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News Sharing on Social Media: Mapping the Ideology of News Media, Politicians, and the Mass Public

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Abstract

This article examines the information sharing behavior of U.S. politicians and the mass public by mapping the ideological sharing space of political news on social media. As data, we use the near-universal currency of online information exchange: web links. We introduce a methodological approach and software to unify the measurement of ideology across social media platforms by using sharing data to jointly estimate the ideology of news media organizations, politicians, and the mass public. Empirically, we show that (1) politicians who share ideologically polarized content share, by far, the most political news and commentary and (2) that the less competitive elections are, the more likely politicians are to share polarized information. These results demonstrate that news and commentary shared by politicians come from a highly unrepresentative set of ideologically extreme legislators and that decreases in election pressures (e.g., by gerrymandering) may encourage polarized sharing behavior.

Keywords: social media; news media; representation; ideology; polarization; measurement

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1. Introduction

Political information is increasingly consumed online. In the United States, a majority of voting age citizens under the age of 50 report frequently consuming political news through online sources (Shearer 2019). The salience and importance of online news consumption and sharing are large, with much debate about online political behavior centering around the ideological orientation of such information. Politicians have, for instance, expressed concern about the consumption of news media content that does not challenge the public's ideological viewpoints (echo chambers) (e.g., BBC News 2017), the skewing of ideological content by social media and search algorithms (filter bubbles) (e.g., Kang *et al.* 2018), and the suppression of political commentary by social media companies based on its ideological leanings (e.g., Herrman and Isaac 2016).

Yet researchers currently lack a unified statistical framework to measure and assess the ideological leanings of news media and commentary shared on social media platforms and that of those who share it. As a result, it can be challenging to understand the ideological underpinnings of the news and commentary that politicians and the mass public share, or to map the ideological structure of the online news media environment. This article helps remedy this by introducing a statistical measurement

model and software that unifies measurement strategies across social media platforms by using as data, web links (URLs), the fundamental building blocks of online information sharing. The model allows us to calculate common-scale estimates of three important quantities of interest: (1) the ideology of politicians, (2) the ideology of ordinary users, and (3) the ideology of the news media and commentary that they share.

We build on seminal work in the field that seeks to measure ideology through news sharing on social media data (e.g., Bakshy, Messing, and Adamic 2015; Barberá *et al.* 2015; Bond and Messing 2015; Gentzkow and Shapiro 2011) by introducing an approach that provides a number of key advantages. First, unlike a number of past approaches, our measurement strategy is agnostic to social media platform. Because links to news media and commentary are widely shared across platforms, our approach can be applied to data from any current or future social media platform that allows link-sharing (e.g., Facebook, Twitter/X, and Reddit). Second, our approach does not require labeled data, for example, partisan or ideological labels of news media outlets or users. Third, our approach enables examination of the ideology of politicians based on their online *behavior*, and thus in a space freer from the constraints imposed by legislative agendas that may be out of politicians' control or by the machinery of party discipline that can influence roll-call voting. Fourth, the approach allows researchers to capture the extent that users and politicians share ideologically diverse or narrow information, with implications for studying behaviors that might promote or discourage polarization or echo chambers. Finally, our approach permits researchers to estimate the ideology of little-known political candidates who have no previous voting records (the typical data used to estimate the ideology of legislators).

Substantively, we document four important facts about the sharing of political information in the United States. First, we demonstrate that politically interested citizens—not politicians—share the majority of ideologically polarized political news and commentary. Second, we show that news content shared by politicians is an exceptionally strong signal of political ideology and partisanship: knowing only the news media that politicians share nearly perfectly separates politicians by party in the United States. Third, we show that there are strong within-party differences in the sharing of ideologically polarized information: politicians from within the Democratic and Republican parties who are on the ideological extremes (1) share much more information than their more moderate peers in general and (2) share more ideologically extreme news and commentary. Collectively, this results in an substantial overrepresentation of polarizing information from U.S. political representatives on social media. Finally, we show that the sharing of polarized information is empirically linked to electoral incentives: politicians in districts that are not electorally competitive are more likely to share polarizing news and commentary, and more likely to share large amounts of news and commentary overall. In other words, the constraints that govern electoral competition in the United States are associated with a less polarized political information environment.

2. Unifying the Study of Social Media and News Media Ideology

Few methodological research programs have been more important for testing theories of political behavior than those seeking to measure and understand the ideology of political actors and its consequences. The measurement of ideology on social media has focused primarily on politicians and users.[1] In the political science literature, two well-known and related measurement techniques use the behavior of social media users to measure the ideology of both users and political actors (Barberá 2015a; Bond and Messing 2015). Data used in these works are roughly analogous: Barberá (2015a) uses data that capture the political actors that ordinary users "follow" on Twitter, and Bond and Messing (2015) use data that capture which political actors ordinary users "endorse" on Facebook. Models developed for these data rely on a homophily assumption: that social media users are more likely to follow or endorse political actors who they perceive to be close to themselves ideologically. As Barberá (2015a) and Bond

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[1]Sharing behavior in specific empirical applications has been examined by, for example, Golovchenko *et al.* (2020), Aruguete, Calvo, and Ventura (2023), and Green *et al.* (Forthcoming).

and Messing (2015) show, spatial models of ideology that rely on this assumption work very well in practice. These approaches for understanding the ideological ecosystem on social media have spurred a wealth of important applied research concerning a wide range of online political behaviors (e.g., Bail *et al.* 2018; Pennycook *et al.* 2021).

Strategies to estimate the ideology of news media have a longer pedigree (Groeling 2013). These include, for example, measurement models using news editorial agreement with Supreme court justices on individual cases (Ho and Quinn 2008), using ideological labels from one domain (e.g., voting records) to estimate the ideology with supervising learning methods in another (e.g., Gentzkow and Shapiro 2010; Martin and Yurukoglu 2017), crowd-sourcing perceptions of news media ideology (e.g., Budak, Goel, and Rao 2016), using the proportions of self-reported liberals or conservatives sharing stories from a given news site (Bakshy *et al.* 2015; Gentzkow and Shapiro 2011), and measuring the screen time of political actors on television news media (Kim, Lelkes, and McCrain 2022).

Here, we seek to unify approaches to measuring the ideology of social media users, politicians, and news media by using web links, the near-universal currency of social media and online information exchange. Using these data has a number of theoretical, empirical, and practical benefits. First, web links are ubiquitous across social media platforms. This allows us to develop a platform-agnostic measure of ideology, enabling calculation of common-scale estimates within and across platforms, and obviating the need for idiosyncratic approaches to any specific platform.

Second, web links shared on social media are central to communication among and between politicians and the public, and have been used, for example, by foreign actors to interfere in democratic elections. Information sharing is thus an important area of substantive interest for understanding day-to-day political discourse and other areas, such as in international relations.

Third, ideology as estimated from sharing data is a *behavioral* measure of ideology for both users and politicians. Previous approaches, by comparison, have primarily examined political ideology indirectly, relying on social media users' perceptions of politicians, such as through users' following or endorsement choices. These measures are important in their own right: user perceptions are critical to understanding behavior online. Data from politicians' sharing behavior, however, provide an important avenue for investigating the communication strategies of campaigns and constituent–politician interactions. A related practical benefit (shown empirically below) is that we can precisely estimate the ideology of politicians using only their own social media behaviors, thus avoiding data collection from, for instance, the millions of the users who may interact with them.

Fourth, the relatively high frequency that politicians share web links facilitates investigation into changes in behavior and ideology across time, an important but challenging area of research. It allows, for example, inquiry into whether the use of social media leads to political polarization among individuals over time or whether the ideology of sharing behavior changes closer to elections or in response to high-profile events.

Finally, using news-sharing behavior allows us to map the structure of news media ideology based on how news media are used in practice. This behavioral approach is similar to that of, among others, Gentzkow and Shapiro (2011), Bakshy *et al.* (2015), and Messing, van Kessel, and Hughes (2017), who estimate news media ideology by using sharing or viewing behavior by users with a known (i.e., labeled) partisanship or ideology. The model presented below, however, does not require existing measures of partisanship or ideology in another domain, such as voting behavior in Congress or ideological self-reports. As detailed in the following section, one can map a common-scale ideological space for users, politicians, and news media based on sharing behavioral data alone.

3. Data and Statistical Model

3.1. Data

As noted above, the approach we introduce can be applied to any social media platform on which users share political web links. For validation and analysis, however, we use data from Twitter. Our reasons

are fourfold. First, the vast majority of U.S. members of Congress have Twitter accounts and share news as part of their daily political communications. This allows us to validate model estimates using those from roll-call voting data. Second, and more pragmatically, Twitter provided relatively straightforward access to these data from politicians and ordinary users. Third, although Twitter is lesser used than other large platforms, citizens are more likely to report regularly consuming news from it than any of other social media platform (Pew Research Center 2022), and it remains a major platform for consuming timely information from citizens' political representatives. Lastly, the most widely applied method in political science research for the measurement of ideology on social media was developed for Twitter data (Barberá 2015a). Using Twitter data thus allows us to compare our results to those from other approaches.

To collect our data, we manually searched, inspected, and compiled a list of the Twitter accounts of U.S. members of the 116th Congress,[2] state governors, members of the executive and cabinet, and accounts associated with prominent unelected members of the Democratic and Republican parties. This resulted in 1,152 accounts from 699 political actors. Some politicians maintain multiple Twitter accounts (e.g., @TedCruz and @RepTedCruz), which may vary, for instance, in the extent that each is used by politicians themselves and their communications staff. Because formal differences between accounts is unknown, and we assume that staffers post in ways consistent with the politicians whom they represent, we combine data from any politician who maintains multiple accounts. We then define the set of national news media organizations online as all sites that provide news or commentary about U.S. national politics. This includes sites from television media (e.g., cnn.com [https://www.cnn.com] and foxnews.com [https://www.foxnews.com]), traditional print journalism (e.g., nytimes.com [https://www.nytimes.com] and wsj.com [https://www.wsj.com]), and commentary (e.g., nationalreview.com [https://www.nationalreview.com] and newrepublic.com [https://www.newrepublic.com]). In total, the list of national media organizations contains 220 web domains (see Supplementary Appendix D).[3]

To compare the sharing behavior of politicians to that of ordinary U.S. users, we collect data from a sample of politically engaged ordinary users on Twitter. We follow the procedure used by Barberá (2015a), who defines the population of minimally politically engaged users as those who follow a researcher-defined number of politicians. We define our population of interest as users geo-located to the United States who follow one or more politicians, who have sent at least 100 tweets, and who have at least 25 followers. For validation and analysis, we take a random sample of 10,000 users from this population. We note that compared to the general Twitter population, the resulting sample will be users who are more interested in politics than others. They thus may be more ideologically extreme than other users (Barberá and Rivero 2015), may be less willing to compromise on issues (Smith *et al.* 2020), and because they will be more politically interested in general, will likely share more political news than other users.

We collect tweets made available for each political actor and politically engaged Twitter user, extract web links from each tweet, and expand any shortened links. Among links shared by political actors, 25% are links to national news sites, and among those shared by politically engaged users, 13% are. Ninety seven percent of political actors and 79% of users shared at least one link to a national news story. For the models and analyses below, we exclude data from links included in the quoted portion of "quote tweets" (18% of links from politicians and 26% from users). Quote tweets are those in which a user cites another tweet to comment on it, and are often used to criticize or satirize its content.

We present in Figure 1 the 50 most tweeted national political news domains as a proportion of all such domains. As the figure shows, the most frequently shared links are to well-known traditional print

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[2]Tweets included are any posts available from each politician's timeline from the end of the 116th Congress (January 3, 2021) back through 2015.

[3]The list was collected manually by examining lists of news media sites on websites providing such listings, by examining web links shared by politicians, and by traversing news media accounts as recommended by Twitter. The list is unlikely to be exhaustive, but should contain the vast majority of meaningful political news websites.
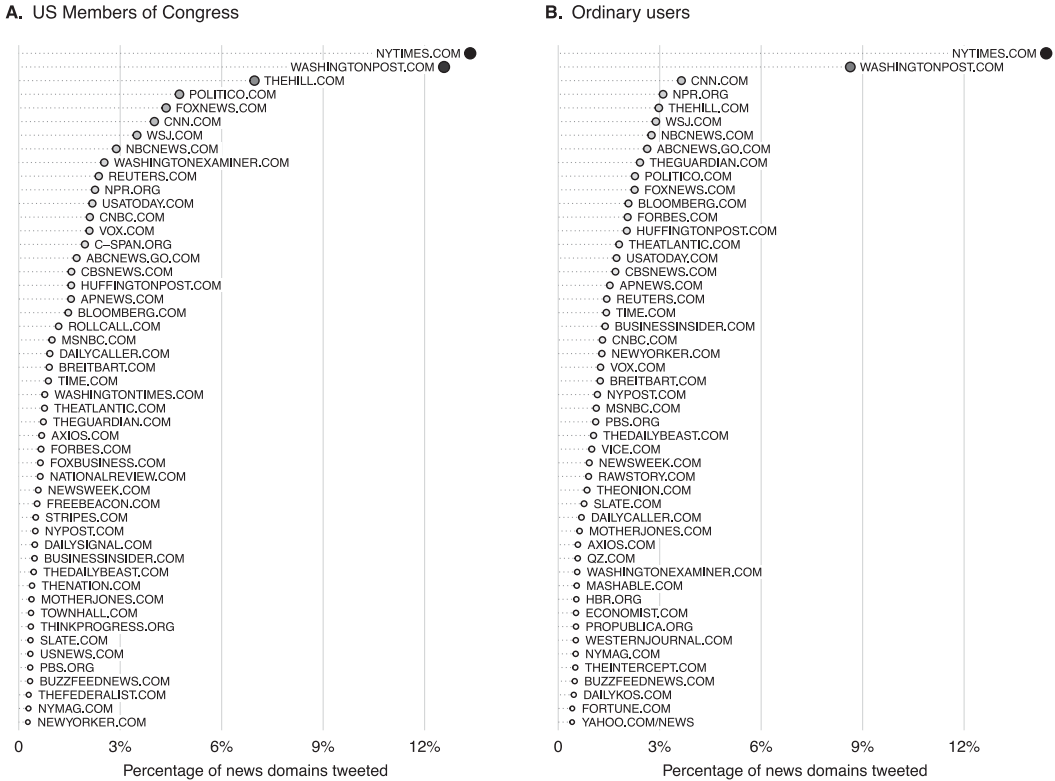
Figure 1. The 50 most tweeted national news media domains as a percentage of all news domains shared.

news (e.g., *New York Times*, *Washington Post*, and *Wall Street Journal*), and the major television media organizations (e.g., CNN, FOX News, NBC, and ABC). By contrast, only a few periodicals dedicated to political commentary (e.g., *The New Yorker* and *Weekly Standard*) find themselves among the most frequently shared domains.

To aggregate these data, for all users $i = 1, \dots, N$ and media domains $m = 1, \dots, M$, we generate an $N \times M$ count matrix whereby each cell represents the number of times that a user i tweeted a story from media organization m. By example, Table 1 presents a sub-matrix of data from six well-known Republicans and Democrats and six news sites. As the data in Table 1 show, at least for this small number of well-known politicians, Republican politicians are clearly more likely to tweet links to media stories right of center (foxnews.com [https://www.foxnews.com] and breitbart.com [https://www.breitbart.com]) than they are those left of center (thenation.com [https://www.thenation.com] and huffingtonpost.com [https://www.huffingtonpost.com]), and vice versa for Democrats. In terms of the frequency of sharing news, in Figure 2, we show that politicians share news media frequently, and tweets by politicians are more likely to include a link to a news media story compared to politically engaged Twitter users. Members of Congress share, on average 0.082 news links per tweet, whereas users share roughly 0.024 news links per tweet.

3.2. Statistical Model

Here, we develop a measurement model to estimate the ideology of (1) news media shared by politicians and users and (2) the ideology of those users and politicians themselves. Consistent with the data described above, let y_{img} denote the count of the media site $m = 1, \dots, M$ shared by a user or politician $i = 1, \dots, N$ who is affiliated with the group $g \in \{D, R, U\}$ (Democratic politicians, Republican politicians,

Table 1. Example of a user-domain count matrix.

	thenation.com	huffingtonpost.com	washingtonpost.com	wsj.com	foxnews.com	breitbart.com	⋯
Ted Cruz (R)	0	1	156	204	464	195	⋯
Mitch McConnell (R)	0	2	67	53	37	0	⋯
Susan Collins (R)	0	1	8	4	0	0	⋯
Joe Manchin (D)	0	4	13	2	3	0	⋯
Alexandria Ocasio-Cortez (D)	27	6	65	5	2	0	⋯
Bernie Sanders (I)	71	110	373	40	1	0	⋯
⋮	⋮	⋮	⋮	⋮	⋮	⋱	

Note: This table shows the number of news stories shared by six well-known members of Congress from six news media organizations across the ideological spectrum.
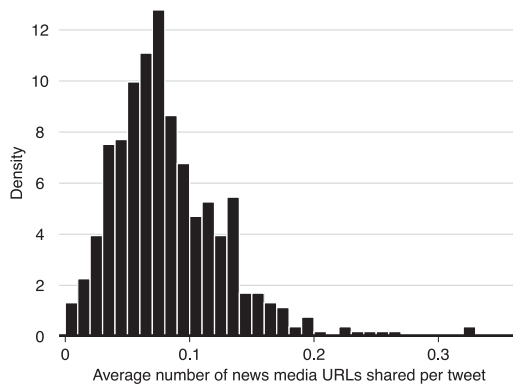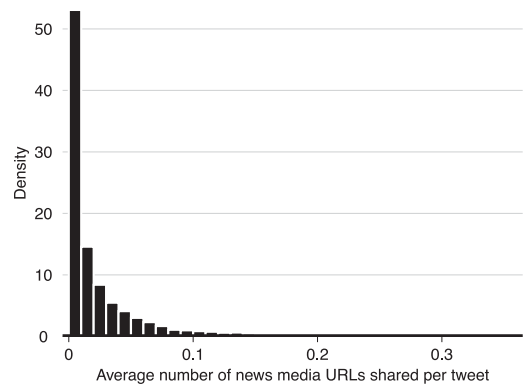
Figure 2. Histograms of the mean number of news media stories (per tweet) shared by members of Congress and politically interested users on Twitter.

ordinary users). Concretely, y_{img} denotes the value of a single cell in Table 1, where the columns represent the media organizations m, and rows the users/actors i affiliated with group g.[4]

We model these data by using two latent variables as the primary quantities of interest. The first, θ_{ig}, denotes the ideology of user i (affiliated with group g); the second, ζ_m, the ideology of media site m. As shorthand, we refer to both sets of these parameters as *media scores*, making clear by context whether we are referring to the ideology of individual users/politicians or news media organizations. We model the data, y_{img}, as arising from a negative binomial (count) distribution:

$$y_{img} \sim \text{NegBin}(\pi_{img}, \omega_m), \tag{1}$$

$$\pi_{img} = \exp(\alpha_i + \gamma_m - ||\theta_i - \zeta_m||^2), \tag{2}$$

where α_i denotes a user-specific intercept, γ_m denotes a domain-specific intercept, and ω_m denotes a news organization dispersion parameter. Concretely, α_i represents the relative extent that a given user shares news in general, and γ_m represents the relative extent to which a given news media domain is shared (i.e., its popularity).

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[4]In principle, researchers can disaggregate data from each news organization at the news-article level to estimate the ideology of individual articles. The scale of data required for this, however, is substantial (e.g., González-Bailón *et al.* 2023), and thus beyond the empirical scope of this article.

The term containing our quantities of interest, $-\|\theta_i - \zeta_m\|^2$, captures the notion that the larger the distance between the ideology of a given user (θ_i) and a given news media organization (ζ_m), the less likely that user is to share links to its content. The substantive meaning of the parameters, θ and ζ, are thus assumed to represent the political ideology of those sharing news links.

We note that this ideological component of news-sharing will stem from a variety of decisions regarding the specific news articles that politicians and users share, and thus be the result of a mix of strategic, personal, and idiosyncratic reasons. As we show in one of the empirical applications below, for example, politicians may have electoral incentives to share more ideologically moderate or extreme news content. Politicians may also share news content, for example, to attract political attention, because it positively highlights their own political behaviors, to make public their positions on issues, to highlight criticisms of another party, or to shape public opinion. Ordinary users may also share more ideologically moderate or extreme content for reasons related to affective polarization (e.g., hyper-partisan news that undermines or humiliates out-partisans), to gain positive feedback from other users, or to share breaking news. Finally, we also note that people select into the news that they read and that which they are exposed to on social media as a result of whom they follow/friend and because of algorithmic filtering. The homophily assumption (as it is in related measurement models for political behavioral data) thus means in practice that much of the variation in these behaviors is assumed to be related to the ideological proximity of the user to the news content that they share.

Lastly, ω_m represents the extent that sharing a news media organization is predictable based on the difference between the ideology of the user and that of the news organization. This allows for the fact that sharing news from some media organizations will be stronger ideological signals (e.g., explicitly partisan sites) than others (e.g., broadly consumed mainstream media) (see Supplementary Appendix C).

We estimate the parameters of this measurement model in a Bayesian framework, placing priors on each group of parameters, and setting constraints as necessary for model identification. In particular, the user intercepts and news organization intercepts are each given common distributions, $\alpha_i \sim \text{Normal}(\mu_\alpha, \sigma_\alpha)$ and $\gamma_i \sim \text{Normal}(0, \sigma_\gamma)$, respectively. We use group-level information about users, $g \in \{D, R, U\}$ (Democratic politicians, Republican politicians, ordinary users), by placing separate common prior distributions on the parameters denoting the ideology, θ_{ig}, of politicians who are members of the Democratic and Republican parties and of ordinary users, $\theta_{ig} \sim \text{Normal}(\mu_\theta^g, \sigma_\theta^g)$. The prior on parameters denoting the ideology of media organizations is set to $\zeta_m \sim \text{Normal}(0, \sigma_\zeta)$.[5] Finally, the dispersion parameters, ω_i, are given a common distribution $\omega_m \sim \text{InvGamma}(\omega_a, \omega_b)$.

To identify the model, we need to address the problem of reflection invariance, which refers to the fact that the likelihood is invariant to multiplication of the parameters θ_{ig} and ζ_m by -1. We need, in other words, to fix the direction of the scale such that higher values of θ_{ig} and ζ_m indicate either liberal or conservative. There are a number of ways to achieve identification. Here, we follow Jackman's (2001) practical solution of allowing the sampler to freely explore the posterior and settle in on one of the two scale directions. We then flip the scale after estimation (if required) such that low values of θ_{ig} indicate liberal, and high values, conservative.[6] We implement this model as a statistical library for use by researchers in the statistical software R, and parallelize the sampler to greatly increase efficiency.

4. Validation

We validate the model by examining the extent that the roll-call voting ideology of members of Congress (i.e., NOMINATE score) aligns with their media score as estimated from the news-sharing model, that is, a test of convergent validity. Because our measure derives from politicians' behavior, substantively this tests whether politicians whose voting behavior is ideologically extreme also behave on social media in ways that broadcast more ideologically polarized information.

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[5]Centering the distribution of ζ_m at 0 resolves the problem of additive aliasing caused by the fact that the likelihood is invariant to adding a constant to the parameters θ_{ig} and ζ_m.

[6]We run six chains per model, assessing convergence with $\hat{R}$ statistics (Gelman *et al.* 2014).
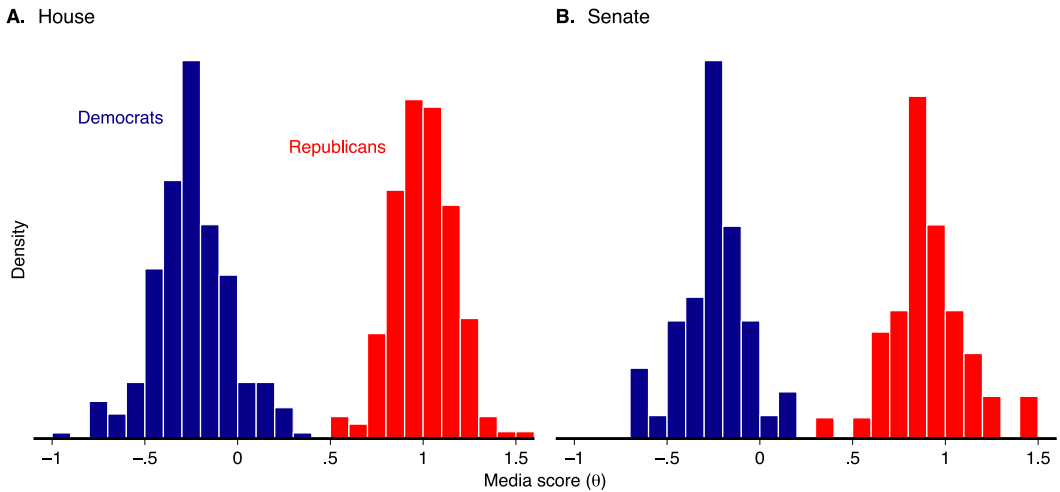
A. House   **B.** Senate

Figure 3. Histogram of the news-sharing ideology of members of Congress.

To test this, we fit our model using sharing data from only the political actors in our dataset: members of Congress, state governors, members of the executive, and actors linked to each party (e.g., party chairpersons and former presidents). We begin by showing in Figure 3 histograms of the estimated ideology of members of Congress by party in the Senate and House. As the figure shows, politicians' news-sharing behavior cleanly separates them by party. In fact, no Republican (Democratic) members of Congress are estimated to be to the left (right) of their colleagues in the other party. However, because our model as specified in Equations (1) and (2) uses separate hierarchical priors for Democratic and Republican politicians, it indirectly includes information about party affiliation. We thus fit an analogous model to remove this information by treating the ideology of all politicians as arising from a single common distribution. Dropping this information is not ideal because it is less efficient and thus will provide noisier estimates of individual politicians who do not post news media often. However, for validation, it allows us to examine the extent that news-sharing behavior alone—absent any indirect party information—differentiates political actors in ideological space. Results from this model are substantively equivalent (see Supplementary Appendix B), with very slight overlap (3%) between the ideological distributions of Democratic and Republican politicians. The news shared by politicians, in other words, nearly perfectly signals the party to which they belong. This is important for two reasons. First, it provides strong face validity of our measurement approach. Second, and more substantively, it highlights the level of partisan polarization in news media use by politicians, such that ideology at the level of the media organization is sufficient to differentiate legislators by party.

If the news media shared by politicians on social media clearly differentiate politicians by party, how well do they differentiate politicians' ideology *within* each party? In Figure 4, we compare media scores for members of Congress to their roll-call voting ideology (NOMINATE) (Boche *et al.* 2018; Poole and Rosenthal 1985). Both overall and within-party correlations are high. As the figure shows, the overall correlation between media scores and NOMINATE scores is extremely high ($\rho = 0.96$, se = 0.01).[7] The within-party correlations between NOMINATE scores and media scores are also high, both in the Senate ($\rho_{Dem.} = 0.76$, se = 0.10 / $\rho_{Rep.} = 0.61$, se = 0.11) and in the House ($\rho_{Dem.} = 0.51$, se = 0.06 / $\rho_{Rep.} = 0.58$, se = 0.06).[8]

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[7]Correlations across members of all parties can often be high even if within-party correlations are low. For instance, applications of the WORDFISH procedure (Slapin and Proksch 2008) to social media data can successfully classify legislators by party, but are much less able to differentiate the ideology of legislators within parties (Temporão *et al.* 2018).

[8]In Supplementary Appendix G, we calculate these correlations using media scores calculated with only a single year of data, showing that even with little data, convergent validity remains relatively high and practical for applied research.
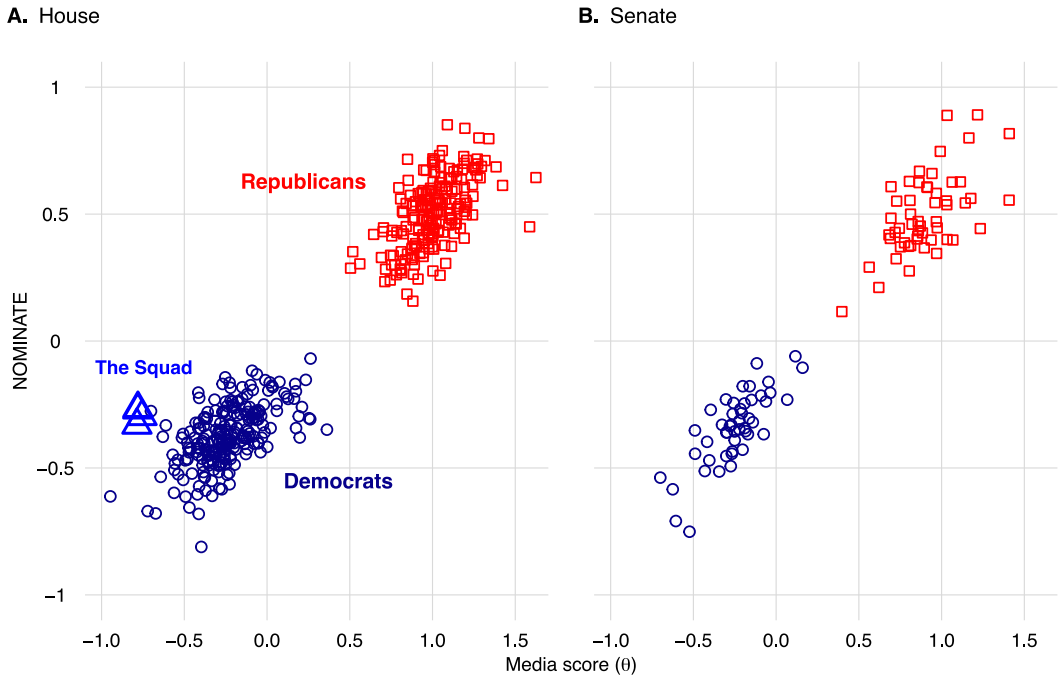
Figure 4. Comparison of the news-sharing ideology of members of Congress and their roll-call voting ideology (NOMINATE). Members of "The Squad" (in the 116th Congress) include Alexandria Ocasio-Cortez, Ilhan Omar, Ayanna Pressley, and Rashida Tlaib.

Furthermore, in Figure 4, we also show estimates for members of "The Squad," a set of well-known vocal congresspersons (Alexandria Ocasio-Cortez, Ilhan Omar, Ayanna Pressley, and Rashida Tlaib) associated with progressive causes on the left in the Democratic caucus. As the figure shows, whereas NOMINATE scores place them as centrist members of the Democratic Party, the Squad's news-sharing behavior places them, as one might expect, far to the ideological left, and left of 99% of all members of Congress.[9] Results for the conservative Freedom Caucus, which align with NOMINATE scores, are provided in Supplementary Appendix F.

We investigate the validity of our measurement approach for ordinary (politically engaged) users by using data from survey-linked social media data collected by YouGov during the 2016 U.S. presidential campaign. These data consist of U.S. respondents who agreed to provide their Twitter IDs for research and completed a survey containing questions concerning, among others, election issues, ideological self-placement, and the strength of partisan identification. All tweets that respondents sent during the election period were collected and linked to respondents' survey-based responses. Of the 1,341 respondents in the survey who sent at least one tweet during the 2016 campaign period, we examine data from the 481 who posted links to at least five national news media stories. In other words, among a sample of Twitter users generally, one might expect to obtain media scores for roughly one-third of them. We fit the model to data from these respondents alongside those from politicians, and calculate the correlation between respondents' media scores and a set of survey-based measures: factor scores from eight issue position questions, ideological self-placement, and strength of partisan attachment (for question text, see Supplementary Appendix H). The correlation between the ideology measure based on respondents' news-sharing behavior and the survey-based measures are high ($\rho = 0.73$ on average).

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[9]Recent work with roll-call voting has sought to address problems of the low face validity of estimates for congresspersons such as those belonging to "The Squad" (Duck-Mayr and Montgomery 2023). Results in Figure 4 thus bear out—from a behavioral measure in a different arena—that these congresspersons likely "should" be found to the left of the vast majority of their colleagues.

By comparison, the pairwise correlations between each pair of the three survey measures themselves are, on average, similar ($\rho = 0.64$, see Supplementary Appendix A).

5. The Ideology of Online News Media

One important feature of the model is that we obtain not only estimates of the ideology of politicians and users as a function of their online behavior, but also estimates of the ideology of news media organizations themselves. These estimates provide an important description of the U.S. news media ecosystem based on how media are used by politicians and users. They are, in other words, a reflection of the ideology of the users who share articles from these media organizations.

To present these estimates, Figure 5 provides media scores for the 150 online news media sites that are shared the most by members of Congress. A handful of well-known moderate and extreme news media
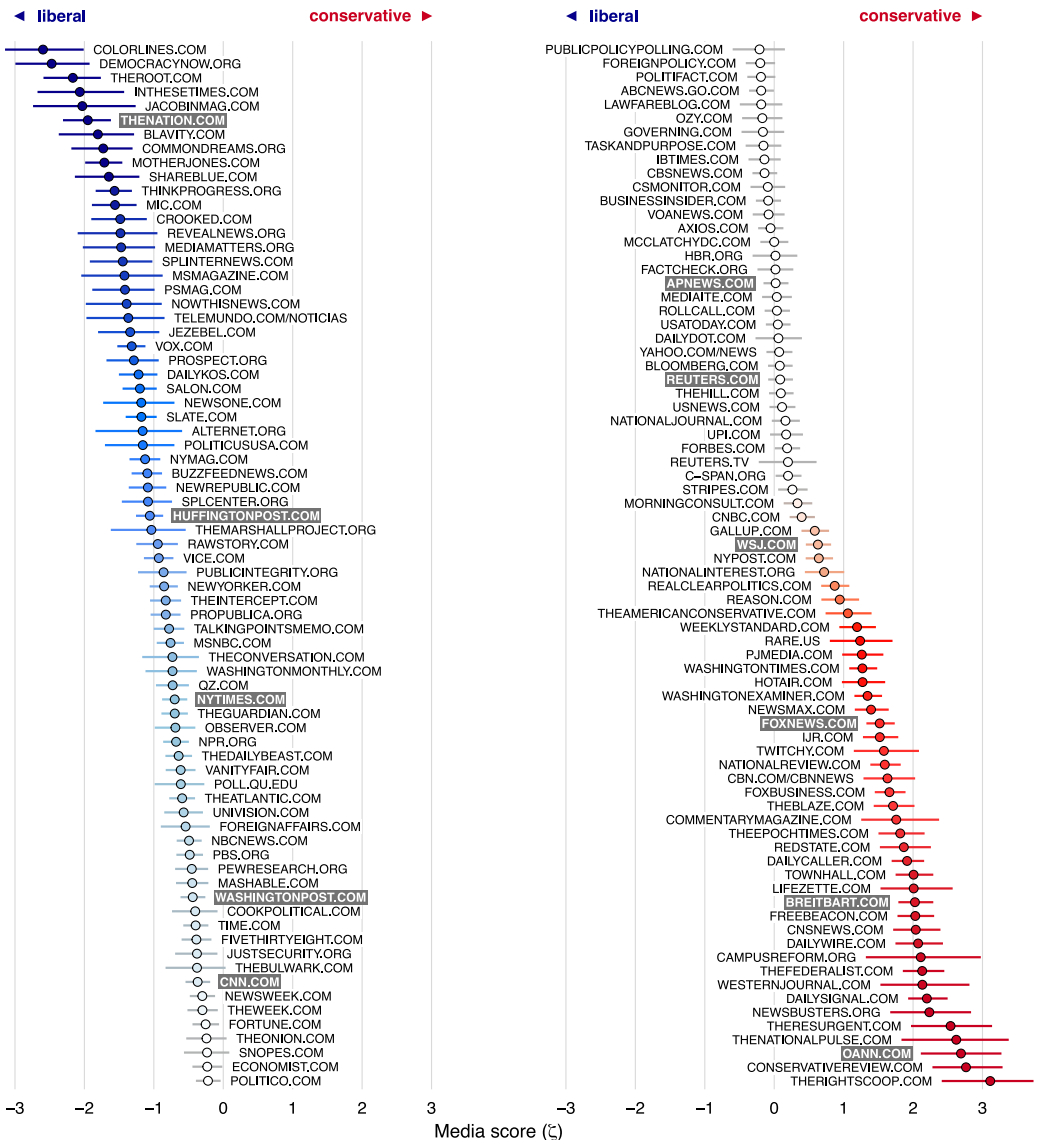

Figure 5. Ideology of news media organization as estimated from the news-sharing behavior of members of Congress. Horizontal lines indicate 90% credible intervals. Media organizations highlighted in gray indicate a number of well-known media organizations across the ideological spectrum to facilitate face validity comparisons.
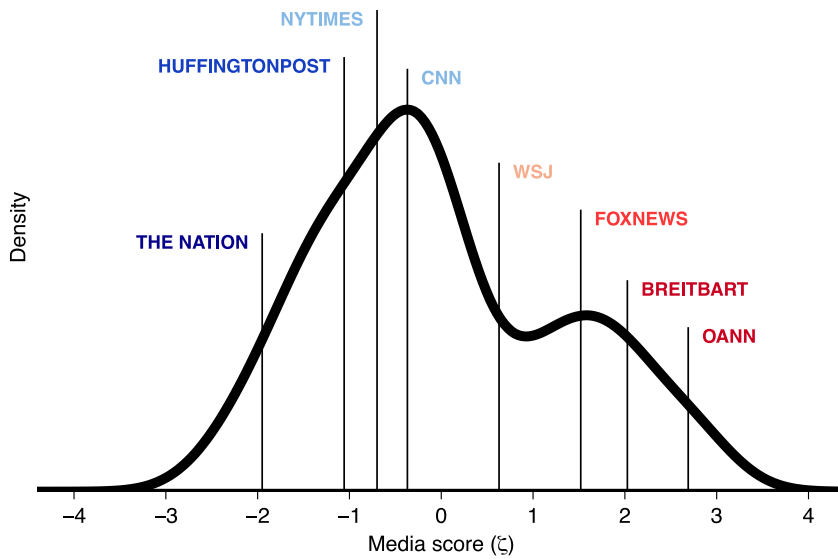
Figure 6. Density of the ideology of news media organizations as estimated from the news-sharing behavior of members of Congress. Named media organizations are highlighted to facilitate substantive understanding of the distribution.

organizations are bolded for reference. Overall, estimates of the ideology of news media organizations have high face validity, with alignment consistent with what observers of U.S. politics and political news media might expect. For example, *Breitbart News*, the far-right news organization prominent during the 2016 and 2020 U.S. presidential elections, is to the right of *FOX News*, which is to the right of the *Wall Street Journal*, the establishment center-right daily paper. On the left, the orderings have similar face validity. *HuffPost* and *The Nation*, for example, are to the left and far left, respectively, of the center-left *New York Times*, *Washington Post*, and *CNN*. Finally, the news wire services Reuters and Associated Press find themselves in the ideological center.[10]

Finally, the full ideological distribution of online news media is presented in Figure 6. As expected, given the ideological polarization of politicians and the electorate, the figure clearly shows a bi-modal distribution, with many more politically liberal news outlets on the left, and a smaller but meaningful group of conservative media on the right.

6. Do Politicians or the Politically Engaged Public Create More Polarizing Information Environments on Social Media?

Among the most important questions in the study of online political behavior are those concerning the level and consequences of polarization. This pertains especially to political discourse and information sharing (e.g., Bail *et al.* 2018; Bakshy *et al.* 2015; Barberá 2015b). In offline arenas, such as voting behavior in Congress, research shows that members of Congress are heavily polarized ideologically and have become increasingly so over time (Hetherington 2009). The literature is less clear on polarization among the general public (e.g., Abramowitz 2010; Fiorina and Abrams 2008). However, research suggests that

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[10]In Supplementary Appendix C, we show the estimated values of the dispersion parameters ω_m for each news media organization, where we see larger values for the mainstream media sites such as *The New York Times* and *FOX News*, suggesting that they are shared by more ideologically diverse sets of users than are smaller, more specialized sites (Green *et al.* Forthcoming).

U.S. politicians are substantially more ideologically polarized than their constituents (e.g., Bafumi and Herron 2010).

Yet whether online political behavior by politicians and the mass public who engage in politics matches conventional offline differences in ideological polarization is unknown. On the one hand, it may be that online political behavior naturally aligns with political attitudes and behaviors offline. On the other hand, communication of ideological positioning can vary across contexts for theoretically meaningful reasons. For instance, the constraints and incentives that determine how legislators vote on bills in Congress have been shown to differ from constraints and incentives that legislators face when discussing their positions on those bills and issues with constituents (e.g., Cormack 2016; Grimmer 2013a, 2013b). Finally, members of the mass public who share political information will be different for a variety of reasons from the mass public generally. For example, the users who share political news will potentially be more affectively polarized than others, with more ideologically polarizing sharing behavior than (nonpolitical) ordinary users. Furthermore, ordinary users, whether politically engaged or not, will also be less constrained by strategic considerations than politicians. Finally, Twitter users overall are shown to be more left-wing than the general public (Robertson, del Rosario, and Van Bavel 2024), and Democratic-identifying users shown to be less likely to want their representatives to compromise on the issues (Smith *et al.* 2020).

However, despite the importance of understanding differences between the online behaviors of politicians and citizens, our empirical understanding of these differences remains relatively shallow. This is, in part, because current approaches to understanding politicians' ideology tend to rely indirectly on ordinary users' perceptions of them. The path-breaking research by Bond and Messing (2015) and Barberá (2015a), for instance, use the following and endorsement behaviors of ordinary Facebook and Twitter users to estimate politicians' ideology, thus examining politicians indirectly through user behavior. One benefit of the measurement approach we use here is that it relies on equivalently measured behaviors from both politicians and users. This allows us to examine ideological polarization in online information sharing without relying on the behavior of users alone.

To investigate differences in the news media sharing ideology of politically engaged Twitter users and members of Congress, we present in Panel A of Figure 7 the distribution of media scores for politicians and politically engaged users on Twitter. As the figure shows, a large group of users on the left are estimated to be ideologically more liberal than the left-most member of Congress. This suggests that many of these users on the left (i.e., presumably Democratic users) share news media that is more liberal than news media shared by members of Congress. On the right side of Panel A, we see a much smaller set of Twitter users whose ideology is estimated to be more conservative than the right-most member of Congress. Stated differently, Democratic members of congress share much more moderate content than their co-partisans, while Republican members of congress and their co-partisans share mostly ideologically similar content.

We compare our estimates with those based on politically engaged Twitter users' following behavior (Barberá 2015a), as shown in Panel B. Estimates in Panel B are presented for the same users as in Panel A. They suggest that, based on the following data, a large set of Democratic legislators are to the left of the left mode of these users, and a large set of Republican legislators to the right of the right mode of these users. Thus, unlike with sharing data, estimates from a following-based measure of ideology do not suggest that there is a large set of users to the left of the left-most Democratic politician. This highlights the fact that different measures can lead to different ideological mappings of political actors and the politically engaged mass public. With following data, one captures what is effectively a perceptual measure of politicians' ideology based on how users perceive the ideological distance between themselves and politicians. By contrast, with sharing data, the ideological mapping of politicians and users is based on a behavior that is conducted equivalently by both politicians and users. Finally, as noted earlier, it is important to remember that estimates of the news-sharing ideology of users are for users who are politically interested (who follow at least one member of Congress) and who share news. Our estimates are thus for users who regularly share political news on social media. Among users who show less interest in politics, media scores would likely show them to be more moderate.
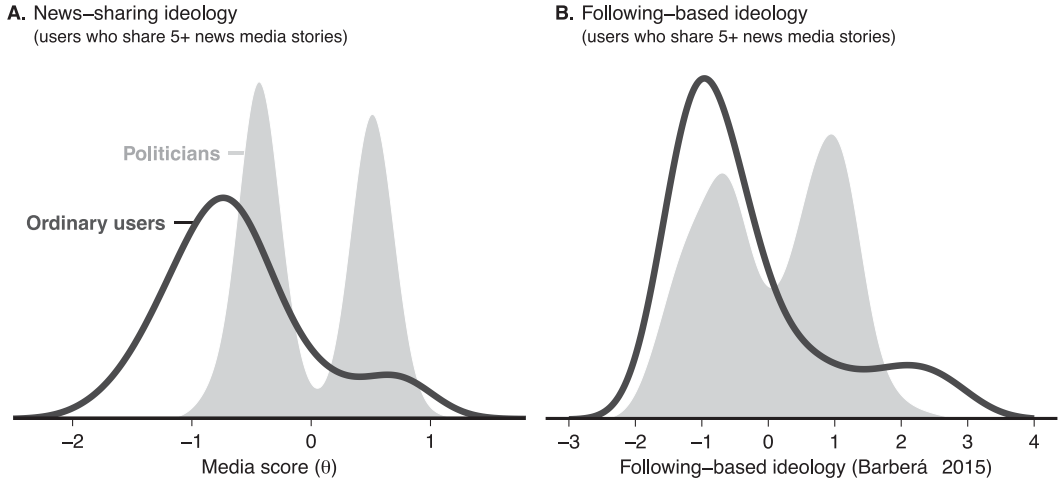
Figure 7. Ideology of politically engaged Twitter users and members of Congress as estimated using news sharing (media scores) and follower data (Barberá 2015a) on Twitter. Panel A presents estimates of the ideology of politically engaged Twitter users (in black) and members of Congress (in gray) based on their news-sharing data. Panel B presents estimates using the method based on the following behavior of users, as introduced by Barberá (2015a) (from data collected in 2018).

Importantly, however, it is these types of politically interested users who contribute to the political information ecosystem.

7. Does Election Competition Constrain Politicians from Sharing Ideologically Polarizing News Media?

We showed above that the ideology of politicians based on their sharing behavior is less polarized than that of politically engaged users who share news. What explains, however, variation in news-sharing ideology among politicians themselves? Answering this question is important because it highlights a key distinction between the behaviors of legislators as it relates to formal policy-making (voting) and how legislators communicate their policies, attitudes, and goals to the public.

Furthermore, as Barberá and Zeitzoff (2018) show, politicians are increasingly using social media to communicate with the public both during and outside of election campaigns. As others have shown, politicians communicate with their constituents in ways that differ depending on factors independent of their voting behavior. Grimmer (2013a) shows, for example, that legislators in districts with a large proportion of constituents who are co-partisans tend to emphasize their positions on the issues, whereas those in more heterogeneous districts emphasize appropriations to avoid alienating voters on the other side of a given issue. Information environments can thus be collectively unrepresentative of politicians' views if politicians who take public positions on issues are primarily those on the ideological extremes. Cormack (2016) shows similarly that politicians are highly selective in the votes that they emphasize to voters, with legislators in districts with many co-partisans highlighting more ideologically extreme votes than legislators in districts with more uniform mixes of co-partisans and out-partisans.

Relatedly, in a social media context, if politicians in electorally uncompetitive districts are more likely to share more ideologically extreme information and more political news generally, then the information ecosystem of political elites will be biased toward ideologically polarized sources. We investigate this empirically by testing whether electoral competitiveness is associated with how moderate or extreme the media scores of legislators are in a given district or state. Theoretically, politicians who face stiffer competition in a general election can be expected to have a more moderate news-sharing ideology (as a function of sharing less ideologically polarizing news media). This is because politicians in competitive elections will be wary of distancing themselves from moderate voters who may prove decisive. By

A. Do politicians in less competitive districts share more ideologically polarizing news content?
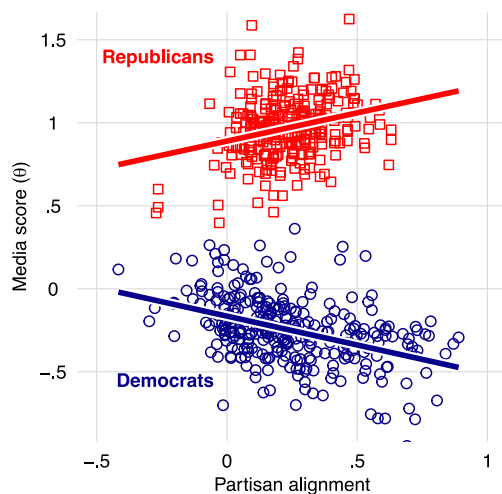
B. Do politicians who share more polarizing news content share more news content in general?
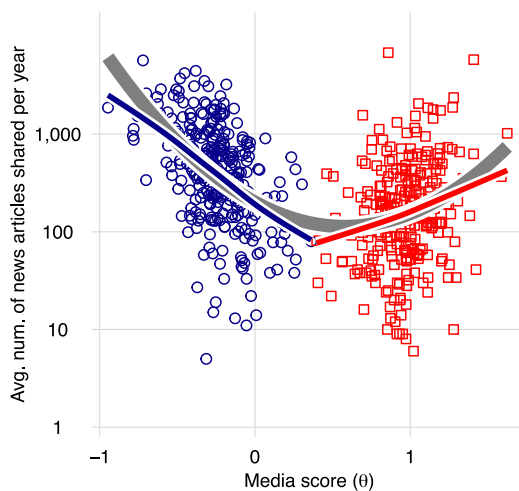

Figure 8. News-sharing ideology and the district/state partisan alignment of U.S. members of Congress and governors. Panel A compares how uncompetitive an electoral district is (how aligned in partisanship its constituents are to the politician who represents them) to the news-sharing ideology (media score) of that politician. Regression lines for members of each party are shown for reference. Panel B compares the media score of politicians to the number of news stories that they share on Twitter generally. The second-order polynomial regression line fit to all of the data, and the regression lines by party are shown for reference.

contrast, politicians who face less electoral competition can be expected to be less constrained with respect to moderate voters, freer to express more polarized ideological leanings, and thus more likely to demonstrate more ideologically extreme news-sharing behavior. Politicians in less competitive general elections can also be expected to be more fearful of primary election challengers from their ideological flanks. This creates incentives to appeal to primary voters through communications that emphasize the more extreme ideological leanings of co-partisan primary voters.

To test this, we measure district and state competitiveness by the difference in the vote share for Donald Trump and Hillary Clinton during the 2016 U.S. presidential election in each district/state. We then compute a measure of partisan alignment by reversing the measure for Democratic politicians, such that high values for all politicians indicate a partisan gap favorable to each legislator, and low values indicate a less favorable partisan context. This is similar to the measure used by Grimmer (2013a) to examine partisan district alignment and position-taking by legislators in offline political communications. Empirically, we expect that the more favorable the partisan competitive landscape, the more likely a legislator will be to exhibit more ideologically extreme news sharing.

In Panel A of Figure 8, we present the relationship between the media scores of members of Congress and the partisan alignment in their district or state. Upward and downward sloping lines represent linear regression models fit to data from Republican and Democratic politicians, respectively. Consistent with expectations, as the partisan alignment of a politician's district/state increases, so too does the ideological extremeness of their news sharing for both Democrats and Republicans. In Panel B of Figure 8, we demonstrate the relationship between politicians' media scores and the number of news articles they share (we take the log due to large differences in sharing behavior between moderates and those on the extremes). As Panel B shows, politicians with more ideologically extreme news-sharing behavior share substantially more political news media than do moderates. News media shared by legislators on Twitter, in other words, comes from a highly unrepresentative set of ideologically extreme politicians.

To examine the relationship between competitiveness and news-sharing ideology more systematically, we fit OLS regression models where the outcome is the media score of a politician, and the variable

Table 2. Relationship between the ideological extremity of news sharing and district/state alignment.

	DV: Ideological extremity of news sharing			
	(1)	(2)	(3)	(4)
District alignment	0.317	0.309	0.108	0.130
	(0.041)	(0.042)	(0.041)	(0.044)
Republican		0.009	0.009	0.008
		(0.016)	(0.015)	(0.015)
Senator		−0.017	−0.038	−0.036
		(0.021)	(0.019)	(0.019)
Nominate score			0.691	0.591
			(0.058)	(0.092)
Nominate score × Republican				0.161
				(0.114)
Intercept	−0.078	−0.077	−0.025	−0.030
	(0.013)	(0.016)	(0.015)	(0.016)
N	527	527	527	527

Note: Standard errors in parentheses. All estimates of the coefficient "District alignment" are statistically significant at the 99% level.

of interest is the partisan alignment of his or her district or state. Results are presented in Table 2. In the first model, we present the simple bivariate relationship, which shows that as the district/state-level partisan gap increases (electoral competitiveness), so too does the extremeness of a politician's news-sharing ideology. Results are similar in model (2), which includes covariates for a politicians' party and whether they are members of the House or Senate. In models (3) and (4), we then test whether this pattern holds if we account for legislators' voting-based ideology (NOMINATE score). As the results show, even when accounting for the ideology of legislators' voting records, politicians who represent districts or states with higher partisan alignment exhibit more ideologically extreme information-sharing behavior online (in all models estimates are statistically significant at the 99% level).

These descriptive results thus suggest that politicians' news-sharing strategies on social media are, in part, driven by legislators' local electoral constraints. Consistent with findings by Grimmer (2013a) and Cormack (2016), politicians use social media as a communications platform to selectively emphasize information to appeal either to a local partisan audience or to a general one: whereas legislators with highly partisan-aligned audiences emphasize ideologically extreme information online, those with mixed audiences (competitive landscapes) emphasize more moderate content. As data in Panel B of Figure 8 show, these more ideologically extreme members of Congress also share substantially more news media on social media, biasing aggregate representation of political information toward the ideological extremes.

8. Conclusion

Research into the attitudes and behaviors of politicians and users on social media has expanded rapidly in recent years. Much of this literature focuses either on the behaviors or discourse of political actors, or that of ordinary users. In this article, we provide a means to analyze the ideological foundations of the behaviors of politicians and users jointly by focusing on the sharing of news media links, a mode of behavior common to both sets of actors. In doing so, we develop methods for estimating the ideology for

both elite actors and the mass public that uses equivalent behaviors. Whereas other homophily-based measures of ideology estimate the ideology of elite actors based on public perceptions of those actors (i.e., which members of the public make the choice to follow those actors, or financially contribute to them), our measure allows the behavior of elite actors themselves to determine their ideology. We note that the way these measures are computed also suggests that one could identify legislators whose behavior is distinct from their public perception. Because sharing information through links is possible on multiple social media platforms (Facebook, Twitter, Threads, or future services), the ideology of content-sharing can be also examined within or across other platforms.

In the examples in this article, we empirically investigated the behavior of politicians and users on Twitter, both for ease of validating data from survey-linked users and from politicians, and because, as a platform heavily used by political elites, it is an important source of data for answering substantive research questions. Nevertheless, social media platforms may implement unexpected restrictions on data, such as changes in monetary costs of access and the types of data available (e.g., recent changes to X/Twitter). Fortunately, with respect to Twitter—which remains an important forum for understanding politicians' behavior—relatively little data from political actors may be required to calculate usable estimates of their news-sharing ideology (see Supplementary Appendix G) and we expect such data for members of Congress to continue to be available. More importantly, the method is, in principle, platform-agnostic. Thus, for social media platforms in the future, the method presented here can be used to compute media scores so long as the sharing of links is possible on a platform.

Other uses and extensions of the model are also possible. Sharing on social media of information analogous to news media could, for example, be used as supplemental data, and may perform similarly well if they contain strong ideological signals. For instance, links to channels of YouTube videos could straightforwardly be accommodated within the framework used here. And we note that in the currently rare case that sharing data are especially large (e.g., González-Bailón *et al.* 2023), our measurement model can be extended to estimate news-sharing ideology at the level of the news article itself, either using the model as-is, or, for instance, placing media organization priors on news-story ideology estimates. Finally, since our measure is based on what is a frequent behavior by political elites, it also can, in principle, allow for measuring ideological change over time within relatively short intervals (e.g., before and after U.S. primary elections). Extensions of our approach, for example, could include a dynamic component that captures changes in the ideology of news organizations and/or the users who share news (see, among others, Martin and Quinn 2002).

Using the fact that politicians' ideology can be estimated from their online sharing behavior allows us to inquire into the incentives that underlie politician's online communications. Substantively, our results suggest that election competition may act as a constraint on politicians from sharing ideologically extreme news media. Institutional and judicial efforts to create more electoral competition (e.g., by overturning heavily gerrymandered districts, Kenny *et al.* 2023) may thus have important indirect implications for the state of the polarized online information ecosystem.

The examination of news-sharing behavior is also central to a wide set of substantive questions in political science. Does the ideological extremeness of news-sharing change among the public and politicians during election campaigns? Is sharing by politicians during primary elections more polarized than during general elections? What is the ideological presentation of accounts controlled by foreign governments who seek to intervene in democratic elections? Do political events shape who shares news and from what sources? Does the ideology of news-sharing vary across social media platforms and why? What do the links to media from video channels (e.g., YouTube) tell us about the users who share them and the channels themselves? Finally, with estimates of the ideology of news media organizations themselves, one can investigate, for example, the prevalence of ideological echo chambers by examining the ideology of consumed media, examine ideological algorithmic biases in social media feeds, or investigate incidental exposure to cross-cutting political content.

In future research, we hope that the approach introduced here, and the accompanying statistical software, will provide researchers with the tools to help answer these and similar questions concerning online political behavior. We also hope our measure will allow for a richer study of congressional

behavior and congressional candidates' behavior. Just as measures such as NOMINATE scores (Poole and Rosenthal 1985), donation-based DIME scores (Bonica 2013), text-based measures (Slapin and Proksch 2008), and social media perception-based measures (Barberá 2015a; Messing and Westwood 2014) (among others) have greatly expanded our understanding of political behavior off- and online, we hope that examining the ideological underpinnings of online information-sharing will open further avenues for research into the study of behavior by politicians and the mass public.

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