservation Act (NPA) in 1970, it gave antitrust immunity for mergers between newspapers in the same market if one of them was about to fold, hence protecting existing JOAs and promoting the creation of more. These agreements were granted mostly to avoid the weaker newspaper (often the afternoon publication) from folding and instead allowing its acquisition by the morning newspaper. People opposed to the NPA have stated that a JOA does little more than give a stronger newspaper *carte blanch* to acquire its competition and become a monopolist. Throughout the past, what JOAs have accomplished is to delay the closure of the weak newspaper for the length of the agreement. In every instance, after the JOA is terminated the weak newspaper ends up folding and the strong newspaper, as expected, becomes the monopolist (e.g. The Tulsa JOA was terminated in 1992 with the result of the Tulsa Tribune folding and the Tulsa World becoming the monopolist of the market). The effect of a newspaper belonging to a JOA on news operations (α_8) is not clear. See Romeo, Pittman and Familant (2003).

[13] The Antitrust Division of the Department of Justice considers an industry to be concentrated when it has a HHI larger than 1800.

available from the SRDS Circulation books corresponding to year 2005, and ownership data from the 2007 FCC Media Ownership Study #2.

The remaining market characteristic variables include the natural logarithm of the number of households by MSA, $\ln(household_i)$, and average income per household, $\ln(income_i)$, provided by SRDS Circulation (in levels). Finally, a day of the week indicator to control for changes in news operations on the "General News" section is added. The general understanding is that Sunday publications have a higher percentage of ads, while Mondays and Tuesdays have relative fewer articles. For this study Wednesday has been taken as the average day so that the other indicator variables represent the change in the amount of news compared to that of a Wednesday. Market dummy variables ($market\_dummies_i$) have also been included omitting the last market dummy (Winchester, VA). Lastly, an error term (u_i) is included and assumed to be distributed $N(0,\sigma^2)$.

In contrast to the TV and radio sections of the FCC Media Ownership Study #4, newspaper ownership data for years prior to 2005 were not available. Therefore, Equation 2 will be estimated through an Ordinary Least Square regression clustering for each newspaper, as the sample consists of daily observations within 2005.[14] Also, dummy variables accounting for each MSA are added. The effect of the market dummies is similar to a fixed effect regression for a panel data as in Section III of this study. Nonetheless, there is one drawback with the inclusion of market dummies, which is possible multicollinearity among the market specific variables. Since none of the market variables present any variability across time (because all observations are from the year 2005), these dummy variables are highly correlated with the market characteristic variables. This correlation affects not only the statistical significance of the coefficients of the collinear variables, but also the coefficients' sign and magnitudes can change drastically depending on the model specification.[15]

[14] Since there are 14 observations for each newspaper, if the regression is not clustered, then the coefficients will be calculated without grouping the observations for each newspaper and would instead consider them to be independent.

[15] Before including the market dummies, the model was estimated instead using newspaper dummies. This specification completely changed the magnitude and asymptotic properties of some of the cross-ownership variables due to its high correlation. See Greene (2000) for a more detailed explanation.

Equation 3 presents a second regression, where all 14 days of observations are aggregated up to the newspaper level, creating a "true" cross-section:

$$\ln(amount\_news)_i = \alpha_0 + \alpha_1 daily\_within\_market_i + \alpha_2 daily\_outside\_market_i + \alpha_3 same\_city\_tv_i + \alpha_4 same\_city\_radio_i + \alpha_5 HHI_i + \alpha_6 JOA_i + + \alpha_7 \ln(income_i) + \alpha_8 \ln(household_i) + u_i \quad (3)$$

This specification includes neither the market nor the day-of-the-week dummy variables. This eliminates the multicollinearity issues previously addressed.

Following Romeo, Pittman and Familant (2003), four market structures are considered using circulation data from SRDS Circulation; they are defined as: a) monopoly markets where there is only one predominant newspaper (e.g. Atlanta Journal Constitution); b) two-edition monopolist newspapers are papers that are editorially dependent and published by a single owner (e.g. Philadelphia Daily News and Philadelphia Inquirer are both owned by Philadelphia Media Holdings LLC); c) competitive markets, where several newspapers compete for readers in the same market without any single one having a clear advantage in circulation (e.g. Chicago Tribune and Chicago Sun-Times); and, d) markets with Joint Operating Agreements (JOA) (e.g. the Detroit News and Free Press entered a 100 year JOA in 1987).[16] The market structure indicators show that 7.1% of the newspapers belong to a JOA, 50.8% are in a competitive market, 8% are part of two-edition monopoly markets, and the remaining 34.1% are monopolist newspapers as shows Figure IV.1.[17]

Table IV.2 presents descriptive statistics for the variables to be used. The size of the page is in terms of column inches in order to match it with the available advertisement data (e.g. a page size of an average broad sheet is 127.4, which is calculated by multiplying the number of columns by the height of the columns, in this case 6*21.23=127.4). We acknowledge that analyzing the amount of news in column inches creates another limitation; not all newspapers have 6 columns, most have between 4 and 6. Moreover, column width is not constant among newspapers, especially when broad sheet newspapers are compared to tabloids. To estimate the model using the

[16] See Busterna and Picard (2003) for a more detailed explanation and coverage on JOAs.
[17] The classification used of market structure by MSA is also consistent with Romeo, Pittman and Familant (2005).

amount of news defined in Equation 1, tabloid newspapers were omitted in order to compare newspapers with similar dimensions.[18]

The ownership variable across newspapers indicates that, on average, a newspaper belongs to a conglomerate of 2.5 other newspapers in the same MSA and to 23.3 other newspapers outside the MSA. In our sample 116 newspapers (or 86.5%) are part of a venture with other newspapers. This number shows a consistent trend of newspaper concentration; in 1920, 8% of daily newspapers were owned by other groups, by 1986 the number increased to 70%.[19] Gannett Company Inc is the newspaper group with the highest amount of dailies owning 89 newspapers nationwide. With respect to the cross-ownership variables, 20.5% of the newspapers are associated with a radio station

The variable TV cross-ownership from Table IV.2 shows that only 12 of our newspaper sample (9%) belong to this group. The BIA dataset presented a total of 28 or 9% of the 1,452 available newspapers were cross owned with a TV, so it appears that we have a consistent sub sample of newspapers.

The market structure indicators show that 7.1% of the newspapers belong to a JOA, 50.8% are in a competitive market, 8% are part of two-edition monopoly markets, and the remaining 34.1% are monopolist newspapers as shows Figure IV.1.[20]

Table IV.3 presents the amount of news and its proportion relative ads, broken down by the day of the week. The appendix of this study presents the results of examining the newspapers' Newshole, so Table IV.3 includes that information as well. Sunday has the highest amount of news; it also has the highest number of pages and ads. The lowest amount of news is circulated on Monday; it also has the fewest number of pages. As can be expected, there is a high correlation between the number of pages and the amount of news being published.

In Table IV.4 the amount of news is presented broken down by the cross-ownership variables. It most be noted that this table only controls for the radio and TV cross-ownership assuming all other variables to be constant. Newspapers co-owned with a radio station have a mean of 1,065 column inches of news, whereas non co-owned

[18] All the broad sheet newspapers provided by TNS have 6 columns.
[19] See Busterna (1988).
[20] The classification used of market structure by MSA is also consistent with Romeo, Pittman and Familant (2005).

newspapers have on average 968 column inches of news, suggesting that when all other variables remain constant, newspapers co-owned with a radio station in the same city present a slightly higher amount of news. Newspapers co-owned with TV stations had an average of 1,103 column inches of news, relative to 976 column inches for newspapers not cross owned with a TV sation.

Table IV.7 provides a list of all the newspapers in our sample and their MSA, market structure, size of page, and other specifications. For example, the first entry is the Akron Beacon Journal (ABJ), which operates in the Akron MSA in the state of Ohio. This newspaper has a page size of 132 column inches. Table IV.7 also shows that the ABJ is a broad sheet newspaper (tabloid indicator equals 0) and is cross-owned in conjunction with 2 other daily papers outside the MSA, but has no ownership with other newspapers within the MSA, or cross-ownership with TV or radio stations. The last two columns of Table IV.7 show the number of pages in the "General News" section and the amount of news in column inches; to continue the example from above, the ABJ had a "General News" section with 8 pages and averages 643.5 column inches of news.

Results

Before providing the estimation of Equations 2 and 3, Table IV.5 shows the model estimation when newspaper dummies are used instead of market dummies. This regression presented a high degree of multicollinearity that made the coefficients flip in sign, magnitude and statistical significance depending on which of the newspaper dummies was left out. As was explained before, the only variables available for radio and TV cross-ownership are indicators that equal 1 if there is a venture and 0 otherwise. We illustrate the issue/problem here. Suppose that the Washington Post is the only newspaper co-owned with a radio station, then this variable equals 1 for the Washington Post and 0 for every other newspaper. But then the radio indicator is identical to the Washington Post dummy variables; hence, if we leave inside the model the Washington Post dummy, we have perfect collinearity since we have two identical variables. If we leave out the Washington Post dummy, we still have perfect collinearity because the radio dummy replaces the Washington Post and we have perfect multicollinearity between the radio indicator and the rest of the newspaper dummies. If instead there are only two

newspapers co-owned with a radio station, then the radio station equals the sum of the respective two newspaper dummies and we have the same problem. Hence, including newspaper dummies creates a high degree of multicollinearity in the model which causes asymptotic properties and magnitude switches in the variables involved. Since the cross-ownership variables are the most important independent variables in the model, this specification has to be dropped.

Column (1) shows the model omitting the dummy variable for the Washington Post which is cross-owned with a radio station. For this specification none of the media cross-ownership variables are statistically significant. Column (2) excludes the Atlanta Journal Constitution which is cross-owned with both a radio and a TV station. For this model the radio cross-ownership variable becomes significant; however, results should not change depending on which dummy variable is left out unless there are data problems, like in our case multicollinearity. When the Akron Beacon Journal is the excluded dummy variable, Column (3) shows how the TV cross-ownership is significant instead of the radio variable. The difference is that the Akron Beacon Journal is not cross-owned with a radio or TV station. Finally, Column (4) presents the same model but excludes the dummy variable for the Arizona Republic, which is co-owned with a TV station. With this specification, both media cross-ownership variables become significant.

The estimation of Equations 2 and 3 are presented in Table IV.6. Column (1) estimates Equation 2 without the market dummy variables. Column (2) includes the market dummy variables. Lastly, Column (3) presents the results of estimating Equation 3 which is the reduced dataset where each observation consists of the average of the 14 days as explained in the previous section.

Column (1) shows that every additional co-owned newspaper in the same market is associated with a 5.4% drop in news. The addition of a co-owned newspaper outside the MSA has no effect on the amount of news as the coefficient is not statistically significant. The coefficients of cross-ownership with a radio or TV station within the same market are not found to affect on the amount of news that is circulated in the newspaper. The previous sections of this study suggest that radio and TV stations do benefit from ventures with newspapers. It may be that the venture in term of news operations is more beneficial to the radio or TV station than to the newspaper. A

plausible explanation for this result is that the source of a reasonable amount of news broadcasted by radio and TV stations comes from newspaper articles. Once a station is co-owned with a newspaper, it presumably has more access to the newspaper' stories which enables increasing its own news operations. On the other hand, this non-result may also be due to the relatively small sample size of newspaper data available to us.

The JOA coefficient suggests that newspapers in such agreements show no evidence of circulating a different amount of news than "independent" newspapers; however as was shown in Figure IV.1, only 7% of the sample belongs to such agreements. With respect to the market variables, the HHI suggests that the level of concentration in the market has no effect on news operations. It must be noted that in our context, concentration is only measured among newspapers, thus, the market share of other broadcasting media such as radio, TV, and nowadays more importantly, the Internet are not included. The number of households suggests that a 1% increase in the number of households implies a 1.4% increase in the amount of news. The average income per household at the MSA level has no effect on the amount of news. Finally, the dummies measuring the effect of each day of the week show that Sunday presents the largest amount of news, with 23.4% more news than an average Wednesday, followed by Friday with 12.2%, and Thursday with 8.1%; Saturday and Thursday present no statistical difference with Wednesday. Lastly, Monday is the day of the week with the lowest amount of news with a drop of 9.4% with respect to Wednesday. Notice that the day of the week estimates are consistent with the descriptive statistics shown in Table IV.3.

Column (2) presents the estimation of Equation 2 including the market dummies. Due to the multicollinearity of the market dummies with the rest of the market variables, the dummies corresponding to the last four markets are excluded to account for the collinearity of each of the four market specific variables. The coefficients are very similar to Column (1); however there is a tradeoff with the inclusion of the new variables. Even though the R^2 of the regression shows an improvement from Column (1) from .1649 to .3826 in Column (2), the market dummy variables also introduce a multicollinearity effect with respect to the market specific variables; which means that the coefficient estimates of the collinear variables vary widely depending on which specification is examined. However, the multicollinearity affects only those variables that are collinear.

From this estimation, each additional co-owned newspaper within the same market suggests a smaller decrease of 4% in the amount of news. The HHI coefficient shows statistical significance; nonetheless, this coefficient is highly correlated with the market dummies which make the result questionable.[21] The rest of the coefficients in Column (2) present magnitude and asymptotic properties similar to those in Column (1).

Lastly, Column (3) presents the results form estimating Equation 3. As was explained above, aggregating the data do not only reduced the sample size, but also loses the effect of the day dummies. However, it eliminates any evidence of multicollinearity. The results are very similar from Column (1) and Column (2). Since the day of the week dummies were significant in the other regressions, Table IV.8 estimates Equation 3 but aggregating only by each day of the week. It shows how each of the parameters from Column (3) in Table IV.6 varies slightly depending on the day of the week

Concluding Remarks

In this section of Media Study #4, the effect of news operations in the newspaper industry has been measured as the absolute amount of news measured in column inches. The main findings, based on our sample, are that a newspaper that is co-owned with another newspaper in the same market has a drop in its news operations of about 5%. An additional sibling newspaper outside the market does not affect news operations. Cross-ownership variables are included to control for the effect of a newspaper co-owned with a radio and/or TV station in the same city. The regression results do not find that same city cross-ownership with radio, or TV, affects the amount of news circulated by the newspaper. This result could be because newspapers do not publish longer editions when cross owned with other media. On the other hand, the non-result may simply be an artifact of our data, and that with more, we could find another result. Specifically, when we compare this section with the other sections of Study 4, we have only observations over one year, and for only 134 newspapers.[22] Nonetheless, radio and TV stations do benefit in their news operations when co-owned with newspapers in the same market.

[21] The regressions were estimated using the statistical software STATA.
[22] Sections I and III of FCC Media Ownership Study #4 cover four years of data and over 6700 individual TV stations and over 8000 radio stations. Section II of Study 4 considers only one year, but has data for over 1,000 stations.

Joint Operating Agreements (JOA) present a similar amount of news to those of independent newspapers.

Market specific variables include the level of newspaper concentration in the market as measured by the Herfindahl-Hirschman Index (HHI). The HHI is not found to have an effect on news operation. To control for the macroeconomic effect of the market, the number of households by MSA and the average income per household are also included. The number of households is associated with an increase in the amount of news, whereas, average income has no effect on news operation.

Finally, Sunday is the day of the week that presents the largest amount of news (approximately 23% over an average Wednesday), followed by Friday (12%) with Monday as the weekday with the smallest amount of news.

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Figure IV.1
Market Structure Representation

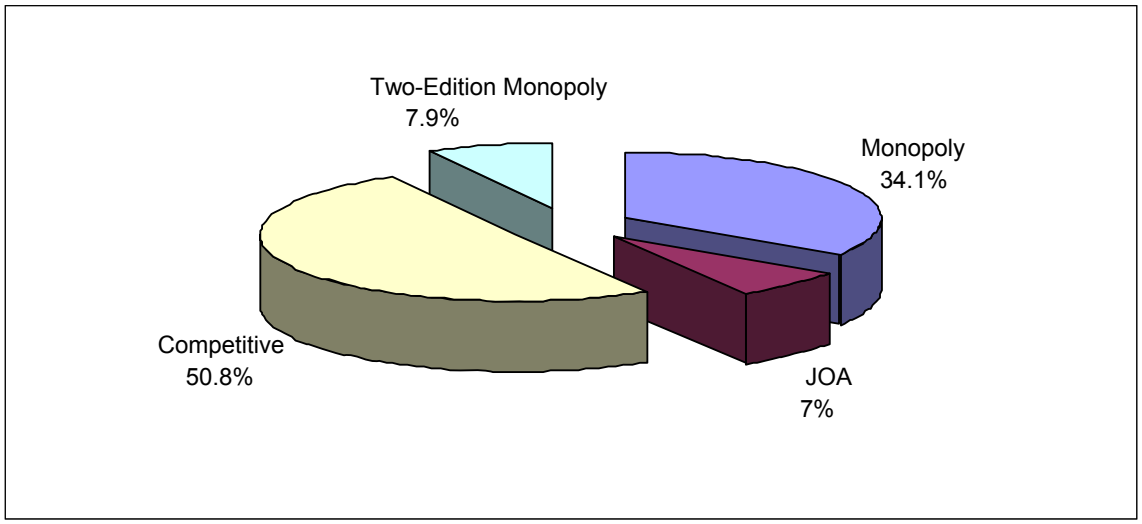

Table IV.1
Constructed Weeks Dates

	Week 1	Week 2
Sunday	12/4/2005	11/6/2005
Monday	1/3/2005	5/9/2005
Tuesday	10/11/2005	4/26/2005
Wednesday	11/23/2005	4/27/2005
Thursday	12/15/2005	1/27/2005
Friday	4/8/2005	1/21/2005
Saturday	7/2/2005	4/16/2005

Table IV.2
Descriptive Statistics

	Variable	Observations	Mean	Std. Dev.	Min	Max
Broad Sheet	Amount of News	1734	1,003.960	523.420	51.5	7692.5
	Size of Page	1734	127.401	4.801	118.5	168
	Number of Pages	1734	14.522	7.591	1	66
Tabloid	Amount of News	113	869.042	719.826	91.25	3927.5
	Size of Page	113	67.126	8.578	57.5	78
	Number of Pages	113	19.407	13.634	3	78
	Overall Newshole	1847	58.767	15.702	7.837302	97.6446
Newspaper Variables	Ownerdailies Within Market	1822	2.561	2.861	1	12
	Ownerdailies Outside Market	1822	23.369	26.184	0	88
	Within Market Radio	1833	0.205	0.404	0	1
	Within Market TV	1833	0.091	0.287	0	1
	Tabloid	1847	0.061	0.240	0	1
	JOA	1847	0.071	0.257	0	1
Market Specific Variables	HHI	1847	0.493	0.234	.139	.997
	Households	1822	1,572,121	1,755,192	17900	6829200
	Average Income per Household	1822	56,885.440	9,838.874	37204	93581

Table IV.3
News by Day of the Week

Day of the Week	Variable	Mean	Std. Dev.	Min.	Max.
	Amounf of News	879.016	458.033	51.500	3927.500
Monday	Newshole	71.279	13.092	36.910	95.736
	Pages per Section	10.459	6.196	1	54
	Amounf of News	916.426	580.392	56	7692.500
Tuesday	Newshole	64.075	13.759	7.837	94.514
	Pages per Section	12.063	6.875	1	66
	Amounf of News	949.576	535.608	88.750	6160.750
Wednesday	Newshole	55.774	15.680	21.197	97.645
	Pages per Section	14.740	7.590	1	51
	Amounf of News	1015.467	469.870	120.750	3270.250
Thursday	Newshole	54.495	14.224	18.142	94.729
	Pages per Section	16.349	8.900	2	78
	Amounf of News	1063.889	526.588	88.875	4900.250
Friday	Newshole	55.571	12.966	24.709	94.703
	Pages per Section	16.275	7.489	1	46
	Amounf of News	967.447	602.808	109.500	6004.500
Saturday	Newshole	59.281	16.844	22.404	94.065
	Pages per Section	14.304	8.123	2	48
	Amounf of News	1194.366	525.199	55	3996.500
Sunday	Newshole	50.103	13.200	16.993	94.767
	Pages per Section	20.004	8.255	1	48

Table IV.4
News by Media Cross-Ownership

Cross-Ownership Variable	Measure of News	Obs	Mean	Std. Dev.	Min	Max
same_city_radio=0	Amount of News	107	968.0138	399.8074	194.5208	2,914.7020
	Newshole	107	59.3039	10.6210	32.8564	90.3628
same_city_radio=1	Amount of News	27	1,065.1420	275.0972	231.9231	1,602.1070
	Newshole	27	56.8722	9.6364	38.3940	86.4043
same_city_tv=0	Amount of News	122	976.2042	388.4749	194.5208	2,914.7020
	Newshole	122	59.5968	10.2191	33.8802	90.3628
same_city_tv=1	Amount of News	12	1,103.2830	248.2356	839.5893	1,602.1070
	Newshole	12	50.8547	9.6685	32.8564	65.3005

Table IV.5
Regression Results with Newspaper Dummies

	(1)		(2)		(3)		(4)	
Excluded dummy:	Washington Post		Atlanta Constitution		Akron Beacon Journal		Arizona Republic	
same_city_radio	-0.0738	0.1769 ♠	-0.7277	0.2533 ♠	0.0961	0.0915 ♠	-0.5891	0.2527 ♠
same_city_tv	0.0605	0.1775 ♠	0.0990	0.0793 ♠	0.3232	0.0621 ♠	0.2218	0.0666 ♠
owner_within	-0.0551	0.0110 **	-0.0634	0.0171 **	-0.1195	0.0086 **	-0.0653	0.0171 **
owner_out	-0.0049	0.0013 **	-0.0095	0.0033 **	-0.0010	0.0009	-0.0113	0.0033 **
joa	0.2268	0.0813 **	-0.0505	0.2787	0.9418	0.1463 **	0.0582	0.2735
hhi	-0.4308	0.2302	-0.3149	0.2105	-0.7665	0.1396 **	-0.6622	0.1421 **
sunday	0.1898	0.0337 **	0.1898	0.0337 **	0.1898	0.0337 **	0.1898	0.0337 **
monday	-0.1020	0.0299 **	-0.1020	0.0299 **	-0.1020	0.0299 **	-0.1020	0.0299 **
tuesday	-0.0576	0.0291	-0.0576	0.0291 **	-0.0576	0.0291 **	-0.0576	0.0291 **
thursday	0.0760	0.0255 **	0.0760	0.0255 **	0.0760	0.0255 **	0.0760	0.0255 **
friday	0.1197	0.0259 **	0.1197	0.0259 **	0.1197	0.0259 **	0.1197	0.0259 **
saturday	0.0080	0.0302	0.0080	0.0302	0.0080	0.0302	0.0080	0.0302
R^2	0.5869		0.5869		0.5869		0.5869	
Cross-Ownership								
same_city_radio	Yes		Yes		No		No	
same_city_tv	No		Yes		No		Yes	

Robust standard errors are provided.
** Significant at 95%. *** Significant at 99%.
♠ Coefficient and Standard Error altered due to Multicollinearity.

Table IV.6
Regression Results: Effect of Cross-Ownership on the Amount of News

	(1) No Market Dummies			(2) Market Dummies			(3) Two-week Regression		
	Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.	
Intercept	4.1680	2.0642	**	52.8028	30.4556		4.1588	2.3102	
Ownerdailies Within Market	-0.0540	0.0175	**	-0.0398	0.0172	**	-0.0594	0.0187	**
Ownerdailies Outside Market	-0.0018	0.0011		-0.0022	0.0017		-0.0020	0.0012	
Radio	-0.0049	0.0753		-0.0310	0.1858		-0.0194	0.0737	
TV	0.0741	0.0842		0.0273	0.1517		0.0573	0.0873	
HHI	0.0843	0.1797		0.0000	0.0000	♠	0.0819	0.1975	
JOA	-0.1418	0.1297		-0.0020	0.1900	♠	-0.1378	0.1364	
sunday	0.2109	0.0449		0.2040	0.0462	**			
monday	-0.0995	0.0295	**	-0.0992	0.0300	**			
tuesday	-0.0545	0.0323	**	-0.0548	0.0330				
thursday	0.0780	0.0245	**	0.0788	0.0255	**			
friday	0.1159	0.0256	**	0.1216	0.0259	**			
saturday	0.0052	0.0283		0.0055	0.0283				
Ln(Income)	0.1421	0.0439	**	-5.9399	3.9705	♠	0.1560	0.0512	**
Ln(Hoseholds)	0.0710	0.1712		1.4043	0.9667	♠	0.0642	0.1841	
R^2	0.1649			0.3789			0.2574		

Robust standard errors are provided.
** Significant at 95%. *** Significant at 99%.
♠ Coefficient and Standard Error altered due to Multicollinearity.

Table IV.7
Newspaper and Market Characteristics

MSA	Newspaper	Market Structure	Tabloid	Dailies within market	Dailies Outside market	Within Market Radio	Within Market TV	Page Size	Pages for Section	Newshole	Amount of News
Akron, OH	Akron Beacon Journal	COM	0	1	2	0	0	132	8	60.938	643.5
Albany-Schenectady-Troy, NY	Albany Times-Union	MON	0	1	11	0	0	129	5	61.860	399
Albuquerque, NM	Albuquerque Journal	JOA	0	1	0	0	0	129	7	95.515	862.5
Allentown-Bethlehem, PA	Morning Call	COM	0	1	11	1	0	126	8	72.941	735.25
Allentown-Bethlehem, PA	Delaware County Daily Times	COM	1	1	26	0	0	78	36	93.795	2633.75
Allentown-Bethlehem, PA	Express-Times, The	COM	0	1	17	0	0	126	1	40.873	51.5
Asheville, NC	Asheville Citizen-Times	COM	0	1	88	0	0	129	3	74.677	289
Atlanta, GA	Atlanta Journal-Constitution	MON	0	1	15	1	1	129	5	91.240	588.5
Austin, TX	Austin American-Statesman	MON	0	1	15	1	0	126	12	87.004	1315.5
Baltimore, MD	Baltimore Sun, The	MON	0	1	11	1	0	126	10	81.329	1024.75
Birmingham, AL	Birmingham News, The	JOA	0	1	17	0	0	130.5	8	82.136	857.5
Boston, MA	Boston Globe, The/ Boston Sunday Globe	COM	0	1	16	1	0	126	14	72.619	1281
Boston, MA	Boston Herald	COM	1	4	1	0	0	66.25	27	62.999	1126.9
Bradford, PA	Daily Review, The	MON	0	1	5	0	0	124.5	7	48.652	424
Bridgeport, CT	Connecticut Post	COM	0	1	48	0	0	121.5	10	68.416	831.25
Bridgeport, CT	Greenwich Time	COM	0	2	10	1	0	129	12	71.786	1111.25
Bridgeport, CT	Advocate, The	COM	0	2	10	1	0	129	11	68.358	970
Buffalo-Niagara Falls, NY	Buffalo News, The	MON	0	1	0	0	0	120	8	95.260	914.5
Charlotte-Gastonia-Rock Hill, NC-SC	Charlotte Observer, The	MON	0	2	31	0	0	135	12	68.735	1113.5
Chicago, IL	Beacon-News, The	COM	0	7	0	0	0	126	8	83.234	839
Chicago, IL	Chicago Sun-Times/Sunday Sun-Times	COM	0	7	0	0	0	126	26	65.205	2136.13
Chicago, IL	Chicago Tribune	COM	0	1	11	1	1	126	13	50.488	827
Chicago, IL	Courier-News, The	COM	0	7	0	0	0	168	7	70.685	831.25
Chicago, IL	Herald-News, The	COM	0	7	0	0	0	126	8	73.016	736
Chicago, IL	Northwest Herald, The	COM	0	3	4	0	0	126	10	71.984	907
Chicago, IL	Daily Southtown	COM	0	7	0	0	0	126	8	90.972	917
Cincinnati, OH	Cincinnati Enquirer, The	JOA	0	1	88	0	0	129	8	68.314	705
Cleveland, OH	Plain Dealer, The	MON	0	1	17	0	0	126	10	57.540	725
Columbus, OH	Columbus Dispatch, The	MON	0	1	0	1	1	126	8	73.016	736
Dallas-Ft. Worth, TX	Dallas Morning News, The	MON	0	2	2	0	1	126	16	59.449	1198.5
Dallas-Ft. Worth, TX	Fort Worth Star-Telegram	COM	0	1	32	0	0	126	8	63.790	643
Dayton, OH	Dayton Daily News	MON	0	2	14	1	1	126	8	86.930	876.25
Daytona Beach, FL	Daytona Beach News-Journal, The	COM	0	1	0	0	0	124.5	7	79.145	689.75

Denver-Boulder, CO	Denver Post, The	JOA	0	1	48	0	0	120	14	40.030	672.5
Denver-Boulder, CO	Rocky Mountain News	JOA	0	3	16	0	0	120	3	79.444	286
Detroit, MI	Detroit Free Press	JOA	0	3	86	0	0	118.5	4	85.970	407.5
Detroit, MI	Detroit News, The	JOA	0	3	86	0	0	118.5	8	94.146	892.5
Durham, NC	Daily Herald	COM	0	1	11	0	0	124.5	12	65.060	972
Fresno, CA	Fresno Bee, The	MON	0	1	32	0	0	126	11	85.173	1180.5
Grand Rapids, MI	Grand Rapids Press, The	MON	0	1	7	0	0	120	8	78.203	750.75
Greensboro-Winston Salem-High Point, NC	News & Record	MON	0	1	2	0	0	129	7	77.076	696
Greenville-Spartanburg, SC	Greenville News, The	COM	0	1	88	0	0	126	5	82.619	520.5
Greenville-Spartanburg, SC	Spartanburg Herald-Journal	COM	0	1	16	1	0	126	6	78.340	592.25
Harrisburg-Lebanon-Carlisle, PA	Patriot-News, The	MON	0	1	17	0	0	126	5	83.968	529
Hartford-New Britain-Middletown, CT	Bristol Press, The	COM	1	5	22	0	0	57.5	8	55.815	256.75
Hartford-New Britain-Middletown, CT	Hartford Courant, The	MON	0	2	10	1	1	129	8	89.026	918.75
Hartford-New Britain-Middletown, CT	Journal Inquirer	COM	1	1	0	0	0	70	8	72.232	404.5
Hartford-New Britain-Middletown, CT	Record-Journal	COM	0	1	0	0	0	129	5	78.140	504
Hartford-New Britain-Middletown, CT	Middletown Press, The	COM	1	5	22	0	0	57.5	3	76.812	132.5
Hartford-New Britain-Middletown, CT	Herald, The/ Sunday Herald Press	COM	1	5	22	0	0	57.5	5	85.652	246.25
Hartford-New Britain-Middletown, CT	New Haven Register	COM	0	5	22	0	0	126	7	70.862	625
Houston-Galveston, TX	Houston Chronicle	MON	0	1	11	0	0	126	7	83.702	738.25
Indianapolis, IN	Indianapolis Star, The	MON	0	1	88	0	0	123	3	89.634	330.75
Jacksonville, FL	Florida Times-Union	MON	0	2	24	0	0	129	16	66.194	1366.25
Kansas City, MO-KS	Kansas City Star, The	MON	0	2	31	0	0	120	8	60.052	576.5
Las Vegas, NV	Las Vegas Review-Journal	JOA	0	1	10	0	0	126	14	69.218	1221
Little Rock, AR	Arkansas Democrat-Gazette	MON	0	1	8	0	0	129	6	90.472	700.25
Los Angeles, CA	Los Angeles Daily News	COM	0	5	44	0	0	126	9	56.526	641
Los Angeles, CA	Los Angeles Times	COM	0	1	11	1	1	129	18	51.626	1198.75
Los Angeles, CA	Press-Telegram	COM	0	5	44	0	0	126	9	85.097	965
Los Angeles, CA	Orange County Register, The	MON	0	1	2	0	0	129	16	58.140	1200
Los Angeles, CA	San Gabriel Valley Tribune	COM	0	5	44	0	0	127.5	13	85.460	1416.5
Louisville, KY	Courier-Journal, The	COM	0	1	88	0	0	118.5	10	77.089	913.5
Melbourne-Titusville-Cocoa, FL	Florida Today	COM	0	1	88	0	0	126	7	79.365	700
Memphis, TN	Commercial Appeal, The	MON	0	1	18	0	0	135	8	73.843	797.5
Miami-Ft. Lauderdale-Hollywood, FL	Boca Raton News	COM	0	1	0	0	0	120	18	82.199	1775.5
Miami-Ft. Lauderdale-Hollywood, FL	Miami Herald, The/El Nuevo Herald	COM	0	2	31	0	0	126	16	72.817	1468
Miami-Ft. Lauderdale-Hollywood, FL	Palm Beach Post, The	MON	0	1	15	1	0	135	14	55.357	1046.25
Miami-Ft. Lauderdale-Hollywood, FL	South Florida Sun-Sentinel	MON	0	1	11	1	1	126	16	52.629	1061
Milwaukee-Racine, WI	Milwaukee Journal Sentinel	MON	0	1	0	1	1	120	14	63.884	1073.25
Minneapolis-St. Paul, MN	Star Tribune	COM	0	1	32	0	0	126	14	73.087	1289.25
Minneapolis-St. Paul, MN	St Paul Pioneer Press	COM	0	1	48	0	0	126	7	58.163	513

Nashville, TN	Tennessean, The	MON	0	1	0	0	0	126	8	80.258	809
New Orleans, LA	Times-Picayune, The	MON	0	1	17	0	0	126	14	64.357	1135.25
New York, NY	Asbury Park Press	COM	0	5	84	0	0	126	12	83.433	1261.5
New York, NY	Record, The/The Sunday Record	COM	0	1	0	0	0	126	10	55.278	696.5
New York, NY	Bridgewater Courier News	COM	0	5	84	0	0	129	8	72.117	744.25
New York, NY	Home News Tribune	COM	0	5	84	0	0	126	8	70.511	710.75
New York, NY	Daily Record	COM	0	5	84	0	0	126	3	85.979	325
New York, NY	New York Post	COM	1	1	0	0	1	75	14	59.571	625.5
New York, NY	Star-Ledger	COM	0	3	15	0	0	129	12	67.070	1038.25
New York, NY	Daily News	COM	1	1	0	0	0	78	19	49.663	736
New York, NY	journal news	COM	0	5	84	0	0	129	6	69.412	537.25
Norfolk-Virginia Beach-Newport News, VA	Daily Press	COM	0	1	11	1	0	126	8	87.326	880.25
Norfolk-Virginia Beach-Newport News, VA	Virginian-Pilot, The	COM	0	1	2	1	0	129	12	62.758	971.5
Norwalk, OH	Norwalk Reflector	COM	0	1	5	0	0	129	11	94.609	1342.5
Oklahoma City, OK	Daily Oklahoman, The	MON	0	1	0	0	0	127.5	16	64.387	1313.5
Omaha-Council Bluffs, NE-IA	Omaha World-Herald	MON	0	1	5	0	0	124.5	1	53.414	66.5
Orlando, FL	Orlando Sentinel, The	MON	0	1	11	1	0	126	9	66.358	752.5
Oxnard-Ventura, CA	Ventura County Star/Sunday Star	COM	0	1	18	1	0	129	9	65.633	762
Philadelphia, PA	Bucks County Courier Times	ED	0	3	3	0	0	129	6	87.177	674.75
Philadelphia, PA	Burlington County Times	ED	0	3	3	0	0	129	6	84.302	652.5
Philadelphia, PA	Courier-Post	COM	0	1	88	0	0	129	8	68.968	711.75
Philadelphia, PA	Intelligencer-Record, The	ED	0	3	3	0	0	129	5	90.000	580.5
Philadelphia, PA	Reporter, The	COM	0	5	22	0	0	129	6	94.574	732
Philadelphia, PA	Philadelphia Inquirer/Philadelphia Daily News	ED	0	2	0	0	0	126	12	65.245	986.5
Phoenix, AZ	Arizona Republic, The	MON	0	2	87	0	1	126	10	57.758	727.75
Phoenix, AZ	East Valley & Scottsdale Tribune	COM	0	1	2	0	0	126	12	78.819	1191.75
Pittsburgh, PA	Tribune-Review	COM	0	4	1	0	0	132	2	83.807	221.25
Pittsburgh, PA	Pittsburgh Post-Gazette	MON	0	1	1	0	0	126	20	44.742	1127.5
Portland, OR	Oregonian, The	MON	0	1	17	0	0	129	8	80.281	828.5
Providence-Warwick-Pawtucket, RI	Providence Journal	MON	0	1	3	0	0	126	2	58.730	148
Raleigh-Durham, NC	Herald-Sun, The	COM	0	1	29	1	0	126	3	70.569	266.75
Raleigh-Durham, NC	News & Observer, The	COM	0	1	0	0	0	126	10	80.556	1015
Richmond, VA	Richmond Times-Dispatch	MON	0	1	24	0	0	126	4	76.538	385.75
Riverside-San Bernardino, CA	Inland Valley Daily Bulletin	COM	0	3	46	0	0	129	10	57.558	742.5
Riverside-San Bernardino, CA	Daily Press, The/ Sunday Press Dispatch	MON	0	2	23	1	0	126	8	63.765	642.75
Riverside-San Bernardino, CA	Sun, The	COM	0	3	46	0	0	126	8	86.062	867.5
Sacramento, CA	Sacramento Bee, The	MON	0	1	32	0	0	126	15	68.307	1291
Salt Lake City-Ogden-Provo, UT	Salt Lake Tribune, The, Deseret Morning News	JOA	0	1	48	0	0	129	8	82.098	847.25
San Antonio, TX	San Antonio Express-News	MON	0	1	11	0	0	126	8	79.712	803.5

San Diego, CA	North County Times	COM	0	1	37	0	0	126	10	60.694	764.75
San Diego, CA	San Diego Union Tribune	MON	0	1	8	0	0	129	12	58.834	910.75
San Francisco, CA	Contra Costa Times	ED	0	12	37	0	0	129	2	86.047	222
San Francisco, CA	Argus, The	ED	0	12	37	0	0	129	6	64.987	503
San Francisco, CA	Daily Review, The	ED	0	12	37	0	0	129	6	65.762	509
San Francisco, CA	Marin Independent Journal	ED	0	12	37	0	0	129	10	60.659	782.5
San Francisco, CA	Oakland Tribune, The	MON	0	12	37	0	0	129	6	69.509	538
San Francisco, CA	Valley Times	ED	0	12	37	1	0	129	2	86.047	222
San Francisco, CA	San Francisco Chronicle	COM	0	1	11	0	0	129	8	69.138	713.5
San Francisco, CA	San Mateo County Times	ED	0	12	37	0	0	129	8	69.913	721.5
San Francisco, CA	Vallejo Times-Herald	MON	0	12	37	1	0	129	11	80.673	1144.75
San Jose, CA	San Jose Mercury News	MON	0	1	48	0	0	129	12	49.919	772.75
Santa Rosa, CA	Press Democrat, The	COM	0	1	16	1	0	126	10	61.310	772.5
Seattle-Tacoma, WA	Seattle Times, The	JOA	0	1	2	0	0	135	10	74.296	1003
Seattle-Tacoma, WA	Seattle Post-Intelligence	JOA	0	1	11	0	0	135	8	76.667	828
Seattle-Tacoma, WA	News Tribune, The	COM	0	2	31	0	0	129	5	78.411	505.75
St. Louis, MO	St Louis Post-Dispatch	MON	0	1	12	0	0	135	5	77.667	524.25
Tampa-St. Petersburg-Clearwater, FL	St Petersburg Times	COM	0	1	0	0	0	129	12	67.862	1050.5
Tampa-St. Petersburg-Clearwater, FL	Tampa Tribune	COM	0	2	23	1	1	126	14	64.626	1140
Tulsa, OK	Tulsa World	MON	0	1	0	0	0	126	17	86.835	1860
Washington, DC	Washington Post, The	COM	0	1	0	1	0	126	14	74.065	1306.5
Washington, DC	Washington Times	COM	0	1	0	0	0	126	16	84.561	1704.75
Winchester, VA	Winchester Star, The	MON	0	1	1	0	0	129	8	81.613	842.25

Table IV.8
Regression by Day of the Week

	Monday		Tuesday		Wednesday		Thursday	
	Coef.	Error	Coef.	Error	Coef.	Error	Coef.	Error
Intercept	3.7005	2.9891	4.3661	2.9205	4.1949	2.9477	2.5227	3.2309
Ownerdailies Within Market	-0.0405	0.0199 **	-0.0467	0.0199 **	-0.0655	0.0195 **	-0.0623	0.0207 **
Ownerdailies Outside Market	-0.0026	0.0013	-0.0021	0.0013	-0.0019	0.0014	-0.0018	0.0012
Radio	0.0365	0.1103	0.1636	0.0933	0.0735	0.0950	0.0662	0.1006
TV	0.0662	0.1003	-0.1079	0.1046	0.0080	0.0755	0.0117	0.1011
HHI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
JOA	-0.0148	0.1414	-0.2125	0.1874	-0.0440	0.1499	-0.0581	0.1409
Ln(Households)	0.1366	0.0636 **	0.1251	0.0594 **	0.1685	0.0631 **	0.1522	0.0699 **
Ln(Income)	0.1135	0.2354	0.0705	0.2487	0.0443	0.2522	0.2169	0.2466
R^2	0.1439		0.1626		0.2369		0.2204	

	Friday		Saturday		Sunday	
	Coef.	Error	Coef.	Error	Coef.	Error
Intercept	4.8337	2.2545 **	1.3852	3.8475	4.6774	2.9226
Ownerdailies Within Market	-0.0675	0.0189 **	-0.0634	0.0223 **	-0.0553	0.0178 **
Ownerdailies Outside Market	-0.0021	0.0012	-0.0007	0.0015	-0.0019	0.0013
Radio	0.0641	0.0934	0.0683	0.1099	0.0337	0.0985
TV	-0.0805	0.1266	0.1141	0.0989	-0.0889	0.0942
HHI	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000 **
JOA	-0.1273	0.1380	-0.3333	0.2457	-0.0437	0.1677
Ln(Households)	0.1267	0.0467 **	0.1964	0.0821 **	0.2016	0.0561 **
Ln(Income)	0.0556	0.2000	0.2529	0.3046	-0.0491	0.2546
R^2	0.2382		0.2096		0.1957	

Appendix

In this section Equations 2 and 3 will be estimated using a second measure for news operations. As was defined above, the Newshole is the percentage of news in a publication. Equation 4 presents the definition of the Newshole in terms of the variables used above.

$$Newshole_i = \frac{size\ of\ page_i * number\ of\ pages_i - ads_i}{size\ of\ page_i * number\ of\ pages_i} * 100\% \quad (4)$$

Replacing the amount of news with the Newshole, Table IV.9 presents the results equivalent to estimating the model with market dummy variables (Column (2) of Table IV.6) and the reduced regression with aggregated data (equivalent to Column (3) of Table IV.6).

The results of Table IV.9 suggest that each additional co-owned newspaper within the same market increases the Newshole by 2%. Columns (1) and (2) show how the flip in sign is evidence of multicollinearity for the regression with the market dummies. As before sibling newspapers outside the MSA show no effect on news operations. Sunday is the day of the week that presents the smallest Newshole (10%) compared to an average Wednesday; Monday and Tuesday are the days of the week with the biggest Newshole, followed by Saturday; Wednesday, Thursday and Friday are not statistically different in the proportion of news that is published for the sample used. For this set of regressions, the number of households is associated with a drop in Newshole of roughly 5%.

Table IV.9
Regression Results with Newshole as the Dependent Variable

	(1) no Market Dummies		(2) Market Dummies		(3) Two-week Regression	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Intercept	4.1680	2.0642 **	15.1397	2.3882 **	4.1588	2.3102
Ownerdailies Within Market	-0.0540	0.0175 **	0.0307	0.0151 **	-0.0594	0.0187 **
Ownerdailies Outside Market	-0.0018	0.0011	-0.0016	0.0009 *	-0.0020	0.0012
Radio	-0.0049	0.0753	0.0772	0.0679	-0.0194	0.0737
TV	0.0741	0.0842	-0.2722	0.0783	0.0573	0.0873
HHI	0.0843	0.1797	-0.3170	0.7280 ♠	0.0819	0.1975
JOA	-0.1418	0.1297	-0.1367	0.0878 ♠	-0.1378	0.1364
sunday	0.2109	0.0449	-0.0974	0.0192 **		
monday	-0.0995	0.0295 **	0.2815	0.0180 **		
tuesday	-0.0545	0.0323 **	0.1599	0.0217		
thursday	0.0780	0.0245 **	-0.0071	0.0174 **		
friday	0.1159	0.0256 **	0.0084	0.0167 **		
saturday	0.0052	0.0283	0.0578	0.0137		
Ln(Income)	0.1421	0.0439 **	-1.0225	0.2337 ♠	0.1560	0.0512 **
Ln(Hoseholds)	0.0710	0.1712	0.0132	0.0200 ♠	0.0642	0.1841
R^2	0.1649		0.4307		0.2574	

Robust standard errors are provided.
** Significant at 95%. *** Significant at 99%.
♠ Coefficient and Standard Error altered due to Multicollinearity.