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The Hostile Audience: The Effect of Access to Broadband Internet on Partisan Affect

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Abstract: *Over the last two decades, as the number of media choices available to consumers has exploded, so too have worries over self-selection into media audiences. Some fear greater apathy, others heightened polarization. In this article, we shed light on the latter possibility. We identify the impact of access to broadband Internet on affective polarization by exploiting differences in broadband availability brought about by variation in state right-of-way regulations (ROW). We merge state-level regulation data with county-level broadband penetration data and a large-N sample of survey data from 2004 to 2008 and find that access to broadband Internet increases partisan hostility. The effect occurs in both years and is stable across levels of political interest. We also find that access to broadband Internet boosts partisans' consumption of partisan media, a likely cause of increased polarization.*

Replication Materials: The data, code, and any additional materials required to replicate all analyses in this article are available on the *American Journal of Political Science* Dataverse within the Harvard Dataverse Network, at: http://dx.doi.org/10.7910/DVN/LWED0F.

Over the past 50 years, partisans have come to increasingly dislike each other (Iyengar, Sood, and Lelkes 2012), so much so, that today implicit partisan prejudice exceeds implicit racial prejudice (Iyengar and Westwood 2014; see also Chambers, Schlenker, and Collisson 2013). Party cues now constrain social and interpersonal relations—partisans trust co-partisans more than supporters of the opposing party (Carlin and Love 2013; Iyengar and Westwood 2014; see also Hetherington and Rudolph 2014), and large proportions of both Republicans and Democrats are troubled by the prospect of a family member marrying a supporter of the main opposing party (Iyengar, Sood, and Lelkes 2012; see also Huber and Malhotra 2013).[1]

Over the same period that partisan animus has been increasing, the reach of partisan information sources has been expanding. The broadcast news audience of 1975 could "choose" between three largely indistinguishable and devoutly nonpartisan network newscasts. Today, aside from a broad array of nonpartisan news sources, including network news, viewers can also tune in to "all-news" partisan cable channels, partisan "news" shows on numerous other television channels, including two prominent shows on Comedy Central, or one of the countless partisan sources available online.

The reach of partisan media is not limited to discretionary exposure (i.e., those who choose to tune in). Increasingly, even the politically disinterested are exposed to nontrivial doses of partisan news. Online social networks today form the backbone of many Americans' daily information environment. And due to network partisan homophily (Halberstam and Knight 2014; Lewis, Gonzalez, and Kaufman 2012), many apolitical individuals find themselves in networks with at least one

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[1] In this article, we focus on affective polarization or interparty animus rather than ideological polarization. Evidence in favor of increasing ideological polarization in the electorate, however, is mixed (e.g., Fiorina, Abrams, and Pope 2005; Abramowitz 2010).

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politically active "friend" who is apt to recirculate news reports and commentary (see Halberstam and Knight 2014; Messing 2013). In fact, by some metrics, Facebook is now a major source of traffic to online news sites (Pew Research Center 2014).

While there are good reasons to believe that the new media environment has contributed to the growth in partisan animus, by facilitating access to partisan news, it is possible that enhanced consumer choice also sets in motion processes that weaken polarization. As choices for news have multiplied, so too have choices for entertainment. The increased availability of entertainment programming enables some to opt out of politics entirely (Prior 2007). But while it is undoubtedly true that 40 or so years ago, when during portions of prime time there was nothing to see except news on network television, some people watched news even when they didn't want to, it is likely also true that some people didn't watch news then because it wasn't available at a time they wanted to see it, or available in a format, style, or ideological slant of their liking. Today, a vast buffet of news is available 24/7, both in and outside the house, on mobile phones and tablets. Thus, the net impact of the increased number of news providers, and the greater empowerment of consumers, is as yet mostly unknown.

In this article, we shed some light on this question. We examine whether better access to choice affects political attitudes. In particular, we investigate how access to broadband Internet affects partisan animus. Considerable evidence suggests that media consumption is strongly elastic, increasing sharply with better access. For instance, those with a broadband Internet connection spend considerably more time online—approximately 1,300 additional minutes per month, according to Hitt and Tambe (2007)—and spend more time reading and sharing news and opinions than those with dial-up connections (Rappoport, Kridel, and Taylor 2002). We investigate whether this dramatic increase in consumption of content, including some political content, affects partisan animus.

We identify the causal impact of broadband access on affective polarization by exploiting differences in broadband availability brought about by variation in state right-of-way regulations (ROW), which significantly affect the cost of building Internet infrastructure and thus the price and availability of broadband access. Our results suggest that had all states adopted the least restrictive right-of-way regulations observed in the data, partisan animus would have been roughly 2 percentage points higher. We show that the estimates are robust. We also demonstrate that an alternative set of instruments for broadband availability (surface topography) yields very similar results. Lastly, we present some analyses suggesting that broadband access increases exposure to partisan information, which we take to be the most likely reason for why access to broadband polarizes partisans.

Broadband Internet, Exposure to Political Information, and Partisan Affect

In the Internet era, social scientists have rediscovered the concept of selective exposure, an idea that dates back to the classic studies on attitude change (e.g., Berelson and Steiner 1964; Festinger 1957; Klapper 1960; Lazarsfeld, Berelson, and Gaudet 1948; McGuire 1968). Explosive growth in the number of media outlets and the declining cost of access to these choices mean that consumers cannot possibly keep up with the increase in available content. Faced with this fire hose of information, people must be selective so as not to be overwhelmed. In selecting what political (and some apolitical) information to consume, partisans have been shown to use, among other things, cues about partisan congeniality (e.g., Iyengar and Hahn 2008; Iyengar et al. 2008; Stroud 2010). However, the evidence suggests that, on average, partisans have only weak preferences for congenial political information (Dvir-Gvirsman, Tsfati, and Menchen-Trevino 2014; Garrett 2009; Gentzkow and Shapiro 2011; Prior 2012).

In the age of broadband, even a small imbalance in the ratio of congenial to uncongenial political information can prove consequential. As already noted, media consumption is strongly elastic; moving from a dial-up connection to broadband produces a large increase in the amount of time spent online (Hitt and Tambe 2007; see also Kolko 2010). And while moving to broadband likely causes some substitution in the kind of content people consume, notably a move from text to video, the primary effect of broadband is to increase the amount of media people consume (rather than what they consume). Put more colloquially, access to broadband primarily increases the size of the pie, without having much impact on the ratio of the individual slices. Assuming patterns of consumption remain roughly the same, any increase in consumption necessarily means greater exposure to imbalanced political information. Consider a person who consumes twice as much partisan over balanced media. Keeping the mix of congenial to uncongenial exposure the same, if the person doubles the consumption of total political information each week, the net imbalance also doubles. Hence, relatively small asymmetries in consumption behavior can be magnified by access to broadband.

Quite separate from imbalances in discretionary exposure are imbalances in inadvertent exposure. Studies suggest that the latter is also skewed in the direction of greater exposure to congenial information (Brundidge 2010; Wojcieszak and Mutz 2009). People frequently encounter political discourse during online discussions devoted to music, hobbies, movies, and so on, and most of the discussion occurs among individuals with similar political views (Wojcieszak and Mutz 2009). Similarly, expected asymmetries in what news and opinion pieces are shared among "friends" on social networks (An, Quercia, and Crowcroft 2014; Flaxman, Goel, and Rao 2013) likely produce biases in the information flow within social networks. Thus, high-speed Internet access, by facilitating online networking and participation in general interest online discussion groups, also contributes to "de facto" partisan selectivity.

The effect of greater exposure to imbalanced political information is straightforward to hypothesize: People are either persuaded to take more extreme positions on issues or persuaded to dislike politicians of the opposing party and the people who support them. It also holds that those persuaded to adopt more extreme policy positions will, as a result, develop greater ill will toward the opposing party.

Exposure to partisan media, however, can polarize audiences in another way—through priming and strengthening their partisan identities. Mere exposure to partisan media primes partisan identity (Knobloch-Westerwick and Kleinman 2012) and strengthens its salience (Horwitz and Nir 2014; Levendusky 2013a). Thus, even when a viewer tunes in to Fox News to catch up on the latest celebrity scandal, her partisan identity is activated (for evidence that partisans prefer to get their soft news from partisan sources, see Iyengar and Hahn 2008). By this account, partisan media do not have to convince partisans about anything to be consequential; they need to merely activate their social identity.

Either through persuasion, or by increasing the salience of partisan identity, greater exposure to partisan media is liable to polarize. Unsurprisingly, then, some research suggests that voluntary exposure to partisan media causes partisans to trust the opposition less (Levendusky 2013a) and increases interparty animosity (Garrett et al. 2014). Thus, one way broadband Internet may affect political attitudes is by increasing the net imbalance in political information that partisans consume. As stated above, we expect this greater imbalance to lead to greater partisan animus.

Separately, access to broadband Internet may increase partisans' exposure to "balanced" political information. But even if access to broadband Internet only facilitated greater exposure to "balanced" information, it could still raise partisan animus. A long line of research shows that partisans engage in "motivated reasoning"—they interpret facts and events in a manner that supports their partisan beliefs (for reviews, see Kunda 1990; Lodge and Taber 2000; see also Lord, Ross, and Lepper 1979). For instance, partisans think sources conveying uncongenial information are unfair (Vallone, Ross, and Lepper 1985). Combined with the fact that in a polarized political environment, even centrist outlets often include abrasive comments from politicians (e.g., see Druckman, Peterson, and Slothuus 2013), greater exposure to balanced media can increase interparty animus (e.g., see Arceneaux, Johnson, and Cryderman 2013). In all, if access to broadband Internet facilitates greater exposure to partisan rhetoric, either imbalanced or balanced, either discretionary or inadvertent, either via increasing exposure to partisan media channels or to "moderate" outlets, it is all but certain to increase partisan hostilities. Access to broadband Internet, however, may also set in motion processes that reduce affective polarization. Enticed by the plethora of entertainment options, people may become more likely to choose entertainment over news (see Prior 2007). But for a rise in selection into entertainment to offset a substantial increase in consumption of all media, and actually reduce exposure to politics, media consumption habits need to undergo a dramatic change. While such dramatic change is likely infrequent, it is liable to be true for some people. Any such reduction in consumption of political news is liable to reduce polarization. Separately, exposure to balanced information may have different effects than suggested by Arceneaux, Johnson, and Cryderman (2013). For instance, a study in which subjects were assigned to consonant or dissonant groups shows that exposure to opposing views under certain conditions can increase tolerance (Mutz 2002). In all, while there are strong reasons to think that access to broadband would polarize audiences, countervailing processes may well attenuate the net polarization we observe.

Identifying the Effect of Broadband Internet on Affective Polarization

The demand for broadband Internet is likely a function of age, income, and education. But it also likely depends on some other (potentially unmeasured) variables. These variables may, in turn, explain partisan affect. To allay worries about such omitted variables, what is needed is an instrumental variable (IV), a variable that causes broadband Internet access, but does not impact affective polarization through any other means.

Fortunately, there exists such an instrument. Section 253 of the Telecommunication Act of 1996 gave municipalities control over public rights-of-way used by telecommunication providers, such as the use of ground beneath a public park to lay fiber-optic cable (Day 2001). Soon after, many states passed laws enabling municipalities to regulate right-of-way, introducing significant variance in the degree to which they could impose fees or otherwise increase the costs faced by Internet service providers entering the local market. These state laws that vary municipal control over right-of-way are a well-known instrument for broadband access (Larcinese and Miner 2012; Suziedelyte 2012; Wallsten 2005). Larcinese and Miner (2012), for instance, find that an index of state regulation of right-of-way laws strongly predicts the number of providers in a county, which, as we discuss later, is a good proxy for broadband uptake. Similarly, Wallsten (2005, 11) finds that "mandated access to rights-of-way can increase broadband penetration by .006 lines per-capita, or about 10 percent."

In this study, we also seek to exploit ROW regulations as an instrument for broadband access. We begin by establishing the strength and validity of the instrument. More concretely, we use data from the Federal Communication Commission (FCC) on the number of broadband providers in a county and regress them on an index of ROW regulations (Beyer and Kende 2003). We also present results in which we add key exogenous county-level features thought to predict broadband access (e.g., racial composition, income, population density, education) to the equation to strengthen the case that the variation in broadband access due to ROW is idiosyncratic.

Formally, our first-stage model takes the following form:

$$X_{jk} = \alpha + \beta Z_k + \delta R_j + v_{jk}, \tag{1}$$

where j indexes county and k states. X refers to the number of providers in county j, Z_k indicates state k's ROW score, R_j represents a matrix of county-level covariates, and v_{jk} is the error term. Whenever we use ROW scores, we include state-clustered robust standard errors.

Next, we assess the instrument's validity. In particular, we supplement the discussion in Larcinese and Miner (2012), who shed light on the validity of the ROW index. For instance, to assess the concern about less restrictive ROW regulations being adopted by more conservative states, we regress ROW on state-level estimates of ideology (we use measures developed by Tausanovitch and Warshaw 2013). We also regress ROW on median ideology of the state legislature using measures developed by Shor and McCarty (2011). In the same spirit, we check whether ROW laws were related to the party of the governor. Note that in an effort to address similar kinds of concerns, Larcinese and Miner (2012) show that ROW is unrelated to Democratic vote share between 2004 and 2008, and 1992 and 1996.

To assess concerns that less stringent ROW laws may have been enacted in richer states, we regress an index of ROW laws on median state income. We find the two to be unrelated. We also test whether more educated states were likelier to adopt more liberal ROW laws. We again find the relationship to be weak. Lastly, to test whether partisan affect is endogenous to ROW laws, we test whether affect in 2000 (prior to widespread broadband adoption) predicts ROW laws. Once again, we find no relationship.

Finding the instrument to be strong and valid, we estimate the reduced-form model by regressing an indicator of partisan affect on ROW and other exogenous covariates. For data on partisan affect, we turn to the 2004 and 2008 National Annenberg Election Studies. (We describe the data and measures in greater detail in the next section.)

The reduced-form model is as follows:

$$Y_{ijk} = \alpha + \beta Z_k + \delta R_j + v_{ijk}, \tag{2}$$

where i tallies respondents, and Y_{ijk} indicates individual-level partisan affect. The reduced-form estimates show that less restrictive right-of-way laws increase affective polarization. After presenting the reduced-form estimates, we turn to results from the second stage of the instrumental variable regression using predicted values of broadband access.

In particular, we estimate the following model:

$$Y_{ijk} = \alpha + \hat{X}_{ijk} + \delta R_j + v_{ijk}, \tag{3}$$

where $\hat{X}$ are the fitted values following the first-stage regression. Results from the second-stage regression converged with the reduced-form estimates: Access to broadband Internet increases partisan animus.

After presenting IV estimates of the effects of broadband availability on affective polarization, we carry out a series of robustness tests. We first test the robustness of our results to different specifications. Next, we present results using a second set of instruments: characteristics of the counties' terrain.

The cost of building broadband infrastructure is known to depend on terrain and weather (Andersen et al. 2012; Government Accountability Office 2006; Jaber 2013; Kolko 2010). For instance, the increased risk of flooding and higher summer temperatures (which disrupt cable heat dissipation) increases the costs of building and maintaining broadband infrastructure in low-lying areas. New lines are more difficult to build on steep rather than flat land. Given the relationship with cost for building broadband infrastructure, scholars have used various geographical variables as instruments for broadband penetration, including a region's average elevation (Jaber 2013), average ground steepness (Kolko 2010), and even average number of lightning strikes per year (Andersen et al. 2012), all of which increase the cost of building broadband infrastructure. Hence, as a second set of instruments, we use data from the Economic Research Service's (ERS) Terrain Typography, which places counties into one of 21 landform categories, ranging from those in which building infrastructure is relatively easy to more difficult (expensive) terrains, and data from Kolko (2010), who uses the average slope of the terrain in an area as an instrument for broadband penetration. This second set of instruments helps alleviate concerns due to the small effective sample size (N = 48) of the first-stage ROW model.

Next, we test for heterogeneous effects. First, we expect the effect of broadband on polarization to have strengthened over time: Political campaigns utilized the Internet far more in 2008 than in 2004 (Chadwick and Anstead 2008; Smith et al. 2009). However, one crucial limitation of our estimation strategy—IV estimates are local average treatment effects (LATE), meaning that less restrictive ROW laws "encouraged" a different set of people to subscribe to broadband in 2008 than in 2004—prevents us from saying much about the question of temporal variation in the effects of broadband.

Second, we test whether the effect of broadband penetration on polarization is concentrated among the politically interested. A number of scholars have argued that media proliferation will affect the more and less engaged differently. For instance, Prior (2007) argues that those uninterested in politics will likely tune out potentially polarizing information, and Arceneaux and Johnson (2013) argue that media proliferation will, on average, have minimal effect, as the highly interested tend to be stable in their attitudes, whereas those who are uninterested are not exposed to news.

Lastly, we test whether the data are consistent with what we think is the most plausible mechanism via which broadband access affects partisan polarization—broadband access changes exposure to partisan media. Many past studies have linked increased consumption of partisan media to increased polarization (Levendusky 2013b; Martin and Yurukoglu 2014; Stroud 2010, 2011; although see Arceneaux and Johnson 2013; Arceneaux, Johnson, and Cryderman 2013). Using passively observed media data from comScore and survey data from the 2004 and 2012 American National Election Studies (ANES), we compare media consumption between those with broadband and those without. We find that those with broadband Internet access consumed far greater amounts of partisan media than those with dial-up connections.

Data and Measures

We use multiple sets of data for the analyses. Briefly, data on right-of-way laws come from an index of these laws compiled by Beyer and Kende (2003). The data on broadband access are from the Federal Communication Commission (FCC). For data on partisan affect, we use the 2004 and 2008 National Annenberg Election Studies (NAES). For media data, we turn to comScore.

Right-of-Way Laws

Fifty-two indicators of regulations on deployment of broadband (e.g., a cap on the fees municipalities can charge providers for ROW usages, and the provision of incentives for broadband deployment, including low-cost loans to suppliers and tax incentives for broadband subscribers) were combined into a right-of-way index (Beyer and Kende 2003). Appendix A in the supporting information provides details on indicators and scoring. These laws were all enacted prior to 2002—two years prior to the collection of the survey data used here. The higher the value of the index, the less restrictive the ROW regulations, and the less costly it is to build Internet infrastructure.[2]

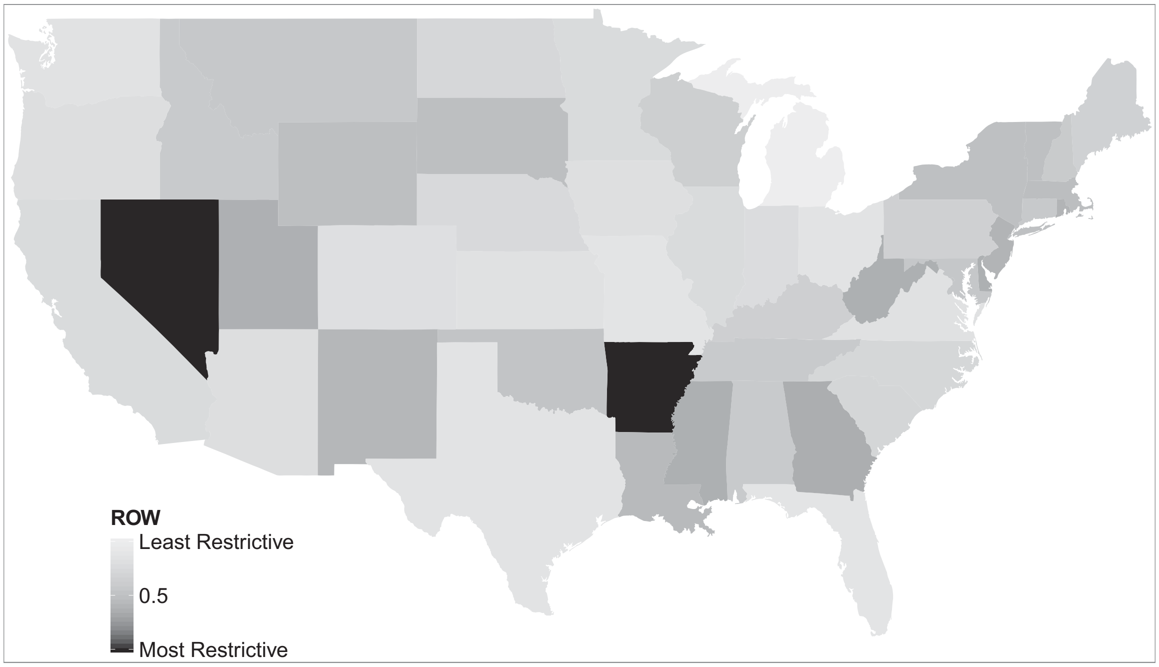
We map the ROW values in Figure 1. The distribution of ROW does not seem to follow any obvious pattern. For instance, rich states and poor states have very similar ROW scores, as do "red" and "blue" states. We more formally test whether ROW is related to ideology in the Results section.

Broadband Access

Since we do not have information about whether our survey respondents had a broadband subscription, we measure broadband access indirectly, via the total number of broadband providers in a respondent's county. The data on broadband providers are from the FCC, which

[2]We define ROW broadly, to include regulations that affect cost of deployment, as well as regulations that increase supply and demand. These three components are all very highly correlated (average $r = .96$). Results are substantively the same if we limit the ROW index to any one component.

FIGURE 1 Right-of-Way Score by State



keeps records of all high-speed Internet providers with more than 250 subscribers in a state.[3] The FCC does not distinguish between DSL, cable, broadband, or satellite; broadband service providers are those that enable a transfer speed of at least 200 kb/s in one direction. For each survey-year, we match survey respondents in a county to the number of providers delivering broadband service to that county code.

The number of broadband providers in a given area is a well-known proxy for broadband penetration. A great deal of research shows that the number of broadband providers is a good measure of the number of broadband subscribers (e.g., see Jaber 2013; Larcinese and Miner 2012). For instance, Larcinese and Miner (2012) find a strong correlation between the number of providers in a state and the proportion of households in the state with a broadband subscription.

A similar relationship between broadband availability and broadband penetration found at the state level obtains at the zip code level. Kolko (2010) uses survey data from Forrester Research to estimate the relationship between the number of providers in a zip code and the proportion of households in a zip code with broadband. He finds that the probability of broadband subscription among respondents living in zip codes with only 1–3 providers is .22, whereas the probability of subscription among those living in zip codes with 20 or more providers is more than doubled (nearly .45). We present a similar analysis, estimating the relationship between the number of providers in a county and the percent of respondents with broadband subscriptions, using data from the comScore 2004 panel. As is clear from Figure C1 in the supporting information, the relationship is monotonic and roughly linear.

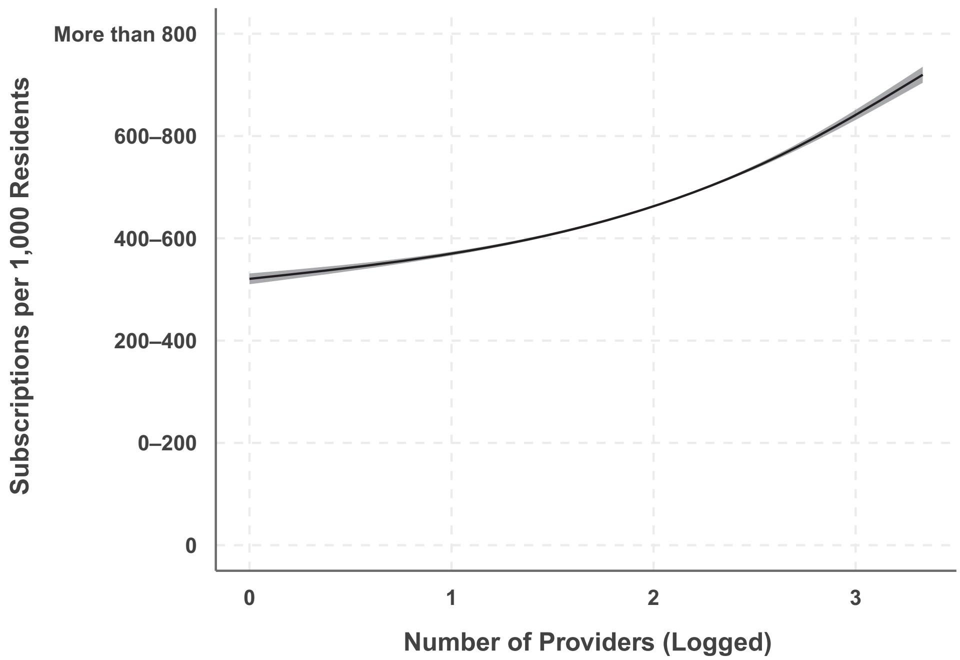
We further replicate the analyses with data at the census tract level from the FCC. The FCC does not provide data on the exact number of subscribers at a lower level of geographic aggregation than the state. However, in December 2008, the FCC for the first time provided the number of broadband lines per 1,000 residents in each census tract split into a few categories: 0–200 connections, 200–400 connections, 400–600 connections, 600–800 connections, and more than 800 connections. We plot these values against the FCC's tally of broadband providers per census tract (logged) and fit a cubic spline and its 95% confidence interval. As shown in Figure 2, the number of subscribers linearly increases when the number of providers in a census tract increases.

Partisan Affect

We rely on data from rolling cross-section surveys conducted as part of the 2004 NAES ($N = 98,711$) and

[3]The data come from FCC Form 477 and are available at http://transition.fcc.gov/wcb/iatd/comp.html.

FIGURE 2 **Relationship and 95% Condence Band between Number of Providers and Proportion with Broadband Internet within Census Tracts in 2008 (Smoothed Using a Cubic Spline Estimator)**



the 2008 NAES ($N = 57,967$) to measure partisan affect.[4] Both surveys are based on a random sample of the U.S. population interviewed by telephone over the course of the presidential campaign. Interviewing occurred between December 2003 and November 2004 in the 2004 study, and between December 2007 and November 2008 in the case of the 2008 study.

Partisan affect was measured as the difference in feelings toward the in-party and out-party presidential candidate.[5] We define partisans to include leaners, and we omit pure Independents from all analyses (Keith et al. 1992).[6] In both 2004 and 2008, respondents were asked to rate the candidates on favorability and a set of traits on an 11-point scale. In 2004, respondents rated George W. Bush and John Kerry on favorability, and the degree to which they viewed each of the candidates as trustworthy, knowledgeable, reckless (which was reverse coded), caring about "people like [them]," and sharing the respondent's values. In 2008, respondents rated John McCain and Barack Obama on favorability, leadership, trustworthiness, experience, and judgment. (See Appendix B in the supporting information for exact question wording and response options.) The average inter-item correlation was .58 (Cronbach's $\alpha = .96$) in 2004 and .49 (Cronbach's $\alpha = .91$) in 2008. We took the average of the differences between the in- and out-party candidate ratings and rescaled it to lie between 0 (out-party candidate rated at 10 on each item and in-party candidate rated at 0 on each item) and 1 (in-party candidate rated at 10 on each item and out-party candidate rated at 0 on each item).[7]

[4]These are the sample sizes before we exclude Independents.

[5]We think affect toward candidates is a very good proxy for partisan affect for two reasons: (a) affect toward partisan candidates is strongly endogenous to partisan affiliation (Bartels 2002; Greene 1999), and (b) even if affect toward partisan candidates was shaped by forces other than partisanship, any growth in candidate affect is still liable to feed into feelings toward parties; people are liable to think badly of parties that nominate candidates they dislike. Lastly, we use data from the 2012 American National Election Studies, which measured affect toward the major party candidates and parties and correlated the two. The average correlation was .80.

[6]Excluding Independents from our analysis does not affect our results. Regressing a variable indicating that identifying as an Independent versus a partisan on ROW (and county-level controls) reveals that the two variables are unrelated ($b = -.02$, $p = .59$).

[7]Since those who are below the midpoint of this measure do not harbor any out-party animosity, we could also recode those scores as 0. Doing so slightly increases the size of the coefficients in the following models, while maintaining their significance. We stick to the simple difference score, as the results are more conservative and the coding is consistent with past studies.

Control Variables

We further included a number of county-level indicators using data from ICPSR's County Characteristics (2000–07)[8] file as controls, including the unemployment rate, median age, the male-to-female ratio, percent black, percent white, census region, whether the county is classified as low education, median income, and the population density. In robustness tests, we also include several variables as individual-level controls: age (divided into quartiles), income (also divided into quartiles), gender, and education (coded as high school or less, some college, bachelor's degree, postgraduate education). We also created dummy variables that tracked missing values on each of the variables.

Results

Validity and Power of the Instrument

We start by presenting results of the first-stage model, predicting the number of providers per county using the ROW index (Table 1, column 1).[9] The relationship between the ROW index and number of providers is positive and statistically significant: Loosening ROW restrictions by about 10% yields a .5% increase in the number of providers ($b = .053$, S.E. $= .018$).[10] Other covariates in the model are plausibly related to broadband penetration. For instance, counties with a higher median income or that are more densely populated have more broadband providers. The variation in broadband access caused by ROW is above and beyond these well-known antecedents of broadband diffusion.[11] Although the F-statistic on the ROW coefficient is only about 8.4, because this is a two-sample design, concerns about consistency are much less pronounced (Inoue and Solon 2010; and we find similar results with our second set of instruments).

Next, we conduct three sets of validation checks, testing the bivariate relationship between ROW laws and a number of state characteristics. First, we assess whether worries about *less restrictive* ROW laws being enacted in conservative states are well founded. In particular, we regress a measure of state-level ideology (Tausanovitch and Warshaw 2013) on ROW. We find no relationship ($b = -.004$, $p = .88$). Next, we test whether less restrictive ROW laws were more likely to be enacted under Republican governors. Lacking exact dates for when ROW laws were enacted, we track the entire time span between 1996 (the year ROW laws began being passed)

TABLE 1 First-Stage, Reduced-Form, and IV Estimates Predicting the Effects of Broadband Penetration on Affective Polarization

	First Stage	Reduced Form	IV Estimates
ROW Index (logged)	.053*	.003*	
	(.018)	(.002)	
# of Providers (logged)			.032*
			(.014)
Median Income (logged)	.987*	.015*	−.013
	(.058)	(.005)	(.014)
Population Density	2.406*	.048*	.018
	(1.096)	(.007)	(.018)
Unemployment Rate	.014	−.002	−.001
	(.007)	(.001)	(.001)
Low-Education County	.028	−.016*	−.018*
	(.023)	(.003)	(.004)
Percent Male	−1.842*	−.083	.084
	(.363)	(.079)	(.107)
Percent White	−.323*	.069*	.100*
	(.115)	(.017)	(.024)
Percent Black	.218	.116*	.104*
	(.134)	(.020)	(.024)
West	−.036	.030*	.027*
	(.049)	(.003)	(.005)
South	.066	.019*	.019*
	(.056)	(.004)	(.004)
Midwest	−.142*	.011*	.015*
	(.055)	(.003)	(.004)
Year: 2008	.821*	−.064*	−.083*
	(.021)	(.002)	(.009)
Intercept	−8.222*	.481*	.628*
	(.715)	(.077)	(.110)
R^2	.770	.034	.032
Adjusted R^2	.769	.034	.031
Observations	6,034	114,803	114,803
RMSE	.263	.183	.183

Note: $*p < .05$.

[8] See http://www.icpsr.umich.edu/icpsrweb/DSDR/studies/20660.

[9] Because of one outlier (Michigan; see Figure A1 in the supporting information) we take the log of the index; the results are substantively unaffected if we do not transform ROW and remove Michigan from the analyses.

[10] These results are the same if we use the merged multilevel data set.

[11] Another relevant question pertains to the type of people who are affected by ROW laws. Because we do not have individual-level broadband subscription information, we can only explore whether ROW laws affect certain types of counties, an analysis we explore in the supporting information. However, people who do not have broadband tend to be less educated, older, and poorer.

and 2008. For each year in that range, we regress party control (Republican = 1) on ROW and find no significant relationship in any of the years (mean $b = .19$, mean $p = .58$). Finally, we test whether ROW laws are related to the ideology of the legislature in each state. We use a measure of state legislative ideology (Shor and McCarty 2011), and, for each year between 1996 and 2008, we regress median ideology of each state senate and house on ROW. We find no relationship for upper chambers (mean $b = .07$, mean $p = .39$) or lower chambers (mean $b = .11$, mean $p = .18$).

Another prominent worry is that more expansionary ROW laws were more likely to be enacted in richer states. Once again, we find little grounds for such worry. Regressing median income (logged) on ROW yields coefficients that are very close to 0 in all years from 1996 to 2008 (mean $b = .02$, mean $p = .38$). Similarly, we test whether ROW laws were related to state-level education. Using census data from 1990 and 2000, we regress the percentage of the state population with a bachelor's degree or higher on ROW. The relationship was small and insignificant in both years ($b = .03$, $p = .44$ in 1990 and $b = .03$, $p = .28$ in 2000). Additionally, state-level affective polarization in 2000 (estimated using the 2000 NAES) was not related to ROW ($b = 0.005$, $p = .25$). In all, the results of these analyses are consistent with the assumption that our instrument is valid.

Effect of Broadband Access on Partisan Affect

We next turn to results from the reduced-form models, modeling affective polarization as a function of the ROW index and exogenous county-level and individual-level covariates. As the second column of Table 1 shows, less restrictive ROW laws cause higher levels of affective polarization ($b = .003$), with a 10% increase in the restrictiveness of ROW laws causing a .03% increase in affective polarization. In other words, if all states were to go from their current value to the least restrictive right-of-way law observed in the data set, partisan animus would increase by roughly 2%, from .65 to about .67.

The IV-based estimates are in line with our reduced-form estimates (see Table 1, column 3). The number of broadband providers in a county increases interparty animus ($b = .03$, S.E. = .01). Translating the logged independent variable into a more intuitive metric, increasing the number of providers in a county by 10% yields a .003 point increase in affective polarization. Since the average number of providers in a county increased by 32% between 2000 and 2004 and 64% between 2004 and 2008, our model implies that broadband expansion increased polarization by .01 (between 2000 and 2004) and .02 points (between 2004 and 2008). Moving from a county with the fewest number of providers to a county with the highest number of providers increases affective polarization by roughly .07. Our estimate of the impact of broadband expansion is half as large as the effect of political interest, which is associated with about a .14 point increase in affective polarization.[12]

Robustness Checks

To test the robustness of the estimate to different specifications, we estimate three other reduced-form and IV models: (a) a model without any controls, (b) a model including only the individual-level controls, and (c) a model including both county-level and individual-level controls. Since controls should not affect the point estimates of a randomly assigned instrument, our confidence in the instrument is strengthened when we compare the columns with and without the controls (including individual-level controls) from the reduced-form models (see Table D1 in the supporting information)—the coefficients are nearly identical. Similarly, our IV results proved robust to these vastly different specifications (see Table D2): Coefficients from the individual-level and county-level covariate models were almost identical to our preferred specification, whereas estimates from the bivariate and individual covariate-only models were slightly larger.

Next, we use a second set of instruments that capture environmental impacts on broadband penetration. Since "flat terrain constitutes good geography for telecommunications deployment" (Government Accountability Office 2006, 19), we use measures that capture terrain. First, we use the Economic Research Service's terrain typology, which classifies terrain into 21 categories, ranging from flat plains to high mountains. Similarly, we follow Kolko (2010) and use the average slope of the terrain within a county. The first-stage, reduced-form, and IV results appear in the supporting information.[13]

Consistent with our expectations, broadband penetration is highest on flat plains (the omitted category in the regression), and significantly so in over half the categories (Table D3, column 1). An F-test indicates that the instruments are not weak: $F(2, 5932) = 10.16$. The reduced-form estimates show that a number of the terrain-related

[12] As estimated by a model similar to column 3 in Table D2, but here political interest is included as a covariate.

[13] Since these variables are at the county level, we present county-clustered standard errors.

dummy variables are significantly correlated with affective polarization (Table D3, column 3). The IV estimates of the effects of broadband access are slightly smaller than in the case of the ROW instrument ($b = .02$, S.E. $= .005$, $p < .001$; Table D3, column 3), but in the same direction and significant. Similarly, there are fewer broadband providers when terrain is steeper (Table D4, column 1). The IV estimates from the slope model also indicate that the broadband penetration significantly increases affective polarization ($b = .015$, S.E. $= .006$, $p < .05$; Table D4, column 3).

Combining the three instruments (ROW, terrain, and slope) into one model gives an effect of ($b = .02$, with state-clustered robust S.E. $= .01$, and $p < .05$). This effect represents the weighted average of the upper-bound estimate from the ROW model and the lower-bound estimate of the terrain model. It indicates that counties with the lowest number of providers are roughly 4 points less polarized than providers with the highest number of providers.

Heterogeneous Effects

To test whether ROW effects are significant in both 2008 and 2004, and whether ROW effects are larger among individuals more interested in politics, we generate the IV estimates of the interaction effect between year and the logged number of providers, on the one hand, and R's political interest and the logged number of providers, on the other, on affective polarization. To estimate the former interaction effect in the first-stage regression, we predict the logged number of providers in a county from a model that includes the ROW × Year interaction. In the second stage, we include the predicted values of the Broadband Penetration × Year interaction and the county-level covariates to predict affective polarization. To estimate the interaction effect between political interest and ROW, we follow the same steps but substitute political interest for year.

The IV estimates from these models appear in Table 2.[14] The effect of broadband penetration remains stable between 2004 and 2008. In addition, the effects were uniform across different levels of political interest.

Table 2 Does the Effect of Broadband Vary by Year or by Political Interest?

	Model 1	Model 2
# of Providers (logged) × Year	.005	
	(.042)	
# of Providers (logged) × Political Interest		.022
		(.050)
Political Interest		.099
		(.099)
Year: 2008	−.093	−.084*
	(.095)	(.010)
# of Providers (logged)	.030	.012
	(.016)	(.037)
Median Income (logged)	−.013	−.015
	(.014)	(.015)
Population Density	.018	.011
	(.018)	(.018)
Unemployment Rate	−.001	−.001
	(.001)	(.001)
Low-Education County	−.017*	−.011*
	(.004)	(.005)
Percent Male	.087	.087
	(.125)	(.115)
Percent White	.100*	.088*
	(.024)	(.024)
Percent Black	.103*	.093*
	(.026)	(.023)
West	.026*	.023*
	(.006)	(.005)
South	.019*	.017*
	(.005)	(.004)
Midwest	.014*	.015*
	(.004)	(.003)
Intercept	.629*	.596*
	(.112)	(.150)
R^2	.032	.073
Adjusted R^2	.031	.073
Observations	114,803	98,374
RMSE	.183	.179

Note: $*p < .05$.

Causal Mechanism

As we note above, we suspect that it is increased exposure to partisan information that accounts for the observed effect of broadband access on affective polarization. Here, we present some analyses that test whether moving to broadband actually increases exposure to partisan media. For reasons to do with limitations of data, in this section we move away from instrumental variable estimates and focus on comparing news media consumption of respondents using broadband or dial-up connection. We use coarsened exact matching (CEM; Iacus, King, and Porro

[14]The N in the second column is lower due to missing values on the political interest variable.

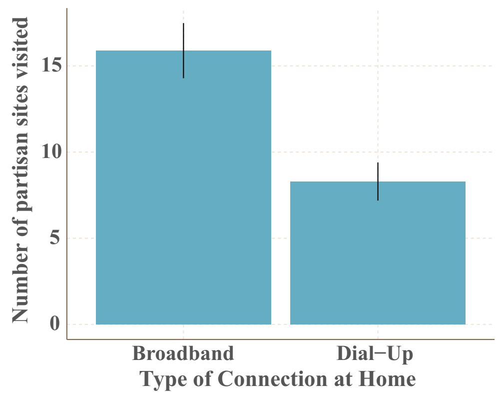
2012) and multiple regression to account for differences between people with broadband and dial-up.

Our first set of analyses relies on 2004 microdata from comScore. The data set is a random sample of 50,000 panelists in the United States who allowed the company to track their browsing behavior in exchange for various rewards, including cash and computer software. Although self-selected, the sample is fairly representative of Internet users in terms of age, education, income, and geographic region (De los Santos, Hortaçsu, and Wildenbeest 2012; Gentzkow and Shapiro 2011). The major advantage of the comScore data is that web browsing is observed behaviorally rather than through unreliable self-reports (Prior 2009). The disadvantage is that we do not know the partisanship of the respondents. Thus, we are only able to check the extent to which consumption of partisan media varies between respondents with broadband and dial-up connections.

We begin by downloading browsing data for a list of 400 popular news websites used by Gentzkow and Shapiro (2011). This list includes popular news sites such as nytimes.com, and cnn.com, as well as important political sites such as democrats.org and votesmart.org. In all, these websites account for a large proportion of the traffic to news sites. We then merge the browsing data with Gentzkow and Shapiro's estimates of website ideology. Next, we use a simple cutoff to categorize whether a website is partisan or not (changing the cutoff has little impact on our results). Specifically, we classify sites that have scores less than $-.2$ as left-leaning and scores of over .2 as right-leaning. This removes sites such as abcnews.com and economist.com but keeps sites such as msnbc.com and foxnews.com. Without adjusting for covariates, we find that respondents with broadband access consumed on average twice as much content from partisan media than those with dial-up access.[15] Controlling for the entire battery of covariates available in the data (age of the oldest member in the household, household size, number of children in the household, racial background, and country of origin) has little impact on the coefficient.

We next use CEM along with multiple regression to compare the frequency with which respondents with a dial-up Internet connection and broadband connection visit partisan websites. (See Appendix E1 in the supporting information for regression results from nonmatched data.) CEM is a nonparametric data preprocessing algorithm that reduces imbalance on a set of covariates between, in our case, those with broadband Internet and those with only dial-up. We matched respondents on the entire list and regressed net exposure to partisan media on the covariates with a weight vector obtained from CEM. The coefficients were again largely unchanged. The covariate-adjusted scores are plotted in Figure 3.

FIGURE 3 Visitation to Partisan Websites by Internet Connection



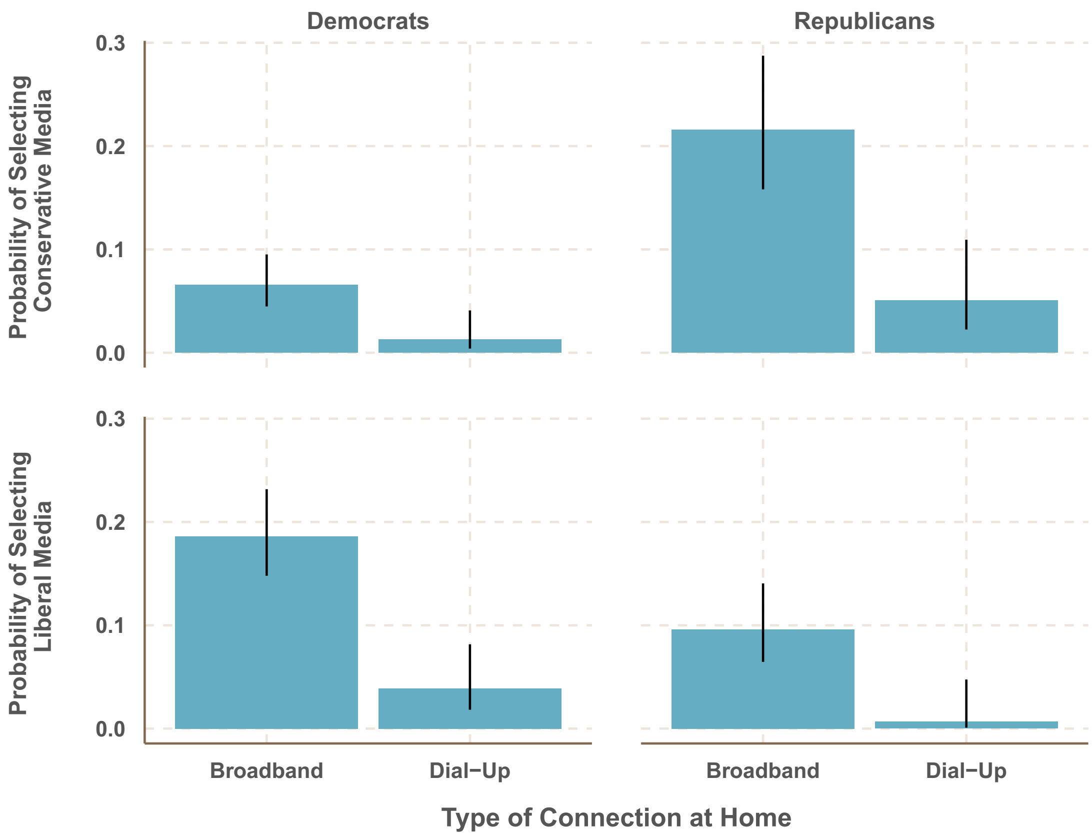
Our second set of analyses is based on data from the 2012 ANES, one of the few publicly available survey data sets to contain indicators of type of Internet access, self-reported media use measures that have been shown to be reasonably valid and reliable (Dilliplane, Goldman, and Mutz 2013; Goldman, Mutz, and Dilliplane 2013; LaCour and Vavreck 2014),[16] and a measure of partisan identification. In the 2012 ANES, respondents were asked to indicate whether they had visited a website from a long list of websites (Dilliplane, Goldman, and Mutz 2013). From the list of websites, we scored Huffington Post and msnbc.com as left-leaning, and Drudge Report and foxnews.com as right-leaning. Next, we use CEM, matching respondents on income, age, gender, race, political interest, and education.[17] The matching analysis (see Figure 4) shows that 19% of Democrats with broadband (compared to 3% with dial-up) say they "regularly" encounter liberal media, and 20% of Republicans with broadband (compared to 8% with dial-up) say they "regularly" encounter conservative media. (The results

[15]Given the skew in visitation patterns, one can also look at medians instead of means. There again we see the same pattern: The median visitation to partisan websites by those with broadband access is roughly double that of those with dial-up connections.

[16]Note, though, that even if media self-reports were biased (Prior 2013), our inferences are only at risk if error in self-reports is correlated with type of Internet access that the respondent has.

[17]See Table E2 for balance statistics before and after matching. There is some concern that since, by 2012, those with dial-up were so unique, matching cannot ensure exchangeability between groups. In Appendix E in the supporting information, we replicate the analysis with Pew data from 2004, when a far larger share of the U.S. population was still connected to the Internet via dial-up.

FIGURE 4 Probability of Visiting Partisan Websites by Internet Connection



are substantively similar if we test for differences in exposure and control for covariates in a traditional regression analysis instead; see Appendix E3 in the supporting information.) In short, broadband access does facilitate exposure to partisan media.[18]

The results from both studies suggest that people with broadband access consume a lot more partisan media—especially from sources congenial to their partisanship—than those with dial-up connections. While there are still concerns about selection bias, the sheer size of the differences and their robustness suggest that the differences are real.

Aside from the data assembled here, there is additional evidence consistent with the claims we advance. Jaber (2013), for instance, finds that access to broadband Internet increases political knowledge by about 3.5%. While one can think of numerous mechanisms behind the effect, the most obvious and likely mechanism is increased exposure to public affairs programming. In all, the available data strongly suggest that access to broadband Internet increases exposure to partisan media and news programming. We think this increase in exposure to partisan programming in particular, and public affairs programming more generally, explains the relationship between access to broadband Internet and affective polarization.

Discussion

Both the supply and the demand for partisan media are considerably greater today than a decade ago. These radical changes have naturally attracted a great deal of scholarly attention. Our study contributes to the burgeoning literature addressing the political implications of changes in the media environment. To overcome concerns over the endogeneity of media consumption to political attitudes, scholars have tried to establish the causal effect of access on attitudes and behaviors, exploiting idiosyncratic variation in the media menus of similar people. For instance, some studies have exploited geographical

[18]Broadband access also is associated with increased exposure to cross-cutting media, but the far larger relationship is exposure to reinforcing media.

variation in the introduction of Fox News to estimate the impact of its introduction (not consumption) on voter preferences (DellaVigna and Kaplan 2007; Hopkins and Ladd 2014). Others have exploited the quasi-random location of various partisan channels on the cable menu (Martin and Yurukoglu 2014).

In this article, we have pursued a similar strategy. We used exogenous variation in access to broadband Internet stemming from differences in right-of-way laws, which significantly boost access to content, to identify the impact of broadband access on partisan polarization. We found that access to broadband Internet polarizes rank-and-file partisans, and the effect amounts to about half the effect of partisans' political interest.

Although we find that the introduction of broadband has contributed to the rise in affective polarization, we do not think broadband is the only, or perhaps even the primary, cause of the rise in partisan ill will (Iyengar, Sood, and Lelkes 2012). Affective polarization began to increase at least two decades before widespread Internet use. Instead, our claim is that the new media environment exacerbates already rising tensions. The data suggest that access to broadband Internet heightens partisan animus by increasing partisans' exposure to imbalanced partisan rhetoric. Despite the possibility of other mechanisms that mute or neutralize any positive effects of broadband on polarization, we have documented such effects.

While some scholars have concluded—on the basis of data showing only limited exposure to partisan news (for a review, see Prior 2012)—that partisan media cannot be consequential, we think this verdict is premature and based on insufficient attention to countervailing evidence. For instance, DellaVigna and Kaplan (2007), Hopkins and Ladd (2014), Martin and Yurukoglu (2014), and Levendusky (2013b) all find that minor changes to a large menu of media choices exert a substantively significant impact on preferences and attitudes.

There are a variety of potential explanations for why relatively small doses of exposure to partisan media can add up to meaningful effects. For one, just because exposure is "small" does not necessarily mean that it is inconsequential. Martin and Yurukoglu (2014), for instance, estimate that watching 4 minutes of Fox News a week is enough to increase the odds of voting for a Republican presidential candidate by .9%. Second, as we noted at the outset, even a small partisan imbalance in media exposure, on the order of the magnitude found in Gentzkow and Shapiro (2011), Dvir-Gvirsman, Tsfati, and Menchen-Trevino (2014), and Flaxman, Goel, and Rao (2013), when accumulated over long spans of time, is liable to have substantial effects.

Finally, it may well be that preferences for agreeable partisan content are stronger than what previous research has suggested. Many of the studies investigating selective exposure code media content and consumption at the level of media outlets. This can understate preferences for partisan content. Prominent media outlets categorized as nonpartisan, such as the *New York Times* and the *Washington Post*, do carry ideological content, although they deliver a wide array of ideological perspectives. Additionally, pooling across various kinds of news stories may understate the strength of preferences for partisan congenial content. For instance, using passively observed data from 1.2 million users (2.3 billion page views), Flaxman, Goel, and Rao (2013) find that ideological segregation tends to be much smaller for general news stories than for opinion stories. All told, the extant literature may greatly understate the degree of imbalance in consumers' exposure to congenial over uncongenial information.

Regardless of the strength of media preferences, the fact that greater access to choice causes partisan animus fits well with evidence from some other studies. In many ways, the fact that access to broadband Internet causes polarization complements the finding that the introduction of broadcast television reduced polarization (Campante and Hojman 2013). As the political information environment became homogenously non-partisan, as a result of the introduction of national network news, partisans' attitudes moderated. Today, as a result of greater access to partisan news, partisan animus has increased.

In closing, this study shows that the new media environment has contributed to increased partisan animus and that greater exposure to biased news sources is the likely cause. As Americans get better access to providers of partisan information, we can anticipate more "fear and loathing" across party lines.

References

Abramowitz, Alan I. 2010. *The disappearing center: Engaged citizens, polarization, and American democracy*. Yale University Press.

An, Jisun, Daniele Quercia, and Jon Crowcroft. 2014. Partisan Sharing: Facebook Evidence and Societal Consequences. In *Proceedings of the Second ACM Conference on Online Social Networks.* COSN '14 New York, NY, USA: ACM, 13–24. http://doi.acm.org/10.1145/2660460.2660469

Andersen, Thomas Barnebeck, Jeanet Bentzen, Carl-Johan Dalgaard, and Pablo Selaya. 2012. "Lightning, IT Diffusion, and Economic Growth across U.S. States." *Review of Economics and Statistics* 94(4): 903–24.

Arceneaux, Kevin, and Martin Johnson. 2013. *Changing Minds or Changing Channels? Partisan News in an Age of Choice.* Chicago: University of Chicago Press.

Arceneaux, Kevin, Martin Johnson, and John Cryderman. 2013. "Communication, Persuasion, and the Conditioning Value of Selective Exposure: Like Minds May Unite and Divide, but They Mostly Tune Out." *Political Communication* 30(2): 213–31.

Bartels, Larry M. 2002. "Beyond the Running Tally: Partisan Bias in Political Perceptions." *Political Behavior* 24(2): 117–50.

Berelson, Bernard, and Gary A. Steiner. 1964. *Human Behavior: An Inventory of Scientific Findings*. Oxford, UK: Harcourt, Brace & World.

Beyer, Gretchen, and Michael Kende. 2003. *The State Broadband Index: An Assessment of State Policies Impacting Broadband Deployment and Demand*. Washington, DC: TechNet.

Brundidge, Jennifer. 2010. "Encountering Difference in the Contemporary Public Sphere: The Contribution of the Internet to the Heterogeneity of Political Discussion Networks." *Journal of Communication* 60(4): 680–700.

Campante, Filipe R., and Daniel A. Hojman. 2013. "Media and Polarization: Evidence from the Introduction of Broadcast TV in the United States." *Journal of Public Economics* 100: 79–92.

Carlin, Ryan E., and Gregory J. Love. 2013. "The Politics of Interpersonal Trust and Reciprocity: An Experimental Approach." *Political Behavior* 35(1): 43–63.

Chadwick, Andrew, and Nick Anstead. 2008. "Toward a Comparative Institutional Approach." In *Routledge Handbook of Internet Politics*, ed. Andrew Chadwick and P. N. Howard. New York: Taylor & Francis, 56–71.

Chambers, John R., Barry R. Schlenker, and Brian Collisson. 2013. "Ideology and Prejudice: The Role of Value Conflicts." *Psychological Science* 24(2): 140–49.

Day, Christopher R. 2001. "The Concrete Barrier at the End of the Information Superhighway: Why Lack of Local Rights-of-Way Access Is Killing Competitive Local Exchange Carriers." *Federal Communications Law Journal* 54(3): 461–491.

DellaVigna, Stefano, and Ethan Kaplan. 2007. "The Fox News Effect: Media Bias and Voting." *Quarterly Journal of Economics* 122(3): 1187–1234.

De los Santos, Babur, Ali Hortaçsu, and Matthijs R. Wildenbeest. 2012. "Testing Models of Consumer Search Using Data on Web Browsing and Purchasing Behavior." *American Economic Review* 102(6): 2955–80.

Dilliplane, Susanna, Seth K. Goldman, and Diana C. Mutz. 2013. "Televised Exposure to Politics: New Measures for a Fragmented Media Environment." *American Journal of Political Science* 57(1): 236–48.

Druckman, James N., Erik Peterson, and Rune Slothuus. 2013. "How Elite Partisan Polarization Affects Public Opinion Formation." *American Political Science Review* 107(1): 57–79.

Dvir-Gvirsman, Shira, Yariv Tsfati, and Ericka Menchen-Trevino. 2014. "The Extent and Nature of Ideological Selective Exposure Online: Combining Survey Responses with Actual Web Log Data from the 2013 Israeli Elections." *New Media & Society* 1–21. doi:10.1177/1461444814549041.

Festinger, Leon. 1957. *A Theory of Cognitive Dissonance*. Stanford, CA: Stanford University Press.

Fiorina, Morris P., Samuel J. Abrams, and Jeremy C. Pope. 2005. *Culture War*? New York: Pearson Longman.

Flaxman, Seth, Sharad Goel, and Justin M. Rao. 2013. "Ideological Segregation and the Effects of Social Media on News Consumption." http://papers.ssrn.com/abstract=2363701.

Garrett, R. Kelly. 2009. "Politically Motivated Reinforcement Seeking: Reframing the Selective Exposure Debate." *Journal of Communication* 59(4): 676–99.

Garrett, R. Kelly, Shira Dvir-Gvirsman, Benjamin K. Johnson, Yariv Tsfati, Rachel Neo, and Aysenur Dal. 2014. "Implications of Pro- and Counterattitudinal Information Exposure for Affective Polarization." *Human Communication Research* 40(3): 309–32.

Gentzkow, Matthew, and Jesse M. Shapiro. 2011. "Ideological Segregation Online and Offline." *Quarterly Journal of Economics* 126(4): 1799–1839.

Goldman, Seth K., Diana C. Mutz, and Susanna Dilliplane. 2013. "All Virtue Is Relative: A Response to Prior." *Political Communication* 30(4): 635–53.

Government Accountability Office. 2006. "Broadband Deployment Is Extensive throughout the United States, but It Is Difficult to Assess the Extent of Deployment Gaps in Rural Areas." Technical Report GAO-06-426, Report to Congressional Committees.

Greene, Steven. 1999. "Understanding Party Identification: A Social Identity Approach." *Political Psychology* 20(2): 393–403.

Halberstam, Yosh, and Brian Knight. 2014. "Homophily, Group Size, and the Diffusion of Political Information in Social Networks: Evidence from Twitter." Technical report National Bureau of Economic Research. http://www.nber.org/papers/w20681.

Hetherington, Marc and Thomas J Rudolph. 2014. "The Emergence of Polarized Trust." http://papers.ssrn.com/sol3/Papers.cfm?abstract_id=2484755.

Hitt, Lorin and Prasanna Tambe. 2007. "Broadband adoption and content consumption." *Information Economics and Policy* 19(3-4): 362–78.

Hopkins, Daniel J and Jonathan M Ladd. 2014. "The Consequences of Broader Media Choice: Evidence from the Expansion of Fox News." *Quarterly Journal of Political Science* 9(1): 115–35.

Horwitz, S Nechama and Lilach Nir. 2014. "How politics-news parallelism invigorates partisanship strength." *International Political Science Review* 36(2): 153–167.

Huber, Gregory and Neil Malhotra. 2013. "Dimensions of Political Homophily: Isolating Choice Homophily along Political Characteristics." http://huber.research.yale.edu/materials/38_paper.pdf.

Iacus, Stefano M, Gary King and Giuseppe Porro. 2012. "Causal Inference without Balance Checking: Coarsened Exact Matching." *Political Analysis* 20(1): 1–24.

Inoue, Atsushi and Gary Solon. 2010. "Two-sample instrumental variables estimators." *The Review of Economics and Statistics* 92(3): 557–61.

Iyengar, Shanto, Gaurav Sood and Yphtach Lelkes. 2012. "Affect, Not Ideology: A Social Identity Perspective on Polarization." *Public Opinion Quarterly* 76(3): 405–31.

Iyengar, Shanto and Kyu S. Hahn. 2008. "Red media, blue media: Evidence of ideological selectivity in media use." *Journal of Communication* 59(1): 19–39.

Iyengar, Shanto, Kyu S. Hahn, Jon A. Krosnick, and John Walker. 2008. "Selective Exposure to Campaign Communication: The Role of Anticipated Agreement and Issue Public Membership." *The Journal of Politics* 70(01): 186–200.

Iyengar, Shanto and Sean J. Westwood. 2014. "Fear and Loathing Across Party Lines: New Evidence on Group Polarization." *American Journal of Political Science* 1–47.

Jaber, Ahmed. 2013. "Broadband Internet and Political Behavior: Evidence from the United States." *Available at SSRN 2353549.* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2353549.

Keith, Bruce E., David B. Magleby, Candice J. Nelson, Elizabeth Orr, and Mark C. Westlye. 1992. *The myth of the independent voter.* University of California Press.

Klapper, Joseph T. 1960. *The Effects of Mass Communication.* Vol. 32 New York, NY: Free Press.

Knobloch-Westerwick, Silvia, and Steven B. Kleinman. 2012. "Preelection Selective Exposure Confirmation Bias Versus Informational Utility." *Communication Research* 39(2): 170–93.

Kolko, Jed. 2010. "A New Measure of U.S. Residential Broadband Availability." *Telecommunications Policy* 34(3): 132–43.

Kunda, Ziva. 1990. "The Case for Motivated Reasoning." *Psychological Bulletin* 108(3): 480–98.

LaCour, Michael J., and Lynn Vavreck. 2014. "Improving Media Measurement: Evidence from the Field." *Political Communication* 31(3): 408–20.

Larcinese, Valentino, and Luke Miner. 2012. "The Political Impact of the Internet on U.S. Presidential Elections." http://core.ac.uk/download/pdf/9994855.pdf.

Lazarsfeld, Paul F., Bernard Berelson, and Hazel Gaudet. 1948. *The People's Choice: How the Voter Makes Up His Mind in a Presidential Campaign.* New York: Columbia University Press.

Levendusky, Matthew S. 2013a. "Partisan Media Exposure and Attitudes Toward the Opposition." *Political Communication* 30(4): 565–81.

Levendusky, Matthew S. 2013b. "Why Do Partisan Media Polarize Viewers?" *American Journal of Political Science* 57(3): 611–23.

Lewis, Kevin, Marco Gonzalez, and Jason Kaufman. 2012. "Social Selection and Peer Influence in an Online Social Network." *Proceedings of the National Academy of Sciences of the United States of America* 109(1): 68–72.

Lodge, Milton, and Charles Taber. 2000. "Three Steps toward a Theory of Motivated Political Reasoning." In *Elements of Reason: Cognition Choice and the Bounds of Rationality* eds. Arthur Lupia, Mathew D. McCubbins, and Samuel L. Popkin, Cambridge, UK: Cambridge University Press, 183–213.

Lord, Charles G., Lee Ross, and Mark R. Lepper. 1979. "Biased Assimilation and Attitude Polarization: The Effects of Prior Theories on Subsequently Considered Evidence." *Journal of Personality and Social Psychology* 37(11): 2098–2109.

Martin, Gregory J., and Ali Yurukoglu. 2014. "Bias in Cable News: Real Effects and Polarization." Working paper, Stanford University. http://www.nber.org/papers/w20798.

McGuire, William J. 1968. "Personality and Susceptibility to Social Influence." In *Handbook of Personality Theory and Research* (Vol. 2), ed. Edgar F. Borgatta and William W. Lambert. Chicago: Rand McNally, 1130–87.

Messing, Solomon. 2013. "How Social Influence Shapes the Diffusion of Elite Discourse, Public Opinion, and Participation." Ph.D. dissertation, Stanford University.

Mutz, Diana C. 2002. "Cross-Cutting Social Networks: Testing Democratic Theory in Practice." *American Political Science Review* 96(1): 111–26.

Pew Research Center. 2014. *The State of the News Media.* http://www.journalism.org/packages/state-of-the-news-media-2014/.

Prior, Markus. 2007. *Post-Broadcast Democracy: How Media Choice Increases Iequality in Political Involvement and Polarizes Elections.* New York: Cambridge University Press.

Prior, Markus. 2009. "The Immensely Inflated News Audience: Assessing Bias in Self-Reported News Exposure." *Public Opinion Quarterly* 73(1): 130–43.

Prior, Markus. 2012. "Media and Political Polarization." *Annual Review of Political Science* 16(1): 101–27.

Prior, Markus. 2013. "The Challenge of Measuring Media Exposure: Reply to Dilliplane, Goldman, and Mutz." *Political Communication* 30(4): 620–34.

Rappoport, Paul N., Donald J. Kridel, and Lester D. Taylor. 2002. The Demand for Broadband: Access, Content, and the Value of Time. In *Broadband: Should we regulate high-speed Internet access?*, eds. R. W. Crandall and J. H. Alleman Washington, DC: AEI-Brookings Joint Center for Regulatory Studies, 57–82.

Shor, Boris, and Nolan McCarty. 2011. "The Ideological Mapping of American Legislatures." *American Political Science Review* 105(3): 530–51.

Smith, Aaron Whitman, Kay Lehman Schlozman, Sidney Verba, and Henry Brady. 2009. *The Internet and Civic Engagement.* Washington, DC: Pew Internet & American Life Project.

Stroud, Natalie Jomini. 2010. "Polarization and Partisan Selective Exposure." *Journal of Communication* 60(3): 556–76.

Stroud, Natalie Jomini. 2011. *Niche News: The Politics of News Choice.* New York: Oxford University Press.

Suziedelyte, Agne. 2012. "How Does Searching for Health Information on the Internet Affect Individuals' Demand for Health Care Services?" *Social Science & Medicine* 75(10): 1828–35.

Tausanovitch, Chris, and Christopher Warshaw. 2013. "Measuring Constituent Policy Preferences in Congress, State Legislatures, and Cities." *Journal of Politics* 75(2): 330–42.

Vallone, Robert P., Lee Ross, and Mark R. Lepper. 1985. "The Hostile Media Phenomenon: Biased Perception and Perceptions of Media Bias in Coverage of the Beirut Massacre." *Journal of Personality and Social Psychology* 49(3): 577–85.

Wallsten, Scott J. 2005. *Broadband Penetration: An Empirical Analysis of State and Federal Policies.* Washington, DC: AEI-Brookings Joint Center for Regulatory Studies AEI-Brookings Joint Center for Regulatory Studies. http://works.bepress.com/cgi/viewcontent.cgi?article=1075&context=scott_wallsten.

Wojcieszak, Magdalena E., and Diana C. Mutz. 2009. "Online Groups and Political Discourse: Do Online Discussion Spaces Facilitate Exposure to Political Disagreement?" *Journal of Communication* 59(1): 40–56.

Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's website:

- Appendix A: ROW Index
- Appendix B: Measures of Affect Towards Candidates
- Appendix C: Relationship Between Number of Internet Providers and Broadband Penetration
- Appendix D: Robustness Checks
- Appendix E: Causal Mechanisms