Information Economics and Policy 24 (2012) 231–242

Contents lists available at SciVerse ScienceDirect

Information Economics and Policy

journal homepage: www.elsevier.com/locate/iep

Local media ownership and media quality ☆

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ARTICLE INFO

Article history:
Received 26 August 2011
Received in revised form 3 August 2012
Accepted 3 August 2012
Available online 19 August 2012

JEL classification:
L82
L13
M31

Keywords:
Concentration
Media
Regulation
Television

ABSTRACT

The Federal Communications Commission regulates local media ownership to promote competition, diversity and the provision of local programming. This study investigates how local media cross-ownership, co-ownership and ownership diversity are associated with media market outcomes. Cross-sectional regressions indicate that television station ownership consolidation is associated with increased local TV news production but lower news ratings. However, panel estimation finds that changes in local media ownership are uncorrelated with local media usage or programming, producing confidence intervals that are tightly centered around zero.

1. Introduction

The Federal Communications Commission (FCC) regulates local media ownership to promote competition, localism and diversity. The academic literature, reviewed below, contains mixed evidence on how media impacts consolidation impacts these three goals. For example, newspaper consolidation has been shown to increase product variety (George, 2007) but it has also coincided with reductions in direct competition (Fu, 2003) and higher prices to readers (Chandra and Collard-Wexler, 2009).

A number of econometric studies have been commissioned to determine how competition, localism and diversity are related to media market ownership structure. These studies face three primary challenges. First, there are significant measurement challenges when it comes to determining outcome variables that represent concepts such as localism and diversity. Second, current regulations limit the levels of media ownership variables observed in the data, so predicting out-of-sample outcomes of counterfactual regulatory regimes necessarily depends on modeling assumptions. Third, and most critically for drawing causal inference, media market ownership structure is jointly determined with media market outcomes (such as competition, localism and diversity), suggesting an endogeneity bias without a clear resolution.

With these challenges in mind, the current paper produces three sets of descriptive results. First, it examines how media cross-ownership and co-ownership are associated with media competition from a consumer perspective, as measured by media usage. Second, it determines how

☆ This study was supported by the US Federal Communications Commission as part of its quadrennial media ownership review. We are indebted to Ambarish Chandra, Anthony Dukes, Lisa George, Jonathan Levy, Tracy Waldon and Jessica Almond for providing data and many helpful comments and discussions. Jeffrey Wooldridge made several excellent suggestions which improved this manuscript. Any remaining errors are our own.

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http://dx.doi.org/10.1016/j.infoecopol.2012.08.001

media cross-ownership and co-ownership are associated with localism, as measured by the amount of local news provided in the market. The term "media quality" is used to refer to the collection of variables measuring media usage and local news provision. Third, it determines how media ownership diversity, as measured by station owner characteristics, is related to media quality. We emphasize that these are estimates of statistical relationships and the reader is advised not to attach any causal interpretation to them. We hope that knowledge of existing correlations may be helpful in developing new theories and policies in this area.

The results depend on the estimation technique used. Cross-sectional estimation of these relationships shows that television ownership consolidation is positively correlated with local TV news production and negatively correlated with news viewership. Panel-based estimation techniques, however, find no statistically significant correlations among media ownership and media quality variables, with confidence intervals that are tightly centered around zero.

The remainder of this section reviews the FCC's local media ownership rules and the relevant academic literature. Section 2 describes the conceptual background for the analysis, the technical details and the data. Section 3 presents the results and Section 4 summarizes their policy implications.

1.1. Regulatory background

Three media ownership rules are relevant to the present analysis. This section gives a brief overview of the rules. FCC (2010) provides a complete explanation.

1.1.1. Newspaper/Broadcast Cross-Ownership Rule

Since 1975, the FCC has restricted the common ownership of a broadcast station and a newspaper when, roughly speaking, the station's footprint contains the newspaper's distribution area. Waivers to this rule may be granted when common ownership is judged to be aligned with the public interest. In 2007, the waiver criteria were relaxed so that common ownership would be presumed to be not inconsistent with the public interest in the 20 largest media markets. Common ownership is still presumed to be inconsistent with the public interest in smaller media markets unless (1) one of the two media outlets were "failed" or "failing," or (2) the joint entity would significantly increase the amount of news available in the market.

1.1.2. Local TV Ownership Limit

One entity may own multiple television stations within the same market if (1) their signals do not overlap (this case is rare), or (2) one of the stations is not ranked in the top four stations in the market based on market share, and there are at least eight independently-owned stations in the market. This second provision prohibits multiple station ownership in markets served by fewer than eight stations.

1.1.3. Local Radio/TV Cross-Ownership Rule

The application of this rule depends on the number of "voices"—TV stations, radio stations, newspapers and a cable system—in a media market. In markets with at least 20 independently-owned voices, one entity may own one TV station and up to seven radio stations or two TV stations and up to six radio stations. In markets with 10–19 independently-owned voices, one entity may own up to two TV stations and up to four radio stations. In smaller markets, an entity that owns a TV station may not own more than one radio station. Co-owned pairs of TV stations are always subject to the Local TV Ownership Limit.

Among these rules, the Newspaper/Broadcast Cross-Ownership Rule is of particular interest. Newspaper advertising revenues (print and online) fell 44% in the 3 years ended December 31, 2009, and circulation revenues fell 6% over the same period. These changes led newspapers to reduce their professional editorial staff by 25%. The situation continues to worsen, as newspapers were the only medium in which ad revenue fell in 2010 (PEJ, 2011).

These changes are troubling from a policy perspective, as newspaper readership has been positively associated with voter information and participation. Historically, the entry of a newspaper into a local market increased voter turnout (Gentzkow et al., forthcoming). Subsequent television station entry into local markets corresponded to sharp drops in both newspaper consumption and voter turnout (Gentzkow, 2011). Survey evidence suggests that knowledge of local politics drops during newspaper strikes (Mondak, 1995). Taken together, these findings suggest that newspapers have played a special role in informing the public about local politics.

This special role may come from fundamental differences in the way that television and newspaper media present the news, since television faces tighter time constraints and often requires supplementary video. Milburn and McGrail (2001) argued that television news presentation typically follows a dramatic narrative arc. A controlled experiment showed that dramatic presentation simplifies consumer thinking and reduces recall of news stories. Chiricos et al. (1997) found that individual consumers' fear of crime is positively correlated with television and radio news consumption but not with newspaper or news magazine consumption.

Further, newspapers and television differ in the range of news stories they cover. Baldwin et al. (2010) found that local newspapers provided far more coverage of city government than local television stations. Semetko and Valkenburg (2001) found that newspapers devoted a higher proportion of coverage to crime and education stories than television news programs. TV news reported proportionally more foreign affairs and "human interest" stories.

It seems possible that allowing mergers between newspapers and television stations could lead to substantial economies of scope and may improve product offerings by enabling cross-media promotions and integrated delivery. Many newspapers now offer some video content online, and many television stations' websites provide large repositories of text news stories. To better understand the potential consequences of such mergers, however, it

is necessary to discern how they correlate with local news availability and quality.

1.2. Literature review

Academic research on the impact of media ownership on media market outcomes goes back at least to Steiner (1952), who showed that commonality in viewer preferences regarding program types can result in a tyranny of the majority in program provision. For example, when there are two broadcasters and two program types, one of which is preferred by more than two-thirds of the viewing population, both broadcasters will air a program of the popular type. Attracting half of the larger audience is more profitable than attracting all of the smaller audience, so the less popular program is not offered. A two-channel monopoly can deliver better results than duopoly because it airs both programs and serves the entire market. Steiner argued that the degree to which this result holds in a multi-period model with competing broadcasters depends on the "shiftability" of consumer preferences—the extent to which media consumers prefer certain programs at certain times, such as news in the morning, or entertainment after dinner.

Modern treatments of media markets recognize that media outlets serve multiple groups of customers, including viewers, advertisers and content producers. This framework is called "multi-sided platform industries" (or "two-sided markets"), and its key insight is that user charges reflect both the cost of platform provision and the effect of the agent's platform usage on agents of other types. Barros and Leite (1997) showed that, when two competing technologies are available, if consumers value the higher-cost more, joint ownership of the two technologies leads to higher welfare when the cost difference is large. Chaudhri (1998) showed that demand conditions in the advertising market can lead a monopoly media platform to price below cost in the consumer market. Anderson and Coate (2005) modeled a two-sided media market, capturing the nonrival nature of television program consumption by viewers, the influence of viewers on advertising revenues, and the negative impact of advertising sales on audiences. Their model predicted that ownership consolidation raises media and advertiser profits at the expense of consumer welfare, with an ambiguous effect on social welfare. This occurs because media consolidation reduces competition for viewers and increases the amount of advertising carried by the media.

The subsequent theoretical literature pushed the bounds of the Anderson–Coate framework in a number of directions. The following discussion is limited only to those papers that directly examine the effects of entry or consolidation on competition, and the findings are discussed in the context of the television industry, although most of these models could be applied to any mass media industry. Crampes et al. (2009) showed that, with endogenous program quality decisions, free entry may lead to a suboptimally high number of media outlets, as program development costs are inefficiently spread across a larger number of media outlets. Cunningham and Alexander (2004), in contrast, found that greater concentration among media may either increase or reduce the amount of programming served to consumers, depending on the elasticity of viewing in response to advertising time. Dukes (2006) endogenized advertiser competition in the product market and found, counterintuitively, that advertisers may be better off with greater media concentration, since this may lead to an equilibrium where their messages are more dispersed, softening price competition. Gal-Or and Dukes (2006) investigated mergers among media stations, and found, in contrast with standard results in product market oligopoly, nonconsolidating media mergers become increasingly profitable as media concentration falls. Gentzkow and Shapiro (2008) reviewed a large body of literature and argued that media competition depends crucially on the number of consumers who receive news from multiple sources, as this constrains the degree to which news media compete in the marketplace of ideas. Kind et al. (2009) considered how two types of competition influence media outlets' business models. They found that media content differentiation leads to greater reliance on advertising-supported models, while a greater number of media outlets encourages subscription pricing. Reisinger et al. (2009) modeled TV stations which compete for advertisers as well as viewers. Their model overturns many of the previous literature's results, finding, for example, media profits and advertising levels can actually *rise* with the number of independent media outlets.

To summarize the theoretical literature, competition may either increase or decrease media market economic performance, depending primarily on (1) differentiation among media platforms, (2) the number of media platforms, (3) the rate at which viewers switch media or consume multiple media, (4) the elasticity of advertiser demand, and (5) the degree to which platforms compete for advertisers. The literature contains many opposing predictions so general conclusions are not available.

There has been a limited amount of empirical work related to the questions of interest in this study. Perhaps closest is Brown and Alexander (2005), who used 1952 TV station license allocations as an instrument to identify the effect of media ownership consolidation on station ratings and ad prices. The identifying assumption was that the number of station licenses granted in 1952 was likely to be correlated with media market structure in 1998 but independent of unobserved determinants of ratings and advertising in 1998. Using a system of equations estimated on a cross section of US media markets, they found that a 20% increase in concentration raises advertising price by 9% and ratings by 0.8%. Kasuga and Shishikura (2006) studied the Japanese television industry, reporting that station profits increase with market share but "no clear correlation can be reached with respect to market consolidation."

Four empirical studies of the newspaper industry are related to the questions posed here. Fu (2003) found that postwar ownership consolidation led newspapers to reduce their circulation footprints, reducing head-to-head competition among newspapers. George (2007) found that newspaper ownership consolidation increases differentiation and product variety, measured by newspapers' employed reporters' listed specialties, without harming readership. Chandra and Collard-Wexler (2009) examined data from a

4-year merger wave in which 75% of Canadian newspapers changed hands. They found that newspaper prices rose substantially during this period, but subscription price rises were no higher at acquired newspapers than at non-acquired newspapers. Argentesi and Fillistrucchi (2009) proposed a structural framework to estimate reader responsiveness to newspaper cover price and advertising quantity on one side, and advertiser responsiveness to advertising price and circulation figures on the other. They used their estimates to infer Italian newspaper markups under a variety of competition/collusion assumptions. Comparing their results to markup data in newspaper financial reports, they found evidence consistent with collusive behavior on cover prices and competitive behavior on advertising prices.

Another body of relevant literature is the research commissioned by the FCC during its previous ownership reviews. Most closely related is Shiman et al. (2007), who estimated a panel regression controlling for market, affiliated network and time-specific factors with three-way fixed effects. They found that television stations that are cross-owned with newspapers or radio stations provided more news than other stations, but other ownership variables did not have any impact on news provision.

2. Research methodology

This section describes the research design, the empirical approach and the data.

2.1. Research design

Three observations guided the research design.

First, the usage of each station in a market depends on the programming of all stations in that market, and the programming of each station in the market depends on the ownership of all stations in the market, as predicted by the theoretical literature reviewed in Section 1.2. This observation leads logically to a data analysis done at the level of the media market rather than the individual media outlet, since individual media outlets' choices are made interdependent by market competition.

Second, it is exceedingly difficult to disentangle media market ownership from media market competition and localism. Ownership decisions may be made in anticipation of long-run trends in local media supply or demand that are observable to the station owners but not recorded in the available data. This suggests a possible correlation in the media ownership variables and the residuals in any regression, a problem that has no clear solution. Therefore, this study is purely descriptive; it makes no claims of causality. Causal interpretations of the empirical results would need to rely on the assumption that media ownership variables are determined prior to media quality variables. An alternate research design would be to rely on an instrumental-variables approach. A candidate instrument would have to be correlated with the media outlet's audience share but uncorrelated with its profits, since station ownership decisions are likely based on station profits. However, since advertising revenues are directly related to audience share, such an instrument is not readily available.

Third, the preferred estimation technique would ideally depend on theory regarding the joint determinants of media quality and media ownership. If these joint determinants are known and observed, then cross-sectional estimation will be preferred over panel-based approaches due to its greater power. Panel estimation techniques, by contrast, rely on variation within a market over time to estimate parameter coefficients. The ability to empirically identify a relationship, therefore, depends not only on whether a relationship between variables truly exists but also on observing sufficient variation to enable precise parameter estimation. Whether due to current media ownership rules or other considerations, there is relatively little variation in some television ownership and cross-media ownership variables during our sample period. For example, between 2005 and 2007 there was only one change in television–newspaper cross-ownership. This effectively rules out making a general statement about the relationship between media quality and television–newspaper cross-ownership in that time period. Thus, difference-based estimation may result in wide confidence intervals due to a lack of variation.

These final two concerns make it clear that econometric analysis cannot be expected to provide definitive answers to the FCC's policy questions. Even structural econometric approaches to estimate these questions would be difficult, as these typically rely on endogenous entry to identify station profits. However, electromagnetic spectrum scarcity prevents profitable television station entry; indeed, this is one of the reasons the FCC was founded.

While the estimation of correlations among key variables cannot provide complete answers to these important policy questions, it is sure to provide useful inputs to the policymaking process. Since those estimates depend on assumptions about unobservables, three sets of estimates are provided below so that the reader may judge the sensitivity of the results to the estimation technique used. While definitive answers are not provided, the paper proceeds on the assumption that the policymaking process is better off with knowledge of the statistical relationships existing in available data than it would be otherwise. Every effort is made to acknowledge shortcomings of the results and clearly document the sensitivity of the conclusions to specific assumptions.

2.2. Empirical approach

The analysis undertaken here regresses a vector of local market media quality variables on a set of local media ownership variables and exogenous controls. The model is designed to fit the available data, which is characterized by the "Large-N, small-T" property found in many survey datasets.

2.2.1. Model

This section presents the model. y^q_{mt} represents quality variable q in market $m = 1,\ldots,M$ in time $t \in \{1,2,3\}$ (corresponding to 2005, 2007 and 2009). x_{mt} represents a vector of media ownership variables. Variable selection and definitions are discussed in Section 2.3.

Eq. (1) is used to predict media quality variable q,

$$y^q_{mt} = \alpha^q_m + \alpha^q_t + x_{mt}\beta_q + \varepsilon^q_{mt}, \quad (1)$$

where α^q_m represents all market characteristics that may influence media quality, α^q_t is a time fixed effect, β_q and γ_q are parameter vectors to be estimated and the object of primary interest, and ε^q_{mt} captures shocks that may covary across markets, time periods and quality variables. Media usage is typically thought to be influenced by long-term habit formation, so Eq. (1) should be thought of as a moving-average representation that likely includes serial correlation in ε^q_{mt}. If the precise form of the serial correlation were known, Eq. (1) could equivalently be expressed as an auto-regressive model with lags of the dependent variable appearing as regressors on the right-hand side.

2.2.2. Estimation

Market characteristics α^q_m may drive both media ownership structure and media quality. Therefore the market-specific intercepts, α^q_m, in Eq. (1) are likely to be correlated with the media ownership variables. This is problematic because the panel data available are too short to estimate the α^q_m terms precisely.

Three approaches are employed to resolve this issue. First, a vector of market demographic variables and media demand predictors are used in place of market intercepts in a cross-sectional regression approach, assuming that

$$\alpha^q_m = z_m\gamma_q,$$

where z_m represents a vector of time-invariant market demographics and media demand predictors discussed below.

The second possible approach is first differencing (FD), in which the market intercepts drop out of the estimating equations. The FD approach lags the dependent variable to transform Eq. (1) into

$$(y^q_{mt} - y^q_{mt-1}) = (\alpha^q_t - \alpha^q_{t-1}) + (x_{mt} - x_{mt-1})\beta_q + (\varepsilon^q_{mt} - \varepsilon^q_{mt-1}). \quad (2)$$

The third approach is the "fixed effects" (FE) approach to dropping out time-invariant terms, changing Eq. (1) into

$$(y^q_{mt} - \bar{y}^q_m) = (\alpha^q_t - \bar{\alpha}^q) + (x_{mt} - \bar{x}_m)\beta_q + (\varepsilon^q_{mt} - \bar{\varepsilon}^q_m), \quad (3)$$

where $\bar{y}^q_m = T^{-1}\sum_1^T y^q_{mt}$, $\bar{\alpha}^q = T^{-1}\sum_1^T \alpha^q_t$, $\bar{x}_m = T^{-1}\sum_1^T x_{mt}$ and $\bar{\varepsilon}^q_m = T^{-1}\sum_1^T \varepsilon^q_{mt}$.

All three sets of estimates are reported below to allow the reader to reach his/her own conclusions and to show the sensitivity of the results to the estimation technique chosen. The cross-sectional approach would be preferred under the assumption that the vector of market demographics and media demand predictors z_m is complete. However, if there are unobserved determinants of media ownership and media quality, then the market intercepts are still correlated with the media ownership variables and the endogeneity problem will persist. In this case, when the sample contains exactly two time periods, FD and FE provide identical parameter estimates. When the sample contains more than two time periods, they provide different estimates. FD is more efficient when ε^q_{mt} is autocorrelated while FE is more efficient when ε^q_{mt} is serially uncorrelated (Wooldridge, 2010). Given the likelihood of habit formation in media usage discussed above, FD estimates will be preferred to FE estimates. However, both sets of estimates are presented to facilitate comparison.

In total, we estimate three sets of regressions: annual cross-sectional regressions of Eq. (1), FD estimation of Eq. (2), and FE estimation of Eq. (3). For each approach, we "stack" the relevant equation for each media quality variable and estimate using the Seemingly Unrelated Regressions approach of Zellner (1962).

Two sets of standard errors are presented for our FD and FE estimations of Eqs. (2) and (3). The common approach would be to apply Ordinary Least-Squares (OLSs) regression to Eqs. (2) and (3). This is commonly known as the "difference-in-differences" estimate in the case of Eq. (2) and the "pooled OLS" estimator in the case of Eq. (3).

The problem with the OLS approach is that, when serial correlation is present in the errors, the standard errors of the parameter estimates may be severely biased. This has been known since Cochrane and Orcutt (1949). Recently, Bertrand et al. (2004) explored the extent to which this issue affects policy-oriented econometric research. They generated random treatments in their data and estimated the effects of these "placebo laws" on female wages. They found that 45% of the placebo treatments' parameter estimates were statistically significant at the 95% confidence level, strong evidence against OLS estimation of Eqs. (2) and (3). Yet while OLS is not viewed as a desirable model in the current setting, it is presented in Section 3 to provide a familiar benchmark.

Bertrand et al. (2004, Section IV.E) advocate using clustered standard errors, showing that this alternative to OLS performs about as well as nonparametric estimation in Monte Carlo simulations. The second set of estimates presented below follows this advice. This allows for autocorrelation in the errors and uses an unstructured "sandwich" estimator to control for possible correlation among the error terms, as in Arellano (1987).

A word is in order about one estimation technique that is not used. The recent dynamic panel estimation literature (e.g., Arellano and Bond, 1991) advocates using lags and previous levels as instruments for endogenous variables. In our application, that would imply using $(x_{mt} - x_{mt-1})$ as an instrument for x_{mt-1} and assuming that $(x_{mt} - x_{mt-1})$ is uncorrelated with ε^q_{mt}. This exogeneity assumption is problematic in the context of media stations, as it would be in most industrial organization settings. The valuation of a media outlet such as a television station or a newspaper is typically calculated as the discounted sum of the station's future earnings, and this value influences the media outlet's price. The exogeneity assumption required by the Arellano/Bond approach would imply that media station owners and potential buyers are either unable to foresee future market-specific shocks to media quality, or that they disregard those shocks in their media station retention/acquisition decisions. This assumption is not testable and not considered to be credible, as Isé and Perloff (1997) showed that scarcity rents accruing to broadcast license ownership are sizable, and Fournier and Campbell (1993) showed that station valuations reflected these scarcity rents. This is the primary reason why this paper takes a descriptive approach rather than claiming to infer causality.

2.3. Data

This section describes the dataset, variables and definitions.

2.3.1. Data sources, markets, time periods, and exogenous controls

The dataset contains information about 210 local media markets in each of three time periods from two sources. Media ownership variables and market demographic variables were provided by the FCC. Media ownership variables correspond to three snapshots in time: December 31, 2005, December 31, 2007, and December 31, 2009.

The second dataset consists of television ratings provided by Nielsen Media Research Galaxy ProFile. The ratings correspond to the November and May "sweeps" months in the 2005–2006, 2007–2008 and 2009–2010 television seasons. Nielsen selects participants through geographic randomization and provides financial incentives to participate. In larger media markets, Nielsen measures television viewing with PeopleMeters, which record television usage and tuning continuously and prompt viewers to indicate their presence via remote control once or twice per hour. In smaller markets, audimeters attached to televisions measure set usage and tuning continuously. Viewer presence is measured via self-reported diaries. Nonresponsive participants are removed from the sample quickly. Other participants are replaced every few years.

The Nielsen data contained many omissions, as many datapoints and some entire market-month datasets were missing without explanation. These issues affected the variable definitions in three ways. First, five markets (Alpena, Biloxi, Miami, New Orleans and West Palm Beach) were dropped since a balanced panel could not be constructed for these markets. Second, because the measurement technology is more reliable for households than for demographic groups, the analysis focuses on household ratings. Demographic group ratings are excluded as these are more often missing. Third, even in the household-level ratings, about 20% of the possible observations are missing. Therefore, the analysis focuses on 4-week average ratings within the evening news daypart. The 4-week average ratings are available in over 94% of the possible observations, making them the most reliable source of information in the data.

Nielsen's data reporting methodology remains less than fully clear, despite repeated inquiries and careful scrutiny of all available documentation. It was thought that the five geographic markets were missing for exogenous technical reasons. Further, it is assumed that Nielsen does not report station ratings when the number of people using television in its local sample is relatively low, since it would be difficult to reliably estimate stations' viewing shares based on a small number of viewers. The frequency of data availability (that is, the frequency with which data were not missing) was roughly constant across weekdays but slightly higher for smaller markets than for larger markets. It appeared that data availability was driven more by variation in Nielsen's sample sizes across media markets rather than by variation in television usage over time within a market.

The market-level demographics and media demand predictors in z_m are median household income, median age, the percentage of minorities, the number of television stations per capita, and the percentages of households with televisions and pay-television service. These data were collected by the American Community Survey and were provided by the FCC in conjunction with the media ownership data.

2.3.2. Media quality variables

This section defines the set of media quality variables, y_{mt}. Quality variables were chosen according to their relevance to the FCC's policy goals and the reliability with which they could be measured. The quality variables are:

2.3.2.1. LocalEveningRating. The average percentage of households in a market watching any local station between the hours of 5–7 p.m. EST, 4–6 p.m. CST, 4–6 p.m. MST, or 5–7 p.m. PST. This is the daypart with the highest coincidence of local programming and consistently available ratings data. Since some stations typically offer syndicated programming during this daypart, this variable measures the degree to which the entire television viewing market is served, not just the segment interested in local news.

2.3.2.2. LocalNewsHours. The number of hours of local news offered on all TV stations in the market.

2.3.2.3. LocalNewsRating. The average rating for all local news programs whose ratings are observed.

2.3.2.4. NewspaperCirculation. The estimated number of daily newspaper copies per capita distributed in the market over the course of 1 week.

2.3.2.5. RadioNewsStations. The number of radio stations in the market classified as "News" format. Values are expressed in per capita terms to correct for the common occurrence that more populous markets are assigned more station licenses, and therefore would naturally have more radio stations. As in Berry and Waldfogel (2001), counts of stations by format are used because (a) data on stations' listenership were not available and (b) the number of stations supported should be a measure of usage as well as availability, since radio stations may easily switch formats if listeners do not patronize news stations. An additional variable, the count of stations classified as "News/Talk" format, was considered but produced results which were qualitatively identical to *RadioNewsStations*, so this variable was dropped to simplify the exposition.

Logarithmic transformations of the variables were investigated but generally fit the data worse than linear functions. The conclusions were largely insensitive to functional form.

To summarize, *LocalEveningRating* addresses the FCC's competition goal; *LocalNewsHours* addresses the FCC's localism goal; and *LocalNewsRatings*, *NewspaperCirculation* and *RadioNewsStations* address both the competition and localism goals.

2.3.3. Media ownership variables

Media ownership variables were chosen according to their relevance to the media ownership rules, but their number was limited to prevent multicollinearity from inflating the standard errors of the estimates. Three ownership variables were reliably measured and varied extensively:

2.3.3.1. Co-ownedTV. The number of television station parents that control more than one television station in the same media market.

2.3.3.2. TV/Radio. The number of television stations whose parent controls at least one radio station in the same market.

2.3.3.3. LocalOwnerTV. The number of television stations in the market controlled by entities located within the market.

Two additional ownership variables are available:

2.3.3.4. TV/Newspaper. The number of television stations whose parent controls at least one newspaper in the same market. This ownership variable exhibits the least variation. It changed in only one market between 2005 and 2007, and changed in five markets between 2007 and 2009.

2.3.3.5. MinorityOwnerTV. The number of television stations in the market with an identifiable controller who was a member of a minority race/ethnicity. This variable was only measured reliably in 2007 and 2009; see Turner (2006) for further discussion.

Unfortunately, *TV/Newspaper* does not show meaningful variation in 2005–2007, and *MinorityOwnerTV* data are not available for 2005. Therefore, these two variables must be excluded from the base set of ownership variables. However, both can be included in a regression based on 2007–2009 data alone.

All ownership variables are defined as count data. The large number of zeros precluded logarithmic specifications. Percentage definitions were found to be misleading, as they are influenced by changes in the base number of television stations in the market. Small independent TV stations sometimes start or stop broadcasting, which then changes all cross-ownership and co-ownership percentage variables in the market. However, because these changes typically occur on the fringe of the TV market, they seldom indicate meaningful changes in station ownership concentration.

Another ownership diversity variable measured the number of television stations in each market with an identifiable controller who was female. However, the data collection methodology for this variable indicated it was only reliably available for 2007. Since the empirical approach relies on panel analysis, and only a single year of data was available for this variable, it was dropped from the analysis.

To summarize the ownership variables, *TV/Newspaper* is relevant to the Newspaper/Broadcast Cross-Ownership Rule; *Co-ownedTV* is relevant to the Local TV Multiple Ownership Rule; *TV/Radio* is relevant to the Local Radio/TV Cross-Ownership Rule; and *LocalOwnerTV* and *MinorityOwnerTV* are relevant to the impact of ownership diversity on media market competition and localism.

3. Empirical results

This section presents the estimation results. First, raw correlations are discussed. Then, cross sectional regression results are presented. Next, FD and FD estimation is applied to the full sample with the limited set of ownership variables. Finally, the second half of the sample is used to estimate parameters for the full set of ownership variables.

3.1. Correlations

Table 1 presents raw correlations between the changes in ownership variables and the changes in media quality variables. Two features of the correlations are notable. First, all correlations are rather modest, lying in the interval [−.11,.11], and none is significant at the 95% confidence level. This suggests that the media ownership variables do not individually exert a very strong influence on the media quality variables. Second, the correlations in 2005–2007 differ substantially from the correlations in 2007–2009. For example, increases in co-ownership of television stations are negatively correlated with evening television ratings (−.09) in the first half of the sample, but this correlation is positive (.01) in the second half of the sample. Many pairwise correlations show similar differences in sign and magnitude between the two halves of the sample. This pattern suggests that both sets of variables may be driven by common factors, such as time effects, and motivates the use of regression analysis.

3.2. Cross-sectional results

Table 2A presents cross-sectional results using the full 2005–2009 sample and the limited set of media ownership variables. Table 2B provides the cross-sectional findings using the 2007–2009 subsample and the full set of media ownership variables.

Television ownership consolidation is positively associated with local TV news provision (as measured by *LocalNewsHours*) and negatively associated with local TV news viewership (*LocalNewsRatings*). The positive correlation between ownership consolidation and news provision may be desirable from a policy viewpoint but the lower news ratings suggest that this increase in news viewership may not be highly valued by the market. There is no apparent effect on overall television usage (*LocalEveningRatings*) so it may be that a merger between two stations in a market benefits non-merged stations more than the merged pair.

The number of news radio stations in the market is negatively associated with television station ownership consolidation but positively correlated with the number of local television station owners. It is logical that since TV station consolidation raises the amount of TV news provided, it would also lead to falling demand for radio news.

Table 1
Correlations.

Change in media ownership variables	Change in media quality variables				
	NewspaperCirculation	*RadioNewsStations*	*LocalNewsHours*	*LocalNewsRating*	*LocalEveningRating*
Full sample (410 obs.)					
TV/Newspaper	0.03	0.05	−0.01	−0.02	−0.01
Co-ownedTV	−0.01	0.03	0.02	0.03	−0.07
TV/Radio	0.01	0.04	0.03	0.03	0.02
LocalOwnerTV	−0.03	−0.07	−0.03	0.00	−0.02
MinorityOwnerTV	–	–	–	–	–
2005–2007 only (205 obs.)					
TV/Newspaper	0.09	−0.01	0.00	0.00	0.01
Co-ownedTV	0.02	0.06	0.02	0.01	−0.09
TV/Radio	0.02	0.01	0.04	0.01	0.07
LocalOwnerTV	0.01	−0.10	−0.04	0.00	0.00
MinorityOwnerTV	–	–	–	–	–
2007–2009 only (205 obs.)					
TV/Newspaper	0.00	0.09	0.00	−0.05	−0.03
Co-ownedTV	0.03	−0.05	−0.07	0.07	0.01
TV/Radio	0.11	0.05	−0.10	0.10	0.00
LocalOwnerTV	−0.08	−0.03	−0.01	0.00	−0.07
MinorityOwnerTV	−0.11	0.03	0.04	−0.04	0.02

An astute observer could raise questions of causality here. For example, is it the case that station ownership consolidation leads to more news and hence falling average news ratings? Or is it the case that markets with supranormal news demand are losing TV news viewers faster and stations are reacting defensively by consolidating? These questions speak to the challenges of answering policy questions using *ex post* regression analysis. Regressions are very useful to characterizing relationships among policy-relevant variables but are limited in their ability to make causal statements.

Tables 2A and 2B show that the cross-sectional regressions fit the data fairly well, with *R*-squared statistics ranging from .40 to .77. However, most of the variation in the dependent variables is explained by demographic controls and media demand predictors; the partial *R*-squared of the entire sets of media ownership variables is always less than .05, and usually less than .01. This suggests that looking at the FE and FD effects may be informative about policy relationships.

3.3. Panel results: base ownership variables, full sample

Table 3 reports estimation results for the base set of three ownership variables in the full sample. The first three columns report the FD point estimates and two sets of

Table 2A
Cross-sectional regression findings, 2005–2009 sample.

	Newspaper circulation		Num. radio news stations		Local news hours		Local news ratings		Local eve. ratings	
	Point est.	Std. err.	Point est.	Std. err.	Point est.	Std. err.	Point est.	Std. err.	Point est.	Std. err.
Media ownership variables										
Local TV owners	−.02	(.02)	.26	(.14)*	.12	(.41)	.05	(.08)	−.01	(.06)
Co-owned TV	−.01	(.03)	−.97	(.19)**	5.59	(1.05)**	−.24	(.13)*	−.09	(.08)
TV/Radio co-owner	.00	(.03)	−.36	(.35)	−.05	(1.25)	.01	(.23)	.04	(.16)
Demographics and media demand predictors										
Median age	.01	(.01)	.23	(.08)**	1.29	(.18)**	−.05	(.07)	.07	(.06)
Median income	.00	(.00)**	.00	(.00)**	.00	(.00)**	.00	(.00)**	.00	(.00)**
Minority population (%)	−.40	(.15)**	−9.49	(.95)**	16.13	(2.48)**	−1.38	(1.14)	−1.34	(.66)**
TV channels per capita	.00	(.01)	.09	(.11)	−.84	(.12)**	.03	(.01)**	−.03	(.02)
Pay TV penetration	1.01	(.36)**	−11.66	(4.68)**	−31.91	(5.95)**	11.95	(2.50)**	6.45	(2.10) «
TV penetration	−.32	(.44)	−9.88	(5.41)*	16.10	(4.14)**	−1.80	(.74)**	1.13	(1.30)
Year 2005 intercept	−.31	(.31)	24.29	(1.46)**	−28.30	(6.96)**	4.93	(3.14)	−.31	(2.16)
Year 2007 intercept	−.35	(.32)	24.64	(1.47)**	−25.58	(7.02)**	4.35	(3.17)	−.80	(2.18)
Year 2009 intercept	−.42	(.32)	25.52	(1.47)**	−19.04	(7.09)**	3.92	(3.19)	−1.51	(2.21)
R-squared		.413		.564		.743		.582		.545
R-sq. w/o media own. var.		.406		.543		.704		.576		.543
Partial *R*-sq. of media own. var.		.007		.021		.039		.006		.002

N. Obs. is 615 in each equation.
** Significant at the 95% confidence level.
* Significant at the 90% confidence level.

Table 2B
Cross-sectional regression findings, 2007–2009 subsample.

	Newspaper circulation		Num. radio news stations		Local news hours		Local news ratings		Local eve. ratings	
	Point est.	Std. err.	Point est.	Std. err.	Point est.	Std. err.	Point est.	Std. err.	Point est.	Std. err.
Media ownership variables										
Minority ownership	.03	(.03)	−.18	(.39)	−1.55	(1.52)	−.19	(.15)	−.15	(.06)**
Local TV owners	−.02	(.03)	.31	(.13)**	.39	(.79)	.09	(.10)	.03	(.05)
Co-owned TV	−.02	(.03)	−.98	(.19)**	6.70	(1.04)**	−.26	(.12)**	−.05	(.08)
TV/Radio co-owner	.00	(.04)	−.05	(.39)	−1.00	(.50)**	.15	(.18)	−.01	(.18)
TV/Newspaper co-owner	−.01	(.04)	−.66	(.54)	.25	(.52)	−.18	(.22)	−.13	(.15)
Demographics and media demand predictors										
Median age	.01	(.01)	.20	(.08)**	1.36	(.14)**	−.05	(.06)	.07	(.05)
Median income	.00	(.00)**	.00	(.00)**	.00	(.00)**	.00	(.00)**	.00	(.00)**
Minority population (%)	−.43	(.17)**	−9.99	(.78)**	19.74	(1.86)**	−1.55	(1.19)	−1.13	(.83)
TV channels per capita	.00	(.01)	.08	(.09)	−.85	(.13)**	.03	(.01)**	−.03	(.02)*
Pay TV penetration	1.01	(.44)**	−11.35	(7.23)	−30.58	(10.90)**	10.85	(2.10)**	5.00	(1.98) **
TV penetration	−.18	(.39)	−7.17	(4.69)	12.63	(4.53)**	−2.22	(.64)**	.26	(.81)
Year 2007 intercept	−.44	(.42)	23.74	(2.79)**	−28.67	(13.94)**	6.20	(2.29)**	.96	(1.30)
Year 2009 intercept	−.51	(.43)	24.56	(2.85)**	−22.06	(14.18)	5.80	(2.30)**	.29	(1.30)
R-squared		.405		.549		.767		.601		.562
R-sq. w/o media own. var.		.398		.527		.721		.592		.557
Partial *R*-sq. of media own. var.		.007		.022		.046		.009		.005

N. Obs. is 410 in each equation.
** Significant at the 95% confidence level.
* Significant at the 90% confidence level.

Table 3
Panel estimation results: base ownership variables, full sample.

Media quality variable	First differences			Fixed effects			Mean elasticity
	Point est.	Std. errors		Point est.	Std. errors		95% Conf. Int.
		OLS	*Clust.*		*OLS*	*Clust.*	(FD, Clust. s.e.)
NewspaperCirculation							
LocalOwnerTV	−.006	(.422)	(.006)	−.001	(.338)	(.009)	(−.01,.00)
Co-OwnedTV	.004	(.432)	(.005)	−.005	(.356)	(.007)	(.00,. 01)
TV/Radio	.010	(.547)	(.015)	.009	(.432)	(.014)	(−.01,.02)
Num. obs.	410			615			
R-squared	.079			.431			
RadioNewsStations							
LocalOwnerTV	−.343	(.422)	(.345)	−.460	(.338)	(.355)	(−.12,. 04)
Co-OwnedTV	.070	(.432)	(.211)	−.060	(.356)	(.242)	(−.04,. 05)
TV/Radio	.189	(.547)	(.314)	.356	(.432)	(.283)	(−.03,. 06)
Num. obs.	410			615			
R-squared	.018			.034			
LocalNewsHours							
LocalOwnerTV	−.478	(.422)	(.852)	−.932	(.338)**	(.884)	(−.04,.02)
Co-OwnedTV	−.339	(.432)	(.929)	−.632	(.356)	(1.117)	(−.03,.02)
TV/Radio	−.284	(.547)	(.892)	−1.057	(.432)*	(1.204)	(−.02,.01)
Num. obs.	410			615			
R-squared	.092			.366			
LocalNewsRatings							
LocalOwnerTV	−.007	(.422)	(.065)	.000	(.338)	(.080)	(−.02,. 02)
Co-OwnedTV	.069	(.432)	(.095)	.097	(.356)	(.096)	(−.02,.04)
TV/Radio	.090	(.547)	(.094)	−.033	(.432)	(.080)	(−.01,.03)
Num. obs.	410			615			
R-squared	.002			.180			
LocalEveningRatings							
LocalOwnerTV	−.050	(.422)	(.052)	−.041	(.338)	(.058)	(−.03,.01)
Co-OwnedTV	−.093	(.432)	(.061)	−.051	(.356)	(.063)	(−.03,. 00)
TV/Radio	.108	(.547)	(.128)	.036	(.432)	(.117)	(−.01,. 04)
Num. obs.	410			615			
R-squared	.039			.330			

Year-specific intercept estimates excluded from table for brevity.
** Significant at the 99% confidence level.
* Significant at the 95% confidence level.

standard errors, one provided by OLS estimation and one provided by clustered standard error estimation. The second set of three columns report the FE point estimates, followed by two sets of standard errors.

The set of FD estimates with clustered standard errors is the preferred set of estimates, so the discussion focuses on these; the other estimates are provided as benchmarks. The final column of Table 3 displays 95% confidence intervals for the mean elasticity on each effect, based on the FD parameter estimates and clustered standard errors.

Three results merit discussion. First, media ownership variables and time dummies explain little of the variation in the media quality variables. Goodness of fit ranges from a .002 *R*-squared for the *LocalNewsRatings* quality variable to .092 for the *LocalNewsHours* quality variable. Second, none of the preferred set of estimates is statistically distinguishable from zero. Third, while the standard errors tend to be much larger than the point estimates, none of the confidence intervals admits any appreciable effect of media ownership variables on media quality variables. With one exception, all 15 elasticities may be safely estimated to be smaller than .07 in absolute magnitude.

3.4. Panel results: all ownership variables, limited sample

Table 4 reports estimation results for the larger set of five ownership variables based on the final 2 years in the sample. The data were limited to the years 2007 and 2009 because *TV/Newspaper* showed almost no variation

Table 4
Panel estimation results: all ownership variables, 2007–2009 subsample.

Media quality variable	First differences			Mean elasticity
	Point Est.	Std. Errors		95% Conf. Int.
		OLS	*Clust.*	(FD, Clust. s.e.)
NewspaperCirculation				
MinorityOwnerTV	−.031	(.960)	(.021)	(−.01,.00)
TV/Newspaper	−.003	(1.702)	(.022)	(−.01,.01)
LocalOwnerTV	−.019	(.725)	(.010)	(−.03,.00)
Co-OwnedTV	.005	(.789)	(.011)	(−.01,.02)
TV/Radio	.039	(1.143)	(.040)	(−.02,.05)
Num. obs.	205			
R-squared	.038			
RadioNewsStations				
Minority OwnerTV	.153	(.960)	(.427)	(−.02,.02)
TV/Newspaper	1.435	(1.702)	(1.728)	(−.04,.09)
LocalOwnerTV	−.217	(.725)	(.341)	(−. 10,.05)
Co-OwnedTV	−.442	(.789)	(.373)	(−.12,.03)
TV/Radio	.449	(1.143)	(.371)	(−.02,.08)
Num. obs.	205			
R-squared	.016			
LocalNewsHours				
MinorityOwnerTV	1.216	(.960)	(1.643)	(−.01,.02)
TV/Newspaper	.395	(1.702)	(2.777)	(−.01,.02)
LocalOwnerTV	−.252	(.725)	(1.558)	(−.06,.05)
Co-OwnedTV	−1.694	(.789)*	(1.451)	(−.07,.02)
TV/Radio	−3.564	(1.143)**	(1.761)*	(−.07,.00)
Num. obs.	205			
R-squared	.017			
LocalNewsRatings				
MinorityOwnerTV	−.109	(.960)	(.090)	(−.01,.00)
TV/Newspaper	−.257	(1.702)	(.131)	(−.01,.00)
LocalOwnerTV	−.008	(.725)	(.073)	(−.02,.02)
Co-OwnedTV	.158	(.789)	(.135)	(−.02,.06)
TV/Radio	.337	(1.143)	(.239)	(−.01,.07)
Num. Obs.	205			
R-squared	.021			
LocalEveningRatings				
MinorityOwnerTV	.042	(.960)	(.092)	(.00,.01)
TV/Newspaper	−.155	(1.702)	(.137)	(−.01,.00)
LocalOwnerTV	−.138	(.725)	(.061)*	(−.04,.00)
Co-OwnedTV	.025	(.789)	(.077)	(−.02,.03)
TV/Radio	.026	(1.143)	(.131)	(−.02,.03)
Num. obs.	205			
R-squared	.007			

Year-specific intercept estimates excluded from table for brevity.
** Significant at the 99% confidence level.
* Significant at the 95% confidence level.

in 2005–2007 and because *MinorityOwnerTV* was not available for 2005. Since FD and FE provide identical estimates when the sample contains just two time periods, only FD estimates are presented in the table.

Model fit is lower in the subsample than in the full sample, with *R*-squared statistics ranging from .007 to .038. However, some parameters which were imprecisely estimated in the full sample were estimated more precisely in the restricted sample. Recall that the changes in media ownership variables are correlated among themselves, and that the 2005–2007 correlations were observed to differ markedly from the 2007–2009 correlations.

The results indicate that television-radio cross-ownership is associated with higher levels of local television news provision within a market, and that local television station ownership is associated with lower evening ratings of local programming. These conclusions should be drawn tentatively, as (a) they did not appear within the full sample and (b) at the 95% confidence level, one would expect one or two out of 25 estimates to be significant due purely to random chance.

Again, the confidence intervals on the mean elasticities indicate that the data do not admit the possibility of large effects. With just two exceptions, all of the elasticities can be safely estimated to be smaller than .08 in absolute value.

It is striking to note that no parameter estimate is statistically significant in *both* the full dataset in Table 3 and the 2007–2009 subsample in Table 4. This suggests a lack of consistent directional relationships between individual ownership variables and media quality variables.

4. Discussion

The reader's preferred set of estimates should depend upon her priors about whether there are unmeasured media market characteristics that are likely to correlate with both media ownership and media quality. If the set of demographics and media demand predictors is complete, then the cross-sectional results should be preferred due to their higher power. If they seem incomplete, then the FD and FE estimates should be preferred. Very little prior work has been done on this topic and it is not statistically testable. The authors favor the difference-based results due to the low partial *R*-squared statistics of the media ownership variables in the cross-sectional regressions.

The following results may contribute to the policy discussion on the FCC's media ownership rules and media ownership diversity policies.

4.1. Newspaper/Broadcast Cross-Ownership Rule

The estimates in Table 4 indicate that that the elasticities of newspaper circulation, local television news provision, and local TV news ratings with respect to the number of television stations co-owned with a newspaper are all less than .03 in absolute value. The lack of television/newspaper integration since the Newspaper/Broadcast Cross-Ownership Rule waiver criteria were loosened in 2007 leads the authors to question the economic basis for keeping the rule in place, given the recent declines in newspaper revenues and news production expenditures, the influence of newspapers on voter information and turnout, and the potential economies of scope available to joint owners of news outlets in multiple media.

4.2. Local TV Multiple Ownership Rule

In both the full sample and the subsample, the elasticities of newspaper circulation, television news provision and local news ratings may safely be estimated to be .08 or smaller in absolute magnitude. However, it is worth noting that the rule limited the amount of television station concentration that could be observed in the data, as no entity is permitted to control two large stations in a single market. The authors would hesitate to extrapolate from these results beyond the range of TV station ownership concentration observed in the data. Significant loosening of the rules may produce fundamentally different patterns in the data.

4.3. Local Radio/TV Cross-Ownership Rule

Increases in television/radio cross-ownership were negatively associated with local TV news provision in the 2007–2009 subsample. The estimate in the full sample is negative but not significantly different from zero. No other significant or sizable effects were found of radio/TV cross-ownership on media quality.

4.4. Ownership diversity

It may be safely estimated that the elasticities of newspaper circulation, local TV news provision and local TV news ratings have elasticities with respect to minority TV ownership and local TV station ownership that are smaller than .05 in absolute value.

The evidence provided in this paper is intended to contribute to the policy debate around the media ownership rules. However, it does not provide any conclusive basis for policymaking. This paper describes statistical relationships without any claims of causality.

The problems that hinder efforts to determine the causal effects of media ownership structure also hint at two potential solutions. The best possible solution would be to implement a controlled experiment in which local media ownership rules are relaxed in a number of randomly selected geographic markets. Such an approach could mimic the techniques used in medical studies and clinical trials.

The other possible solution is to identify instrumental variables that are related to changes in media ownership but unrelated to changes in media market outcomes. This approach necessarily relies on assumptions but may be less costly to implement than a controlled experiment. For example, one might consider that the death of a broadcast licensee may help predict a change in television station ownership but not the quality of news supplied by the station. Or one might use aggregate changes in the demand for local television advertising to predict media ownership consolidation under the assumption that it has a limited effect on media market quality. Such an approach would still be subject to the second concern raised in the

introduction, and will always be conditional on the identifying assumptions made, but will be useful in determining the causal effects of media ownership consolidation on media market outcomes.

Until such time as these techniques are employed, it is hoped that appropriately documented knowledge about statistical relationships found in existing data may help to improve the policymaking process.

References

Anderson, Simon, Coate, Stephen, 2005. Market provision of broadcasting: a welfare analysis. Review of Economic Studies 72 (4), 947–972.

Arellano, M., 1987. Computing robust standard-errors for within-group estimators. Oxford Bulletin of Economics and Statistics 49 (4), 431–434.

Arellano, M., Bond, S., 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. Review of Economic Studies 58 (2), 277–297.

Argentesi, E., Fillistrucchi, L., 2009. Estimating market power in a two-sided market: the case of newspapers. Journal of Applied Econometrics 22, 1247–1266.

Baldwin, T., Bergan, D., Fico, F., Lacy, S., Wildman, S.S., 2010. News Media Coverage of City Governments in 2009. <http://quello.msu.edu/images/uploads/PEJ_City_Govt_report-final.pdf> (accessed March 2011).

Barros, P.P., Leite, A.P.N., 1997. The good monopoly? A case for joint ownership of competing systems. Information Economics and Policy 9 (1), 19–36.

Berry, S., Waldfogel, J., 2001. Do mergers increase product variety? Evidence from radio broadcasting. Quarterly Journal of Economics 116, 1009–1025.

Bertrand, M., Duflo, E., Mullainathan, S., 2004. How much should we trust differences-in-differences estimates? Quarterly Journal of Economics 119 (1), 249–275.

Brown, K., Alexander, P.J., 2005. Market structure, viewer welfare, and advertising rates in local broadcast television markets. Economics Letters 86, 331–337.

Chandra, A., Collard-Wexler, A., 2009. Mergers in two-sided markets: an application to the Canadian newspaper industry. Journal of Economics and Management Strategy 18 (4), 1045–1070.

Chaudhri, V., 1998. Pricing and efficiency of a circulation industry: The case of newspapers. Information Economics and Policy 10 (1), 59–76.

Chiricos, T., Eschholz, S., Gertz, M., 1997. Crime, news and fear of crime: toward an identification of audience effects. Social Problems 44 (3), 342–357.

Cochrane, D., Orcutt, G.H., 1949. Application of least-squares regression to relationships containing auto-correlated error terms. Journal of the American Statistical Association 44 (245), 32–61.

Crampes, C., Haritchabalet, C., Jullien, B., 2009. Advertising, competition and entry in media industries. Journal of Industrial Economics 42 (1), 7–31.

Cunningham, B.M., Alexander, P.J., 2004. A theory of broadcast media concentration and commercial advertising. Journal of Public Economic Theory 6 (4), 557–575.

Dukes, A., 2006. Media concentration and consumer product prices. Economic Inquiry 44 (1), 128–141.

Federal Communications Commission, 2010. Notice of Inquiry. <http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-10-92A1.pdf> (accessed March 2011).

Fournier, G.M., Campbell, E.S., 1993. Shifts in broadcast policy and the value of television licenses. Information Economics and Policy 5 (1), 87–104.

Fu, W.W., 2003. Multimarket contact of US newspaper chains: circulation competition and market coordination. Information Economics and Policy 15 (4), 501–519.

Gal-Or, E., Dukes, A., 2006. On the profitability of media mergers. Journal of Business 79 (2), 489–525.

Gentzkow, M., 2011. Television and voter turnout. The Quarterly Journal of Economics 123 (1), 931–972.

Gentzkow, M., Shapiro, J.M., 2008. Competition and truth in the market for news. Journal of Economic Perspectives 22 (2), 133–154.

Gentzkow, M., Shapiro, J.M., Sinkinson, M., forthcoming. The effect of newspaper entry and exit on electoral politics. American Economic Review.

George, L., 2007. What's fit to print: the effect of ownership concentration on product variety in daily newspaper markets. Information Economics and Policy 19 (3–4), 285–303.

Isé, S.J., Perloff, J.M., 1997. Effects of FCC regulations on television profits. Information Economics and Policy 9 (1), 37–49.

Kasuga, N., Shishikura, M., 2006. Determinants of profit in the broadcasting industry: evidence from Japanese microdata. Information Economics and Policy 18 (2), 216–228.

Kind, H.J., Nilssen, T., Sorgard, L., 2009. Business models for media firms: does competition matter for how they raise revenue? Marketing Science 28 (6), 1112–1128.

Milburn, M.A., McGrail, A.B., 2001. The dramatic presentation of news and its effects on cognitive complexity. Political Psychology 13 (4), 613–632.

Mondak, J.J., 1995. Newspapers and political awareness. American Journal of Political Science 39 (2), 513–527.

Project for Excellence in Journalism (PEJ), 2011. Newspapers: By the Numbers. <http://stateofthemedia.org/2011/newspapers-essay/data-page-6/> (accessed March 2011).

Reisinger, M., Ressner, L., Schmidtke, R., 2009. Two-sided markets with pecuniary and participation externalities. Journal of Industrial Economics 42 (1), 32–57.

Semetko, H.A., Valkenburg, P.M., 2001. Framing European politics: a content analysis of press and television news. Journal of Communication 50 (2), 93–109.

Shiman, D., Lynch, K., Stroup, C., Almogeura, P., 2007. Television Station Ownership Structure and the Quantity and Quality of TV Programming. 2007 FCC Media Ownership Study #4.

Steiner, P.O., 1952. Program patterns and preferences, and the workability of competition in radio broadcasting. The Quarterly Journal of Economics 66 (2), 194–223.

Turner, S.D., 2006. Out of the Picture: Minority and Female TV Station Ownership in the United States. <http://www.freepress.net/files/out_of_the_picture.pdf> (accessed March 2011).

Wooldridge, J.M., 2010. Econometric Analysis of Cross Section and Panel Data, second ed. MIT Press, Cambridge, MA.

Zellner, A., 1962. An efficient method of estimating seemingly unrelated regressions and tests for aggregation bias. Journal of the American Statistical Association 58, 977–992.