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BIAS IN CABLE NEWS: REAL EFFECTS AND POLARIZATION

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ABSTRACT

We jointly measure the persuasive effects of slanted news and tastes for like-minded news. The key ingredient is using channel positions as exogenous shifters of cable news viewership. Local cable positions affect viewership by cable subscribers. They do not correlate with viewership by local satellite subscribers, who are observably similar to cable subscribers. We estimate a model of voters who select into watching slanted news, and whose ideologies evolve as a result. We estimate that Fox News increases the likelihood of voting Republican by 0.9 points among viewers induced into watching four additional minutes per week by differential channel positions.

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1 Introduction

Political observers across the ideological spectrum routinely make allegations of media bias and its detrimental effect on society. Two of the three 24-hour cable news channels, the Fox News Channel and MSNBC, are frequent targets of such allegations. In this paper, we address two questions about cable news. First, how much does consuming slanted news, like the Fox News Channel, alter the propensity of an individual to vote Republican in Presidential elections, if at all? Second, how intense are consumer preferences for cable news that is slanted towards their own ideology?

The answers to these questions are key inputs for designing optimal public policy towards the media sector. If consumers simply prefer news that resonates with their pre-existing ideology, as in Mullainathan and Shleifer (2005) and Gentzkow and Shapiro (2010), then the news media sector is similar to any other consumer product, and should be treated as such by public policy. However, if consuming news with a slant alters the consumer's ideology, then public policy towards the news media sector becomes more complex.[1] In particular, if news consumption alters ideology, and consumers have a taste for like-minded news, then the existence of slanted news could lead to a polarizing feedback loop: an "echo chamber" where partisans can reinforce and strengthen their initial biases.[2] Furthermore, an interested party could potentially influence the political process by owning or controlling media outlets.[3] Such concerns led the Federal Communications Commission (FCC) to condition approval of the merger of Comcast Corporation and NBC Universal in 2010 on the requirement that Comcast take steps to promote independent news services.[4]

Differentiating the taste mechanism from the influence mechanism is difficult in observational data. The analyst observes a positive correlation between the propensity to

[1] Gentzkow and Shapiro (2008) detail the complexities in designing optimal regulatory policy for media markets.

[2] Gentzkow and Shapiro (2011) indicate that current media consumption tends to be balanced across ideologically slanted sources. This paper identifies trends suggesting that the "echo chamber" scenario may be increasing in relevance.

[3] Existing evidence from Gentzkow and Shapiro (2010) shows that owner partisanship is not an important determinant of newspaper slant. The sample size is too small to test this hypothesis in the cable news case.

[4] The condition required that Comcast move "independent" news channels such as Bloomberg Television into "news neighborhoods." This effectively required Comcast to move Bloomberg next to channels such as MSNBC and CNN in their channel lineups.

vote Republican and hours spent watching Fox News. Were Fox News viewers already predisposed to vote Republican, and the observed correlation driven by preference for watching like-minded news? Or were some fraction of those viewers persuaded to vote Republican as a consequence of watching Fox News?

The essential ingredient in our analysis is the use of the channel positions of news channels in cable and satellite television lineups as instrumental variables. Variation in channel positions causes some viewers to watch more or less of these channels. We use the corresponding induced variation in time watched to estimate whether or not watching slanted news changes voting behavior. We estimate that watching the Fox News Channel (at its current ideological positioning) for four additional minutes per week[5] increases the probability of intending to vote for the Republican presidential candidate by 0.9 percentage points for voters induced into watching by variation in channel position. Watching MSNBC (at its current ideological positioning) for four additional minutes per week increases the probability of intending to vote for the Democratic presidential candidate by about 0.7 percentage points for voters induced into watching by variation in channel position.

As with any instrumental variables design, it is critical that the channel positions for Fox News and MSNBC are exogenous, and not chosen to accord with local political tastes. In Section 2, we describe turbulence in the cable industry in the years 1994-2000 that induced as good as random variation in channel positions across locations. We then directly test and confirm the validity of the instrument by demonstrating that the local cable channel positions of Fox News and MSNBC correlate strongly with the channels' viewership among cable subscribers but do not correlate with viewership by satellite television subscribers in the same zip code.

Satellite viewership provides a useful placebo test because the two satellite providers each use a single nationwide channel position lineup; thus, satellite subscribers' viewing decisions cannot be directly influenced by the local cable operator's choice of lineup. However, satellite subscribers' observable characteristics and viewing tastes are highly positively correlated with the characteristics and tastes of cable subscribers in the same zip code. If the same correlation holds for unobservable political ideology, and if cable

[5]Approximately four minutes per week is the additional time spent watching Fox News associated with moving from a cable system with Fox News channel position at the 75^{th} percentile of the distribution to one with Fox News channel position at the 25^{th} percentile.

companies endogenously choose channel positions to suit local political leanings, then the channels' positions on cable systems should predict viewing by satellite subscribers in the same zip code. Our data reject this hypothesis. Across the set of news channels, the coefficient estimates of cable channel positions on satellite viewing are close to zero. Statistically, we can (1) not reject that effects of the cable positions on satellite viewing are zero, and (2) reject that the effects of cable positions on satellite viewing are equal to the effects of cable positions on cable viewing.

Our approach to quantifying the second object of interest, the preference for like-minded news, follows Gentzkow and Shapiro (2010), who estimate this quantity in the context of US daily newspapers. We first place the cable news channels on the ideological spectrum by quantifying how similar the language employed by the channels is to the language employed by individual members of Congress. This method provides a measure of ideological slant for each channel in each year. We measure the relationship between changes in the slant measure over time and the characteristics of viewers of these channels. A key source of variation in this exercise is MSNBC's change in business strategy towards offering more explicitly liberal content around 2006. Our ideology estimates pick up this format switch - MSNBC closely tracks CNN in the early 2000s, but then moves left following the format switch in 2006. We estimate Fox News' ideology to the right of CNN throughout the sample period, although the distance between the two has been widening in the most recent years.

We conduct the analysis of these two questions in a unified framework. We model consumer-voters who choose how much time to spend watching the cable news channels; whether to subscribe to cable, satellite or nothing at all; and for whom to vote in presidential elections. Consumers' allocation of time to television channels is governed by their preferences for the channels (which are a function of their ideology, the channels' ideologies, and their demographics), and the availability of the channels (whether the cable operator carries them and, if so, the positions they occupy on the channel lineup). Consumers' ideologies evolve from their initial position depending on how much time they allocate to watching channels of different ideologies. This process culminates in a presidential election in which consumers choose for whom to vote.

We estimate the parameters of the model by simulated indirect inference. The criterion function is the distance between two-stage least squares estimates of intention to vote on demographics and hours watched of each channel, using channel positions

as instrumental variables, in the actual data and in data simulated from the model. In addition to matching the second stage regression coefficients, we also match the first stage (viewership equation) regression coefficients and the "mis-specified" OLS regression coefficients. We use data covering 1998 to 2008 from multiple sources including (1) high quality channel lineup data that provides channel positions and availability by zip code, provider, and year, (2) individual level viewership data on hours watched by channel and year together with demographics and zip code, (3) individual level survey data on intent to vote Republican in presidential elections together with demographics and zip code, (4) county-level presidential vote shares, (5) broadcast transcripts of Fox News, CNN, and MSNBC by year, and (6) the Congressional record by year.

We use the estimated model to quantitatively assess the degree of ideological polarization induced by cable news and separately the effect of the entry of Fox News prior to the year 2000 election. We find that cable news does increase polarization among the viewing public. Furthermore, the increase in polarization depends critically on the existence of *both* a persuasive effect *and* a taste for like-minded news. We estimate that removing Fox News from cable television during the 2000 election cycle would have reduced the average county's Republican vote share by 1.6 percentage points.

This paper contributes to the empirical literature on the causes and effects of the news media, particularly regarding political outcomes.[6] The closest papers to this study are by DellaVigna and Kaplan (2007) and Gentzkow and Shapiro (2010).

DellaVigna and Kaplan (2007) seek to study the effects of Fox News by comparing vote shares in locations with and without cable access to Fox News by November 2000, as partially measured by the Cable and Television Factbook data set. Our contribution to this strand of the literature is to introduce a new and more credibly exogenous source of variation, channel positions, to measure the effects of Fox News as well other cable news like MSNBC, using correct data.[7] The use of channel positions

[6] A number of papers have demonstrated that media usage or availability affects behavior. Amongst others, Chiang and Knight (2011) find positive effects of unexpected newspaper endorsements on vote shares for the endorsed candidate, Gentzkow (2006) finds decreased voter turnout from television access, Gerber et al. (2009) find positive effects of newspaper exposure, regardless of slant, on Democratic vote shares in the 2005 Virginia gubernatorial elections. Enikolopov et al. (2011) find that viewing an independent news channel in Russia increased vote shares for the opposition parties and decreased overall turnout in 1999. Lim et al. (2014) find that media coverage can affect criminal sentencing decisions for judges.

[7] In Appendix A, we document that the data set used in DellaVigna and Kaplan (2007) has severe mismeasurement of Fox News availability. Nearly 40% of the "control group," the locations that they consider

as instrumental variables could be useful for studying the effects of media consumption in other contexts. In terms of results, we estimate a Fox News effect that is statistically positive and quantitatively large whereas the DellaVigna and Kaplan (2007) analysis, updated to use the correct channel availability data, is inconclusive. We also find a large MSNBC effect in 2008.

Our approach follows Gentzkow and Shapiro (2010) in several dimensions, including the use of text analysis to measure media outlet slant. Like Gentzkow and Shapiro (2010), we treat that measure as a characteristic over which consumers have heterogeneous tastes when choosing media consumption levels. Our contribution is to model media consumption together with voting to separately measure tastes for like-minded news and the influence of slanted media consumption on consumer ideology. The influence effect also interacts with the existence of tastes for like-minded news. Consumers for whom both effects are present can be induced into feedback loops where they consume slanted media, their ideologies then evolve in the direction of the slant, then their taste for that slanted media increases, and so on in a loop.

2 Institutional Overview

During our study period of 1998-2008, most households had three options for television service: subscribe to a cable (that is, a wire-based transmission) package, subscribe to a satellite television package, or subscribe to neither and receive only over-the-air broadcast signals.[8] In 2000, the vast majority of cable or satellite subscribers were cable subscribers, but by 2008, satellite providers had a market share of about 30%. Different locations have different cable providers such as Comcast, Time Warner Cable, Cox, Cablevision, or Charter. The set of channels, or content, in a cable package varies across providers and within providers across locations. A typical set of cable packages

as not having cable access to Fox News in 2000, did in fact have cable access to Fox News. 25% of the control group had Fox News availability since 1998. Their data set simply had not been updated to reflect Fox News's arrival in those locations. We detail how their results change upon correcting the measurement error in Appendix A.

[8]Some households, for example households in remote rural areas, did not have a cable option. Some households which did not have a direct line of sight due to physical obstructions like tall buildings, trees, or steep slopes, did not have a satellite option. And some households, mostly in urban areas, had two wire-based cable operators.

would have one Basic package which retransmits the over-the-air signals, an Expanded Basic package which includes the top 40 to 80 cable channels such as ESPN, USA, TNT, CNN, Nickelodeon, MTV, Comedy Central, and similar, and a digital package which offers more niche content like the DIY Channel or the Tennis Channel. Throughout the period, there were two nationwide satellite providers: DirecTV and the Dish Network. Each satellite provider offers the same channel lineup and packages in all locations.

Cable content is produced by media conglomerates such as Viacom, News Corporation, ABC-Disney, or NBC Universal. The cable and satellite providers contract with these firms to offer their content to subscribers. This bilateral contracting is the focus of Crawford and Yurukoglu (2012), which provides more detail about the industry's structure. There was some vertical integration during our sample period: News Corporation had a controlling interest in DirecTV, and Time Warner and Time Warner Cable were integrated.

The foci of this study are the cable news channels CNN, the Fox News Channel, and MSNBC. CNN began broadcasting in 1980 as one of the earliest cable channels of any genre, and pioneered the 24 hour news channel format. It was acquired by Time Warner in 1996. CNN does not have any explicit ideological orientation.[9] The Fox News Channel and MSNBC both entered the market in the mid 1990's. Launched by the News Corporation in late 1996, Fox News Channel's business strategy was to provide news with a more conservative slant. This strategy and the perception of such a slant continues today. Fox News has become one of the most highly rated cable channels across all genres. It is a cultural force in the U.S. synonymous with media bias and the mixing of news and entertainment. MSNBC began as a joint venture between NBC and Microsoft. At the outset, MSNBC did not have any explicit slant. MSNBC changed its business strategy in the mid-2000's to provide news with a more liberal slant (Sanneh, 2013).

The channel lineup, or the numerical ordering of channels, varies by local cable system. In most cases the first ten to twenty channel positions are allocated to the over-the-air broadcast affiliates. For example, NBC4 occupies channel position 4 in Washington D.C. area cable systems. After the over-the-air channels, the cable chan-

[9]In our analyses we make no assumption that CNN's content is neutral or moderate, and treat it symmetrically with MSNBC and Fox. We apply the same text-based measures to estimate its ideology, and flexibly estimate its effect on viewers' political preferences.

nels begin. We assert in this paper that the ordering of a channel in the lineup can have significant effects on the viewership of news channels.[10]

The obvious empirical concern is that a channel might be placed in lower positions in localities with high tastes for the channel. We later examine that concern with a placebo test of whether satellite subscriber viewership is correlated with local cable channel positions. Describing the process by which channel positions were determined provides additional support for the claim that channel positions are valid instruments.

The 1994-2001 period during which Fox News and MSNBC were rolling out was a tumultuous time for the cable television industry. This period saw many systems upgrade from older analog to newer digital equipment, expanding the number of channels cable operators were able to offer their subscribers. Coincident with this technical advance, a wave of new channels (including the two cable news channels that are the focus of this paper) entered cable lineups alongside first-generation channels like CNN, ESPN, MTV, TBS, TNT and the USA Network.

However, the timing of the advances in content and technology were not coordinated: some systems invested in upgrades early, before the wave of new channel entry, and some later. Meanwhile, bilateral deals for content distribution were being struck between the numerous new channels and cable system operators, of which in this period before the early-2000s wave of consolidation there were many. As a result, the channel positioning that Fox or MSNBC ended up with on a given local system depended on the specific timing of that system's negotiations with multiple new channels as well as its decision of when to upgrade. Channels were often allocated positions sequentially, in the order in which they were added to a system.[11] Combined with the key principle in lineup design of limiting the changes in channel positions as much as possible so as to not confuse existing customers, these chaotic historical factors generated persistent cross-system variation in the positioning of Fox News and MSNBC.[12]

Figure 1 plots the growth in subscribers for a group of peer channels during this

[10]The significant relationship between channel position and viewership holds for all genres, not just news.

[11]In Appendix C, we show that channel positions correlate with the best available position in the year before a channel was added.

[12]Some systems have shuffled positions over time as channels went out of business, as channel capacity expanded and as new channels came online. Some local managers pursued a strategy of moving channels with similar content or in the same genre together into "neighborhoods," when possible. In general, however, the ordering of cable channels is highly persistent from year to year.

time period. The top line shows ESPN, which was available on virtually every cable system. The other channels in the graph all experienced substantial growth during this time period. Idiosyncracies in the timing of contracts and system upgrades created variation in channel positions for a given channel across locations. In some cases, if Fox News was being added to a system facing capacity constraints, its channel position was determined by the position of the channel it was replacing. On systems owned by the multiple-system operator TCI in 1996, Fox News was reported to have replaced one of as many as twelve different channels depending on the location (Dempsey (1996)).

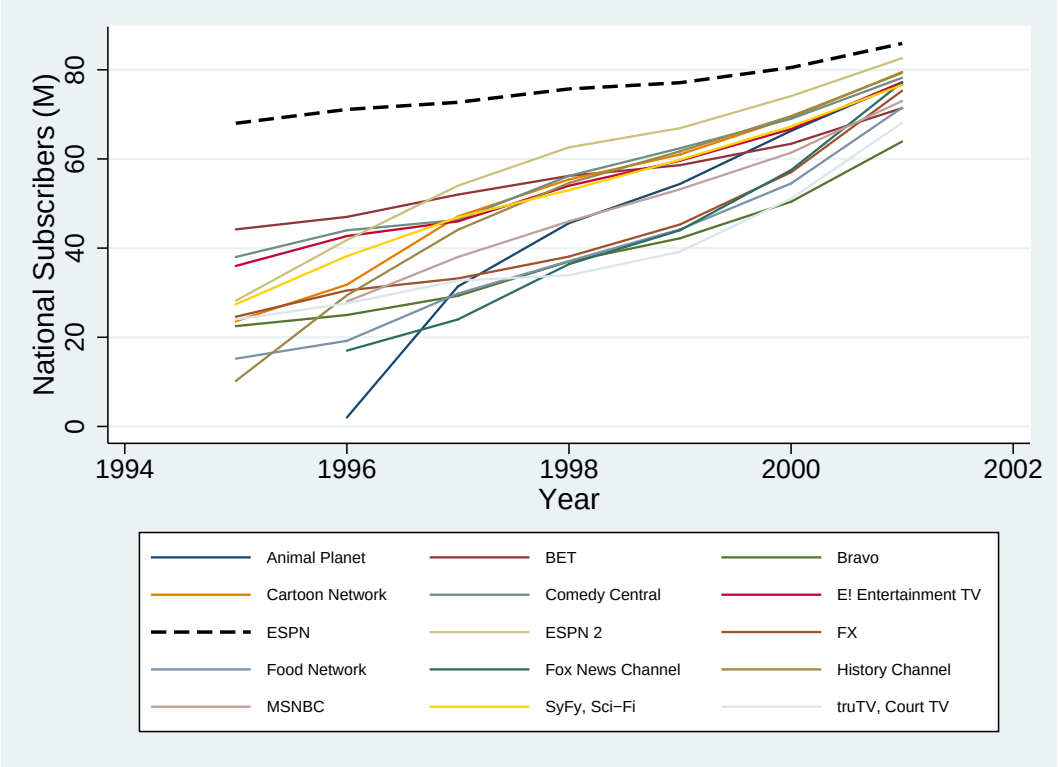

Figure 1: Number of subscribers for a group of peer channels by year for the period 1994-2001. National subscriber numbers according to SNL Kagan data.

3 Data

We use seven categories of data sets: (1) Nielsen FOCUS data on cable channel lineups by zip code by year, (2) the National Annenberg Election Survey (NAES) and the Cooperative Congressional Election Study (CCES, Ansolabehere (2011)) on individual demographics, zip code, and intent to vote Republican in 2000, 2004, and 2008 U.S. Presidential elections, (3) Mediamark and Simmons individual survey data on hours spent watching cable news by channel, individual demographics, and zip code, (4) County level presidential election vote share data compiled by Congressional Quarterly, (5) U.S. Census demographics by zip code, (6) Broadcast transcripts of cable news from Lexis-Nexis, and (7) the Congressional Record. We now describe each data set and exposit several empirical relationships that are central to our results. Most of our analysis focuses on the years 2000 to 2008, but some data sets cover through 2011.

3.1 Cable Lineups: Nielsen FOCUS

The Nielsen FOCUS database consists of yearly observations on cable systems. The key variables in this data set are, for each system and year, the availability of CNN, Fox News, and MSNBC, the channel positions of CNN, Fox News, and MSNBC, when available, and the zip codes served by the system. In Figure 2, we document the availability of each of these news channels by year. CNN was already near-universal by 1998. Fox News and MSNBC became widespread over the sample period. Table 1 presents the mean and standard deviation of channel position for each of the three news channel by year. CNN is generally lower than Fox, which is generally lower than MSNBC. The pairwise correlations in positions of the channels are around .3, with variation depending on the channel pair and the year. As seen in Figure 4, Fox News Channel is in a lower position than CNN in 11% of the observations when both are available. MSNBC is in a lower position than CNN in 7% of the observations, and in a lower position than Fox News Channel in 23% of the observations. Table 2 shows the corresponding Republican vote shares and cable news viewership levels conditional on lowest ordered channel. The average Republican vote share is higher and the average hours of Fox News watched are higher when Fox News is in the lowest position.

There are two important facts about this data set. First, the Nielsen FOCUS database contains the universe of cable systems. Second, all entries are updated on a

regular basis. This feature is different from the Cable and Television Factbook used in previous studies. We detail this important difference in Appendix A.

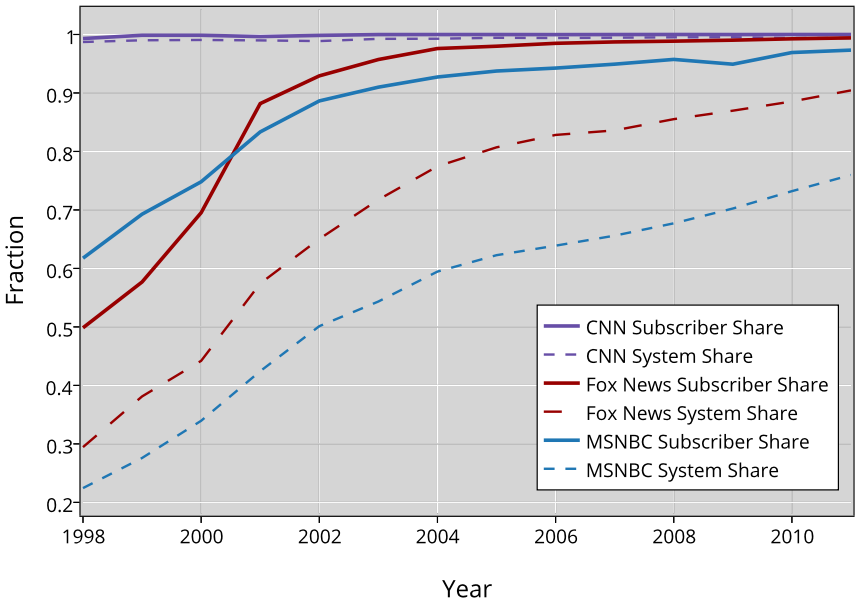

Figure 2: Availability of cable news channels by year. The solid lines represent the fraction of cable subscribers for whom the news channel was carried on their system. The dashed lines represent the fraction of cable systems which carry the news channels. By 2002, nearly all cable subscribers had access to Fox News and MSNBC.

3.2 Individual Voting Data: NAES and CCES

The National Annenberg Election Study (NAES) is a large-scale phone survey conducted each presidential election cycle which asks individual respondents a range of political preference questions, along with demographic identifiers. We use data from the 2000, 2004, and 2008 election cycles, including the confidential zip-code field. The key variables are demographic variables such as race, age, and income; zip code; stated ideology; and actual or intent to vote in the current presidential election. The NAES surveys were conducted on a rolling basis over the course of each election, with most

Year	CNN		FNC		MSNBC	
	Mean	SD	Mean	SD	Mean	SD
2000	17.34	10.49	35.40	12.94	39.00	12.76
2004	21.83	12.83	38.22	14.31	41.66	13.53
2008	24.67	14.40	37.48	14.42	42.87	18.18
All	21.14	13.06	37.28	14.17	41.59	15.68

Table 1: Mean and standard deviation of channel position by news channel by year in election years.

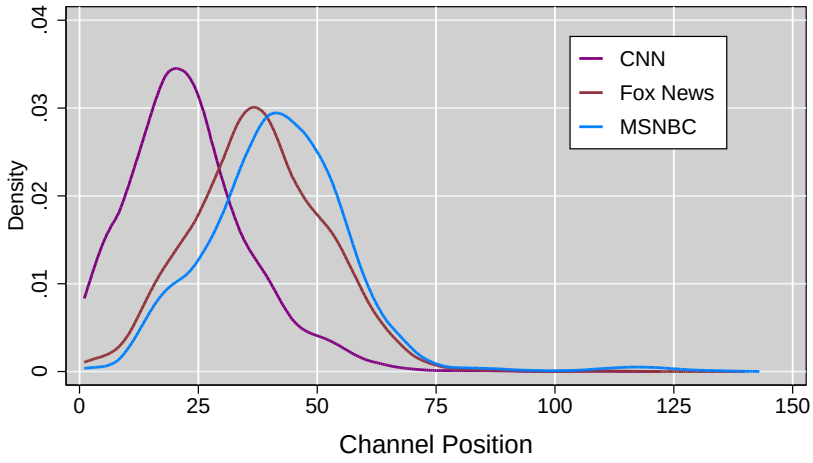

Figure 3: Kernel Density Estimate of Distribution of Channel Positions by Channel

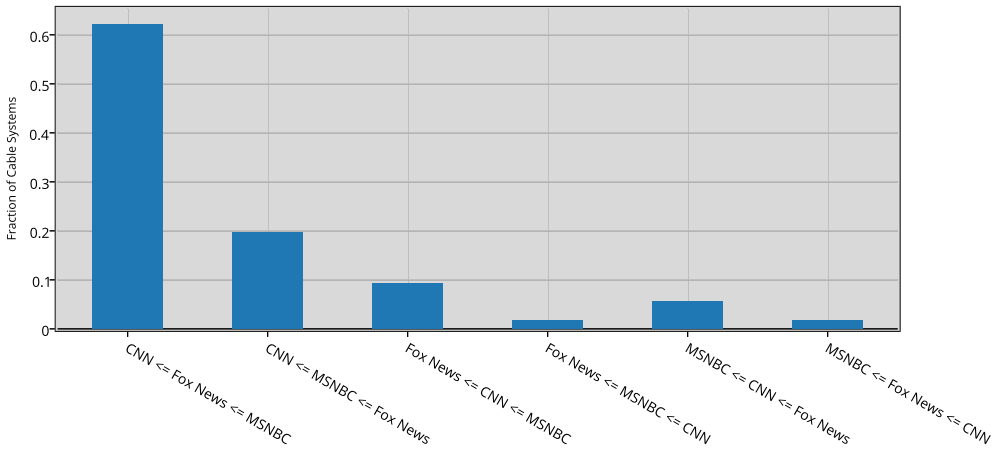

Figure 4: Fraction of systems with certain ordinal configurations.

	CNN Lowest	FNC Lowest	MSNBC Lowest	All
Republican Vote Share	0.5023	0.5082	0.4900	0.5017
Fox Hours Watched	1.0556	1.1440	1.0608	1.0699
CNN Hours Watched	1.2078	1.2657	1.2471	1.2222
MSNBC Hours Watched	0.5219	0.5279	0.5690	0.5294

Table 2: Mean Republican presidential vote shares and cable news hours watched by lowest ordered cable news channel.

respondents contacted before election day but some after. We combine actual vote (from respondents contacted after election day) together with intent to vote (from those contacted before) into a single variable.

The 2004 and 2008 NAES surveys also asked respondents to report their "most watched" cable news source, if any. We use this variable in estimating OLS regressions of vote intention on channel viewership.

These data are summarized in Table 3. For 2008, we add data from the Cooperative Congressional Election Study (CCES) on the same variables that we use from the NAES.

3.3 Individual Viewership Data: Mediamark and Simmons

Mediamark and Simmons are two commercial data vendors who survey individuals on their usage of different brands, including media usage. We use Mediamark for 2000 to 2007, and Simmons for 2008 to 2011. The key variables for our study are year, zip code, individual demographics, whether the respondent subscribes to cable, satellite, or neither, and the reported number of hours watched per week of CNN, Fox News Channel, and MSNBC. These data are also summarized in Table 3.

3.4 County Level Vote Shares and Census

We use county level presidential vote shares for the Presidential elections in 2000, 2004, and 2008 obtained from the Voting and Elections Collection Database maintained by *Congressional Quarterly*. We also use zip code level demographic statistics from the 2000 and 2010 US Census. We use these data to construct county-level distributions of household income, age, race, education, and initial ideology, from which we draw a set of simulated consumer-voters for the model of section 5. For zip codes which span multiple counties, we split the zip code across the relevant counties in proportion to the county size.

3.5 Broadcast Transcripts and Congressional Record

To quantify the slant of each news channel in each year, we follow Gentzkow and Shapiro (2010)[13] in comparing the language that the channels use to language that Congresspeople use. We modify their statistical procedure as well as create scores for each channel for each year. This procedure does not recognize irony, satire, sub-text, nor tone, and thus likely underestimates the true dispersion in slant as the slanted outlets sometimes employ the language of the other side of political spectrum for purposes of mockery or derision.[14] We obtained broadcast transcripts for CNN, Fox News

[13]The idea is similar in spirit to Groseclose and Milyo (2005)

[14]This is one reason why we exclude Comedy Central, which features two prominent slanted cable news programs, *The Daily Show with Jon Stewart* and *The Colbert Report*, from the analysis. Their slant relies heavily on satire and is not as reasonably quantified based on phrase usage. As a separate matter, Comedy Central has other highly viewed shows which are not explicitly political such as *South Park*, and our data

	N	Mean	SD
NAES/CCES			
Male	122243	0.460	0.498
White	122243	0.841	0.365
Black	122243	0.082	0.275
Hispanic	122243	0.067	0.251
Age	122243	47.801	16.071
College Graduate	122243	0.369	0.482
Household Income ($000s)	122243	65.312	50.796
Intent to Vote: Republican	122243	0.498	0.500
Self Reported Ideology	119524	3.185	1.042
Mediamark/Simmons			
Male	209352	0.505	53.130
White	209352	0.812	15.738
Black	209352	0.106	0.390
Hispanic	209352	0.109	0.308
Age	209352	46.314	0.312
College Graduate	209352	0.328	0.475
Household Income ($000s)	209352	70.744	0.303
Cable Subscriber	209352	0.656	0.261
DirecTV Subscriber	209352	0.102	0.469
Dish Network Subscriber	209352	0.074	0.500
Watch any CNN	209352	0.360	0.480
CNN Hours per Week	209352	1.223	2.816
Watch any Fox News Channel	209352	0.291	0.454
Fox News Channel Hours per Week	209352	1.070	2.847
Watch any MSNBC	209352	0.203	0.402
MSNBC Hours per Week	209352	0.529	1.726

Table 3: Summary Statistics for individual level NAES/CCES and Mediamark/Simmons data. Ideology ranges from Very Liberal (1) to Very Conservative (5). The variables excepting age, household income, and the hours per week are dummy variables.

Channel, and MSNBC from the Lexis-Nexis database for the sample period 1998-2012 by downloading all transcripts per year for each identifiable cable news program from each of the three channels.

Taking the Congressional Record for each year, the first steps are to stem the words, remove stop words, and then count the frequency of usage of two word phrases by each Congress person. Each Congress person has a measure of their ideology, the DW-NOMINATE score from McCarty et al. (1997), which places them on the interval $[-1, 1]$ with more positive being more conservative. The second step is to correlate phrase usage with the DW-Nominate score. There are many more two word phrases than Congresspeople, and an ordinary least squares criterion is therefore useless because there are more variables than observations. For each year, we run an Elastic Net (Zou and Hastie, 2005) regression of DW Nominate score of frequency of phrase usage where an observation is a Congressperson. The Elastic Net regression is a variable selection algorithm that combines the LASSO and the Ridge Regression regularization penalties. In Table 4, we follow Gentzkow and Shapiro (2010) in showing a subset of the most indicative partisan phrases selected by the Elastic Net regression for 2000, 2004, and 2008.

We use the estimated coefficients to predict the DW-Nominate score for each cable news channel in each year. We then apply a three period moving average smoothing filter. The results of this procedure are in Figure 5. Fox News is consistently more conservative than the other two channels. MSNBC switches to being more liberal in the mid-2000's. The estimates also reveal increased polarization of cable news over time. The text based measures produce estimated ideologies for the channels that are more moderate than the median members of each party. In the modelling to come, we allow for consumers to perceive these news channels to be more or less ideologically differentiated, in proportion to these estimates. Indeed, our estimates for this scale factor put Fox News Channel very close to the median Republican voter.

are aggregated to the channel level.

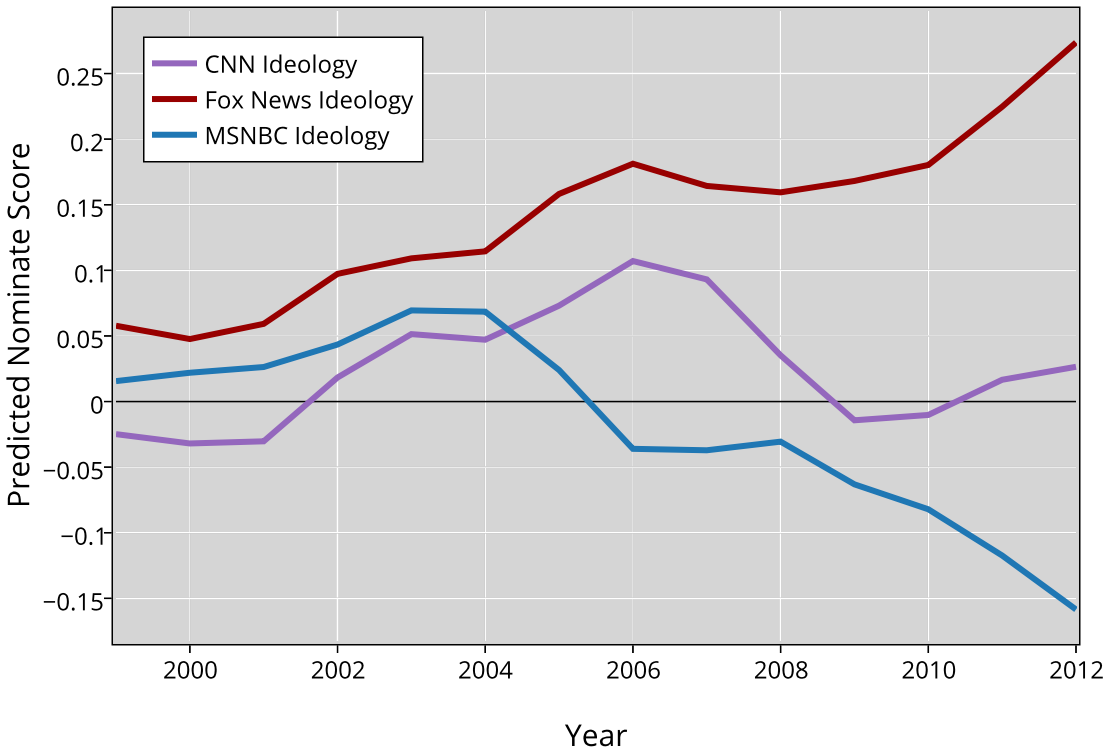

Figure 5: Estimated Ideology by Channel-Year

2000	Party	2004	Party	2008	Party
60 minut	R	17 month	D	11 countri	R
administr fail	R	administr continu	D	allow vote	R
american coupl	R	administr fail	D	american resourc	R
bank credit	D	administr refus	D	approv rate	R
benefit wealthiest	D	administr republican	D	bring skyrocket	R
big bank	D	administr want	D	bush chenei	D
break wealthi	D	american without	D	bush took	D
break wealthiest	D	bid contract	D	busi come	D
bush tax	D	billion iraq	D	busi todai	D
busi come	R	bipartisan commiss	D	call abort	R
caught nap	R	bush budget	D	can produc	R
child tax	R	busi come	R	capit gain	R
continu everi	D	civil justic	R	control two	D
coupl pai	R	compani hmo	D	cost energi	R
cut wealthi	D	corpor profit	D	dai spent	R
cut wealthiest	D	cost energi	R	death tax	R
eight billion	R	cost war	D	deep sea	R
elderli peopl	D	cut wealthi	D	deep water	R
elimin death	R	cut wealthiest	D	democrat bill	R
feder bureaucraci	R	date time	R	democrat colleagu	R
follow morn	R	don nickl	R	develop resourc	R
gun hand	D	econom advis	D	entitl reform	R
hard earn	R	evil empir	R	explor oil	R
huge tax	D	fall far	D	kill littl	R
increas domest	R	far short	D	liquid fuel	R
labor right	D	gdp growth	R	major parti	R
largest tax	R	govern regul	R	minimum wage	D
larg tax	D	govern spend	R	never express	R
line vote	D	hold line	R	new nuclear	R
live poverti	D	increas medicar	D	new refineri	R
modern school	D	invas iraq	D	nuclear plant	R
monei washington	R	job administr	D	pelosi said	R
name peopl	D	largest deficit	D	plan bring	R
need prescript	D	lawrenc v	R	process law	R
pai social	R	liabil cost	R	produc american	R
per child	R	major want	D	product american	R
pm todai	R	marriag licens	R	properti without	R
presid busi	R	marriag will	R	record profit	D
reduc tax	R	mass grave	R	refineri capac	R
reproduct health	D	medicar premium	D	remind realli	R
republican bill	D	million manufactur	D	safe wai	R
republican friend	D	presid aristid	D	sign petit	R
republican propos	D	presid econom	D	soon on	R
right organ	D	print report	R	sue opec	R
riski scheme	R	protect tradit	R	suppli energi	R
sensibl gun	D	reserv us	R	tax american	R
seven million	R	revenu feder	R	tax burden	R
sinc columbin	D	reward compani	D	tax hike	R
state arizona	R	sector job	D	tax oil	R
still republican	D	servic author	R	thing common	R
tax death	R	ship job	D	took offic	D
tax hike	R	social justic	D	trillion barrel	R
tax just	R	time administr	D	trillion cubic	R
unidentifi male	D	trillion surplu	D	unfund liabil	R
us later	R	univers health	D	v wade	R
wealthiest american	D	war cost	D	warrantless surveil	D
wealthiest peopl	D	wealthiest american	D	wast spend	R
work condit	D	woman right	D	without due	R
		year administr	D	yet todai	R

Table 4: Top decile of partisan indicative phrases selected by Elastic Net for years 2000, 2004, and 2008. Word variants are stemmed to their roots.

4 Regression Analysis

This section provides the regression results on the relationship between channels positions, watching Fox News and MSNBC, and voting Republican. These results serve as the basis for the model estimation and simulation in the following sections. The results in this section do not depend on the behavioral model estimation that we specify in Section 5. This section can be read and evaluated as a stand-alone instrumental variables regression analysis.

The first stage regressions are channel viewership against channel positions, channel availability, year effects, and demographics. The second stage regression is intent to vote Republican against predicted viewership, channel availability, year effects, and demographics.[15] We present the placebo first stage regression of channel viewership by satellite subscribers against cable channel positions, cable channel availability, year effects, and demographics.[16] We also present the OLS regression of intent to vote Republican against channel viewership, channel availability, year effects, and demographics because the OLS regression is also relevant for the model estimation.

4.1 Viewership on Channel Positions: First Stage with Individual Level Data

The first stage describes how hours watched varies with channel position. We use channel-year fixed effects to ask whether a given channel has more viewership when it is in a lower position. The idea is that lower channel positions induce more viewership for channels such as Fox News and MSNBC because the higher watched content tends to be in lower channel positions for historical reasons.[17] The most obvious mechanism to generate such an effect is a costly search model. Consider a viewer who just finished watching a television program, and begins to search for a new program. Their search will begin from the channel they were watching, which is likely to be in a low position.

[15] The variation in viewership attributable to differential availability of Fox News and MSNBC is thus not part of the estimation strategy.

[16] This serves to argue the validity of channel positions as instrumental variables because if channel positions were tailored to local tastes, they should correlate with viewership of satellite subscribers in the same zip code.

[17] In addition to the broadcast networks ABC, CBS, Fox, and NBC, the lower channel positions are occupied by the earliest entrants into cable (eg ESPN, MTV, TNT, USA) which also have high viewership.

They will move away from that channel, thereby making it more likely they stop nearer to that channel than further away.[18] The obvious worry is that channel positions are tailored to local tastes so that channels which will be watched more often are easier to find. We address this concern with a placebo test that shows that local cable positions do not correlate with viewership by satellite subscribers in the same zip code.

There are two regressions for each channel to model explicitly the mass of consumers who watch zero hours of a given news channel, which is a salient feature of the data. The median individual hours watched for each news channel is zero. One regression for each channel is a linear probability model for whether one watches the channel at all, or not. The second regression for each channel is for how long one watches the channel, conditional on watching at all.

$$\begin{aligned} h_{it}^{c} &= \delta_{ct} + a_{it} + \eta_c x_{it} + \theta_{c,CNN} p_{it}^{CNN} + \theta_{c,FNC} p_{it}^{FNC} + \theta_{c,MSNBC} p_{it}^{MSNBC} + e_{ict} \\ \chi_{it}^{c} &= \tilde{\delta}_{ct} + \tilde{a}_{it} + \tilde{\eta}_c x_{it} + \tilde{\theta}_{c,CNN} p_{it}^{CNN} + \tilde{\theta}_{c,FNC} p_{it}^{FNC} + \tilde{\theta}_{c,MSNBC} p_{it}^{MSNBC} + \tilde{e}_{ict} \end{aligned}$$

where p_{it}^{j} is the logged channel position of j in individual i's zip code in year t, δ_{ct} and $\tilde{\delta_{ct}}$ are channel-year fixed effects, x_{it} are individual level demographics, and a_{it} and $\tilde{a_{it}}$ are fixed effects for availability of the cable news channels to individual i. We choose a log functional form for the position effects on the basis of the empirical relationship between position and viewership. Figure 6 shows the relationship in the full set of 96 channels measured by MediaMark. We first regress hours watched on demographic attributes of the respondents plus fixed effects for each channel and each year in the dataset, and plot the residual hours watched against ordinal channel position. The resulting relationship is negative, with a slope that steadily diminishes as channel position increases.

To simplify the presentation, we present in Table 5 first stage estimates for regressions of hours watched on channel positions without modeling the mass of zero viewership.[19] Own channel position has the expected sign and is strongly statistically

[18] Bias to the top of a list or default option in search is documented in eye tracking studies for yellow pages (Lohse (1997)) and survey response (Galesic et al. (2008)). There is a theoretical literature in economics modelling such behavior (see Rubinstein and Salant (2006), Horan (2010), Masatlioglu and Nakajima (2013), and the literature on status-quo bias more generally.)

[19] For the 2SLS estimates, we model the first stage as the combination of a linear probability model of

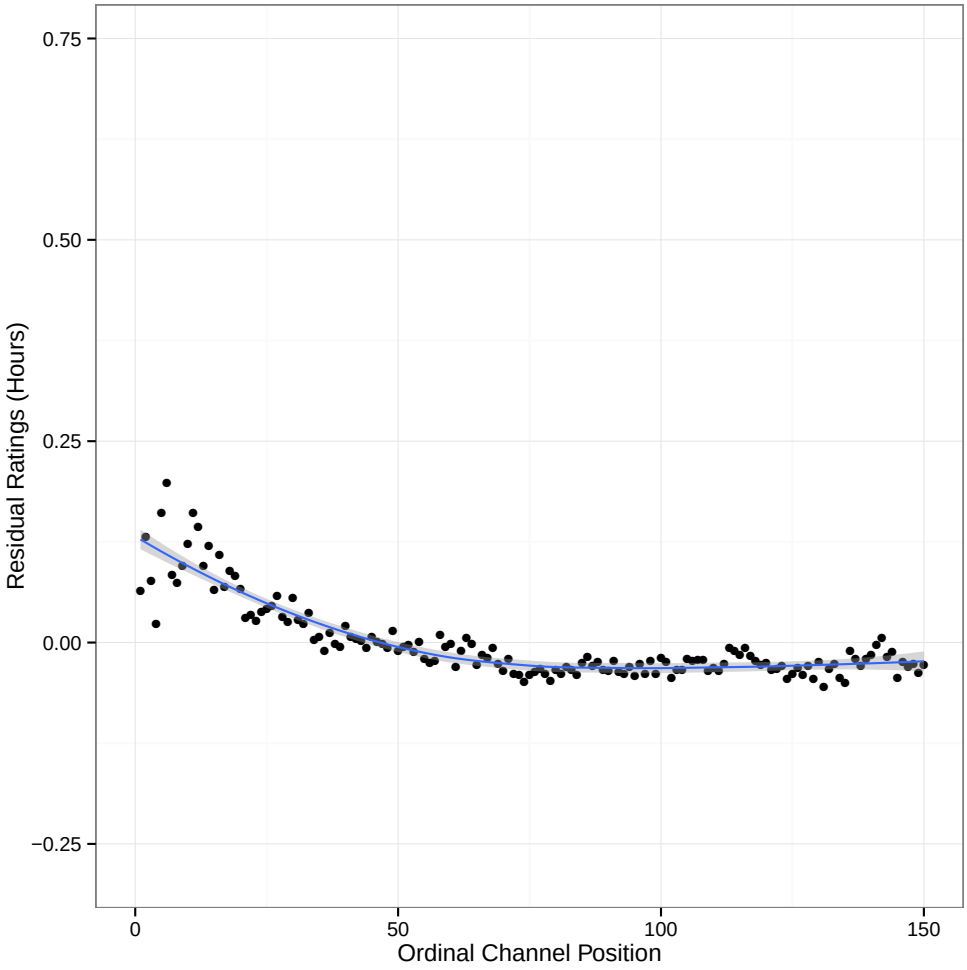

Figure 6: Residual hours watched (after removing individual demographic effects plus channel and year fixed effects) of all 96 channels in the MediaMark dataset, plotted against the channel's ordinal position in the lineup.

VARIABLES	(1) Fox News Hours	(2) CNN Hours	(3) MSNBC Hours
log(Fox News Position)	-0.122***	-0.0309	0.0499***
	(0.0212)	(0.0215)	(0.0134)
log(CNN Position)	-0.0106	-0.111***	-0.0148*
	(0.0136)	(0.0138)	(0.00859)
log(MSNBC Position)	0.128***	0.0721***	-0.0969***
	(0.0230)	(0.0233)	(0.0145)
HH Income	0.0116***	0.00677***	0.00535***
	(0.00134)	(0.00137)	(0.000847)
HH Income^2	-0.000110***	-4.86e-05***	-4.23e-05***
	(1.41e-05)	(1.43e-05)	(8.87e-06)
HH Income^3	2.86e-07***	1.22e-07***	1.08e-07***
	(4.04e-08)	(4.10e-08)	(2.54e-08)
Age	-0.00282	-0.0137***	0.00229
	(0.00357)	(0.00363)	(0.00225)
Age^2	0.000340***	0.000531***	8.20e-05***
	(3.76e-05)	(3.82e-05)	(2.37e-05)
White	0.175***	-0.329***	-0.0981***
	(0.0336)	(0.0341)	(0.0212)
Black	0.268***	0.0934**	0.0231
	(0.0416)	(0.0423)	(0.0262)
Hispanic	-0.256***	-0.184***	-0.0997***
	(0.0301)	(0.0306)	(0.0190)
College	-0.124***	0.287***	0.113***
	(0.0186)	(0.0189)	(0.0117)
Male	0.245***	0.192***	0.120***
	(0.0165)	(0.0168)	(0.0104)
log(N Channels)	-0.0155	-0.0815**	0.0328
	(0.0327)	(0.0332)	(0.0206)
Observations	137,312	137,312	137,312
R-squared	0.037	0.040	0.013
Year FE	Yes	Yes	Yes
F-test for Positions	16.33	23.61	18.14
Prob > F	1.32e-10	0	0

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Three OLS Regressions of hours watched by channel on cable channel availability, **local cable channel positions** interacted with availability, demographics, and year dummy variables for the sample of **cable** subscribers. The F statistic is for the joint test that all the coefficients on the channel positions interacted with availability are equal to zero.

VARIABLES	(1) Fox News Hours	(2) CNN Hours	(3) MSNBC Hours
log(Fox News Position)	-0.0150	0.00411	0.0146
	(0.0442)	(0.0381)	(0.0255)
log(CNN Position)	-0.00219	0.0147	-0.00924
	(0.0300)	(0.0258)	(0.0173)
log(MSNBC Position)	0.0220	-0.000588	-0.0201
	(0.0480)	(0.0413)	(0.0276)
HH Income	0.00662**	-0.000931	0.00233
	(0.00264)	(0.00227)	(0.00152)
HH Income^2	-4.42e-05*	2.59e-05	-1.39e-05
	(2.67e-05)	(2.30e-05)	(1.54e-05)
HH Income^3	9.92e-08	-8.23e-08	3.66e-08
	(7.52e-08)	(6.47e-08)	(4.33e-08)
Age	-0.0145*	-0.00497	0.00737*
	(0.00753)	(0.00648)	(0.00433)
Age^2	0.000581***	0.000367***	4.13e-05
	(8.01e-05)	(6.90e-05)	(4.61e-05)
White	0.176***	-0.440***	-0.0566
	(0.0601)	(0.0518)	(0.0346)
Black	0.138*	0.0452	0.126***
	(0.0790)	(0.0680)	(0.0455)
Hispanic	-0.353***	-0.144***	-0.0950***
	(0.0559)	(0.0481)	(0.0322)
College	-0.0138	0.312***	0.0834***
	(0.0391)	(0.0337)	(0.0225)
Male	0.210***	0.197***	0.116***
	(0.0334)	(0.0288)	(0.0192)
log(N Channels)	0.0478	0.0196	0.0181
	(0.0560)	(0.0482)	(0.0323)
Observations	36,735	36,735	36,735
R-squared	0.046	0.033	0.012
Year FE	Yes	Yes	Yes
F-test for Positions	0.0863	0.124	0.331
Prob > F	0.968	0.946	0.803

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Placebo Regressions: Three OLS Regressions of hours watched by channel on cable channel availability, **local cable channel positions** interacted with local cable availability, demographics, and year dummy variables for the sample of **satellite** subscribers. The F statistic is for the joint test that all the coefficients on the channel positions interacted with availability are equal to zero.

significantly different from zero for own hours watched. The magnitudes imply that an improvement of the Fox News channel position from the 75th percentile to 25th percentile would increase viewership by 4 minutes. The cross-channel position effects are generally positive, reflecting substitution consistent with our viewership model.[20] The first stage F statistics on the instrumental variables range from 16.3 for the Fox News Channel regression to 23.6 in the MSNBC regression.

As a placebo test for whether channel positions respond to unobserved characteristics of the local population, we repeat the same regressions on the sample of satellite subscribers but using the channel positions on the local cable system. If the channel positions on the local cable system are chosen in response to unobservable local characteristics, then these positions should predict satellite viewership. The results in Table 6 indicate that channel positions on the cable system do not predict viewership on satellite. None of the coefficients on cable channel position are statistically distinguishable from zero for satellite subscribers. These coefficients are always much closer to zero than in the sample of cable subscribers. Finally, we can reject equality of nearly all of them with the corresponding cable coefficients with high degrees of confidence.[21]

Demographics predict viewership in similar manners for both cable and satellite subscribers. Across locations, satellite subscriber characteristics correlate strongly with cable subscriber characteristics. Table 7 shows the regression coefficients of mean satellite subscriber characteristics on mean cable subscriber characteristics in the same cable system territory, nearly all of which are positive and large. Since the means of these characteristics are measured with sampling error - as they are constructed

watching the channel, and a linear regression of how much one watches conditional on watching. The 2SLS coefficients have the same estimated magnitudes using either first stage model. The second stage Fox News is only significant at the 90% level and the MSNBC effect drops just below conventional confidence levels when we do not model the mass on zero explicitly, though the signs and magnitudes of the effects are the same. The loss of precision is not surprising given that a linear model for viewership will grossly under-predict the number of viewers who watch zero hours.

[20] CNN's channel position is negative, though imprecise, in the Fox News and MSNBC regressions. A negative coefficient would suggest a complementarity between CNN and these two channels, whereas our model does not admit such a complementarity. We note this as a weakness of the analysis. Modelling the complementarity in the model we use is difficult computationally as the first stage optimization would have to be solved numerically rather than with an analytical solution that our current demand system admits.

[21] In the Appendix, we carry out Chow tests assuming the demographic effects on viewership are the same between cable and satellite subscribers, and formally reject that the cable position effect on cable subscribers is equal to the effect on satellite subscribers.

from the television viewership survey samples - the OLS coefficients are attenuated. In the table, we address this measurement error problem in two ways.[22] First, we progressively restrict the regression to markets with more and more survey respondents as these markets will have less sampling error. Second, we instrument for the mean cable characteristic with lead and lagged mean cable characteristic. Survey respondents are sampled independently from year to year. Consistent with measurement error, the coefficients genereally tend upwards to one when we restrict to system-years with more respondents. Furthermore, the IV coefficients are generally very close to one.

In the same vein, we can look directly at viewership patterns. Satellite viewers watch 1.2 fewer minutes per week of Fox News Channel on average relative to cable viewers (on an overall mean of 90 minutes). At the bottom of Table 7, we regress predicted mean viewership of satellite subscribers (predicted from demographics) on that of cable subscribers. We also regress the cable system territory mean residual viewership of satellite subscribers (net of demographics) on the mean residual viewership of cable subscribers. Across the board, cable and satellite subscribers within the same cable system territory display strong correlations of demographics and viewing behavior.

What is important is that satellite subscribers' ideologies are correlated with cable subscribers' ideologies. Given that all observable characteristics correlate positively, and that demographics explain little of whether or not an individual is a satellite subscriber, we find such a scenario to be plausible. Our principal identification assumption is thus that cable channel positions are not chosen to reflect unobservable attributes that are unique to cable subscribers' (to the extent that they differ from satellite subscribers') political leanings in a locality. The placebo tests provide empirical evidence in favor of this assumption.

4.2 Voting on Projected Viewership: 2SLS with Individual Level Data

Let y_{it} be an indicator for whether individual i intends to vote for the Republican Presidential candidate in the election of year t. Let h_{it}^{j} be the reported hours watched

[22] One could also dis-attenuate the coefficients as the variance induced by sampling is known. This exercise is complicated because each cable system-year has different sampling variance.

Characteristic	N>0	N>10	N>50	N>100	IV
Black	0.581***	0.708***	0.783***	0.912***	0.996***
	(0.0129)	(0.0148)	(0.0279)	(0.0571)	(0.0388)
College	0.398***	0.540***	0.705***	0.716***	0.917***
	(0.0165)	(0.0202)	(0.0412)	(0.0714)	(0.0779)
HH Income	0.498***	0.612***	0.820***	0.886***	0.973***
	(0.0144)	(0.0166)	(0.0309)	(0.0607)	(0.0637)
Age	0.261***	0.358***	0.395***	0.490***	0.791***
	(0.0165)	(0.0212)	(0.0458)	(0.0764)	(0.0998)
Hispanic	0.538***	0.665***	0.778***	0.843***	0.838***
	(0.0138)	(0.0159)	(0.0234)	(0.0345)	(0.0304)
Party ID R	0.105***	0.289***	0.629***	0.888***	1.552***
	(0.0286)	(0.0503)	(0.106)	(0.172)	(0.437)
Party ID D	0.118***	0.228***	0.630***	1.174***	2.947*
	(0.0282)	(0.0506)	(0.117)	(0.211)	(1.690)
Predicted Fox News	0.766***	0.804***	0.912***	0.924***	0.965***
	(0.0130)	(0.0137)	(0.0215)	(0.0274)	(0.0453)
Predicted CNN Viewing	0.506***	0.556***	0.633***	0.720***	0.831***
	(0.0177)	(0.0198)	(0.0361)	(0.0523)	(0.146)
Predicted MSNBC Viewing	0.766***	0.791***	0.831***	0.810***	0.828***
	(0.0132)	(0.0141)	(0.0259)	(0.0397)	(0.0761)
Fox News Residual	0.111***	0.168***	0.453***	0.376***	0.612**
	(0.0237)	(0.0282)	(0.0624)	(0.0862)	(0.304)
CNN Residual	0.180***	0.190***	0.272***	0.340***	0.645***
	(0.0191)	(0.0201)	(0.0452)	(0.0656)	(0.196)
MSNBC Residual	0.101***	0.107***	0.424***	0.642***	0.588**
	(0.0210)	(0.0221)	(0.0613)	(0.106)	(0.246)

Note: The first column of coefficients uses all cable system territory-years. These coefficients are attenuated because the mean cable is constructed from samples of survey respondents which can be as few as 2 per cable system territory-year. The second column of coefficients restricts to those with more than ten surveyed respondents. The third column of coefficients restricts to those with more than fifty survey respondents. The fourth column of coefficients restricts to those with more than 100 survey respondents. The final column of coefficients are uses lead and lagged means of cable subscribers as instrumental variables as respondents are sampled independently from year to year.

Table 7: Regression coefficients of demographic characteristics and cable news viewership of satellite subscribers on the characteristics of cable subscribers in the same cable territory-year in MediaMark / Simmons viewership data.

per week of channel j where $j \in c, f, m$ with c corresponding to CNN, f to Fox News, and m to MSNBC. We are interested in the coefficients in the population relationship:

$$y_{it} = \gamma_t + a_{it} + \alpha x_{it} + \beta_c h_{it}^c + \beta_f h_{it}^f + \beta_m h_{it}^m + \epsilon_{it} \quad (1)$$

where γ are election fixed effects and α are election-specific coefficients on demographics x_i. The assumption that ϵ is uncorrelated with the vector of hours watched is untenable if consumers have a preference for like-minded news. We use channel positions as instrumental variables for these three endogenous variables, and estimate by 2SLS. Results from the second stage regressions are in Table 8. We compute standard errors by bootstrap as deemed appropriate in two-sample IV settings by Inoue and Solon (2010). Our estimates imply that being induced to watch an additional hour per week of Fox News by the channel position instruments would lead to an approximately 14-point increase in the probability of voting Republican in presidential elections for those induced into watching by the instrument.[23]

In terms of magnitudes, the estimated effect of one hour of Fox News is just under one-half of the effect of being black on voting Republican, and about equal to the difference in dummy coefficients for residence in Ohio versus residence in Massachusetts. We point out a few caveats regarding this seemingly large magnitude. First, the implied effect on an election of removing Fox News will be significantly smaller, as the majority of people do not watch any Fox News, and among those who do, the majority are already going to vote Republican.[24] Second, our survey-based vote intention measure may include individuals who are both unlikely to vote and lack an established political ideology, and thus are more open to persuasion by slanted news.[25] When we restrict our second stage to registered voters, the Fox News Channel coefficient falls to 0.107. Enikolopov et al. (2011) examined both individual level survey data and actual vote

[23]The typical change in viewership induced by the instrument is significantly less than one hour per week. Given our first-stage estimates and the distribution of the instrument presented in Figure 3, a one-standard deviation increase in channel position induces a roughly 3-minute-per-week increase in Fox News viewing.

[24]In Section 7, we estimate a 1.3% change in the 2000 presidential election's Republican vote share resulting from the existence of Fox News. This estimate accounts for selective viewership.

[25]An extensive literature on turnout in political science, e.g. Leighley and Nagler (2013), has found non-voters to be much more likely to report independent partisan affiliation and "moderate" ideological leanings than are regular voters.

VARIABLES	(1) Intent to Vote R
Fox News Channel Hours	0.137***
	(0.0108)
CNN Hours	0.0221
	(0.0197)
MSNBC Hours	-0.101***
	(0.0221)
HH Income	0.00273***
	(0.000286)
HH Income^2	-2.22e-05***
	(3.04e-06)
HH Income^3	5.65e-08***
	(9.06e-09)
Age	0.00377***
	(0.000620)
Age^2	-7.47e-05***
	(9.25e-06)
White	0.0745***
	(0.00740)
Black	-0.357***
	(0.00755)
Hispanic	-0.0571***
	(0.00606)
College	-0.0636***
	(0.00556)
Male	0.0516***
	(0.00339)
log(N Channels)	-0.0975***
	(0.00463)
Observations	122,243
R-squared	0.089
Year Effects	Yes
Channel Availability	Yes

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Second Stage regressions of NAES and CCES intent to vote Republican vote share on predicted hours watched from the first stage.

shares and found significantly larger effects of media consumption using the individual level survey data. Finally, as the behavioral model makes clear, we are estimating a single coefficient in a world of heterogenous treatment effects. The IV estimates reflect an average treatment effect on individuals induced into watching by the instrument. These viewers will lack strong political orientations, and thus be more malleable.

There is additional validation when we interact the instrumented time watched with election year dummy variables. The Fox News effect increases over time. The MSNBC effect is only present in 2008, after MSNBC made the switch to liberal slanted programming. These interaction terms are both consistent with the ideology estimates in Figure 5. First, the estimated ideology of Fox News moves further to the right over the sample period. Second, MSNBC's persuasive effect only dips to the left after the 2004 election. Sorting out the dynamics of persuasion implied by these results are an interesting angle for future research.

4.3 Voting on Viewership: OLS with Individual Level Data

We also present the estimated coefficients in an OLS regression of intent to vote Republican on demographics and indicators for most watched cable news channel in the NAES data. This is the OLS analog to the second stage above with two slight differences. First, it uses only indicators for most watched cable news channel rather than hours watched. Second, the sample is restricted to NAES data. The reason for these differences is because the OLS regression is only possible on the NAES data where hours watched is not available. In the 2SLS, we estimate the first stage on Mediamark and Simmons data,[26] and use the estimated coefficients to predict hours watched on the NAES and CCES data which has intent to vote.

The purpose of presenting the mis-specified OLS regression is because we use it in the model estimation later to estimate the taste for like-minded news. Imagine a researcher who purports to estimate the influence of Fox News on voting Republican by regressing intent to vote Republican on an indicator for whether Fox News is the most watched news channel. Such an estimate would lack credibility because it mixes any influence effect with the selection into viewership of Fox News by those who intend to

[26]Mediamark and Simmons data do not include Intent to vote.

VARIABLES	(1) Intent to Vote R
Fox News Channel Hours * Year 2000	0.100***
	(0.0304)
Fox News Channel Hours * Year 2004	0.122***
	(0.0204)
Fox News Channel Hours * Year 2008	0.141***
	(0.0154)
CNN Hours * Year 2000	0.0148
	(0.0253)
CNN Hours * Year 2004	-0.0105
	(0.0258)
CNN Hours * Year 2008	0.0337
	(0.0205)
MSNBC Hours * Year 2000	0.0296
	(0.0416)
MSNBC Hours * Year 2004	-0.0144
	(0.0470)
MSNBC Hours * Year 2008	-0.113***
	(0.0226)
HH Income	0.00246***
	(0.000450)
HH Income^2	-1.99e-05***
	(4.10e-06)
HH Income^3	5.03e-08***
	(1.14e-08)
Age	0.00328***
	(0.000636)
Age^2	-6.87e-05***
	(1.02e-05)
White	0.0754***
	(0.00841)
Black	-0.358***
	(0.00864)
Hispanic	-0.0574***
	(0.00671)
College	-0.0681***
	(0.00646)
Male	0.0497***
	(0.00512)
log(N Channels)	-0.0964***
	(0.00468)
Observations	122,243
R-squared	0.090
Year Effects	Yes
Channel Availability	Yes

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Second Stage regressions of NAES and CCES intent to vote Republican vote share on predicted hours watched from the first stage interacted with election year effects.

vote Republican because of tastes for like-minded news. Our approach is to use channel positions to estimate the influence effect, while jointly matching the OLS coefficient to estimate the tastes for like minded news.

Table 10 confirms a positive correlation between intending to vote Republican and indicating that one's most watched cable news channel is Fox News, and corresponding negative coefficients for indicating MSNBC and CNN.

5 Model

The model for a given election cycle has two stages. In the first stage, the consumer-voters choose a television package and how much time to watch the cable news channels. In the second stage, the consumer-voters vote in the Presidential election. Between the first and second stage, the consumer-voters' ideologies evolve as a function of the ideologies of and time spent watching the news channels.

5.1 Voter Ideology and Presidential Vote Decision

Our consumer-voters have a latent unidimensional political ideology which determines their vote choice in presidential elections. We denote the left-right ideology of consumer-voter i by r_{it}.

We specify voters' initial ideologies as a function of their county of residence. Specifically, we estimate a logit model of vote choice with county dummies as explanatory variables, which matches county level vote shares from the previous election cycle.[27] The county-level intercepts from this model then determine the simulated consumers' initial ideologies, along with an iid logit error term:

$$r_{ij0} = \delta_j + \epsilon_{ij} \tag{2}$$

Where δ_j is the estimated county intercept for county j, consumer i's county of residence. From this starting point, ideology may evolve if the consumer watches cable news, according to a process described in detail later in this section.

[27] E.g., simulated voters in the 2008 election cycle have their ideologies initialized using coefficients that match county-level vote shares in the 2004 election.

VARIABLES	(1) Intent to Vote R
Most Watched CNN	-0.0869***
	(0.00633)
Most Watched Fox News Channel	0.329***
	(0.00654)
Most Watched MSNBC	-0.0963***
	(0.00844)
HH Income	0.00427***
	(0.000408)
HH Income^2	-3.11e-05***
	(4.62e-06)
HH Income^3	7.21e-08***
	(1.38e-08)
Age	0.00333***
	(0.000759)
Age^2	-3.47e-05***
	(7.38e-06)
White	0.103***
	(0.00876)
Black	-0.285***
	(0.0111)
Hispanic	-0.0909***
	(0.00908)
College	-0.0556***
	(0.00465)
Male	0.0447***
	(0.00423)
log(N Channels)	-0.104***
	(0.00786)
Observations	44,472
R-squared	0.230
Year Effects	Yes
Channel Availability	Yes

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10: OLS linear probability regression of intent to vote Republican on demographics and indicators for most watched cable news channel.

At election time, each voter votes for the party whose candidate's announced position is closest to her own. This behavior is consistent with voting given a utility function over the ideology of the winning candidate that is single-peaked with maximum at r_{it}. As in all such spatial models, only the cutpoint between the candidate positions, and not the absolute values of the positions, determine the voting decision. We can, therefore, describe each presidential election using a single parameter P_t, for $t \in \{2000, 2004, 2008\}$. All voters to the left of the cutpoint (with $r_{it} < P_t$) vote for the Democratic candidate in the election, and those to the right vote for the Republican.

5.2 Viewership and Subscription

The viewership time allocation and subscription portion of the model follows Crawford and Yurukoglu (2012). Given access to the news channels C_{jt} in package j in year t, consumer-voter i allocates their time amongst watching those channels and other activities to maximize:

$$v_{ij} = \sum_{c \in C_{jt}} \gamma_{ict} \log(1 + T_{ijc}) \tag{3}$$

where γ_{ict} is consumer-voter i's preference parameter for news channel c in year t. We choose the normalization that the outside option (doing anything other than watching cable news) has $\gamma_{i0t} = 1$ for all i, t, and parameterize the remaining vector of γ_{ict} as

$$\begin{aligned}
\gamma_{it} &= \chi_{it} \circ \nu_{it} \\
\chi_{ict} &\sim \mathsf{Bernoulli}(\alpha_{0ct} + \Pi_{0c} d_i + \zeta_0 pos_{ict} - \eta((a + br_{ct}) - r_{it})^2) && (4) \\
\nu_{ict} &\sim \mathsf{Exp}(\alpha_{ct} + \Pi_c d_i + \zeta pos_{ict}) && (5)
\end{aligned}$$

χ_{ict} determines whether consumer-voter i has a non-zero preference for channel c.[28] It is a random function of demographics d_i according to parameters Π_0, a channel-year specific fixed effect α_{0ct}, the position of the channel in the lineup according to

[28] We use this formulation because most consumers watch zero or one news channel.

ζ_0, and the distance of consumer-voter i's one dimensional political ideology r_{it} from the channel's estimated ideology r_{ct} according to η. This last term represents taste for like-minded news and follows a similar parameterization to Gentzkow and Shapiro (2010). The parameters a and b scale the text based ideology measures to allow for consumers to perceive slant as a linear function of the text based slant measure. If η is positive, then increasing the ideological distance between consumer-voter i and channel c reduces the probability i watches c.

If the consumer-voter has a non-zero preference, the intensity of her preference is drawn from an exponential distribution whose distributional parameter depends on α_{ct}, a channel-year specific fixed effect, demographics d_i according to parameters Π, and the position of the channel in the lineup according to ζ. The exponential shape assumption mixed with a mass at zero is inspired by the raw data on hours watched which features a mass at zero and right-skewed and monotonically decreasing density.

The constrained maximization problem defined by (3) has an analytic solution that can be determined as follows. Define ρ_{ict} as the Lagrange multipliers associated with the non-negativity constraints on T_{ict}. By complementary slackness, if $\rho_{ict} > 0$ then $T_{ict} = 0$. From the first order condition, $\rho_{ict} = \lambda_{it} - \gamma_{ict}$ where λ_{it} is the Lagrange multiplier on consumer i's budget constraint. Therefore, T_{ict} can be zero if and only if $\gamma_{ict} < \lambda_{it}$.

For all the channels with $\gamma_{ict} > 0$, $\lambda_{it} = \gamma_{ict}/(1+T_{ict})$. Additionally, each consumer faces a time-budget constraint, $\sum_c T_{ict} = B$, where B is the total time available (in our scaling, the number of hours in a week: 168). This gives a system of equations with solution:

$$\lambda_{it} = \frac{1 + \sum_{c^+} \gamma_{ic^+t}}{B + C^+}$$

where c^+ are the indices of the channels that i watches a positive amount, and C^+ is the total number of such channels. Given this result, the iterative solution is to replace the γ_{ict}'s below the cutoff $(1 + \sum_c \gamma_c)/(B + C)$ with zero. If there were any γ_{ict}'s below this threshold, we now have a new cutoff defined by the remaining positive γ_{ict}'s, and we repeat the process again. There are at most C steps of this until we hit the final set of positive γ_{ict}'s, at which point we compute the times watched as:

$$T_{ict} = (T + C^{+}) \frac{\gamma_{ict}}{\sum_{c^{+}} \gamma_{ic^{+}t}} - \mathbf{1}(\gamma_{ict} > 0)$$

The indirect utility from solving this problem enters into the consumer-voter's decision whether to subscribe to cable, satellite, or no television package at all. The conditional indirect utility from subscribing to package j is

$$u_{ij} \quad = \quad v_{ij}^{*} + \delta_j + \epsilon_{ij}$$

where δ_j is the mean utility of package j, ϵ_{ij} is an idiosyncratic logit error term and j corresponds to cable or satellite. We also allow consumers to subscribe to no package at all. This choice is associated with a normalized $\delta_0 = 0$ and, since we assume consumers cannot watch cable news if they do not subscribe, the only choice is to spend their entire time budget in non-cable-news activity. This yields corresponding $u_{i0} = \log(1 + B) + \epsilon_{i0}$.

5.3 Ideological Influence

After watching cable news, consumer-voter i's one-dimensional political ideology evolves as a function of how much time i spends watching the news channels and the ideology of the news channels.[29] We assume that i is attracted towards the ideologies of the news channels he watches, the more so the more time i spends watching. Specifically

$$r_{it} = \frac{r_{i,t-1} + \rho \sum_c T_{ic,t-1}(a + b r_{c,t-1})}{1 + \rho \sum_c T_{ic,t-1}} \tag{6}$$

where $r_{i,t-1}$ is i's ideology prior to watching, r_{it} is i's new ideology, and ρ is a parameter to be estimated which controls the magnitude of news channels' influence on viewers' ideology. One interpretation of ρ is as a (per-hour) rate at which viewers receive ideological signals while watching cable news. If voters treat signals from slanted outlets as true draws on the state of the world, and further, if they do not account for the lack of independence between repeated signals from the same source as in the model

[29] The ideology measure is the same function of the text based slant measure that enters the viewership decision problem.

of DeMarzo et al. (2003),[30] then equation (6) arises as the inverse-variance-weighted average of signals observed by viewer i in period t.[31]

The functional form here implies that a consumer-voter's attraction is governed by the same parameter (ρ), whether coming from the left or the right. This parameter doesn't depend on how far away the consumer-voter starts from the channel. It rules out that a voter might watch a slanted channel, become disgusted, and move in the opposite direction of the channel as in Arceneaux et al. (2012). Furthermore, consumer-voters are naive about the influence effect when choosing time watched.

6 Estimation, Results, and Empirical Identification

We estimate the parameters of the model by indirect inference (Smith (1990); Gourieroux et al. (1993)). This implies choosing the estimates of the model's parameters to match estimates of an auxiliary model. The auxiliary model consists of eight linear regressions that fall into four categories, and a set of unconditional moments: (1) a regression of individual level time spent watching each cable news channel on demographics and channel positions, conditional on watching the channel (three regressions), (2) a linear probability regression of individual level watching any positive amount of each cable news channel on demographics and channel positions (three regressions), and (3) a linear probability regression of individual level intent to vote Republican on demographics and predicted time spent watching from (1) and (2), and (4) an OLS regression of intent to vote Republican on reporting whether Fox News, MSNBC, or CNN is an individual's most watched cable news channel. (1)-(3) correspond to a two-stage least squares estimate of the effects of watching the cable news channels on voting Republican using channel positions as instrumental variables. (4) corresponds to an OLS regression of intent to vote Republican on viewership. Finally, we also match (5) the actual vote shares in each presidential election, the year by year hours watched for each channel, and the year by year fraction of non-zero viewership for each channel.

[30] Gentzkow and Shapiro (2006) explore media consumption and endogenous slant with fully Bayesian consumers.

[31] For this interpretation to hold over a series of periods, we require that at the beginning of each period the consumer gets an ideology shock which returns the variance of his ideology to 1.

We choose the model's parameters so that estimating (1)-(5) on data simulated from the model produce coefficient estimates with minimum distance to those in the data. We weight the distance metric in proportion to the inverse of the standard errors in the estimated relationships in the real data, with the exception that the IV and OLS hours watched coefficients are weighted more heavily.[32]

We also impose two constraints in our estimation procedure to accomodate the linear probability structure of equation 4. First, all the channel-year fixed effects in the Bernoulli parameter (α_{0ct}) are constrained to lie between zero and one. Second, the demographic effects in the Bernoulli parameter (Π_{0c}) are constrained such that their linear combination lies between -1 and 1 for all demographic types.[33] Note that these constraints apply only to the fixed effects and the demographic parameters, and thus do not prevent the model from setting the probability of a given individual watching a channel to be exactly zero, for example if the individual is very ideologically distant from the channel or has the channel in very high position on her cable system. We impose them to prevent the optimizer from moving into territory where the channel-position and ideological effects have no influence on large numbers of simulated individuals.

6.1 Empirical Identification

Empirical identification of the model's parameters is relatively straightforward. In terms of the notion of parameter estimated sensitivity, formalized in Gentzkow and Shapiro (2013), ρ, the parameter which determines the degree of influence, is sensitive to the coefficients on projected time in the second stage regression. η, the parameter governing the degree of tastes for like-minded news, is sensitive to coefficients on which channel is reported as most watched in the OLS regression relative to the coefficients on projected hours watched in the second stage regressions. One intuition for these estimates comes from considering the OLS regression of intent to vote Republican on Fox News Channel hours watched. The coefficient estimates on hours watched of Fox

[32] We begin with the inverse regression standard errors as our weights vector, but scale up the OLS and IV hours watched weights by a relative factor of 100.

[33] Our demographic variables are all either binary (such as our race and education dummies) or continuous but bounded in the data (such as income and age). Hence, it is possible to define a demographic profile for each channel with minimum and maximum viewership.

News Channel would not be a credible measure of the effects of consuming media because the estimate would conflate tastes for like-minded news with any influence effect. However, if one knew the level of the influence effect, then this estimate would be informative about the tastes for like-minded news. Our approach is to measure the influence effect by using channel positions as instrumental variables, and choose the level of tastes for like minded news to explain the OLS coefficient conditional on the influence effect.

ζ, the parameters determining the strength of channel positions in the time allocation problem, are sensitive to the first stage coefficients on channel positions. A similar straightforward relationship applies to the demographic factors influencing time watched and the coefficients on demographics in the first stage regressions.

P_t, the parameters characterizing the three presidential elections in our sample period, are sensitive to the year-effects in the voting equations. These parameters allow the model to capture national trends in party preference.

Finally, a and b, the parameters scaling our text-based ideology measures, are sensitive to both the OLS regression coefficients on which channel is reported as most watched as well as the coefficients on projected hours watched in the second stage regressions. Separate identification of these parameters from ρ and η is possible because there are three channels and thus six moments to work with. The asymmetries in the channels' estimated effects relative to their text-based ideological positioning provide variation to distinguish the scaling parameters from ρ and η. To make this concrete, consider the OLS estimates for Fox News and MSNBC. The Fox News coefficient is more positive than the MSNBC coefficient is negative. Increasing η intensifies the magnitude of both OLS coefficients generated from the model in similar proportions. Increasing b at a fixed η increases the magnitude of the Fox News coefficient at a faster rate than the MSNBC coefficient, because the text-based Fox News ideology is more conservative than the text-based MSNBC ideology is liberal.[34]

[34]To test this intuition, we verified that the derivative of the model's Fox News OLS coefficient with respect to η is on the same order as the same derivative for the MSNBC OLS coefficient, while the derivative of the model's Fox News coefficient with respect to b is larger than that derivative for the MSNBC OLS coefficient.

6.2 Model Estimates

Table 11 shows the main parameter estimates from the model.[35] We estimate positive values for both ρ, the influence parameter, and η, the taste for like-minded news, implying a positive feedback process where voters watch slanted news, are influenced to move closer to the news' channel's ideology, and subsequently have even stronger preference for that channel, due to the decreased ideological distance.

Parameter	Estimate	Bootstrapped Standard Error
Slant Preference (η)	0.163	0.0109
Ideological Influence (ρ)	0.096	0.0080
Position Effect - Ratings	-0.002	0.0002
Position Effect - Viewership	-0.085	0.0030
2000 R/D Threshold	-0.184	0.0130
2004 R/D Threshold	0.055	0.0127
2008 R/D Threshold	0.106	0.0167
Channel Ideology Intercept (a)	-0.246	0.0179
Channel Ideology Slope (b)	5.378	0.2441

Table 11: Key parameter estimates.

The magnitude of the estimate of the taste for like minded news parameter η implies that an ideological distance of one unit between viewer and channel reduces that viewer's probability of watching by about 16%. For reference, at our estimated scaling parameters, the ideological distance between Fox News and MSNBC in 2008 is close to one unit. The magnitude of ρ implies that a voter watching an hour per week of a news channel for a year would be influenced to a new ideological position just under 10% of the distance to the channel's ideology. Estimates of the channel position parameters, consistent with the data, imply that increasing channel position decreases both the probability of watching any of a channel, as well as the number of hours watched conditional on watching any. The effect on the probability of watching any - row 4 in the table - implies that doubling the channel position decreases the probability of a typical voter watching a channel by about 8.5%.

[35]The full set of parameters additionally contains channel-year fixed effects and demographic terms, separately for the amount watched and the probability of watching any. These are omitted here for brevity. The estimated model's fit on regression coefficients is available in the Appendix.

The channel position effect on the number of hours watched is harder to interpret directly, as the hours-watched model is nonlinear and hence effects of changing these quantities depend on the values of all the other covariates. Tables 12 and 13 therefore show some interpretable quantities generated by the model for viewers with various demographic and ideological profiles.

						Channel Position Elasticity		
Age	Income ($000s)	Ethnicity	College	Gender	Ideology	CNN	FOX	MSNBC
65	25	White	No	Man	Centrist	17.5	16.6	16.0
65	25	White	No	Man	Median Republican	0.0	16.1	0.0
65	25	White	No	Man	Median Democrat	16.4	13.4	15.9
30	85	Black	Yes	Man	Centrist	15.8	11.7	13.6
30	85	Black	Yes	Man	Median Republican	12.8	11.2	0.0
30	85	Black	Yes	Man	Median Democrat	14.6	8.2	13.5
65	85	Hispanic	No	Man	Centrist	20.8	16.8	16.3
65	85	Hispanic	No	Man	Median Republican	18.0	16.3	0.0
65	85	Hispanic	No	Man	Median Democrat	19.7	13.5	16.2
30	25	White	Yes	Woman	Centrist	0.0	8.8	12.5
30	25	White	Yes	Woman	Median Republican	0.0	7.4	0.0
30	25	White	Yes	Woman	Median Democrat	0.0	0.0	12.4
65	25	Black	No	Woman	Centrist	18.2	16.9	15.3
65	25	Black	No	Woman	Median Republican	0.0	16.5	0.0
65	25	Black	No	Woman	Median Democrat	17.1	13.7	15.3
30	85	Hispanic	Yes	Woman	Centrist	14.6	9.0	12.8
30	85	Hispanic	Yes	Woman	Median Republican	0.0	8.5	0.0
30	85	Hispanic	Yes	Woman	Median Democrat	13.4	0.0	12.8

Table 12: Change in expected ratings (minutes watched per week) following a move from channel position 50 to channel position 30, for selected demographic and ideological profiles.

Table 12 shows computed elasticities of viewers' expected minutes watched with respect to channel position. We compute the change in ratings (measured in minutes per week) resulting from a channel's moving from position 50 to position 30 in the lineup.[36] All are weakly positive, as expected, although some are exactly zero because the average viewer of the given demographic and ideological profile does not watch any of the channel, regardless of position. Viewers' demographics and initial ideologies have an important influence on their sensitivity to channel position, with viewer-types who initially watch more of a channel showing larger changes in minutes.

Table 13 shows a different look at the relationship of viewer preference for channels to demographics and channel position. For the same ideological and demographic pro-

[36]Positions 50 and 30 correspond approximately to the 75th and 25th percentile position, respectively, of Fox News in 2008. We show the same channel position difference for all three channels to make the figures comparable to each other.

Age	Income ($000s)	Ethnicity	College	Gender	Ideology	Channel Rank-Order	FNC ⇔ MSNBC
65	25	White	No	Man	Centrist	FNC, CNN, MSNBC	-2.25
65	25	White	No	Man	Median Republican	FNC, CNN, MSNBC	-4.12
65	25	White	No	Man	Median Democrat	MSNBC, CNN, FNC	1.08
30	85	Black	Yes	Man	Centrist	CNN, MSNBC, FNC	0.47
30	85	Black	Yes	Man	Median Republican	FNC, CNN, MSNBC	-2.98
30	85	Black	Yes	Man	Median Democrat	CNN, MSNBC, FNC	4.75
65	85	Hispanic	No	Man	Centrist	CNN, FNC, MSNBC	-1.75
65	85	Hispanic	No	Man	Median Republican	FNC, CNN, MSNBC	-4.71
65	85	Hispanic	No	Man	Median Democrat	CNN, MSNBC, FNC	1.44
30	25	White	Yes	Woman	Centrist	MSNBC, FNC, CNN	1.07
30	25	White	Yes	Woman	Median Republican	FNC, CNN, MSNBC	-0.18
30	25	White	Yes	Woman	Median Democrat	MSNBC, CNN, FNC	1.83
65	25	Black	No	Woman	Centrist	FNC, CNN, MSNBC	-2.59
65	25	Black	No	Woman	Median Republican	FNC, CNN, MSNBC	-4.29
65	25	Black	No	Woman	Median Democrat	MSNBC, CNN, FNC	0.63
30	85	Hispanic	Yes	Woman	Centrist	CNN, MSNBC, FNC	1.63
30	85	Hispanic	Yes	Woman	Median Republican	FNC, CNN, MSNBC	-1.22
30	85	Hispanic	Yes	Woman	Median Democrat	MSNBC, CNN, FNC	3.79

Table 13: Preference orderings of channels, and change in log channel position needed to flip FNC / MSNBC preference order, for selected demographic profiles.

files as in the previous table, Table 13 lists that type of viewer's preference ordering over the three cable channels, on a hypothetical system where all three are available and positioned at their median position in the data in 2008. The last column shows the difference in log channel position that would be required to flip that type of viewer's preference between Fox and MSNBC. Demographic effects play a large role in determining the most preferred channel. Within demographic profiles, ideology can drive differences in preferences: all Republican types prefer Fox News to MSNBC, and vice versa for Democrats.

In both our raw data and in the simulations, slanted media are consumed by agents who do not necessarily share the same ideology as the media outlet. This result is consistent with the analysis in Gentzkow and Shapiro (2011) who find that much of Fox News Channel's audience is composed of people who do not self-identify as conservative, and related, that self-identified conservatives watch other cable news besides Fox News.[37] Our model estimates match these facts. Furthermore, such a lack of ideological segregation is a necessary precursor in our model for cable news consumption to change voter intentions.

[37]Their results apply more broadly showing that individuals across the political spectrum tend to consume media that is ideologically diverse.

Election	Voter Ideology	1 Hour CNN	1 Hour FNC	1 Hour MSNBC
2000	Centrist	-0.016	0.014	0.004
	Median Republican	-0.078	-0.054	-0.062
	Median Democrat	0.048	0.073	0.065
2004	Centrist	-0.003	0.022	0.005
	Median Republican	-0.069	-0.048	-0.062
	Median Democrat	0.058	0.080	0.065
2008	Centrist	-0.011	0.035	-0.036
	Median Republican	-0.076	-0.039	-0.097
	Median Democrat	0.051	0.092	0.031

Table 14: Effects of watching an additional 1 hour per week on the probability of voting Republican.

Election	Voter Ideology	CNN	FNC	MSNBC
2000	Median Republican	0.41	0.46	0.32
	Median Democrat	0.62	0.35	0.32
2004	Median Republican	0.31	0.53	0.19
	Median Democrat	0.41	0.36	0.20
2008	Median Republican	0.00	0.31	0.00
	Median Democrat	0.12	0.00	0.20

Table 15: Probability of cable subscribers with access to the channel watching each channel in each election year, for different ideological types.

We find that the perception of slant for the channels is a multiple of about five times the text based slant measure. The text based slant measures place Fox News and MSNBC in 2008 closer to the center than the median Republican or median Democratic congressman, respectively. The scaled ideology estimates place Fox News close to the median Republican voter.

Table 14 shows the change in the probability of voting Republican with respect to watching one hour per week of each of the cable channels, again for viewers with different initial ideological types. For initially centrist voters, watching additional CNN has a small negative influence on the probability of voting Republican, by between 0 and 1.5 percentage points depending on the election. The effect of MSNBC is very close to zero in 2000 and 2004, but becomes substantially negative (at 3.6 percentage points) in 2008 after MSNBC's format switch. The effect of Fox is positive, ranging

Election	All voters		Only attached voters	
	FNC (D to R)	MSNBC (R to D)	FNC (D to R)	MSNBC (R to D)
2000	13%	12%	2%	3%
2004	34%	9%	17%	1%
2008	50%	30%	29%	23%

Table 16: Persuasion rates of Fox News and MSNBC. "All voters" counts as a Democrat any voter initially to the left of the election cutoff, and counts as a Republican any voter initially to the right. "Only attached voters" includes only voters in the leftmost 25% and rightmost 25% of the voter ideology distribution. Percentages are conditional on watching the channel.

from 1.4 point in 2000 to 3.5 points in 2008. The largest elasticity magnitudes are on individuals from the opposite ideology of the channel, with Fox generally better at influencing Democrats than MSNBC is at influencing Republicans. This last feature is consistent with the regression result that the IV effect of Fox is greater than the corresponding effect for MSNBC.

Table 15 shows the effects of viewers' initial ideology on the probability that they choose to watch each channel. The noteworthy pattern is that both Fox and MSNBC appear to become more ideologically distinctive over time. In 2000, the difference between the probability of a typical Republican and that of a typical Democrat watching Fox is about 11 percentage points; by 2008 that gap widens to over 30 points. For MSNBC the difference is essentially zero in 2000 and 2004, but widens to 20 points by 2008.

Finally, Table 16 shows the estimated persuasion rates of the channels at converting votes from one party to the other. The numerator here is the number of, for example, Fox News viewers who are initially Democrats but by the end of an election cycle change to supporting the Republican party. The denominator is the number of Fox News viewers who are initially Democrats.[38] Again, Fox is more effective at converting viewers than is MSNBC. The persuasion rates are high, and increasing over time as the channels polarize. However, due to the taste for like-minded news, the effect on the total number of votes converted is ambiguous; as shown in Table 15, there are far fewer Democrats deciding to watch Fox News in 2008 than in 2000.

[38] As our model has no inherent notion of partisanship, only an ideological cutpoint between the parties, in Table 16 we consider two definitions of what constitutes a Democrat or Republican partisan.

7 Polarization Dynamics

In this section, we perform two exercises to quantify the effects of slanted cable news on election outcomes. First, we simulate the evolution of ideology for groups of voters over time to document the incidence of slanted cable news on these agents' political ideologies. Second, we estimate the effect of the entry of Fox News on the 2000 presidential election.

A positive ρ, implying that watching slanted news affects ideology, and a positive η, implying a taste for like-minded news, together create the potential for a polarizing feedback loop. Consider forcing a centrist voter to watch only the Fox News Channel. The more that individual watches the Fox News Channel, the more they drift to the right; the more they drift to the right, the more they are attracted to watching Fox News, and so on. These two effects reinforce each other, in a positive feedback process related to theoretical models from the literature on network formation (Holme and Newman, 2006). In this section, we quantify the rate at which such polarization can occur, given our model's estimates. We employ the polarization index developed in Esteban and Ray (1994) and Duclos et al. (2004).

Evolution of viewer ideology Figure 7 shows the results of a simulation of viewing behavior given the model parameters estimated in the previous section. A sample of 10,000 hypothetical viewers in an average cable system[39] in a county with average demographic characteristics are initialized are assigned ideologies from the initial ideology distribution for 2008, conditional on their simulated demographics. In each year, they choose whether and how much to watch of each channel, given individual-specific preferences. Their ideologies then adjust towards the ideology of the channels they view in accordance with equation 6. This process repeats over the next ten years.

The resulting distribution of ideologies changes according to two contrasting patterns. Cable viewers who are initially centrist quickly polarize according to their chosen channel, leading to the emergence of new poles at the ideologies of CNN, FNC, and MSNBC respectively. The peaks of the distribution at those points become succes-

[39]For purposes of this simulation, all viewers are given access to all three cable channels, at the channels' mean positions in the data.

sively sharper in each year. However, for initially extreme cable viewers - those to the right of FOX or to the left of MSNBC - watching cable news exerts a centralizing force. Correspondingly, mass in the far tails of the ideology distribution declines.

Because of this combination of drawing in viewers from the extremes, and driving apart those initially centrist, the aggregate effect of cable news on ideological polarization is ambiguous and not easily discerned from plots like that in Figure 7. We therefore turn to the work of Esteban and Ray (1994); Duclos et al. (2004), who provide a measure of polarization derived from axioms. Employing their measure on simulated individuals, we find that the existence of cable news increases polarization. Interestingly, this increase in polarization is dependent on the existence of a taste for like-minded news; without such a taste, cable news actually reduces polarization. The first row in Table 17 presents this polarization measure at the initial ideology distribution for the presidential election cycle in question. The second row presents the polarization measure after four years of watching cable news. The third row presents the same measure, but shutting down the taste for like-minded news.[40] Without a taste for congruent news, viewers from across the political spectrum would be exposed to and persuaded by news from the other side.

	2000	2004	2008
Initial	0.439	0.439	0.440
Post-Exposure	0.455	0.503	0.470
Post-Exposure (no slant preference)	0.412	0.420	0.396

Table 17: Esteban and Ray polarization measure, before and after exposure to cable news.

Fox Entry in 2000 Next, we estimated the effect of the entry of Fox News into the cable news market beginning in late 1996 on the 2000 presidential election. Using our estimated model parameters, we simulated two conditions. First, a base case where Fox was available to cable subscribers in the 1997-2000 period according to the observed rollout pattern. Second, a scenario where Fox was available exclusively to satellite subscribers and not on any local cable system. We computed aggregate viewer welfare and aggregate vote outcomes under each scenario.

[40] I.e., we set the parameter η equal to zero, rather than the estimated value.

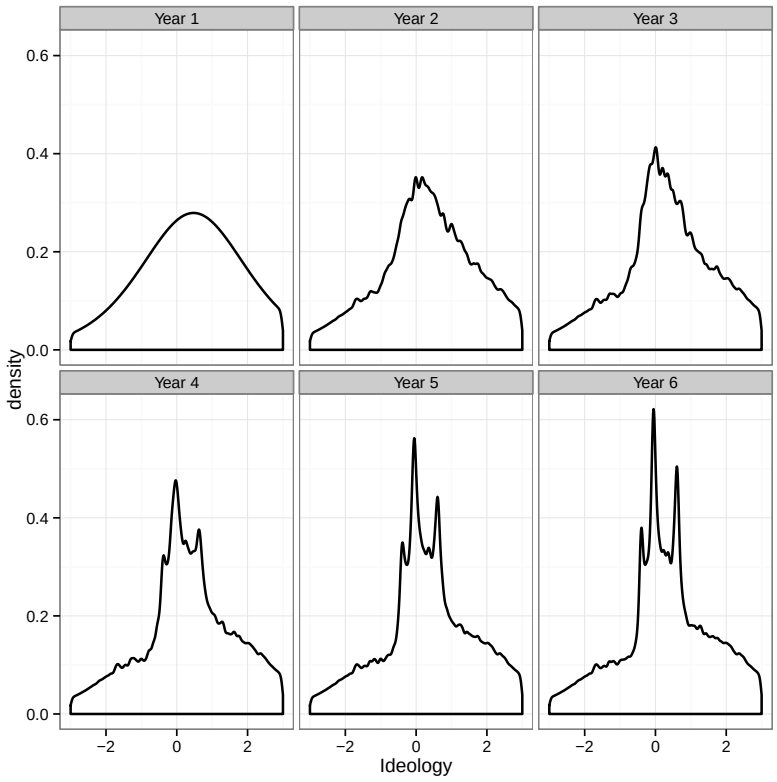

Figure 7: Density plots of viewers' ideology over time. Voters are initially drawn from the unconditional ideology distribution in 2008. The remaining 5 plots show the change in the ideology distribution over time, in years 2 through 6.

Cycle	Intention	Intention (voters)	Welfare	Substitution
2000	-0.013	-0.009	-0.38	0.87
2004	-0.057	-0.040	-0.34	0.84
2008	-0.059	-0.042	-0.40	0.80

Table 18: Effects of elimination of the Fox News Channel from cable lineups. Column 2 is the change in the Republican share of the presidential vote intention; column 3 rescales these to approximate the effects on registered voters only; column 4 is the average fractional change in welfare from cable TV of Fox viewers; column 5 is the fraction of initial Fox viewers who switch to CNN or MSNBC after Fox is eliminated.

Table 18 shows the effects of eliminating Fox from cable lineups in the 1997-2000 period and subsequent election cycles. County-level Republican vote shares on average fall by 1.3 percentage points under the no-Fox scenario relative to the baseline. This prediction is roughly an order of magnitude higher than the previous estimate of DellaVigna and Kaplan (2007).[41] We note that because our simulation model predicts vote intention, and not actual votes,[42] these estimates overstate the effect on actual election outcomes. As a rough estimate of the importance of this compositional difference between the NAES sample and the population of voters, we scale our counterfactual vote changes down in proportion to the reduction in the 2SLS effect seen when we restrict our regression sample to registered voters (discussed in section 4.2). Welfare from cable news of those cable subscribers who watched some Fox under the baseline scenario but could not in the no-Fox case falls as well, by about 40% overall. The welfare loss is mitigated to some degree by the availability of substitutes in CNN and MSNBC; large majorities of former Fox viewers switch to watching one of the other two channels when Fox availablility is eliminated.

We also repeat this no-Fox counterfactual exercise in the two subsequent election cycles. In subsequent cycles, the implied Fox News effect increases due to two forces. First and most importantly, overall Fox News viewership approximately doubles during the period 2000 to 2008, meaning nearly twice as many viewers are exposed to Fox News

[41] One can attribute the differences to measurement error in the DellaVigna and Kaplan (2007) study detailed in Appendix A of this paper. Furthermore, their study considers only a subset of geographies for which they could obtain voting data whereas our estimates cover the universe of US cable systems.

[42] The underlying data come from the NAES, which surveyed a random sample of American adults, not all of whom are likely voters or even registered to vote.

in later cycles. Second, Fox News moves to the right, increasing its persuasive effect enough to outweigh any loss in viewership due to the ideological drift. Finally, as Fox becomes more ideologically distinctive over time, the proportion of its viewers who find MSNBC or CNN to be acceptable substitutes falls as well.

MSNBC Format Switch Finally, we estimated the effects of MSNBC's format switch to providing more explicitly liberal coverage in 2005. We simulated a condition where MSNBC's ideology matched that of CNN, and compared to our base case. Table 19 shows that the estimated effect in the 2008 election cycle of this switch is to increase the Republican share of presidential vote intention by over 4 percentage points, an effect somewhat smaller but comparable in magnitude to the estimated effect of eliminating Fox News. This change induces welfare losses of MSNBC subscribers, who prefer the base case ideology; however, preferences are not as strong as those of Fox viewers. For comparison purposes, we also run this scenario for the earlier two election cycles, showing that prior to 2005, MSNBC was a net conservative force.

Cycle	Intention	Intention (voters)	Welfare
2000	-0.016	-0.011	-0.25
2004	-0.019	-0.013	-0.16
2008	0.043	0.030	-0.20

Table 19: Effects of setting MSNBC's ideology to match that of CNN. Column 2 is the change in the Republican share of the presidential vote intention; column 3 rescales these to approximate the effects on registered voters only; column 4 is the average percentage change in welfare from cable TV of MSNBC viewers.

8 Conclusion

This paper provides estimates of both the influence of slanted news on political views and the taste for like-minded news in the context of cable television news in the U.S. The key ingredient in the analysis is the use of channel positions as instrumental variables to estimate a model of viewership, voting, and ideology evolution. We show instrumental variables estimates that watching the Fox News Channel increases the probability of

voting Republican, and watching MSNBC after 2004 decreases the probability of voting Republican in presidential elections.

We estimate a model of consumer-viewer-voters who choose cable subscriptions, allocate time to watching news channels, and vote in elections. The tastes for news channels are partly determined by the closeness of the news channels' estimated ideology to the individuals. Individual ideology evolves towards the estimated ideologies of the news channels that a consumer watches. We use the estimated model to characterize the degree of polarization that one can attribute to slanted cable news consumption, and measure effects on elections. Our estimates imply large effects of Fox News on presidential elections. Furthermore, we estimate that cable news does increase polarization, and that this increase depends on both a persuasive effect of cable news and the existence of tastes for like-minded news.

Future research could go in a number of directions. The use of channel positions as instrumental variable could be useful in other studies of how media consumption affects behavior. One could also use channel position variation to study the cable news channels in more detail by examining specific programs, e.g. "The O'Reilly Factor," and specific issues like abortion, gay marriage, or government spending. In a different direction, studying the causes and consequences of the divergence in estimated ideologies seems fruitful.[43] It would also be useful to test, refine, or expand the specific model we employ for belief updating after media consumption. For example, one could allow for a joint distribution of influence parameters and tastes for like-minded news in the population.

[43]This includes improving these text based procedures to allow for sentiment analysis or other partisan indicators.

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A DellaVigna and Kaplan (2007)

DellaVigna and Kaplan (2007) (henceforth DVK) compare changes in presidential vote shares in towns which had access to the Fox News Channel by the year 2000 compared to towns that did not conditional on a rich set of co-variates. The first-order problem in DVK's data is severe mis-measurement due to non-updated entries. Specifically, 37% of control group observations, the towns which the DVK data indicate did not have cable access to the Fox News Channel in the year 2000, actually did have access to Fox News, but were not properly updated in that data source. In fact, about 25% of these towns already had cable access to the Fox News Channel in 1998. When one re-runs their specifications with the Nielsen FOCUS data,[44] one draws new inferences from the estimated coefficients in DVK's two preferred specifications.

In the specification with county-level fixed effects, the coefficient on having access to Fox News drops from 0.00694 to 0.00215, and is no longer statistically significant. In the specification with district-level fixed effects, the coefficient on having access to Fox News remains roughly the same. However, this specification now performs poorly on the placebo test that DVK used to argue that the estimate is not driven by selection of towns into having access to the Fox News Channel. The estimated coefficient of cable availability of Fox News in 2000 on the change in Republican vote share from 1992 to 1996 is nearly the same as the estimated coefficient for the change between 1996 and 2000.[45]

A.1 The Data Problem

The data source in DVK is the Warren's Cable and Television Factbook (henceforth Factbook). The Factbook updates only a minority of cable systems every year. The extent of non-updating has been documented by Crawford and Yurukoglu (2012). We reproduce the relevant years from their Appendix table below in Table 20. Updating is especially poor around DVK sample year. Between 1999 and 2000, only 22% of observations were updated. Between 1998 and 1999, only 37% of observations were

[44] These data are discussed in Section 3. We detail in the next subsection why the Factbook data are not suitable for evaluating the effects of Fox News in 2000 while the Nielsen FOCUS data are.

[45] The former is not statistically distinguishable from the latter nor from zero. The placebo estimate (0.00296) is closer to the actual estimate (0.0037) than it is to zero.

updated. Since Fox News was expanding across the country rapidly during these years, this infrequent updating is consequential: many towns in the Factbook were listed as not having cable access to Fox News, when in fact they did but the Factbook simply wasn't updated yet. Nearly all systems in the Nielsen FOCUS data are updated every year.

Table 20: Data Quality of Factbook

Year	*Variable*	*Number of Bundles*	*Fraction of Bundles*
1998	Total bundles	15,743	100.0%
	Full information	10,872	69.0%
	Updated	4,714	30.0%
	Full information and updated	3,461	22.0%
1999	Total bundles	15,497	100.0%
	Full information	10,444	67.0%
	Updated	5,663	37.0%
	Full information and updated	3,595	23.0%
2000	Total bundles	15,453	100.0%
	Full information	10,312	67.0%
	Updated	3,358	22.0%
	Full information and updated	2,478	16.0%
2001	Total bundles	15,391	100.0%
	Full information	9,793	64.0%
	Updated	4,173	27.0%
	Full information and updated	2,663	17.0%
2002	Total bundles	15,287	100.0%
	Full information	7,776	51.0%
	Updated	5,086	33.0%
	Full information and updated	1,484	10.0%
1997-2007	Total bundles	166,619	100.0%
	Full information	91,100	55.0%
	Updated	62,299	37.0%
	Full information and updated	31,493	19.0%

Notes: This table is a reproduction from Crawford and Yurukoglu (2012) indicating the degree of non-updating in Factbook data.

One can verify that the Nielsen FOCUS data are accurate, while the non-updated Factbook data are not. First, one can cross check the data sources against newspapers from the time period. Black and Hamburger (1999) is a newspaper article from December 2, 1999 stating that "Fox News Channel is channel 21B to subscribers in Minneapolis." According to the Factbook data used in DVK, Minneapolis did not have

access to the Fox News Channel by November 2000. The Nielsen FOCUS data indicate that Minneapolis did have access to Fox News Channel in 1999, and also correctly indicates the channel number of 21B. Second, we investigated the systems with the largest discrepancy: those where Nielsen FOCUS indicated had Fox News availability in 1998 while the Factbook indicated no availability by 2000. 353 of these systems were operated by Tele-Communcations Inc. (TCI) in 1998. Press reports from the time period indicate that Fox News would be available to over 90% of TCI customers by 1998 (Colman (1996)).

Finally, the number of subscribers for Fox News implied by the Factbook data conflict with the amount of viewership Fox News had in 2000, including the viewership data used in DVK. According to DVK, "About half of the Fox News audience, therefore, watches Fox News in ways other than via cable, possibly via satellite. This finding could also be due to measurement error in our measure of availability via cable." According to their data, 17% of households were watching Fox News in 2000. Therefore, 8.5% of all households must have been simultaneously satellite subscribers and watching Fox News. However, the market share of satellite in the year 2000 was 11.4%[46] Therefore, a vast majority of satellite subscribers must have been watching Fox News in 2000 to be consistent with the Factbook availability measures. Our Mediamark data indicate that the fraction of satellite subscribers watching Fox News in 2000 is only 19%.[47]

To correct this issue, we matched the voting and demographic data in DVK to Nielsen FOCUS. The identification numbers in the Factbook and Nielsen FOCUS do not match. We employed a matching procedure based on community names and firm names, using manual inspection when matches weren't obvious. We were able to reliably match 8,286 observations out of 9,256 to Nielsen FOCUS. Tables 21 and 22 compare the availability of Fox News according to the two data sources.

About 40 percent of the control group in DVK is mis-classified as not having cable access to Fox News. About 25 percent already had access in 1998 and hadn't been updated for at least two years in the Factbook.

[46]The cable market share was 70.2% implying a 81.6% total market share. Thus, about 14% of cable or satellite subscribers were satellite subscribers.

[47]Their viewership data and our Mediamark data agree on the aggregate 17% number. Our Mediamark data indicate the conditional probability of watching Fox News conditional on satellite is only marginally higher at 19%.

		Factbook Fox News (Year 2000)		
		0	1	Total
Nielsen Fox News	0	3,632	58	3,690
(Year 2000)	1	3,076	1,520	4,596
	Total	6,708	1,578	8,286

Table 21: Year 2000: Nielsen Fox News Availability and Factbook non-updated Fox News Availability.

		Factbook Fox News (Year 2000)		
		0	1	Total
Nielsen Fox News	0	4,837	358	5,195
(Year 1998)	1	1,871	1,220	3,091
	Total	6,708	1,578	8,286

Table 22: Nielsen Fox News Availability in 1998 and Factbook non-updated Fox News Availability in 2000.

A.2 Estimates with Nielsen Data

We now re-run the two "benchmark" specifications from DVK: the county level fixed effects regression and the US House district level fixed effects regression. These correspond to equation (2) in DVK. Table 23 compares the resulting estimates.

The estimate in the county level fixed effects regression drops from a statistically significant 0.00694 (Column 7) to 0.00215 (Column 9), and becomes statistically indistinguishable from no effect of Fox News on change in Republican vote share. The difference cannot be attributed to not matching all of DVK's observations. Their estimated effect is stronger when using their Fox variable, but only on the subset of matching observations (Column 8).

The estimate in the Congressional district fixed effects regression remains stable with the Nielsen data. However, this specification delivers new results in the placebo test DVK use to argue that their specifications are estimating the causal effects of Fox News rather than selection of towns trending Republican into carrying Fox News. Table 24 compares the placebo regression estimates using the original data and the corrected data. Using the correct data, the placebo regression indicates that availability of Fox

	Republican two-party vote share change between 2000 and 1996 pres. elections								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Factbook Fox	0.00798***	0.00869***		0.00421***	0.00473***		0.00694***	0.00741***	
	(0.00257)	(0.00270)		(0.00154)	(0.00163)		(0.00150)	(0.00158)	
Nielsen Fox			0.00786***			0.00377***			0.00215
			(0.00171)			(0.00117)			(0.00131)
Observations	9,256	8,286	8,286	9,256	8,286	8,286	9,256	8,286	8,286
R-squared	0.557	0.559	0.561	0.753	0.755	0.755	0.812	0.815	0.814
Data Set	Factbook	Factbook	Nielsen	Factbook	Factbook	Nielsen	Factbook	Factbook	Nielsen
Sample	Full	Matched	Matched	Full	Matched	Matched	Full	Matched	Matched
FE	OLS	OLS	OLS	District	District	District	County	County	County

Robust standard errors in parentheses, clustered by cable firm
*** p<0.01, ** p<0.05, * p<0.1

Table 23: OLS, District FE, and County FE specifications from DVK and with corrected Fox News availability data.

News might very well be positively correlated with the change in Republican vote share between 1992 and 1996 in the district fixed effect specification. The coefficient's precision can not rule out a zero effect, but the district fixed effects regression should be interpreted in light of the placebo results.

B Comparison of Regression Coefficients in Real and Simulated Data

This section reports the fit of the indirect inference estimation routine. Tables 25, 26, and 27 report the fit for the first and second stages, respectively.

C More on Channel Positions

The combination of the placebo test of whether cable channel positions predict viewership of news channels on satellite together with the institutional narrative of the period 1992-2000 is the most convincing argument for the validity of channel positions as instrumental variables for the effect of watching cable news on voting Republican. In this section, we provide additional evidence in support of the validity for the instrumental variables assumption. First, we show that cable channels whose viewership is composed of similar demographics have uncorrelated channel positions. Second, we show that Fox News and MSNBC channel positions are highly correlated with the best available position on the system at the time they were added. Third, we carry out the formal test for whether local cable position effects are equal for cable and satellite subscribers.

C.1 Channel Positions for Channels with Similar Demographics

If channel positions are tailored to local tastes, one would expect channels whose viewership is composed of similar demographics would have correlated channel positions. We examine this possibility in the data. The results are in Table 28. First, the Fox News Channel position is positively correlated with the MSNBC position despite their

	Republican two-party vote share change between 1996 and 1992 pres. elections					
	(1)	(2)	(3)	(4)	(5)	(6)
Factbook Fox	0.00539	0.00459		-0.00237	-0.00271	
	(0.00503)	(0.00507)		(0.00313)	(0.00325)	
Nielsen Fox			0.00702**			0.00296
			(0.00337)			(0.00205)
Observations	4,006	3,637	3,637	4,006	3,637	3,637
R-squared	0.327	0.337	0.341	0.620	0.625	0.626
Data Set	Factbook	Factbook	Nielsen	Factbook	Factbook	Nielsen
Sample	Full	Matched	Matched	Full	Matched	Matched
Specification	OLS	OLS	OLS	District FE	District FE	District FE

Robust standard errors in parentheses, clustered by cable firm
*** p<0.01, ** p<0.05, * p<0.1

Table 24: OLS and District FE Placebo specifications from DVK and with corrected Fox News availability data.

differences in slant. This is perhaps because they are both news channels, and some system managers prefer to group same genre channels together even if they cater to different segments of the population. Compare Columns (2) and (3) to see which other channel positions correlate with Fox News and MSNBC positions. There is one channel, Bravo, which suggests endogenous positioning. During the sample period, Bravo reformatted as a channel catering to younger and more urban viewers, including some of the first programming to include gay characters in lead roles. Indeed, the Bravo position is negatively correlated with the Fox Position, and positively correlated with the MSNBC position. On the other hand, most of the other coefficients tell a different story. Comedy Central, which airs the liberal slanted Daily Show and Colbert Report, is negatively correlated with MSNBC. Country Music Television (CMT) is positively correlated with MSNBC. The Trinity Broadcasting Network (TBN) which is explicitly religious is negatively correlated with Fox News. Column (4) shows that Speed Channel, which airs coverage of NASCAR and other motorsports, is positively correlated with Bravo.

C.2 Best Available Channel Position

We demonstrate one example of this historical influence in Table 29. We regress the ordinal positions of Fox News and MSNBC on the system's best available ordinal position in 1997, along with a control for the overall size of the system - its total number of channels.[48] The best available position in 1998 is a strong predictor of the current position, *even though* the positioning data here extends through 2008. A system's channel configuration prior to the addition of Fox or MSNBC exerts a lasting influence on the positioning of Fox and MSNBC today.

[48]Our lineup data begins in 1998, and hence we restrict the sample for this regression to cable systems that did not have Fox/MSNBC in 1998. "Best available" is defined as the lowest open slot (unoccupied by an existing channel) in the region of the lineup dedicated to cable (i.e. non-network and non-local-access) channels. We define the cable region by locating the positions of CNN, ESPN, TNT, and The Discovery Channel, and consider any open slot above at least one of those channels to be available.

C.3 Chow Test for Positions

This subsection formally carries out the Chow tests for whether the local cable position affects satellite subscribers in the same manner it affects cable subscribers. This difference between this regression and Tables 5 and 6 is that here we restrict the demographic coefficients to be equal for both sets of subscribers.

D Other Outcome Variables

In this section, we explore the effect of cable news on other measures of political partisanship aside from the surveyed Presidential vote variable. We look at self-reported ideology on a 1 to 5 scale (Very conservative, Conservative, Moderate, Liberal, and Very liberal) as well as precinct level actual vote tallies from the 2008 election.

D.1 Self-reported Ideology

Table 31 presents the results for self reported ideology. The Fox News effect corresponds to one-quarter of a standard deviation of self-reported ideology for an extra hour per week. The MSNBC effect is statistically imprecise. Interestingly, there is a liberal CNN effect of about one-sixth of a standard deviation for an extra hour of CNN per week.

D.2 2008 Precinct Level Vote Shares

We regress two party vote share at the precinct level on cable news channel positions using the data set compiled by Ansolabehere et al. (2014). The advantage of these data is that they capture actual realized vote totals. However, because we do not have precinct level viewership, we can not directly estimate the viewership effect. Across a variety of specifications, higher positions for Fox News predict a lower Republican vote share, and higher positions of MSNBC predict a higher Republican vote share.

	CNN-Positive		**FNC-Positive**		**MSNBC-Positive**	
Regressor	Real	Simulated	Real	Simulated	Real	Simulated
CNN Position	-0.087	-0.172	-0.005	0.032	-0.046	-0.013
FOX Position	-0.012	0.004	-0.043	-0.261	0.041	0.030
MSN Position	0.034	-0.052	0.038	0.015	-0.001	-0.175
2000	3.837	3.520	2.791	2.281	2.844	3.210
2001	4.515	4.970	3.163	2.918	3.095	3.367
2002	4.492	4.404	3.470	3.092	2.989	3.305
2003	4.179	4.157	3.417	3.054	2.916	3.399
2004	4.333	4.098	3.699	3.178	2.960	3.724
2005	4.301	4.175	3.612	3.942	2.927	3.433
2006	4.113	3.966	3.437	3.205	2.908	3.128
2007	4.167	4.039	3.478	3.334	2.843	3.073
2008	6.446	7.141	6.897	3.864	5.878	6.033
FOX Only	0.125	-0.056	0.490	1.087	-0.450	-0.122
MSN Only	-0.101	0.115	-0.548	0.088	0.096	0.774
Both Available	-0.022	0.061	-0.004	1.023	-0.224	0.681
Income	-0.899	-0.693	-0.244	-0.300	-0.746	-0.454
Income^2	0.348	0.256	-0.076	0.015	0.299	0.096
Income^3	-0.019	-0.014	0.048	0.016	-0.018	0.024
Age	-0.020	-0.027	-0.016	-0.022	-0.011	-0.044
Age^2	0.001	0.001	0.001	0.001	0.000	0.001
White	-0.323	-0.256	0.391	0.081	-0.139	0.059
Black	0.151	0.206	0.191	0.078	0.232	-0.227
Hispanic	-0.025	0.099	-0.152	0.018	0.084	-0.082
College Graduate	0.021	-0.024	-0.179	-0.106	-0.140	-0.066
Man	0.010	0.090	0.042	0.047	-0.049	-0.075
Log Number of Channels	-0.135	-0.084	-0.163	-0.089	-0.015	-0.082

Table 25: Comparison of regression coefficients in real data and simulations. Dependent variable is hours watched of each channel, conditional on watching any.

	CNN-Zero		FNC-Zero		MSNBC-Zero	
Regressor	Real	Simulated	Real	Simulated	Real	Simulated
CNN Position	-0.013	-0.030	-0.001	-0.002	-0.001	0.001
FOX Position	0.000	-0.005	-0.018	-0.037	0.009	0.001
MSN Position	-0.005	-0.005	0.011	-0.004	-0.033	-0.042
2000	-0.004	0.013	-0.235	-0.245	-0.131	-0.089
2001	0.041	0.010	-0.179	-0.246	-0.103	-0.082
2002	0.042	0.049	-0.138	-0.215	-0.123	-0.109
2003	0.016	0.027	-0.121	-0.202	-0.094	-0.084
2004	0.005	0.027	-0.091	-0.164	-0.096	-0.082
2005	0.013	0.023	-0.081	-0.214	-0.076	-0.070
2006	-0.004	0.010	-0.095	-0.194	-0.099	-0.081
2007	-0.016	0.007	-0.096	-0.181	-0.095	-0.072
2008	-0.157	-0.137	-0.225	-0.302	-0.198	-0.191
FOX Only	0.045	0.030	0.124	0.373	-0.022	0.003
MSN Only	0.083	0.027	-0.018	0.009	0.205	0.340
Both Available	0.068	0.051	0.077	0.390	0.160	0.333
Income	0.348	0.358	0.262	0.180	0.209	0.179
Income^2	-0.129	-0.082	-0.107	-0.034	-0.077	-0.054
Income^3	0.013	0.005	0.011	0.000	0.008	0.002
Age	0.003	0.005	0.004	0.004	0.003	0.002
Age^2	0.000	0.000	0.000	0.000	0.000	0.000
White	-0.025	-0.019	0.030	0.007	-0.001	-0.023
Black	0.020	0.017	0.057	0.061	0.007	0.013
Hispanic	-0.041	-0.035	-0.042	-0.033	-0.030	-0.031
College Graduate	0.063	0.064	-0.019	-0.012	0.040	0.043
Man	0.043	0.047	0.048	0.047	0.038	0.036
Log Number of Channels	-0.001	-0.003	0.008	-0.012	0.004	-0.008

Table 26: Comparison of regression coefficients in real data and simulations. Dependent variable is an indicator for watching any of the channel.

	Vote Intention - IV		**Vote Intention - OLS**	
Regressor	Real	Simulated	Real	Simulated
CNN Time	0.009	-0.011		
FOX Time	0.138	0.125		
MSN Time	-0.103	-0.076		
CNN Most-Watched			-0.087	-0.087
FOX Most-Watched			0.329	0.331
MSN Most-Watched			-0.095	-0.099
2000	0.741	0.699		
2004	0.693	0.722	0.648	0.823
2008	0.682	0.772	0.649	0.854
FOX Only	0.009	-0.007	0.060	0.065
MSN Only	0.066	0.069	0.085	0.033
Both Available	0.037	0.018	0.060	0.060
Income	0.382	0.018	0.430	0.023
Income^2	-0.341	-0.014	-0.314	-0.006
Income^3	0.091	0.002	0.073	0.000
Age	0.003	0.002	0.003	0.000
Age^2	0.000	0.000	0.000	0.000
White	0.074	0.028	0.103	0.038
Black	-0.354	-0.031	-0.286	-0.012
Hispanic	-0.060	-0.018	-0.092	-0.020
College Graduate	-0.060	0.004	-0.056	-0.011
Man	0.053	-0.006	0.044	0.004
Log Number of Channels	-0.095	-0.064	-0.102	-0.087

Table 27: Comparison of regression coefficients in real data and simulations. Dependent variable is Republican vote intention.

VARIABLES	(1) Fox News Position	(2) Fox News Position	(3) MSNBC Position	(4) SPEED Position
ESPN Position		0.0377*	0.0761***	
		(0.0210)	(0.0217)	
TNT Position		-0.0281	0.0391	
		(0.0228)	(0.0279)	
USA Position		9.66e-06	-0.141***	
		(0.0216)	(0.0255)	
Bravo Position		-0.0449***	0.0823***	0.311***
		(0.0112)	(0.0153)	(0.0271)
Comedy Central Position		0.00983	-0.0483**	
		(0.0194)	(0.0206)	
Trinity Broadcasting Network Position		-0.0142**	-0.00180	
		(0.00579)	(0.00627)	
CMT Position		0.00308	0.0528***	0.0120
		(0.00928)	(0.0107)	(0.0184)
SPEED Position		-0.00318	0.00922	
		(0.00593)	(0.00662)	
N Channels	0.0184***	0.0267***	-0.00975**	0.244***
	(0.00221)	(0.00434)	(0.00480)	(0.00835)
MSNBC Position	0.324***			
	(0.0161)			
Observations	47,524	26,173	24,591	40,464
R-squared	0.154	0.022	0.031	0.186
Year Effects	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 28: Channel positions regressed on other channel positions.

Coefficient	MSNBC	Fox
(Intercept)	33.8	30.7
	(0.573)	(0.432)
Number of Channels	0.032	0.032
	(0.003)	(0.002)
Best Available	0.181	0.148
	(0.014)	(0.012)
R^2	0.066	0.077
N	29,337	38,328

Table 29: Ordinal channel position vs. best available ordinal channel position, among systems where the channel (MSNBC or Fox News) was added in 1998 or later. Standard errors clustered by cable system.

VARIABLES	(1) Fox News Hours	(2) CNN Hours	(3) MSNBC Hours
FNC Cable Position x Cable	-0.122***	-0.0316	0.0500***
	(0.0214)	(0.0210)	(0.0132)
FNC Cable Position x Satellite	-0.00617	0.0328	0.00273
	(0.0457)	(0.0449)	(0.0282)
CNN Cable Position x Cable	-0.0126	-0.112***	-0.0139
	(0.0137)	(0.0135)	(0.00849)
CNN Cable Position x Satellite	0.00759	0.0137	-0.00864
	(0.0311)	(0.0306)	(0.0192)
MSNBC Cable Position x Cable	0.129***	0.0718***	-0.0973***
	(0.0232)	(0.0228)	(0.0143)
MSNBC Cable Position x Satellite	0.0511	0.0135	0.0111
	(0.0500)	(0.0491)	(0.0309)
Observations	168,862	168,862	168,862
R-squared	0.038	0.041	0.013
F Stat for Own Position x Cable = Own Position x Satellite	5.320	14.14	10.18
P Value for Own Position x Cable = Own Position x Satellite	0.0211	0.000170	0.00142

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 30: Chow Tests for whether cable position affects cable subscribers and satellite subscribers equally.

VARIABLES	(1) Intent to Vote R
Fox News Channel Hours	0.233***
	(0.0234)
CNN Hours	-0.174***
	(0.0428)
MSNBC Hours	-0.0300
	(0.0480)
HH Income	0.00369***
	(0.000622)
HH Income^2	-2.65e-05***
	(6.59e-06)
HH Income^3	6.21e-08***
	(1.96e-08)
Age	0.0157***
	(0.00135)
Age^2	-0.000104***
	(2.01e-05)
White	0.0236
	(0.0161)
Black	-0.127***
	(0.0164)
Hispanic	-0.00404
	(0.0131)
College	-0.142***
	(0.0120)
Male	0.147***
	(0.00734)
log(N Channels)	-0.208***
	(0.0101)
Observations	119,524
R-squared	0.038
Year Effects	Yes
Channel Availability	Yes

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 31: Second Stage regressions of NAES and CCES self-reported ideology on predicted hours watched from the first stage.

VARIABLES	(1) R Vote Share	(2) R Vote Share	(3) R Vote Share	(4) R Vote Share	(5) R Vote Share	(6) R Vote Share
log(Fox News Position)	-0.0100	-0.0135	-0.0106*	-0.0115*	-0.00650*	-0.00756**
	(0.00841)	(0.00831)	(0.00613)	(0.00613)	(0.00348)	(0.00347)
log(MSNBC Position)	0.0229**	0.0202**	0.00653	0.00388	-0.000393	0.000428
	(0.00986)	(0.00968)	(0.00775)	(0.00750)	(0.00427)	(0.00440)
log(CNN Position)	0.00578	0.00352	-0.00279	-0.00268	0.00178	0.00202
	(0.00643)	(0.00635)	(0.00466)	(0.00451)	(0.00265)	(0.00270)
Observations	23,107	23,107	21,874	21,874	21,874	21,874
R-squared	0.129	0.154	0.478	0.493	0.710	0.717
Channel Availability	Yes	Yes	Yes	Yes	Yes	Yes
Demographics	No	No	Yes	Yes	Yes	Yes
Number of Channels	Log	Log	Log	Log	Log	Log
Number of OTA Broadcast	Log	Full Set	Log	Full Set	Log	Full Set
State FE	No	No	No	No	Yes	Yes

Standard errors clustered by cable system
*** p<0.01, ** p<0.05, * p<0.1

Table 32: OTA stands for "Over the Air" broadcast stations likes ABC, CBS, Fox, and NBC.