Political Differentiation in Newspaper Markets

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Abstract

This paper analyzes the effects of media competition on the political ideologies of newspapers and the consumption of news. A model of newspaper competition in this paper predicts that newspapers in competition may perform moderate differentiation in their political ideologies and thus attract more readers with extreme ideologies than a monopoly newspaper. This prediction is tested and verified using the National Annenberg Election Surveys of 2000 and 2004. Empirical results also show that newspaper competition discourages people with extreme ideologies from accessing political information online. These results suggest that newspaper competition encourages newspapers to specialize in different ideologies and satisfy readers with opposing views.

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1 Introduction

The social effects of competition have long interested economists. In many markets, such as those for automobiles and dining, competitive environments result in product variety and thus increase consumer welfare. However, the effect of competition is more difficult to assess in media markets because they generally have relatively little competition. In particular, most daily newspapers enjoy monopolies.[1] Regarding the effect of competition on media markets, one of the interesting questions is whether an increase in media competition produces more or less differentiation in the political ideology of media outlets. As no consensus has yet been reached, this paper examines the effects of competition on the political ideology of daily newspapers in the United States.

Informed citizens are the basis of a sound democracy. In the United States, newspapers have historically informed people and hence strengthened democracy (Gentzkow et al., 2006). Previous research shows that a less informed population is less likely to participate in politics. Moreover, an unequally informed population may promote policies that benefit informed groups at the expense of less informed groups (Snyder and Strömberg, 2010). This paper also investigates whether there are more readers among those adhering to extreme ideologies in competitive markets.

Theories of media bias offer different predictions regarding the effect of media competition on media ideologies. Some argue that increased media competition induces media firms to move towards more mainstream political ideologies because of the pressure to attract more readers and generate greater advertising revenue. Another reason for ideological convergence could be that media firms compete on their reputation for truthful and balanced news reporting. From this perspective, increased media competition should reduce media bias. However, others argue that media firms engaged in price competition adopt a product differentiation strategy, catering to consumers' beliefs. In this case, competition leads to divergent ideologies in media outlets

[1] The fact that most daily newspapers enjoy a monopoly may be due to the high fixed cost of producing a newspaper; as a result, the number of newspapers is not a linear function of market size (Berry and Waldfogel, 2010). It could also be because advertisers prefer to buy ads in newspapers with more readers, making it difficult for a newspaper with fewer readers to survive.

and greater market segmentation.

This paper first provides a model of newspaper competition. The model is based on three assumptions. (1) Newspapers aim to maximize their readership. (2) Readers prefer news outlets with ideologies close to their own ideologies. (3) Readers may choose not to read a local newspaper. The model predicts that a monopoly newspaper will select the mean ideology of the market, and readers at the extremes will be less likely to read the newspaper. In a two-newspaper market, newspapers will exhibit moderate differentiation, and therefore increase the number of people with extreme ideologies reading a local newspaper.

The predictions above are then tested by political demographics of newspaper readership from the 2000 and 2004 Annenberg surveys. The aggregate political demographics of newspaper readership support the hypothesis that newspapers in competitive markets have different ideologies. Using individual data on political ideology and consumption of daily newspapers, empirical results show that consumers with extreme ideologies are less likely to read a daily newspaper than consumers with moderate ideologies. However, the difference in newspaper consumption decreases as the number of newspapers increases. This supports the predictions of the model that newspaper competition will cause newspaper ideologies to diverge and increase news consumption by those with extreme ideologies.

One concern in comparing news consumption across newspaper markets involves the endogeneity of newspaper competition. Even among those with the same ideologies, the residents of different cities may have different patterns of news consumption. To address this concern, this study uses the change in newspaper competition between 2000 and 2004 to examine the effects of competition on newspaper consumption. The variation would be exogenous over time if the change in newspaper competition was unrelated to the change in the demand for news by people at the ideological extremes. As shown in this paper, the change in newspaper competition from 2000 to 2004 is negatively correlated with the growth of the Internet, which was driven by supply side factors (Greenstein and Prince, 2007), and therefore unlikely to be related to the change in the demand for news by people at the extremes. The results from the market fixed-effect specifications are similar to the results from the pooled cross-section

specifications, suggesting that potential bias caused by heterogenous news demand in different cities is not serious. In addition, results from a falsification test show that when newspaper readers are classified as political news readers and nonpolitical news readers, the differential effect of competition is only significant for political news readers. This test ensures that the change in news consumption is not driven by differential demand or supply in nonpolitical news.

When people with extreme ideologies consume less news from local newspapers due to declining newspaper competition, they may switch to other news sources. Empirical results show that newspaper competition reduces the frequency of people at ideological extremes obtaining political news online. However, newspaper competition does not have a similar effect on watching local TV news programs or listening to talk radio. These results suggest that traditional newspaper consumption and online news consumption are substitutes. Since online news consumption are concentrated on national news websites, declining newspaper competition reduces local news consumption.

The paper proceeds as follows. Section 2 reviews the relevant literature on sources and measurement of media bias. Section 3 provides a model of newspaper competition. Section 4 describes the data and presents an analysis based on aggregate readership data. Section 5 uses individual data to test predictions of the model on news consumption. The final section of the paper concludes.

2 Related Literature

News media provides individuals with the information they need to make decisions. However, the political ideologies of news outlets may affect their news selection (Larcinese et al., 2010). Most theories of media bias attempt to explain the origin of media bias and how it is affected by competition between media firms. Under the assumption that consumers value news accuracy, media competition may force media outlets to deliver more accurate information (Anderson, 2009; Besley and Prat, 2006). In contrast, media firms may adopt a product differentiation strategy by increasing their bias, catering to consumers' beliefs (Mullainathan and Shleifer, 2005).

Revenue sources and consumers' advertisement preferences may also affect the ideologies of newspapers under competitive pressure (Anderson and Gabszewicz, 2005; Gabszewicz et al., 2002).

Gentzkow and Shapiro (2006) present a theory of media bias in which consumers prefer media outlets that deliver unbiased information. Media bias may emerge since readers believe that outlets have better information if news reports conform to the readers' prior beliefs. Media competition will increase the amount of independent evidence on the true state of the world, and will therefore reduce media bias when consumers have homogenous beliefs. When beliefs of consumers are heterogeneous, media firms in competition may segment the market according to consumer beliefs. However, firms will move toward honest reporting when consumers receive sufficient feedback regarding news reports due to competition. Gentzkow and Shapiro also provide empirical evidence on this point. They find that in local TV markets, presidential candidates' sound bites are more balanced in markets where there are more local TV news programs, suggesting that media competition reduces media bias.

Mullainathan and Shleifer (2005) present another theory of media competition and media bias. They assume that readers hold beliefs that they like to see confirmed in the news they consume and that newspapers can slant stories toward these beliefs. When choosing an extreme position, a newspaper gains more monopoly power over readers at the extremes and therefore can charge a higher price, however, it may also lose some moderate readers. Analogous to the standard Hotelling model, the price effect dominates the market share effect until firms are ideologically very far apart.[2] Therefore, duopolist newspapers will differentiate themselves by reporting extreme news so that they can charge higher prices. In this case, if readers do not have access to both news sources, competition will strengthen the relation between readers' beliefs and the ideologies of their news sources.

Considering how sources of revenue affect the ideologies of newspapers under competition pressure, Gabszewicz et al. (2002) construct a model based on a Hotelling

[2]In the standard Hotelling model with price competition, two firms will present maximum differentiation (Tirole, 1988). In general, the factors of product differentiation are: the costs of disutility, the demand elasticity, the number of firms, and the density of consumers (Brenner, 2002).

model with price competition. They show that as long as potential advertising revenue is high enough, advertising will induce newspapers to compete for a maximal audience and therefore will force newspapers to moderate their political content.[3] Petrova (2008) develops a model of interaction between special interest groups and media outlets, in which special interest groups provide financial subsidies to induce media outlets to give favorable coverage. One of her results finds that when there are multiple media outlets and two interest groups, media outlets may be more polarized than the situation without interest groups.[4]

This paper provides a model predicting the effect of competition on newspaper ideology and consumer newspaper choice. The model shares the assumption of Mullainathan and Shleifer (2005) that readers prefer a newspaper whose slant is consistent with their prior beliefs. The model also uses the assumption of Gabszewicz et al. (2002) that newspapers do not engage in price competition and thus maximize their readership in order to maximize profits. However, I assume that consumers may also choose not to read a local newspaper if the utility from outside options is high enough. The model predicts that in a one-newspaper market, outside options for the readers will force the newspaper to cater to the majority. In a two-newspaper market, however, outside options will force newspapers to specialize in different ideologies. In terms of consumer behavior, the model predicts that people with extreme ideologies are more likely to read a newspaper in a competitive market than in a monopoly market.

Each of the studies mentioned above makes a theoretical claim about the effect of media competition. Empirical evidence backing up these claims is, however, relatively scarce. One reason for this is the difficulty inherent in measuring the ideologies of media outlets. Groseclose and Milyo (2005) provide a method for measuring the bias of several major media outlets in the United States. The basic idea is to compare citations of think tanks in the media with the citations of think tanks used by Republican and Democratic senators. Groseclose and Milyo found that most major media outlets are biased to the left. Gentzkow and Shapiro (2006) constructed another index of

[3] The examples provided in their paper are comparisons of newspapers in the US and Europe.

[4] The result is based on assumptions that some equilibrium without special interest groups exist and preferences of special interest groups are more extreme than preferences of media consumers.

media slant by comparing the language in newspapers and the language used by Republican and Democratic Congressmen. The index they created correlated with the ratings of newspapers' political orientation submitted to the media directory website MondoTimes by readers. They found that this index of media slant can be largely explained by consumer preference and not by ownership preference. They also found that readers respond to the ideology of newspapers because newspapers would lose readership if they deviated from the optimal ideology. Using different approaches from above studies, Puglisi and Snyder (2008) analyze the coverage of U.S. political scandals in newspapers. They find that newspapers with a higher propensity to endorse Democratic candidates in elections give more coverage to scandals involving Republican politicians, while Republican-leaning newspapers behave in the opposite way. They also find that newspapers appear to cater to the partisan tastes of readers only for local scandals.

Since there is evidence that people are conscious of newspaper ideologies, this paper investigates the effect of competition on newspaper ideologies and news consumption based on readers' choice of newspapers.

3 A Model of Newspaper Competition

The proposed model investigates the effects of newspaper competition and derives testable predictions regarding newspaper ideologies and consumers' newspaper consumption. There are three key assumptions in the model. First, readers prefer to read a newspaper with an ideology that is close to their own. Second, newspapers are not engaged in price competition. Therefore, newspapers simply choose the ideology that maximizes their market share.[5] Third, consumers have news options other than newspapers. Therefore, consumers can choose not to read a newspaper. This study provides evidence that directly supports the first assumption.

[5] Since more than 60 percent of the revenue of newspapers comes from advertising, it is reasonable to assume that newspapers attempt to maximize market share rather than the revenue from selling newspapers.

3.1 Model Setup

In the model, there are either one or two newspapers, and the population of consumers is normalized to 1. The goal of newspapers is to maximize market share. Consumer i has ideology c_i, which is single-peaked and symmetrically distributed with mean μ and cumulative density function $F(\cdot)$. I assume that newspapers know consumers' ideologies without uncertainty and therefore c_i is not a random variable. Newspapers are sold at fixed price p. The utility of reading a newspaper j with ideology e_j for consumer i is represented as:

$$U_{ij} = a - t|c_i - e_j|. \tag{1}$$

This utility is larger when the ideology of the newspaper is closer to the ideology of the reader. Let U_0 be the utility from outside options. Consumer i will read newspaper j if and only if the utility from reading newspaper j is greater than U_0 and the utility of reading other newspapers:

$$U_{ij} \geq \max_{k \neq j}\{U_{ik}, U_0\}. \tag{2}$$

Therefore, in this model, a consumer will not read a newspaper whose ideology is far from his own. Let $l = \frac{a-U_0}{t}$, a consumer with ideology c_i will read a newspaper only if there is one newspaper located at $[c_i - l, c_i + l]$. l can be seen as a measure of consumer' sensitivity to newspaper ideology in the market. l will be larger if consumers are more sensitive to newspaper ideology, if the utility from outside options is higher or if the distribution of consumers' ideologies is flatter.

3.2 Case I: Monopoly Newspaper

First, we consider the case when there is only one newspaper in the market. If the newspaper locates at ideology e, then the demand for the newspaper is

$$R = F(e + l) - F(e - l).$$

To maximize its market share, a newspaper will adopt an optimal ideology e^* to satisfy the following first-order condition:

$$f(e^* + l) = f(e^* - l),$$

where f is the probability density function of consumer ideology. Since the distribution of consumer ideologies is symmetric and single-peaked, the optimal ideology, e^*, is μ. Consumers with ideologies greater than $\mu + l$ or less than $\mu - l$ will not read the newspaper. Figure 1 illustrates the case of a monopoly newspaper.

3.3 Case II: Two Newspapers

Next, consider a market containing two newspapers, 1 and 2, with ideologies e_1 and e_2, respectively. For simplicity, assume $e_1 \leq e_2$. If the utility from outside options is extremely low, then almost every consumer will read a local newspaper. Thus, both newspapers will choose mean ideology μ. When the utility from outside options, U_0, increases, newspapers face a trade-off between losing some consumers in the middle or losing some of the extreme consumers when deciding an optimal ideology. Thus, the equilibrium will no longer be (μ, μ) if U_0 is high enough.

In this case, two newspapers will be located in different sides of the distribution. If two newspapers are located on the same side of the distribution, one can gain more readers by choosing a symmetrical position. Moreover, the distance between two newspapers will not be greater than $2l$. That is, all readers between two newspapers are worth keeping. If the distance is greater than $2l$, one newspaper can gain more readers by deviating toward μ because the distribution of reader ideologies is single-peaked and symmetric. This leads to e_1 in the range $[\mu - 2l, \mu]$ and e_2 in the range $[\mu, \mu + 2l]$. Since the two newspapers are not both located at μ and all consumers with ideologies between two newspapers read a newspaper, the two newspapers can attract more readers at the extremes than a monopoly newspaper. These results can be summarized in the following proposition, the detailed proof of which appears in Appendix 1.

Proposition. *Let k be $|f^{-1}\left(\frac{1}{2}f(\mu)\right)| - \mu$. In the case of duopoly, at any Nash equilibrium (e_1, e_2), when $U_0 > a - tk$, i.e. $k > l$, two newspapers will choose different ideologies with $e_1 \leq \mu \leq e_2$ and $0 < e_2 - e_1 \leq 2l$. Thus, ideological range of newspaper readers is wider than the range $[\mu - l, \mu + l]$.*

This proposition states that as long as the utility from outside options is relatively high, two competing newspapers will choose different ideologies. However, the degree

of differentiation is limited by consumers' sensitivity to newspaper ideologies because the ideological distance of two newspapers cannot exceed $2l$. In terms of consumer behavior, while only consumers in the range $[\mu - l, \mu + l]$ read a newspaper in the monopoly case, now some readers outside the range $[\mu - l, \mu + l]$ also read a newspaper.

We can further classify the equilibria into two types when $U_0 > a - tk$: (1) The distance between the two newspapers is less than $2l$ and they are located symmetrically at $(\mu - k + l, \mu + k - l)$. (2) The distance between two newspapers equals $2l$. These results imply that once newspapers develop diverging ideologies, the ideological distance between two newspapers is increasing in U_0 in the first symmetric type of equilibrium. When the distance between two newspapers equals $2l$, newspapers may be located asymmetrically at μ. This type of equilibrium appears when consumers are very sensitive to newspaper ideology, causing newspapers to reach their maximum differentiation $2l$ to maximize their readership. These results are stated and proved in proposition A1 in Appendix 1. Graph 2 illustrates the case of symmetric equilibrium.

In a market with more than two newspapers, similar properties hold for the equilibrium: At least one newspaper will be located not further than l from μ, and the distance between two adjacent newspapers will never exceed $2l$. These results are stated and proved in proposition A2 in Appendix 1.

3.4 Predictions

The model is based on the assumptions that newspapers attempt to maximize their readership and that consumers may choose not to read a local newspaper.[6] This model predicts a monopoly newspaper will select the mean ideology. In the case of competition, when the utility of outside options is high enough, newspapers will choose different ideologies. However, the two newspapers will not attain maximum differentiation.

The model also makes predictions about consumer behavior. First, in the case of

[6]The model does not consider the possible influence of owner preferences. Because newspapers in a monopoly market have more monopoly power, the influence of owner preference on newspapers' ideologies could be larger in single-newspaper markets. Gentzkow et al. (2006) provided a simple and clarifying supply-driven model of the link between media bias and competition on media markets.

a monopoly, readers whose ideologies are far from the mean ideology are less likely to read a newspaper. Second, newspapers in competitive markets attract more readers with extreme ideologies than a monopoly newspaper. These predictions will be tested using the data illustrated in the next section.

4 Data

This section describes the data sources and key variables used in this paper, and presents graphs and analysis based on aggregate data.

4.1 Newspaper Competition

In order to investigate the effect of newspaper competition on the ideologies of newspapers, it is necessary to define the market area and measure the degree of newspaper competition. In the U.S., most daily newspapers are city newspapers, though a few are county specific. Because the circulation area of a daily newspaper is usually larger than a city, the newspaper market is defined as either an MSA (Metropolitan Statistical Area) or a county.

Newspaper competition is measured by the number of newspapers in the city. The *Editor and Publisher International Year Book* lists multiple-newspaper cities in the U.S. and the newspapers in those multiple-newspaper cities. In 2000, there were 59 cities that had more than one newspaper. From 2000 to 2004, 10 cities became single-newspaper cities, and two cities became multiple-newspaper cities. I assume that markets without any multiple newspaper cities have only one newspaper. Because some U.S. counties have no newspapers, I dropped individuals who live in markets with a population of less than 15,000 to reduce possible measurement error. The sample is also restricted to markets with more than 15 observations to construct meaningful relative extremism index.

In some multiple-newspaper cities, different newspapers have the same owners or have an agreement to cooperate in printing and distribution. Nevertheless, because these newspapers still have different editorial staffs, they are treated in the same manner as independent newspapers competing with each other. Business and foreign-

language newspapers are excluded when counting the number of newspapers in the market. Because one MSA could have several cities with one or zero newspapers, the newspaper competition measure does not account for all available newspapers in the market. The variation of newspaper competition relies on whether there is any city with more than one newspaper in the market area.

4.2 Newspaper Reading and Political Demographics

The data concerning individuals' news consumption and political demographics are taken from the 2000 and 2004 National Annenberg Election Surveys (NAES) conducted by the Annenberg Public Policy Center of the University of Pennsylvania. The institution did a rolling cross-section survey from the end of 1999 to the end of 2000 and performed a similar rolling cross-section survey from the end of 2003 to the end of 2004. The survey data includes information on individuals' media consumption, ideology, political affiliation, and voting behavior.

Local Newspaper Reading

The survey asked respondents which newspaper they had read most in the past week. If the newspaper they had read most was a national newspaper or an international newspaper, the individual was defined as not reading a local newspaper. However, there are several major daily newspapers that circulated outside their MSA. For example, the *Boston Globe* circulates both in Boston and in the Providence MSA. Because the newspaper competition measure does not consider all the newspapers available in the market, the readers of such widely distributed major daily newspapers are defined as not reading a local newspaper if they live outside of the MSA where the newspaper is published.

Political Ideology of the Respondents

The political ideology of the respondent was self-reported into one of the five following categories: very liberal, liberal, moderate, conservative, or very conservative. I coded the ideologies from –2 to 2; very liberal is coded as –2, and very conservative

is coded as 2. For each respondent, I defined their absolute extremism index as:

$$Absolute\ extremism\ index = |ideo_{im}|, \tag{3}$$

where $ideo_{im}$ is the ideology of individual i in the market m.

To reflect the degree of ideological extremism in their market area, I also defined the relative extremism index of individual i in market m as:

$$Relative\ extremism\ index = |ideo_{im} - mean_m|. \tag{4}$$

where $mean_m$ is the mean ideology of the market m.

4.3 Presence of High-speed Internet

The quality and the price of the Internet may directly affect the utility of accessing information from the Internet and therefore more news sources available to consumers. As a result, the growth in the availability of high-speed Internet may directly affect the readership of newspapers.

In this paper, the number of high-speed internet providers is used as a proxy for the speed and quality of internet connection. The Federal Communications Commission (FCC) provides information on the number of high-speed internet providers by zip code.[7] The mean of the number of high-speed internet suppliers in the sample is 3.57 in 2000 and 8.44 in 2004.

4.4 Graphs and Analysis based on Aggregate Data

Graph 1 presents the ideological distribution of residents in a one-newspaper market, Hartford, and the ideological distribution of readers of the *Hartford Courant*. A comparison of these two distributions show that the ideology distribution of the readers of the *Hartford Courant* is more concentrated in the middle than the ideologies of residents of the Hartford market. This comparison suggests that readers at the extremes are less likely to read a local newspaper. Graph 2 presents the ideological distribution of readers of the *Boston Globe* and the *Boston Herald* in the Boston

[7] The data are available from 1999 for every half year.

two-newspaper market. These two distributions suggest that the *Boston Herald* has more conservative readers, suggesting that the *Boston Globe* and the *Boston Herald* have different ideologies.

To test if newspapers in two newspaper markets have different ideologies, we first calculate each newspaper's ideology based on the mean ideology of its readers. This information can then be used to derive an F-statistic and test the hypothesis that newspapers in a two-newspaper market target individuals with different ideologies. Appendix 1 provides the details of the derivation. The null hypothesis is that all newspapers target the mean of the market's ideological distribution. The alternative hypothesis is that newspapers in a two-newspaper market target readers with different ideologies. The F-statistic, 1.9, is greater than the critical value, 1.42, at a 5 percent significance level, rejecting the null hypothesis. This provides evidence supporting the prediction that newspapers specialize in different ideologies in two-newspaper markets.

The ideological gap between the newspapers in two-newspaper cities varies by city. To investigate factors affecting the degree of differentiation, this study implements regression analysis using aggregate data. The dependent variable, *Diff1*, in Table 2 column (1) was generated by taking the difference between two newspapers' ideologies. Control variables include average education, market population, average age, and the percent of people who are very liberal or very conservative in the market.[8] Results show that education has a positive effect on the degree of differentiation, while income and age have negative effects on the degree of differentiation.

In monopoly markets, some newspapers' ideologies are closer to the mean market ideologies than others. A variable *Diff2* was generated by taking the difference between newspaper ideology and market ideology, which served as a dependent variable in column (2). The coefficient of education is negative and the coefficient of income is positive but neither is significant.

In column (3) , the sample includes newspapers in monopoly and duopoly mar-

[8] The sample in Table 2 column (1) includes 43 pairs of newspapers in competition. If newspapers in different years are treated as different newspapers, then there are 76 pairs of newspapers in two-newspaper cities. The coefficient of education is no longer significant in this case.

kets and the dependent variable is *Diff2.* Variable competition is a dummy variable indicating that the newspaper is in a two-newspaper market. This result suggests that newspapers in two-newspaper cities have different ideologies.

5 Empirical Analysis

This section provides empirical analysis based on individuals' choices of newspaper. I firstly restrict the sample to respondents in one-newspaper markets and test whether respondents with extreme ideologies are more likely to read a local newspaper. Secondly, I investigate whether newspaper competition increases the probability of reading a local newspaper more among those with extreme ideologies. To exclude alternative interpretations, market fixed-effect specifications, a falsification test, and instrumental variables are used. Finally I test whether newspaper competition reduces the incentive to obtain political information online.

5.1 The Case of a One-newspaper Market

To test the prediction that people at the extremes are less likely to read a local newspaper in a single-newspaper market, individual newspaper reading is estimated by the Probit model when the sample is restricted to the respondents in one-newspaper markets. The dependent variable is a dummy variable that indicates whether the respondent reads a newspaper or not. Independent variables include variables that represent the ideologies of respondents. Other variables such as education, income, age, and gender are also included. Results are reported in Table 3. Column (1) shows that people who are very conservative or very liberal are less likely to read a local newspaper, compared to people who are moderate. In Column (2), the absolute extremism index is used instead of ideology dummy variables.[9] On average, people who are at the extremes are 4.1 percent less likely to read a local newspaper.

These results suggest that readers prefer to read a newspaper with an ideology closer to their own ideology. It could also mean that, in general, those with extreme

[9] The absolute extreme index is 2 if very conservative or very liberal, 1 if conservative or liberal, and 0 if moderate.

ideologies demand less local news. However, if people at either end of the political spectrum simply demand less local news, newspaper competition should not have larger effects on the probability of reading a local newspaper for people at the extremes relative to those not at the extremes. Therefore, analyzing the effect of competition may help us to distinguish between those two possible reasons.

5.2 The Effect of Newspaper Competition

Table 3 column (3) and column (4) present results when the sample is restricted to the respondents in multiple-newspaper markets. I use ideological dummies in column (3), and absolute extremism index in column (4). While consumers who are more liberal are more likely to read a local newspaper, the difference between moderate readers and readers with extreme ideologies is smaller than in single-newspaper markets. To quantify the effect of competition, I use the whole sample to estimate the differential effect of newspaper competition on the probability of reading a local newspaper and results are reported in Table 4. Using the ideological dummy variables in column (1), the result shows that competition increased the probability of those who are very conservative or very liberal reading a local newspaper. In column (2), the interaction term of the absolute extremism index and the number of newspapers is positive, indicating that newspaper competition has a larger effect on newspaper reading for people who are at the extremes. In terms of magnitude, on average, six newspapers will erase the gap of local newspaper readership between people with different ideologies. These results support the hypothesis that readers prefer a newspaper with an ideology close to their own and that newspaper competition will make newspapers specialize in different ideologies.

It is possible that people with different demographic characteristics have different patterns of news demand. For example, people with lower incomes or higher education levels may be less sensitive to newspaper ideology and thus read a newspaper regardless of how big the gap between their ideology and that of the newspapers they read. To control for the possible difference, the specification in column (3) includes interaction terms of the absolute extremism index and personal characteristics, such as income, education, and age. The result indicates that younger people with ex-

treme ideologies are more likely to read a newspaper than older people with extreme ideologies.

While newspapers in competition may differentiate in political ideologies to attract more readers at the extremes, they may also differentiate in other aspects to attract readers with lower income or lower education. In table 4 column (3), the specification includes interaction terms of number of papers and personal characteristics. The results show that newspaper competition also increases the readership among those with lower income and those who are younger. The effect of newspaper competition on consumers with extreme ideologies still remains significant.

5.3 Alternative Explanation – Heterogeneous News Demand

One concern of the above results involves endogeneity in the number of newspapers in a market. The number of newspapers may be positively correlated to an unobservable news demand among people at the extremes. In this case, we will observe a spurious correlation between newspaper competition and newspaper readership among those at the ideological extremes. Therefore, I use a market fixed-effect specification, a falsification test for consumption of nonpolitical news, and instrumental variables to address this concern.

A. Market Fixed-effect Specification

One way to account for this concern is to rely on the change in competition over time by including market fixed effects. In the market fixed-effect specification, the variation of newspaper competition comes from the change from 2000 to 2004. Table 5 column (1) presents the results with market fixed effects using the absolute extremism index. Compared with the results from the pooled cross-section results in Table 4, the differential effects of newspaper competition are similar, suggesting that potential bias caused by heterogenous news demand in different cities is not serious. To control for possible changes of outside options, the number of local high speed internet providers is included in column (2). Because the mean ideology of each market varies across the U.S., in column (3) I use the relative extremism index instead of absolute extremism index to measure respondents' ideological extremism in

their markets. In column (3), after controlling for respondents' ideology, results show that the more an individual's ideology varies from the mean market ideology, the less likely they are to read a local newspaper and newspaper competition encourages those with relatively extreme ideologies to read a newspaper. Seven newspapers are needed to erase the gap of local newspaper readership between people with different ideologies.

The identification assumption for the market fixed-effect specification to be unbiased is that the change in newspaper competition should not be related to a change in demand for news among people at the extremes. To investigate factors that may affect newspaper competition at the market level, I use OLS and fixed-effect models in Table 6. The dependent variable is the number of newspapers in the market. Column (1) presents the results of cross-section estimation, and column (2) presents the results of fixed-effect specification. The results in column (2) indicate that the growth of high-speed internet providers affected the change in newspaper competition from 2000 to 2004, while other factors such as ideology distribution were not related to newspaper competition.

Researchers have investigated factors that contributed to the growth of high-speed Internet. As Greenstein and Prince (2007) demonstrated, in the earliest years of broadband internet access (prior to 2003), it was very much supply driven in the sense that supply-side issues were the main determinants of broadband internet availability and hence adoption. Specifically, highly populated areas were more profitable because of economies of scale and lower last-mile expenses.[10] While the early stage of high-speed Internet focused on metropolitan areas and areas with higher income, the diffusion process makes it such that the growth rate is unlikely to be positively correlated with a change in news demand among those with extreme ideologies.

B. Political News vs. Nonpolitical News

In addition to asking respondents which newspaper they read most in the past week, the ANES survey also asked respondents whether they got political information about the presidential campaign from the newspaper they read. The exact survey

[10] Greenstein and Prince (2007) found that the diffusion of dial-up spread quickly because it relied on the existing phone line infrastructure.

question in 2004 is as follows: "During the past week, how much attention did you pay to newspaper articles about the campaign for president – a great deal of attention, some, not too much, or no attention at all." Therefore, we can split local newspaper readers into political information readers and nonpolitical information readers by their answers. Local newspaper readers who answered "a great deal of attention" and "some" are coded as political readers, and those who answered "not too much" or "no attention" are coded as nonpolitical readers. The survey question regarding their political news consumption from newspapers in 2000 has three versions in the question and were asked during different time periods. However, the three versions of the question has only slightly different wordings and response choices were the same, so I include the information from the 2000 data.

In Table 7, results show that the effect of newspaper competition has a larger effect on the probability of being a political newspaper reader among those at the extremes. However, newspaper competition does not have a differential effect on the probability of being a nonpolitical newspaper reader.

The results suggest that people at the extremes increase their demand for political news as there are more newspapers in the market, but their demand for nonpolitical news does not change. This may indicate that the differential effect of newspaper competition that we observed from the OLS and market fixed-effect specifications are most likely caused by the change in political news. If newspaper competition induces newspapers to differentiate in other aspects, this comparison can help us rule out the case that people at the extremes are more sensitive to changes other than political ideologies, such as changes in the amount of sports news or newspaper quality.

5.4 Reverse Causality

So far in this paper, individuals' ideologies are considered unaffected by the newspapers they read. This section provides a discussion of the related literature and how removing this assumption would change the interpretation of empirical results in this paper.

There is some evidence showing that the media may affect voting behavior (DellaVigna and Kaplan, 2007; Gerber et al., 2009); however, there is limited evidence that

the media will affect the political ideologies of individuals. Bernhardt et al. (2008) argue that the increase in observed partisan behavior is not due to a fundamental change of voters' political preference. Rather, they argue that it is due to the different information that voters received because the ideological distribution has been stable over recent years, but political opinions became more diverse. Moreover, they argued that in 2004, Bush and Kerry supporters held vastly different beliefs about facts reported by the media, relative to their differences in core beliefs (e.g., abortion), which are less influenced by the media.

If newspapers can affect readers' ideologies, the OLS estimates in the last section could be a result of reverse causality. The OLS results still show that, in equilibrium, newspapers under competition have different ideologies. However, we can no longer make any inferences about whether readers prefer a newspaper consistent with their prior beliefs.

The variation of competition in the fixed-effect specification is the change in competition from 2000 to 2004. Because readers ideologies generally take more than four years to be significantly altered by newspapers, the results from the fixed-effect specification is less sensitive to the possible effect of newspapers on ideologies. Because the estimates from the OLS and fixed-effect specifications are similar, the potential problem of reverse causality is not serious.

5.5 Effect of Newspaper Competition on Obtaining Information Online

If news sources with similar ideologies are substitutes and newspaper competition induces newspapers to specialize in different ideologies, then newspaper competition may affect the incentive for people at the extremes to get information from other sources such as the Internet, local TV news programs, or radio. Table 8 presents the results of newspaper competition on news consumption from other sources. The dependent variable in column (1) and column (2) is the number of days people accessed political information online in the past week.[11] The result shows that people who are

[11] The exact survey question is: "How many days in the past week did you access information about the campaign for president online?" Some respondents are asked, alternatively : "How many

at the extremes access political information from the Internet less frequently in the presence of newspaper competition.[12]

However, in column (3) and column (4), when changing the dependent variable to the frequency of watching local TV news or listening to talk radio, the effect of the interaction term of newspaper competition and extremism index is not significant. These results suggest that when there are fewer newspapers in the market, consumers with extreme ideologies will consume less news from daily newspapers and more news from the Internet, but the news consumption from local TV news and radio will not change.[13]

6 Conclusion

This paper has analyzed how media competition affects political ideologies of media outlets and news consumption of the general public. Using the NAES in 2000 and 2004, the empirical results show that in markets with only one newspaper, residents who are at ideological extremes may choose not to read a newspaper. However, in competitive markets, residents who are at the extremes are more likely to read a newspaper, relative to the monopoly case. The results also show that newspaper competition reduces the incentive for people at the extremes to access political information online. These results suggest that readers prefer a newspaper with an ideology that is closer to their own and that newspaper competition will induce newspapers to specialize in different ideologies, satisfying the news demand of people with opposing ideologies.

News media not only provide people with information to make decisions, but also provide ways for people to communicate with each other to help formulate public policies. With updated information, people are more likely to have discussions based

days in the past week did you read information about the campaign for president online?"

[12] Regarding other factors such as income, education, or age, people with higher incomes or higher education levels are more likely to read a local newspaper and get political information on the Internet. Older people are more likely to read a local newspaper; in addition, they are less likely to get information from the Internet.

[13] Since most popular and well-designed news websites are national news website, the declining newspaper competition is likely to decrease local news consumption of people at the extremes.

on facts, not solely based on their ideologies. This paper finds that while competition in newspaper markets may cause newspapers to differentiate their political ideologies, competition also encourages more readers with extreme ideologies to read a newspaper, which may facilitate communication between people with different ideologies.

Appendix 1

Proof of Proposition 1 on page 10. Under the condition $k > l$, (μ, μ) will not be the equilibrium. If $k > l$, then $\frac{1}{2}f(\mu) < f(l)$. Suppose that $e_1 = e_2 = \mu$. In this case, one of the newspapers will deviate from μ since the marginal gain, $f(l)$, is greater than its marginal loss, $\frac{1}{2}f(\mu)$. Therefore, (μ, μ) will not be at equilibrium. Moreover, newspapers will not choose the same side of μ. Whenever e_2 and e_1 are both less than μ, newspaper 2 will be better off by choosing its symmetric position.

We now show that $0 < |e_1 - e_2| \leq 2l$. Suppose that in the equilibrium, $e_2 - e_1 > 2l$. In this case, consumers with ideology $\frac{e_1+e_2}{2}$ will not read either newspaper. Since $f(\frac{e_1+e_2}{2})$ is greater than either $f(e_1 + l)$ or $f(e_2 - l)$, one of the newspapers will gain more consumers by deviating toward the mean ideology. The proof is now complete.

Proposition A1. *Suppose that there are two newspapers in the market, if $U_{i0} > a - tk$, i.e. $k > l$, two types of equilibria may exist:*

(1) *The distance of two newspapers is less than $2l$ and newspapers are located symmetrically at $(\mu - k + l, \mu + k - l)$.*

(2) *The distance of two newspapers equals $2l$.*

Proof. Proposition 1 shows that $0 < |e_1 - e_2| \leq 2l$ at the equilibrium when $l < k$. This means that either $0 < |e_1 - e_2| < 2l$ or $|e_1 - e_2| = 2l$ at the equilibrium. Given newspaper 1's position e_1, the demand for newspaper 2 can be represented as follows:

$$D(e_2) = \begin{cases} F(e_2 + l) - F(\frac{1}{2}(e_1 + e_2)) & \text{when } e_1 - e_2 \leq 2l, \\ F(e_2 + l) - F(e_2 - l) & \text{when } e_1 - e_2 \geq 2l. \end{cases}$$

Note that the demand of newspaper 2 is not continuous at $e_2 = e_1 + 2l$.

Suppose that $0 < |e_1 - e_2| < 2l$ at the equilibrium. In this case, (e_1, e_2) must satisfy the following two first order conditions:

$$f(\frac{e_1 + e_2}{2}) \times \frac{1}{2} - f(e_1 - l) = 0 \tag{5}$$

$$f(l + e_2) - f(\frac{e_1 + e_2}{2}) \times \frac{1}{2} = 0. \tag{6}$$

Moreover, newspaper 2 cannot gain more readership by choosing $e_2 = e_1 + 2l$.

Suppose that $k/2 < l < k$. Then $(e_1, e_2) = (\mu - k + l, \mu + k - l)$ is the equilibrium if the following condition holds:

$$F(\mu + k) - F(\mu) \geq F(-k + 4l) - F(-k + 2l). \tag{7}$$

The distance of two newspapers is less than $2l$ and $(\mu - k + l, \mu + k - l)$ satisfies the first order conditions. The second order conditions are also satisfied since $f'(\mu)$ is zero under the assumption that the distribution is single-peaked. The condition of equation (8) ensures that $e_2 = e_1 + 2l$ will not give newspaper 2 greater demand.

Now suppose that $e_2 - e_1 = 2l$ at the equilibrium. In this case, there is no symmetric condition for newspapers' choices, and the equilibrium can be asymmetric. This type of equilibrium appears when consumers are very sensitive to newspaper ideology, causing newspapers to reach their maximum differentiation $2l$ to maximize their readership.

An Example: While the existence of equilibrium require restrictions on the distribution of consumer ideology, these restrictions are not difficult to meet. Consider the following example of a normal distribution: When consumer ideology has a standard normal distribution, $N(0,1)$, the value of k is 1.1774. When $l > k$, there exists one unique equilibrium: $(0,0)$. When $k/2 < l < k$, there exists one unique equilibrium $(k+l, k-l)$ because $F(k) - F(0) > F(-k+4l) - F(-k+2l)$. When l is smaller, there are multiple equilibria. For example, both $(-0.3, 0.3)$ and $(0, 0.6)$ are equilibria when $l = 0.3$.

Proposition A2. *With notations above, suppose that there are n newspapers in the market. Let $(e_1, e_2, ...e_n)$ be a Nash equilibrium with $e_1 \leq e_2 ... \leq e_n$. This leads to the following conditions:*

(1) *At least one newspaper's ideology will be located in $(\mu - l, \mu + l)$.*

(2) *The distance of two adjacent newspapers will be less than or equal to $2l$.*

(3) *If $e_{i-1} < e_i < e_{i+1} < \mu$, then either $|e_i - e_{i-1}|$ or $|e_i - e_{i+1}|$ must be equal to $2l$.*

The proof of (1) and (2) is similar to the proof of Proposition 1. For (3), if there exists e_i such that $|e_i - e_{i+1}| < 2l$ and $|e_{i-1} - e_{i+1}| < 2l$, then newspaper i will be better off by either deviating to the left or right. This is because its right-hand marginal gain, $0.5f((e_{i-1} + e_i)/2)$, will not equal its left-hand marginal gain $0.5f((e_i + e_{i+1})/2)$. Therefore, the distance between a newspaper and one of its adjacent newspapers equals $2l$.

Appendix 2

From the ANES survey, we can calculate the mean ideology of the readers of each newspaper. We are interested in testing whether ideologies of newspapers in a two-newspaper city target different groups of readers, as the model in this paper predicts. The null hypothesis is that newspapers in two-newspaper markets target the middle of the ideological distribution in their markets. The alternative hypothesis is that newspapers in two-newspaper markets target different groups of readers. Assume that every newspaper has the same ability to target the majority of readers in its market. Under the null hypothesis, ideologies of newspaper i in market m can be represented as follows:

$$e_{im} = \mu_m + \varepsilon_{im}, \tag{8}$$

where μ_m is the mean ideology of the market, and ε_{im} is i.i.d. normally distributed with mean 0 and variance σ^2.

Suppose that there are N_1 newspapers in a one-newspaper market and N_2 newspapers in a two-newspaper market. For any newspaper in a one-newspaper market, we will have:

$$\Sigma \frac{(e_{im} - \mu_m)^2}{\sigma^2} \sim \chi^2_{N_1}. \tag{9}$$

Similarly, for newspaper i and j in a two-newspaper market:

$$\Sigma \frac{(e_{im} - e_{jm})^2}{2\sigma^2} \sim \chi^2_{N_2}. \tag{10}$$

Therefore, we can derive a statistic that is distributed as an F-distribution with degrees of freedom N_2 and N_1:

$$\frac{\Sigma \frac{(e_{im}-e_{jm})^2}{2\sigma^2}/N_2}{\Sigma \frac{(e_{im}-\mu_m)^2}{\sigma^2}/N_1} \sim F_{N1,N2}. \tag{11}$$

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Table 1: Summary Statistics

Sample:	All Sample					
	Obs	Mean	S.D.	Min	Max	
Number of newspapers	111207	1.523	1.096	1	5	
Read a local newspaper (1 or 0)	111207	0.712	0.453	0	1	
Ideology	111207	0.151	0.973	-2	2	
Relative extremism index	111207	0.751	0.589	0	2.833	
Absolute extremism index	111207	0.727	0.664	0	2	
Internet supply at market level	111207	4.855	3.228	0.143	11.714	
Internet supply at zipcode level	111207	6.450	4.024	0	19	
College or more	111207	0.672	0.469	0	1	
High school	111207	0.258	0.437	0	1	
Log income	111207	10.706	0.773	8.987	11.983	
Age	111207	46.287	16.135	18	97	
Frequency of getting information online	96175	1.133	2.149	0	7	
Log population	111207	13.714	1.749	9.615	16.724	
Sample:	One Newspaper Market			Multiple Newspaper Market		
	Obs	Mean	S.D.	Obs	Mean	S.D.
Number of newspapers	79563	1.000	0.000	31644	2.837	1.345
Read a local newspaper (1 or 0)	79563	0.727	0.445	31644	0.674	0.469
Ideology	79563	0.203	0.969	31644	0.018	0.969
Relative extremism index	79563	0.759	0.575	31644	0.731	0.622
Absolute extremism index	79563	0.733	0.666	31644	0.710	0.660
Internet supply at market level	79563	4.277	2.951	31644	6.308	3.429
Internet supply at zipcode level	79563	5.769	3.810	31644	8.163	4.040
College or more	79563	0.653	0.476	31644	0.719	0.449
High school	79563	0.274	0.446	31644	0.218	0.413
Log income	79563	10.655	0.762	31644	10.832	0.785
Age	79563	46.665	16.258	31644	45.338	15.781
Frequency of getting information online	68617	1.075	2.102	27558	1.276	2.257
Log population	79563	13.058	1.486	31644	15.363	1.182

Table 2: Newspaper Ideologies in Monopoly Markets and Duopoly Markets

	(1) *Diff1*	(2) *Diff2*	(3) *Diff2*
Competition			0.046∗
			(0.026)
Avg. age	−0.050∗	−0.002	−0.003
	(0.028)	(0.002)	(0.002)
Avg. eduaction	0.370∗	−0.007	0.009
	(0.192)	(0.015)	(0.016)
Avg. income	−0.916∗	0.018	−0.014
	(0.462)	(0.053)	(0.053)
Frac. very conservative	−2.228	−0.005	−0.013
	(2.127)	(0.155)	(0.160)
Frac. very liberal	−1.811	0.224	0.374
	(3.389)	(0.224)	(0.229)
Log population	−0.000	−0.012∗	−0.011∗
	(0.063)	(0.006)	(0.006)
Constant	8.283∗	0.300	0.491
	(4.124)	(0.486)	(0.485)
Observations	43	876	962
R-squared	0.276	0.006	0.011

Note: *Diff1* is the absolute difference of the two newspapers' ideologies. *Diff2* is the absolute difference between the newspaper ideology and market mean ideology. The sample in column (1) is restricted to duopoly markets. The sample in column (2) is restricted to monopoly newspapers. The sample in column (3) is restricted to monopoly and duopoly markets. Standard errors in parentheses. * denotes 90% significance; ** denotes 95% significance; *** denotes 99% significance.

Table 3: Monopoly Markets and Markets in Competition

	Monopoly Markets		Multiple-newspaper Markets	
	(1)	(2)	(3)	(4)
	Probit	Probit	Probit	Probit
Very conservative	−0.057***		−0.042***	
	(0.006)		(0.015)	
Conservative	−0.015***		−0.019**	
	(0.004)		(0.008)	
Liberal	−0.008		−0.012	
	(0.005)		(0.008)	
Very liberal	−0.033***		−0.029**	
	(0.009)		(0.014)	
Absolute estremism index		−0.020***		-0.017***
		(0.002)		(0.005)
Log income	0.035***	0.035***	0.017**	0.016**
	(0.003)	(0.003)	(0.008)	(0.008)
High school	0.119***	0.119***	0.130***	0.130***
	(0.006)	(0.006)	(0.012)	(0.012)
College	0.133***	0.134***	0.132***	0.133***
	(0.008)	(0.008)	(0.016)	(0.016)
Log population	−0.014***	−0.014***	−0.020**	-0.020**
	(0.002)	(0.002)	(0.009)	(0.009)
Male	−0.003	−0.003	0.015**	0.014**
	(0.003)	(0.003)	(0.006)	(0.006)
Age	0.003***	0.003***	0.003***	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)
Year 2004	−0.024***	−0.024***	−0.042***	-0.042***
	(0.003)	(0.003)	(0.014)	(0.014)
Region	Yes	Yes	Yes	Yes
Observations	79563	79563	31644	31644
Pseudo R-squared	0.03	0.03	0.05	0.05

Note: Dependent variable is 1 if the respondent read a local newspaper. Marginal effects are reported in the Probit Specifications. Absolute extremism index is 2 if the ideology of the respondent is very conservative or very liberal, 1 if liberal or conservative, and 0 if moderate. Standard errors are adjusted for market-level clustering and appear in parentheses. * indicates significance at 10%; ** significance at 5 %; *** significance at 1%.

Table 4: Effect of Newspaper Competition(Pooled Cross-Section)

	(1)	(2)	(3)	(4)
Number of papers	−0.005	−0.006	−0.006	0.058**
	(0.005)	(0.005)	(0.005)	(0.023)
Number of papers*Very conservative	0.008***			
	(0.003)			
Number of papers*Conservative	0.001			
	(0.003)			
Number of papers*Liberal	0.002			
	(0.002)			
Number of papers*Very Liberal	0.012***			
	(0.004)			
Absolute extremism index		−0.026***	−0.027	−0.025***
		(0.003)	(0.036)	(0.003)
Number of papers*Absolute extremism index		0.005***	0.004***	0.004***
		(0.001)	(0.001)	(0.001)
Absolute extremism index*Log income			0.003	
			(0.003)	
Absolute extremism index*College			−0.002	
			(0.008)	
Absolute extremism index*High School			0.002	
			(0.008)	
Absolute extremism index*Age			−0.001***	
			(0.000)	
Number of Papers*Log income				−0.004**
				(0.002)
Number of Papers*College				−0.005
				(0.005)
Number of Papers*High school				0.003
				(0.003)
Number of Papers*Age				−0.000***
				(0.000)
Very conservative	−0.064***			
	(0.009)			
Conservative	−0.017***			
	(0.006)			
Liberal	−0.015**			
	(0.007)			
Very liberal	−0.052***			
	(0.011)			
Log income	0.027***	0.027***	0.025***	0.035***
	(0.005)	(0.005)	(0.007)	(0.005)
High school	0.122***	0.122***	0.120***	0.118***
	(0.005)	(0.005)	(0.008)	(0.007)
College	0.133***	0.134***	0.135***	0.142***
	(0.007)	(0.007)	(0.009)	(0.011)
Log population	−0.018***	−0.018***	−0.018***	−0.018***
	(0.004)	(0.005)	(0.004)	(0.005)
Male	0.002	0.002	0.002	0.002
	(0.003)	(0.003)	(0.003)	(0.003)
Age	0.003***	0.003***	0.004***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)
Year 2004	−0.024***	−0.024***	−0.024***	−0.024***
	(0.003)	(0.003)	(0.003)	(0.003)
Census Division	Yes	Yes	Yes	Yes
Observations	111207	111207	111207	111207
Pseudo R-squared	0.03	0.03	0.03	0.03

Note: Dependent variable is 1 if the respondent read a local newspaper. Marginal effects in the Probit model reported. Dummy variables for the nine census divisions are included. Standard errors are adjusted for market-level clustering and appear in parentheses. * indicates significance at 10%; ** significance at 5%; *** significance at 1%.

Table 5: Effect of Newspaper Competition(Market Fixed Effect)

	(1)	(2)	(3)	(4)
Number of papers	−0.011	−0.012	−0.014	−0.015
	(0.011)	(0.011)	(0.011)	(0.011)
Number of papers*Very conservative	0.010***			
	(0.004)			
Number of papers*Conservative	0.002			
	(0.003)			
Number of papers*Liberal	0.001			
	(0.002)			
Number of papers*Very Liberal	0.010**			
	(0.004)			
Absolute extremism index		−0.026***	−0.031***	
		(0.003)	(0.005)	
Number of papers*Absolute		0.005***	0.004***	
extremism index		(0.001)	(0.001)	
Relative extremism index				−0.029***
				(0.010)
Number of papers*Relative				0.004***
extremism index				(0.001)
Very conservative	−0.068***			−0.030**
	(0.008)			(0.015)
Conservative	−0.020***			−0.008
	(0.006)			(0.006)
Liberal	−0.009			0.007
	(0.006)			(0.009)
Very liberal	−0.045***			−0.002
	(0.011)			(0.018)
Log income	0.035***	0.034***	0.034***	0.034***
	(0.003)	(0.003)	(0.003)	(0.003)
High school	0.137***	0.137***	0.137***	0.137***
	(0.007)	(0.007)	(0.007)	(0.007)
College	0.137***	0.138***	0.138***	0.137***
	(0.008)	(0.008)	(0.008)	(0.008)
Male	0.002	0.001	0.001	0.002
	(0.003)	(0.003)	(0.003)	(0.003)
Age	0.003***	0.003***	0.003***	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)
Year 2004	−0.025***	−0.025***	−0.019***	−0.018***
	(0.003)	(0.003)	(0.006)	(0.006)
Internet supply			−0.002	−0.002*
			(0.001)	(0.001)
Internet Supply*Absolute			0.001**	
extremism index			(0.001)	
Internet Supply*Relative				0.001**
extremism index				(0.001)
Constant	0.105**	0.113***	0.126***	0.127***
	(0.042)	(0.042)	(0.043)	(0.044)
Market fixed effect	Yes	Yes	Yes	Yes
Observations	111207	111207	111207	111207
R-squared	0.065	0.065	0.065	0.066

Note: Dependent variable is 1 if the respondent read a local newspaper. All results in this table are estimated using a linear probability model with market fixed effects. Standard errors are adjusted for market-level clustering and appear in parentheses. * indicates significance at 10%; ** significance at 5%; *** significance at 1%.

Table 6: Change in Newspaper Competition

Dependent variable: Number of newspapers		
	(1)	(2)
	OLS	Fixed-effects
Avg. income	−0.006	−0.013
	(0.028)	(0.011)
Avg. education	−0.013	−0.001
	(0.008)	(0.004)
Avg. internet supply	0.004	−0.006***
	(0.006)	(0.002)
Frac. very liberal	−0.106	−0.022
	(0.073)	(0.029)
Frac. very conservative	0.043	−0.001
	(0.105)	(0.041)
Log population	0.082***	
	(0.006)	
Year 2004	−0.013	0.013*
	(0.020)	(0.007)
Constant	0.322	1.201***
	(0.270)	(0.116)
Observations	1926	1926
R-squared	0.140	0.970

Note: Dependent variable is the number of newspapers in the market. * indicates significance at 10%; ** significance at 5%; *** significance at 1%.

Table 7: Political News versus Nonpolitical News

	Political	Non-political	Political	Non-political
	(1)	(2)	(3)	(4)
	Probit	Probit	Linear Prob	Linear Prob
Number of papers	0.005	0.002	−0.018**	0.003
	(0.003)	(0.004)	(0.008)	(0.011)
Relative extremism index	−0.036**	0.024**	−0.048***	0.018**
	(0.015)	(0.010)	(0.012)	(0.009)
Number of papers*Relative	0.004*	−0.000	0.004*	−0.000
extremism index	(0.002)	(0.002)	(0.002)	(0.002)
Very conservative	0.018	−0.067***	0.033*	−0.064***
	(0.022)	(0.013)	(0.017)	(0.013)
Conservative	0.001	−0.017***	0.007	−0.015***
	(0.008)	(0.006)	(0.007)	(0.006)
Liberal	0.038**	−0.047***	0.050***	−0.043***
	(0.015)	(0.009)	(0.011)	(0.008)
Very liberal	0.066**	−0.091***	0.086***	−0.089***
	(0.026)	(0.015)	(0.020)	(0.016)
High school	0.107***	0.047***	0.092***	0.045***
	(0.007)	(0.007)	(0.006)	(0.007)
College	0.150***	−0.002	0.140***	−0.002
	(0.006)	(0.007)	(0.006)	(0.007)
Age	0.005***	−0.001***	0.005***	−0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Log income	0.037***	−0.007**	0.039***	−0.004*
	(0.004)	(0.003)	(0.003)	(0.002)
Internet supply	−0.001	−0.003***	−0.000	−0.002***
	(0.001)	(0.001)	(0.001)	(0.001)
Internet supply*Relative	0.000	0.001	0.000	0.001
extremism index	(0.001)	(0.001)	(0.001)	(0.001)
Male	0.031***	−0.029***	0.031***	−0.030***
	(0.004)	(0.003)	(0.004)	(0.003)
Year 2004	0.026***	−0.024***	0.017***	−0.026***
	(0.006)	(0.006)	(0.007)	(0.005)
Log population	−0.007**	−0.010***		
	(0.003)	(0.002)		
Constant			−0.313***	0.420***
			(0.037)	(0.031)
Market fixed effect	No	No	Yes	Yes
Observations	109414	109414	109414	109414
R-squared			0.053	0.024

Note: Standard errors are adjusted for market-level clustering and appear in parentheses. * indicates significance at 10%; ** significance at 5%; *** significance at 1%.

Table 8: Effect of Newspaper Competition on News Consumption from Other Sources

	Internet	Internet	Local TV	Talk radio
	(1)	(2)	(3)	(4)
Number of papers	−0.012	0.043	−0.189	−0.104**
	(0.017)	(0.048)	(0.136)	(0.044)
Number of papers*Relative	−0.013*	−0.013*	−0.003	0.011
extremism index	(0.008)	(0.008)	(0.011)	(0.007)
Relative extremism index	−0.096**	−0.093*	0.180***	0.088*
	(0.048)	(0.050)	(0.060)	(0.053)
Very conservative	0.300***	0.293***	−0.602***	0.722***
	(0.065)	(0.068)	(0.097)	(0.081)
Conservative	0.035	0.035	−0.253***	0.362***
	(0.029)	(0.029)	(0.041)	(0.035)
Liberal	0.226***	0.218***	−0.270***	−0.177***
	(0.039)	(0.041)	(0.065)	(0.050)
Very liberal	0.662***	0.649***	−0.810***	−0.138
	(0.073)	(0.076)	(0.119)	(0.094)
Log income	0.263***	0.259***	−0.005	0.182***
	(0.013)	(0.013)	(0.014)	(0.014)
High school	0.104***	0.107***	0.497***	0.232***
	(0.022)	(0.022)	(0.058)	(0.030)
College	0.612***	0.605***	0.248***	0.492***
	(0.024)	(0.024)	(0.058)	(0.029)
Male	0.421***	0.422***	−0.312***	0.431***
	(0.018)	(0.018)	(0.015)	(0.016)
Age	−0.010***	−0.010***	0.033***	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Internet supply	0.021***	0.022***	−0.011**	−0.006
	(0.004)	(0.004)	(0.005)	(0.006)
Internet supply*Relative	0.004	0.004	−0.008*	−0.002
extremism index	(0.004)	(0.004)	(0.004)	(0.004)
Log population	0.017**			
	(0.008)			
Year 2004	−0.763***	−0.759***	−0.141***	−0.310***
	(0.020)	(0.021)	(0.023)	(0.027)
Constant	−1.786***	−1.597***	3.073***	−0.839***
	(0.154)	(0.157)	(0.285)	(0.179)
Market fixed effect	No	Yes	Yes	Yes
Observations	96175	96175	110921	111023
R-squared	0.082	0.091	0.077	0.058

Standard errors are adjusted for market-level clustering and appear in parentheses. * indicates significance at 10%; ** significance at 5%; *** significance at 1%.