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Partisan selective exposure in news consumption

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Abstract

The development of online social media has raised concerns about how individuals are over-exposed to partisan news. However, social media are only a part of the daily media diet of an average consumer (Allcott and Gentzkow, 2017; Allen *et al.*, 2020, Guess *et al.*, 2019). The aim of this paper is therefore to examine partisan news exposure with respect to the entire media diet. We develop a partisan selective exposure index that indicates the over-representation of partisan political opinions in individual daily news consumption. Our analysis of data from a survey of 4000 representative individuals in France regarding their news consumption and political stance shows that on average, partisan exposure is low when social media are excluded. Among traditional media, online versions of newspapers and radio contribute most to partisan selective exposure. The introduction of social media increases the index, especially for the youngest consumers. Another striking result is that the index is higher for far-left and far-right news consumers, and increases to between 55% and 78% for far-left groups, and between 40% and 58% for far-right groups when social media consumption is included.

JEL Codes: D83, L82

Key Words: Media, Selective Exposure, Partisan news, Internet and Social Media, Echo Chamber.

1. Introduction

Recent years have seen growing concern about the interplay between online media and democracy. Critics accuse social media, in particular, of exacerbating the polarization of people's political attitudes. The mechanism underlying this effect is referred to as the *filter bubble* phenomenon (Pariser, 2012) or the *echo chamber* (Sunstein, 2001; 2007; 2017). While consuming news online, internet users reduce their exposure to conflicting opinions in two ways. First, they naturally seek out information that is in line with their opinions and beliefs, in a high-choice environment; and second, algorithms and online media have learned to manage preferences to consolidate their audience, and propose more partisan content. With respect to social media, a growing body of empirical studies reports conflicting results on the existence of such a phenomenon (Halberstam and Knight, 2016; Goel *et al.*, 2010; Barberá, 2015).

In practice, social media only represents a part of overall news consumption, and its importance should not be overestimated (Allcott and Gentzkow, 2017; Guess *et al.*, 2019). In a recent study, Allen *et al.* (2020) showed that it only represents 14% of Americans' daily media diet. Television, radio or newspapers are other platforms where individuals have been

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consuming news for decades. According to the latest Standard Eurobarometer (European Commission, 2019), television remains the most-consumed news platform in Europe: 90% of Europeans watch television on a television set at least once a week, followed by radio (74%), social media (64%) and the written press (55%). On each of these platforms, consumers can choose from a wide range of media outlets with different political slants. This makes the information ecosystem of an individual, and selective exposure to different points of view very complex. In this context, the aim of this paper is to study how the media diet exposes individuals to like-minded content. Can we identify those who consume news media that are most aligned with their political views? Do they over-consume partisan news outlets when consuming online media?

As far as we know, the study by Gentzkow and Shapiro (2011) is the only attempt to investigate how cross-platform news consumption impacts the way people are selectively exposed to different opinions. The authors find that individuals consume more like-minded news online than offline, even if the absolute level is low. To extend this earlier work, we propose a measure of ideological exposure at the individual level that considers the global news diet: we call this the selective exposure index. This index indicates, for an individual, the share of daily news consumption that reflects her or his ideological opinions. To measure the degree to which an outlet contains like-minded news, we compare the political position of the individual and the political position of the audience of the consumed outlet (Gentzkow and Shapiro, 2011). However, as each social media user is exposed to a personalized set of news, we cannot approximate the slant of a social media outlet by the ideology of its audience. To overcome this limitation, we propose three scenarios that range from a situation where the media is as partisan as the most partisan platform, to a situation where it is as partisan as the least partisan platform. Our index is one of the first measures that can reflect the consumption of partisan news outlets in the overall media diet of an individual.

We then apply this index to a representative sample of French news consumers. We draw upon an original survey conducted among 4,000 French individuals who were asked about their news consumption in the previous week on all platforms (television, radio, newspapers, pure players, news aggregators and social media) and their political stance. The representativeness of our survey enabled us to estimate the global selective exposure of the French population and the contribution of each platform. At the individual level, we analyze the socio-economic determinants of partisan selective exposure, as well as the role of political position. In a context of increasing mistrust of online news sources (following the Cambridge Analytica scandal, the emergence of fake news, etc.) we focus, in particular, on the role of online consumption.

Our results show that, without social media, the average news consumer is only selectively exposed to 3.5% more like-minded information compared to someone who is randomly exposed to a representative bundle of news outlets. Online newspapers and listening to the radio contribute most to the increase in the index. Furthermore, we document an increase in selective exposure to partisan information when online social media are introduced. The latter dramatically changes the determinants of selective exposure: the youngest are more selectively exposed to partisan news, as well as individuals who hold views that are on the left and right wings of the political spectrum (compared to moderates). Finally, the selective exposure index increases drastically for far-left and far-right news consumers, and this effect is mainly driven by consumption on social media.

Our paper is organized as follows. In the next section, we review the literature on selective exposure, then describe our dataset, before presenting our methodology and the index of like-minded selective exposure. Finally, we present our results, discuss their implications and conclude.

2. Literature review

Our paper contributes to the literature on selective exposure (Festinger, 1957), defined as an individual's tendency to select information that is aligned with prior attitudes or like-minded sources (Guess *et al.*, 2018). This literature is the subject of renewed interest in an environment characterized by the expansion of media choice that is, in turn, driven by a multitude of new technologies (cable, satellite, etc.) and the reduced cost (in terms of time, effort and money) of digitalization. This renewal began with the development of cable television in the United States. Empirical evidence indicates that 'traditional' news consumption is characterized by selective exposure to partisan outlets (Stroud, 2008; Iyengar and Hahn, 2009). For instance, Republicans are more likely to watch Fox news, while Democrats tend to favor CNN. Skovsgaard *et al.* (2016) show similar patterns in Sweden.

As scholars and observers have noted, selective exposure to partisan news is likely to be reinforced in the online context by three factors. The first is homophily², where users of social networks develop links with like-minded others (Bisgin *et al.*, 2012; De Choudhury, 2011). Secondly, the internet creates the well-known *echo chamber* phenomenon (Sunstein, 2007, 2017).³ Compared to traditional media, online platforms allow consumers to easily choose only the news they agree with. Third, the echo chamber phenomenon is reinforced by *filter bubbles*, a term coined by Pariser (2012). Selective like-minded exposure could result not only from the choices of individuals, but also from algorithms that select content according to the user's previous behavior, or that of someone who shares the same tastes and opinions. To study this phenomenon, Bakshy *et al.* (2015) collected data on a sub-sample of users who self-identified as liberal or conservative on Facebook. They reported that the Facebook algorithm provided a less diverse choice set, and that the self-selection led users to see less news with a different ideology (6% among liberals and 17% among conservatives).

However, much of the literature only focuses on a particular platform (e.g. television or social media), while the media diet of a typical individual is more diverse (Allcott and Gentzkow, 2017; Allen *et al.*, 2020; Guess *et al.*, 2019). For example, Flaxman *et al.* (2016) compared selective exposure on social media to other online platforms (such as online newspapers). Using tracking data to measure news consumption in the United States, and voter geo-localization to indirectly estimate the average media slant, the authors found that internet

² The term *homophily* finds its origins in the sociological literature, notably the work of Lazarsfeld and Merton (1954). It is based on the principle that the frequency of contact is higher among individuals who have similar characteristics and values than among those with dissimilar views. For more details, see McPherson *et al.* (2001).

³ Sunstein (2017) explains the creation of the echo chamber in these terms: "A lot of people love reading things that fortify and confirm their own opinions — and, by definition, people like reading about topics that interest them. So, freedom of choice can produce self-sorting, in which people enter echo chambers or information cocoons. Each of us can create and live in a "Daily Me." That was not widely anticipated. I wouldn't say that we are now more isolated from diversity; there's a lot of diversity out there, in terms of how isolated people are from diversity. But many people do like to isolate themselves, and that's a big problem." <https://today.law.harvard.edu/danger-internet-echo-chamber>. Christina Pazzanese/ Harvard Staff Writer, March 24, 2017.

users who consumed news on social media were more likely to be exposed to news from the opposite side of the political spectrum. The study also reports that the vast majority of online news consumption takes the form of individuals who visit the homepage of their favorite outlet. Studying online news consumption during the 2016 presidential campaign in the United States, Peterson *et al.* (2021) report greater partisan selective exposure, even if the absolute level is low.

It should be noted that these studies focus on selective exposure to online news, regardless of the consumption of offline media. To overcome this limitation, Gentzkow and Shapiro (2011) analyzed how online and offline platforms impact the way consumers are selectively exposed to partisan news. They constructed an isolation index, inspired by the literature on spatial segregation. The aim was to measure the share of conservatives (liberals) who disproportionately visited news outlet whose visitors were mainly conservative (liberal). Applied to news consumption in the United States, they found that the isolation index was low for online news consumption but, nevertheless, higher than offline consumption (except for offline newspapers and face-to-face social interactions). Halberstam and Knight (2016) calculated the same isolation index for Twitter.⁴ Compared to results reported by Gentzkow and Shapiro (2011), they found that the use of Twitter was as partisan as face-to-face interactions, and much higher than traditional media outlets such as newspapers and television.

Although these papers provide evidence about the relationship between media platforms and consumer exposure to different ideologies, they do not help in estimating the individual distribution of partisan selective exposure, and its determinants. Our analysis addresses this gap. We build an index of individual selective exposure to partisan news outlets and apply it to consumption data from France. Using a survey, we are able to link individual political opinion to the political slant of the media that is consumed.

3. Data

Data used in this article are drawn from an online survey conducted in May 2019 among 4,034 individuals representative of the French population. Age, location, gender and socio-professional categories were the criteria used to ensure representativeness. The online survey was managed by a professional agency, and respondents benefited from non-systematic incentives. A key feature of the survey was to collect accurate information about both news consumption and political ideology.

On the consumption side, respondents were asked to indicate which platforms they had consulted, and the news outlets they had consumed in the previous week. Offline platforms were television, radio, and newspapers, and online platforms were television, radio, newspapers, pure players, aggregators, and social networks. For each platform that was consulted at least once a week, respondents were presented with a list of different outlets, and asked to check the corresponding box if he or she had consumed that media. Appendix A lists all outlets. For television and radio, the list was close to exhaustive, as there are not many television channels (especially those broadcasting news programs). We cross-checked the selected media with figures published by Mediamétrie, the main source of audience

⁴ This isolation index was based on links between followers of Twitter accounts associated with candidates in the 2012 United States election.

measurement in France. For newspapers (in magazine format, or weekly or daily media) we relied on the ranking published by the Alliance for Press and Media Figures (*Alliance pour les Chiffres de la Presse et des Médias*), which provides statistics. Pure players are the fuzziest category, as no official classification exists, and the distinction between a media outlet and a successful participative blog is sometimes difficult. We arbitrarily selected 18 of what we considered to be the best-known sources. For aggregators and social media, the choice was more limited, and we relied on various surveys of internet use in France. Finally, for each platform, respondents were able to add other items that were not already included on the list.

Table 1 reports online and offline news consumption for the 4,034 individuals who took part in the survey. It indicates that offline television is the preferred platform (87%), followed by offline radio (68%), social media (55%), and online newspapers (49%). These percentages are similar to those obtained in November 2019 in France (European Commission, 2019) and a similar distribution is found in other European countries.

Asking people about their political preferences has a long tradition in the social sciences. Large international surveys such as the World Value Survey or the European Value Survey (EVS) have helped to standardize questions about political stance. Therefore, the following question was included to evaluate the political ideology of individuals: “In politics, people talk about ‘left’ and ‘right’. Where do you fall on this scale in general terms? (*from 1 = Left to 10 = Right*)”.⁵ Respondents were invited to position themselves on the scale, but could also answer “Don’t know”. A total of 19% of respondents indicated “don’t know” or refused to answer the question. This percentage is the same as in the 2018 wave of the EVS (2020). This sub-sample of non-positioned respondents is characterized by their lack of interest in news⁶; they consume fewer media outlets overall, but no more online social media (see column 3 in Table 1). These respondents were excluded from the analysis, as the aim was to measure whether people consume media that is politically like-minded. The cleaned dataset consisted of 3,163 responses from people who declared a political position on the left/ right axis.

⁵ This representation of political opinions is more relevant in the context of French politics, where a left/ right axis is more usual than a conservative/ liberal axis.

⁶ On a scale of 1 to 10, 78% of this group declared an interest in news below or equal to 8, compared to 54% for the rest of the sample.

Table 1: News outlet consumption.

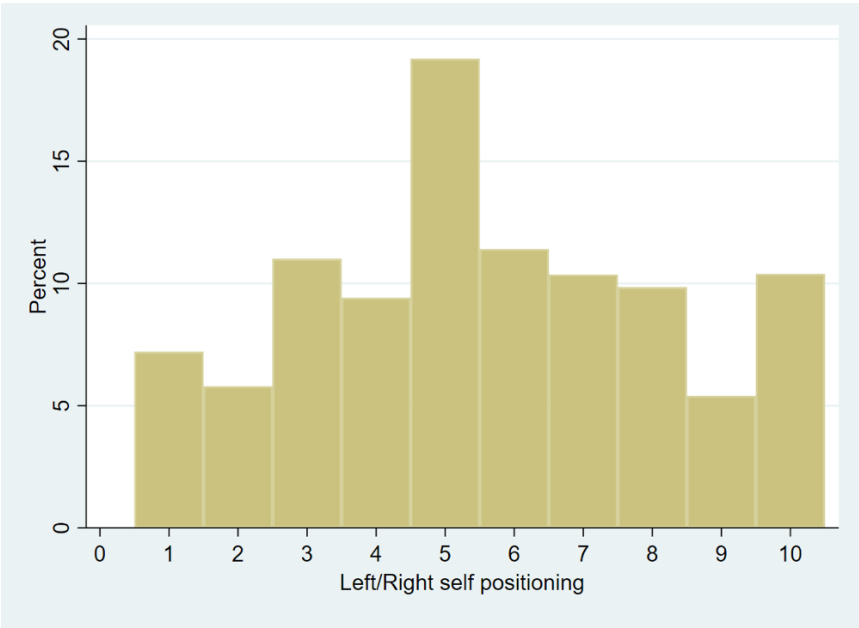
		(1) n = 4034	(2) n = 3163	(3) n = 772
Offline consumption	Television	87%	90%	79%
	Radio	65%	70%	54%
	Newspaper	43%	48%	28%
Online consumption	Television	33%	35%	27%
	Radio	20%	22%	16%
	Newspaper	49%	55%	35%
	Pure player	29%	32%	20%
	Social media	55%	57%	54%
	Aggregator	41%	44%	32%

Note: Column (1) presents results for the initial sample. Column (2) excludes respondents who did not declare a particular political position or who did not complete all of the survey. Column (3) shows those who did not indicate their political position.

Figure 1 shows the distribution of responses for the final sample. These results are consistent with the results of recent large-scale surveys, such as the EVS (2020). The mode of the distribution is 5 (19.2% of respondents). While the hierarchy of responses is the same as that of the EVS, a difference appears at the far right of the axis. Those who answered 9 and 10 in our survey represent 12% of the sample, compared to only 5% in the 2018 wave of the EVS (2020). Although this is surprising at first glance, it is possible that the French population has recently moved to the right. A survey of 1,000 individuals in the same period (June 2019) found that far-right partisans represented 11% of the sample.⁷ Moreover, our figure does not seem to be an overestimate, given the results of the most recent presidential and European elections in France, where the leading right-wing nationalist party obtained more than 20% of the vote – this percentage corresponds almost exactly to the proportion of respondents who answered 8, 9 or 10 to the political orientation question (1 = left to 10 = right).

⁷ <https://www.ifop.com/wp-content/uploads/2019/06/116XXX-Rapport-Atlantico.pdf>

Figure 1: Self-positioning on the left/right political ideology axis.



4. Measuring partisan selective exposure in media consumption

To determine whether people consume partisan news outlets we developed an original index to evaluate selective exposure in news consumption at the individual level. This index indicates to what extent the news outlets that an individual consults exposes the person to news that reflects her or his personal ideological opinions. The first step was to estimate the ideological slant of different media.

Media slant

On the one hand, media slant can be driven by supply, when media owners, governments, lobbies, editors or journalists express their views and decide what news to cover (Baron, 2005, 2006; Besley and Prat, 2006). On the other hand, it can be driven by demand if the content is based on audience preferences (Mullainathan and Shleifer, 2005; Gentzkow and Shapiro, 2006). The latter is explained by the fact that news outlet business models are highly dependent on advertising (Anderson and Gabszewicz, 2006). Moreover, in a market with heterogeneous preferences among consumers, media have to horizontally differentiate themselves.

Drawing upon the assumption that news production in each media reflects consumer preferences (Gentzkow and Shapiro, 2010; Freitag *et al.*, 2021), Gentzkow and Shapiro (2011) present a method to determine media slant. They approximate it as the share of republican readers compared to the total audience for that media (or the sum of republican and democrat consumers). The resulting measure indicates the degree to which a news outlet has a republican audience (see also Newman *et al.*, 2017; Flaxman *et al.*, 2016).

We applied this audience-based methodology to the French media market. In France, a left/right axis is more usual than a republican/ democrat division, and we therefore estimated, for each media outlet, its slant as the percentage of consumers with a particular political opinion (left, moderate or right-wing) compared to the total audience. Appendix A presents the

method in detail. It should be noted that the method measures media slant if and only if the news outlet offers the same content to all consumers; it is thus unable to evaluate the slant of social media, where each user views her or his own set of news. Furthermore, it should be noted that social media do not produce news. They are an intermediary between producers and consumers. Due to these limitations, we do not calculate social media slant using the method proposed by Gentzkow and Shapiro (2011) – instead, section 5 outlines the method used.

The index of partisan selective exposure

The purpose of our index of partisan selective exposure is to reflect how media that are consulted expose an individual to news that reflect her or his personal opinions and beliefs. First, we used the 10-point scale described in section 3 to classify respondents into three categories: left wing (between 1 and 4); right wing (between 7 and 10); and moderate (5 or 6). We then measured exposure to a particular political slant. For example, if a media outlet’s audience is 70% left wing, we consider that someone who visits that outlet is exposed to 70% left-wing content. Each individual is thus exposed to different opinions, depending on the slant of the media they visit. This approach makes it possible to estimate, for each individual, his or her exposure to partisan opinions when visiting different news outlets. The index is calculated as follows.

Let $p = \{1, \dots, P\}$ be a platform (online and offline television, online and offline newspapers, online and offline radio, pure players, aggregators and social media) and $j = \{1, \dots, J\}$ be a news outlet (TF1, Le Monde, Google News, etc.). Individuals are indexed as $i = \{1, \dots, N\}$, and J_{ip} represents the number of outlets an individual i consumes on platform p . Each individual is associated with a political ideology $s = \{left, moderate, right\}$. N_j is the number of individuals who visit the news outlet j and N_{js_i} is the number of individuals visiting the news outlet j and sharing the ideology s of the individual i .

Formally, we define the selective exposure index as follows:

$$\forall s = \{left, moderate, right\},$$

$$I_i^{SE} = \left(\frac{\sum_{p=1}^P \sum_{j=1}^J (N_{js_i}/N_j) \times w_{ip}}{\sum_{p=1}^P w_{ip} \times J_{ip}} \right) \times N/N_s$$

where $\sum_{j=1}^J N_{js_i}/N_j$ indicates, for an individual i of a particular opinion s , her or his selective exposure to partisan opinions when visiting different news outlets. For instance, a left-wing individual who consumes one media outlet that is visited by 30% left-wing individuals is selectively exposed to 0.3 like-minded opinions. The fact that the rest of the audience is composed of 70% moderates, or 20% moderates and 50% of people holding right-wing views, does not change the value of the index.

To capture consumption frequency, we weight $\sum_j N_{js_i}/N_j$ by w_{ip} . This is available for each individual at the platform level. It can take four values: 1 if the platform is visited every day; 0.6 if visited 3 to 5 times a week; 0.2 if visited 1 or 2 times a week; and 0 if visited less than once a week. This value captures whether someone is selectively exposed to news every day. If an individual i reports watching offline television daily and visiting two channels, it implicitly assumes that i watches these two channels in the same proportion.

$\sum_{p=1}^P \sum_{j=1}^J N_{js_i}/N_j \times w_{ip}$ captures daily selective exposure to partisan opinions over all media outlets and platforms. If it is equal to one, then individual i is exposed to one unit of like-minded information every day. This could either be because the person reads a newspaper whose audience is composed of 100% of people with the same ideology, or because she or he listens every day to one radio station, and watches one television channel where half of the audience has the same ideology as that individual ($\sum_{p=1}^P \sum_{j=1}^J (N_{js_i}/N_j) \times w_{ip} = 0.5 \times 1 + 0.5 \times 1$). However, in the second case, the individual is also exposed to news with a different ideology, as half of the audience of the two outlets is made up of people who have different opinions. Thus, the selective exposure index is a mean: it indicates the daily proportion of like-minded exposure compared to total exposure (*i.e.* the number of outlets j consumes weighted by i 's consumption frequency).

In the previous example, the index of an individual who reads a newspaper whose audience is composed of 100% of people with the same ideology is equal to 1 ($\frac{1 \times 1}{1 \times 1} = 1$), indicating exclusive consumption of partisan content. The index of an individual who listens every day to one radio station and watches one television channel where half of the audience shares the same partisan ideology is equal to 0.5 ($\frac{0.5 \times 1 + 0.5 \times 1}{1 \times 1 + 1 \times 1} = 0.5$), meaning that the person is selectively exposed to 50% like-minded content on a daily basis.

Finally, N_s/N normalizes the index with regard to the initial distribution of ideologies. As media slant is based on audience ideology, news outlets with a majority right-wing audience produce more right-wing information, thus we can expect that, on average, right-wing individuals are exposed to more like-minded information. We overcome this issue by dividing the index by the share of s -type individuals in the population (N_s/N). This ratio represents the share of ideology in the population. If an individual is selectively exposed to more partisan content than N_s/N , this is because the person consumes news outlets where the audience of type s is over-represented.

Put differently, if for an individual i ,

$$I_i^{SE} > 1, \quad \frac{\sum_{p=1}^P \sum_{j=1}^J (N_{js_i}/N_j) \times w_{ip}}{\sum_{p=1}^P w_{ip} \times J_{ip}} > N_s/N,$$

then consumption choices expose the person to more like-minded information than an individual who makes random choices; the reverse is true if $I_i^{SE} < 1$

Our index can be interpreted as an indicator of the over-representation of partisan opinions in individual daily selective exposure. A value of one for a left-wing individual means that the person is exposed to exactly the same proportion of left-wing news as a random left-wing individual who consumes a representative bundle of news outlets. A value greater than (below) one means that the person is exposed to more (less) left-wing news than the equivalent random news consumer.

We also implicitly assume that for a given audience each platform exposes individuals in the same way. Whether watching news on television, listening to the radio, reading a newspaper or consulting a pure player website on a smartphone, news reaches the audience in the same way.

5. Results

This section presents the results of our application of the index of selective exposure to a representative sample of the French population. As noted in section 3, this sample only includes respondents who declared holding a particular political position and who answered all of the survey questions. As noted previously (section 4), this index is first examined without taking social media consumption into account (they are introduced later in this section).

5.1. Distribution of the partisan selective exposure index

Overall

The distribution of I_i^{SE} , the index measuring daily exposure to like-minded content in news consumption is shown in Figure 2 and Table 2. We observe that the mean (1.036) is above one, which suggests that the partisan exposure of the average news consumer is 3.6% higher than an individual who consumes a representative bundle of news. This is not a remarkable difference, and shows that, on average, French people are not selectively over- or under-exposed to partisan content in their news consumption. As the audience is concentrated on the most ideologically balanced outlets (see Appendix A), the average consumer is not especially over-exposed to like-minded information. Figure 3 sheds more light on the overall distribution, with each bin in the histogram representing a decile of the distribution. The right (left) tails show consumers who are selectively exposed to more (less) partisan information than the average. Although the index is highly concentrated around the mean, almost 20% of individuals in the sample (the last two deciles) are selectively over-exposed to partisan news by at least 10%. The last decile and the last 5% of the sample are respectively over-exposed by 15% and 21%. The left tail of the distribution is less stretched, reflecting the fact that individuals who are selectively under-exposed to partisan information are scarcer. The first decile corresponds to consumers who are 8% under-exposed to partisan information.

Figure 2: Distribution of the selective exposure index

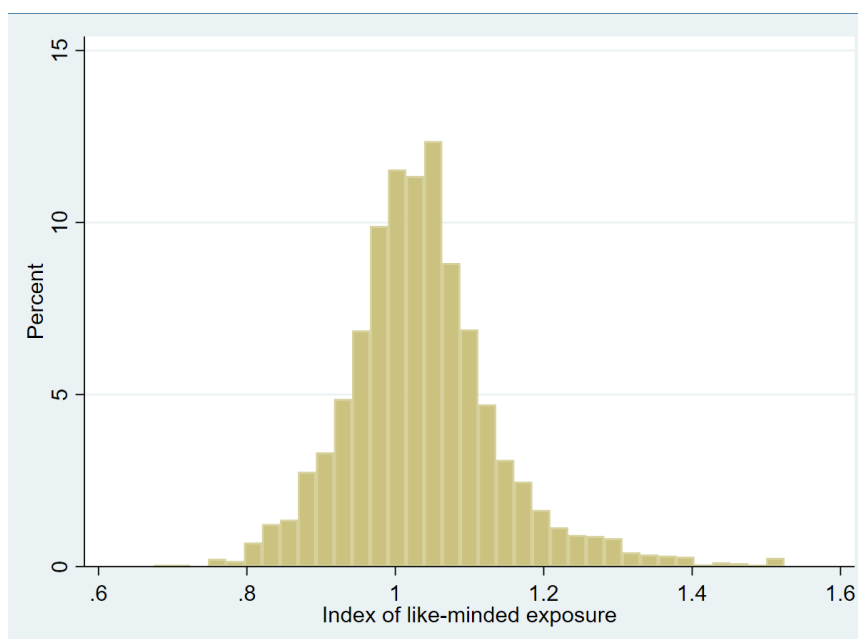


Figure 3: Distribution of the selective exposure index with bin limits as deciles.

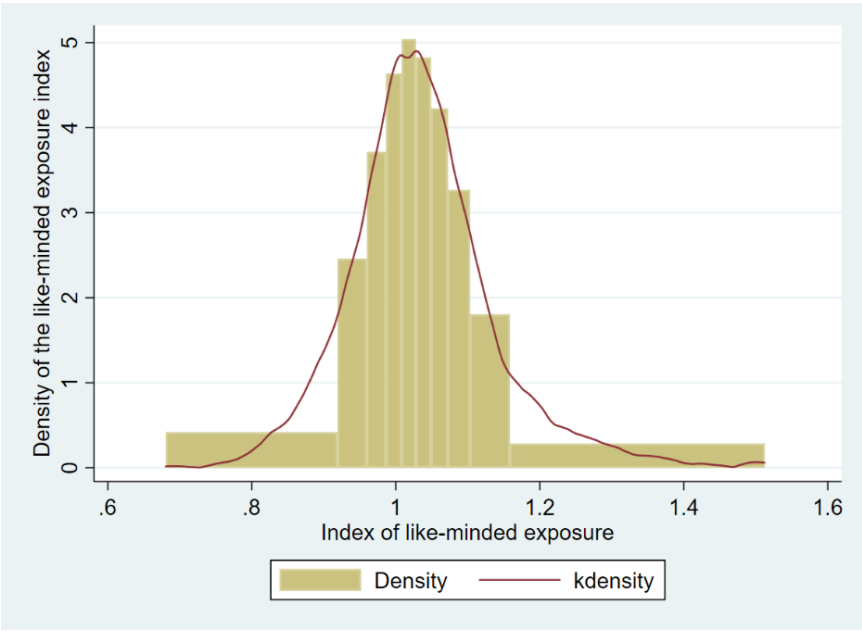


Table 2: Descriptive statistics for I_i^{SE} .

	All (n = 3,163)	By platform							
		Offline TV	Offline Radio	Offline newspaper	Online TV	Online radio	Online newspaper	Pure player	Aggregators
Mean	1.036	1.024	1.042	1.045	1.034	1.05	1.041	1.071	1.013
Sd	0.103	0.086	0.166	0.146	0.12	0.172	0.137	0.241	0.127
25th	0.977	0.957	0.941	0.957	0.963	0.945	0.958	0.878	0.909
50th	1.028	1.026	1.037	1.014	1.045	1.057	1.01	1.02	1.037
75th	1.086	1.073	1.105	1.088	1.107	1.114	1.115	1.262	1.118

By platform

Figure 4 shows the distribution of the index as a function of the platform (online and offline) with kernel density estimates. Highly-centered platforms are those where left- and right-wing individuals are less selectively over- or under-exposed to content reflecting their own political slant. A fat right tail in the distribution shows where consumers use the platform to consume proportionally more partisan news and, symmetrically, the left tail shows where there is a higher proportion of news consumers who consult media outlets reflecting opposite opinions.

The diversity of distributions shown in Figure 4 reflects the fact that each platform contributes in a different way to selective exposure (see also Table 2). The distribution of the index for offline television is highly centered and symmetrical, while for pure players it is more bimodal. Offline television does not seem to contribute to the over- or under-exposure of an individual to like-minded content, confirming that this platform has a large and ideologically diverse audience. Consumption patterns for pure players highlight individuals who are over-exposed (right tail) and under-exposed (left tail) to content reflecting their own political slant. This indicates that where there are right (left) wing individuals who mainly consume right-wing (left-wing) oriented media, there are also others who consume media reflecting other

ideologies. The distribution for newspapers (especially online versions) has a relatively large right tail, suggesting that this platform could play a significant role in selectively over-exposing individuals to partisan content. The consumption of radio also seems to favor selective exposure to partisan news outlets; here, the distribution is relatively stretched compared to other platforms, but strongly centered to the right of one.

To assess the role of each platform, we ran a simple regression of the selective exposure index on daily use. The results are shown in Table 3, and are in line with what we observe in Figure 4. Daily consumption of news provided by offline radio or online newspapers is positively associated with selective exposure to partisan content. Inversely, exposure to offline television or aggregators is associated with a lower value of the index. The difference between offline and online versions of a platform (for instance, newspapers) highlights the role played by the platform and the distribution channel, independent of the media. The non-significance of the coefficient of the variable “Daily use of pure players” could be explained by the bimodal distribution of the index (see Figure 4).

Figure 4: Index of selective exposure as a function of online and offline platforms.

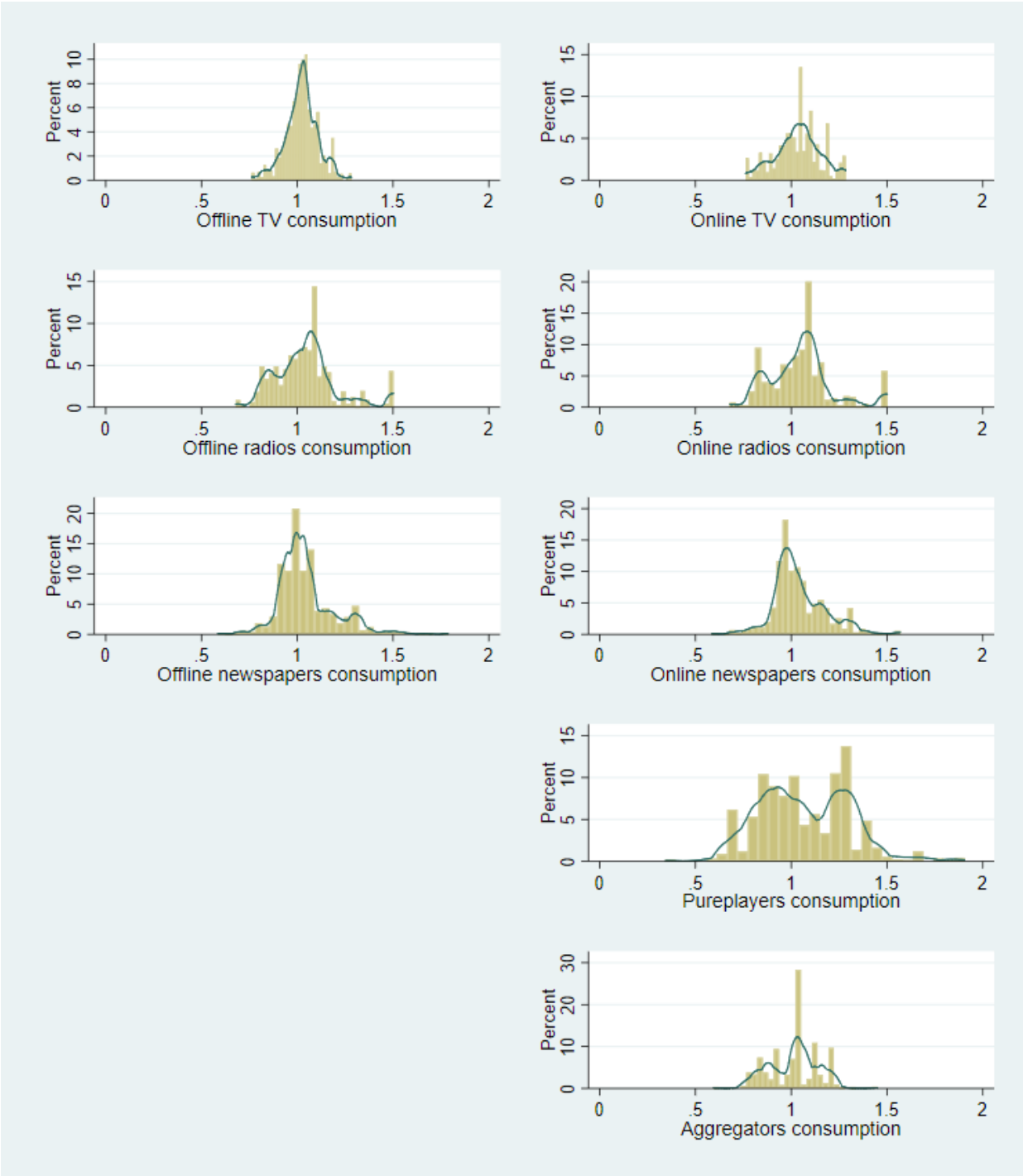


Table 3: Estimation of the effect of the frequency of news consumption on each platform on the selective exposure index.

VARIABLES	I_i^{SE}
Daily use of TV (offline)	-0.020*** (0.004)
Daily use of TV (online)	0.002 (0.006)
Daily use of radio (offline)	0.024*** (0.004)
Daily use of radio (online)	0.005 (0.008)
Daily use of newspaper (offline)	-0.005 (0.005)
Daily use of newspaper (online)	0.011** (0.005)
Daily use of pure players	0.003 (0.007)
Daily use of aggregators	-0.015*** (0.005)
Constant	1.041*** (0.004)
Observations	3,163
R-squared	0.023

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

5.2. Individual determinants of partisan selective exposure

In this sub-section, we focus on socio-demographic characteristics (age, education, size of the city of residence and income), political ideology, and the use of the internet to consume news (% of online consumption in the media diet) as possible determinants of selective exposure. Table 4 shows summary statistics. Table 5 indicates the estimation of the determinants of the index I_i^{SE} . Columns 1, 2 and 3 show the different determinants (respectively, socio-demographic characteristics, political ideology and online consumption) and Column 4 pools these determinants in the same specification. All regressions use ordinary least squares estimates with robust standard errors.

Table 4: Summary statistics.

	N	Mean	SD	min	max
% of online consumption	3163	.345	.276	0	1
Political ideology					
Left wing	3163	.334	.471	0	1
Moderate	3163	.305	.46	0	1
Right-wing	3163	.359	.48	0	1
Gender					
Male	3163	.514	.5	0	1
Age					
[18–24]	3163	.083	.275	0	1
[25–34]	3163	.125	.331	0	1
[35–49]	3163	.271	.444	0	1
[50–64]	3163	.311	.463	0	1
[65+]	3163	.211	.408	0	1
Education					
Did not complete high school	3163	.21	.408	0	1
High school	3163	.221	.415	0	1
Undergraduate	3163	.236	.425	0	1
Postgraduate	3163	.333	.471	0	1
City size					
City size <2000	3163	.175	.38	0	1
City size [2000–20 000]	3163	.157	.364	0	1
City size [20 000–100 000]	3163	.146	.353	0	1
City size >100 000	3163	.354	.478	0	1
Paris region	3163	.168	.374	0	1
Income (€)					
Income <1500	3163	.164	.371	0	1
Income [1501–2500]	3163	.251	.434	0	1
Income [2501–3500]	3163	.268	.443	0	1
Income >3500	3163	.262	.44	0	1

Table 5: Estimation of selective exposure index determinants.

VARIABLES		I_i^{SE}	I_i^{SE}	I_i^{SE}	I_i^{SE}
		(1)	(2)	(3)	(4)
Online news	% of online consumption			0.013	0.014
				(0.007)	(0.008)
Political ideology	Left-wing		0.032***		0.031***
Ref: moderate			(0.005)		(0.005)
	Right-wing		0.061***		0.059***
			(0.003)		(0.003)
Gender	Male	0.001			-0.001
		(0.004)			(0.004)
Age	[18–24]	-0.031***			-0.027***
Ref: 65+		(0.007)			(0.008)
	[25–34]	-0.015**			-0.012
		(0.007)			(0.006)
	[35–49]	-0.013***			-0.010**
		(0.005)			(0.005)
	[50–64]	-0.007			-0.004
		(0.005)			(0.005)
Education	Did not complete high school	-0.024***			-0.022***
Ref: Postgraduate		(0.006)			(0.005)
	High school	-0.023***			-0.021***
		(0.005)			(0.005)
	Undergraduate	-0.016***			-0.014***
		(0.005)			(0.005)
City size	<2000	0.007			0.010
Ref: Paris region		(0.007)			(0.006)
	[2000–20 000]	-0.000			0.001
		(0.006)			(0.006)
	[20 000–100 000]	-0.002			-0.001
		(0.006)			(0.006)
	>100 000	-0.000			0.001
		(0.006)			(0.005)
Income (€)	<1500	0.008			0.008
Ref: >3500		(0.006)			(0.006)
	[1501–2500]	-0.010			-0.008
		(0.005)			(0.005)
	[2501–3500]	-0.013***			-0.012***
		(0.005)			(0.005)
	Constant	1.064***	1.004***	1.033***	1.024***
		(0.007)	(0.002)	(0.003)	(0.007)
	Observations	3,163	3,163	3,163	3,163
	R-squared	0.019	0.057	0.001	0.075

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Socio-economic determinants

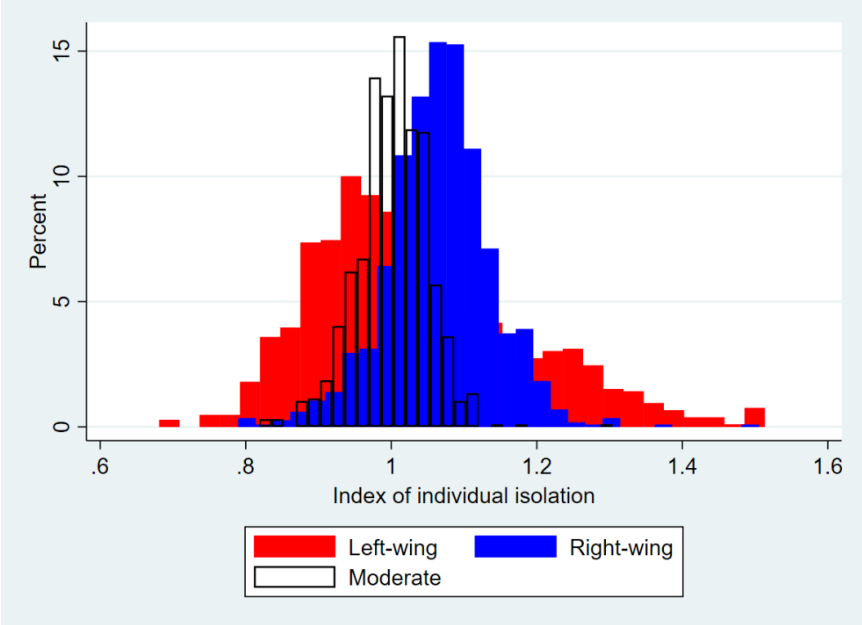
The analysis of socio-demographic variables (age, education, size of the city of residence and income) suggests that, on average, the youngest are less exposed to like-minded content (see Columns 1 and 4). This may be because this group consumes more news outlets online, and

are likely to rely less on a few media than the oldest. Those aged 18–24 and 25–39 respectively consume, on average, 8.1 and 9.8 different news outlets per week, compared to 7.5 and 7.4 for those aged 50–64 and 65+. This variety of news outlet consumption could be an opportunity to be exposed to different ideologies. The less-educated are also less exposed to partisan news outlets. It is possible that their consumption is more oriented toward entertainment outlets with no strong political stance, even if they declare holding right- or left-wing views. These two findings may also be explained by the exclusion of social media from this first analysis. We will discuss this effect in more detail in the following sub-section.

Political ideology

Columns 2 and 4 of Table 5 show that there is a correlation between consuming like-minded content and political stance. Being positioned to the right (left) increases exposure to like-minded content by 6.1% (3.2%) compared to more moderate individuals. Figure 5 helps to visualize the distribution of the index as a function of political ideology. The distribution of right-wing individuals is shifted to the right, clearly suggesting that, on average, there is greater exposure to partisan content. Figure 5 also reveals an interesting result concerning individuals who hold left-wing views. While they are, on average, more exposed to partisan news outlets than people with moderate opinions (cf. Table 5), the distribution is more dispersed: although some are more selectively exposed to like-minded content than moderate and right-wing groups, others are less exposed.

Figure 5: Index of selective exposure as a function of political stance.



Online consumption

Does online consumption over-expose individuals to partisan news outlets? To account for the role of the internet, we calculated, for each individual, the share of online consumption. Columns 3 and 4 of Table 5 show that there is no clear positive correlation between the percentage of online news consumed and partisan exposure. However, this analysis excludes

the role of social networks, which are accused of trapping people in their own ideology. In the following sub-section, we address the methodological problem of estimating the political slant of social media.

5.3. The impact of social media on selective exposure

Social networks have changed the way people access news online. Unlike traditional media, they do not produce news, but aggregate content from different sources and display it on the user's interface. The most important difference is that each user views his or her own set of news, whereas other media provide the same information to everyone (Sunstein, 2016; 2017). As a result, the audience-based method presented above is unable to account for this specificity. To overcome this problem, we assign three levels of partisan audience to social media, and observe how the selective exposure index varies at the individual level. The levels describe the following scenarios.

H1 - Upper-bound: as partisan as the most partisan pure player. This is the worst-case scenario: for each political position, social media is considered to expose individuals to partisan content at the same level as the most partisan media in our sample. Table A1 and Figure A2 indicate that the most partisan outlets are pure players. For right-wing individuals, we consider that social media are as partisan as *Français de souche*, a pure player with an audience composed of 68% right-wing readers. For left-wing individuals, social networks are as partisan as *Acrimed*, a pure player with an audience composed of 64% left-wing readers. For moderates, they are as partisan as *Ohmymag*, another pure player that produces entertainment news with an audience composed of 42% moderates. In this scenario, social media are the most partisan platform for everyone, but not more than the most partisan news outlet for each category of ideology.

H2 - Middle-bound: as partisan as the most partisan newspaper. In this scenario social media are as partisan as the average of newspaper outlets. We consider this configuration as a middle bound, because the most partisan newspapers are more moderate than pure players, but the audience is more polarized than for television and radio. Here, for right-wing individuals we consider that social media are as partisan as *Le Figaro*, a conservative daily newspaper with an audience composed of 49% right-wing readers. For left-wing individuals, they are as partisan as *L'humanité*, a daily newspaper historically managed by the French communist party with an audience composed of 59% left-wing readers. For moderates, they are as partisan as *20 minutes*, a free daily newspaper with an audience composed of 31% moderates.

H3 - Lower-bound: as partisan as television. In this scenario, social media exposes users to less partisan content than in the two other scenarios. Here, for right-wing individuals we consider that social media are as partisan as *LCI*, a free-to-air news channel with an audience composed of 46% right-wing viewers. For individuals who hold left-wing views, they are as partisan as *ARTE*, a Franco-German channel with a strong specialization in cultural and European programs that has an audience composed of 43% left-wing viewers. For moderates, they are as partisan as *TMC*, a generalist channel with an audience composed of 34.2% moderates. It should be noted that television and social media are the platforms favored by the oldest and the youngest, respectively. By making them as partisan as each other under H3, we hope to soften the potential effect of an intergenerational gap in news consumption.

Figure 6 shows the distribution of the index I_i^{SE} with and without the inclusion of social media under H1, H2, and H3, and Table 6 presents statistical distributions. Compared to I_i^{SE} calculated without social media, we observe differences under each scenario (see Table 1). Under scenario H1, partisan exposure is 14% higher than an individual who consumes a representative bundle of news (compared to 3.6% when social media are excluded). Consequently, if social media are as partisan as the most partisan outlets (i.e. pure players under scenario H1) their consumption has an important impact on the overall index (+10.4 percentage points). Compared to I_i^{SE} calculated without social media, overall exposure also increased under H2 (+5.4 percentage points) and under H3 (+2.9 percentage points). These results suggest that, even under lower bound conditions, news consumption on social media tends to increase selective exposure to like-minded content.

Figure 6: Distribution of the individual selective exposure index with and without social media under scenarios H1, H2, and H3

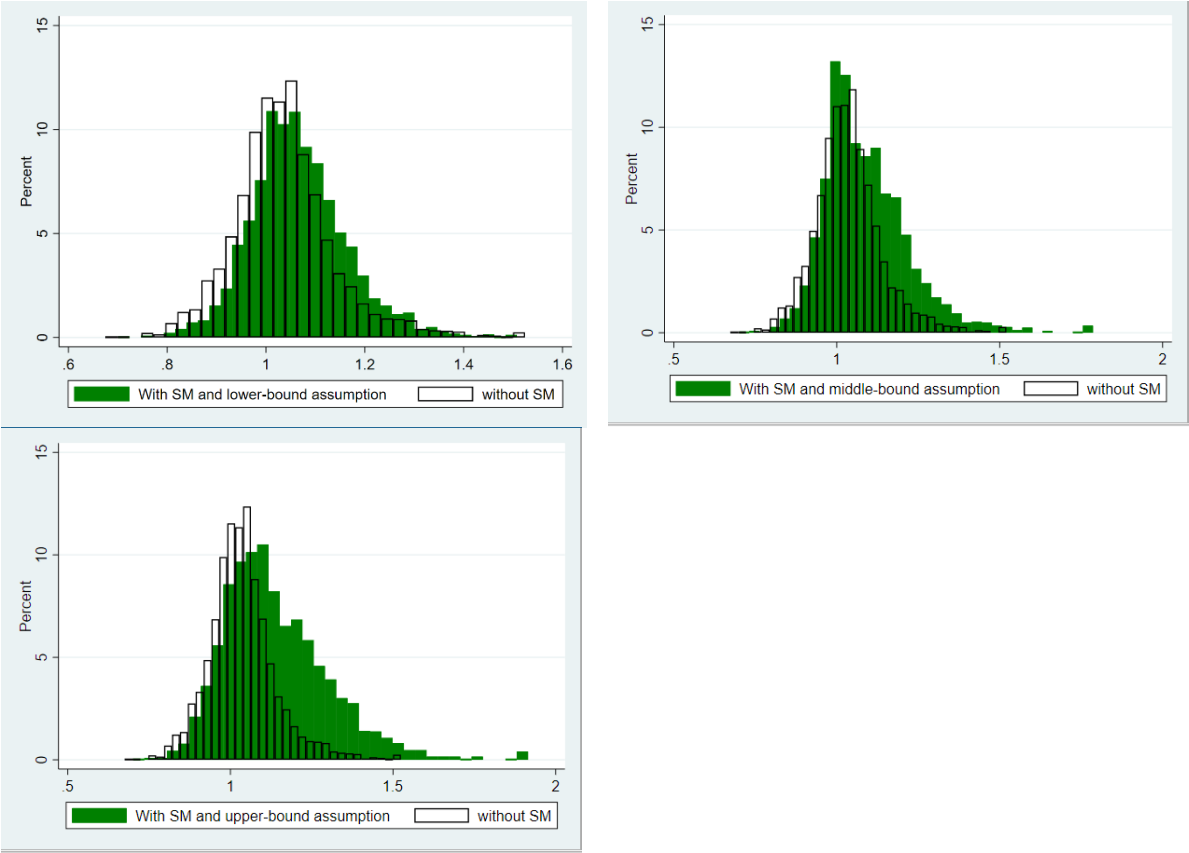


Table 6: Statistical distribution of the selective exposure index under the different scenarios.

	I_i^{SE}	I_i^{SE}	I_i^{SE}	I_i^{SE}
	Without SM	With SM as isolating as pure players	With SM as isolating as newspapers	With SM as isolating as television
		H1	H2	H3
Mean	1.036	1.14	1.09	1.065
SD	0.103	0.161	0.132	0.097
25 th	0.977	1.028	1.002	1.005
50 th	1.028	1.111	1.065	1.056
75 th	1.086	1.23	1.157	1.118

Introducing social media into the index also changes the determinants of selective exposure. Table 7 helps to understand their role. Here, the econometric specifications used in Table 5 are repeated with the addition of social media scenarios. Column 1 repeats Column 4 of Table 5 for comparison purposes, while Columns 2, 3 and 4 report results under H1, H2 and H3. As the coefficients of the variable “% of online consumption” become significant in the three scenarios, we can confirm that, even under the lower bound, the consumption of social media increases partisan exposure. Concerning socio-economic variables, women become more selectively exposed to like-minded content under H1 and H2. Whatever the scenario, the youngest become more selectively exposed than the oldest. This is not surprising; as they are the biggest consumers of social media⁸, those aged 18–24 are likely to see the greatest increase in the index. While the most educated are most exposed to outlets that reflect their preferences when social media are excluded, this difference does not hold when they are introduced. Under H1, we observe that the less-educated are significantly more selectively exposed than the most educated. Finally, the marginal effect of political ideology is also increased. Holding left- or right-wing views increases the index by 10–14% under H1 and H2, compared to moderates.

⁸ According to our data, 83% of the youngest (aged 18–24) obtain their news from social media.

Table 7: Estimation of the selective exposure index with social media.

VARIABLES		I_i^{SE}	With social media		
			I_i^{SE} H1	I_i^{SE} H2	I_i^{SE} H3
Political ideology Ref: moderate	Left-wing	0.031*** (0.005)	0.110*** (0.006)	0.144*** (0.005)	0.055*** (0.004)
	Right-wing	0.059*** (0.003)	0.129*** (0.005)	0.106*** (0.003)	0.076*** (0.003)
Online news	% of online consumption	0.014 (0.008)	0.026** (0.011)	0.015* (0.009)	0.016** (0.007)
Gender	Male	-0.001 (0.004)	-0.015*** (0.005)	-0.009** (0.004)	-0.005 (0.003)
Age Ref: 65+	[18–24]	-0.027*** (0.008)	0.102*** (0.011)	0.045*** (0.009)	0.013** (0.007)
	[25–34]	-0.012 (0.006)	0.083*** (0.009)	0.035*** (0.007)	0.015*** (0.006)
	[35–49]	-0.010** (0.005)	0.040*** (0.007)	0.014** (0.006)	0.004 (0.005)
	[50–64]	-0.004 (0.005)	0.020*** (0.007)	0.006 (0.005)	0.002 (0.005)
Education Ref: Postgraduate	Did not complete high school	-0.022*** (0.005)	0.016** (0.008)	-0.003 (0.006)	-0.010** (0.005)
	High school	-0.021*** (0.005)	0.002 (0.007)	-0.007 (0.006)	-0.013*** (0.005)
	Undergraduate	-0.014*** (0.005)	0.002 (0.007)	-0.007 (0.005)	-0.009** (0.004)
City size Ref: Paris region	<2000	0.010 (0.006)	-0.004 (0.009)	0.003 (0.007)	0.005 (0.006)
	[2000–20 000]	0.001 (0.006)	-0.004 (0.009)	-0.003 (0.007)	-0.001 (0.006)
	[20 000–100 000]	-0.001 (0.006)	-0.006 (0.009)	-0.006 (0.007)	-0.003 (0.006)
	>100 000	0.001 (0.005)	0.000 (0.007)	0.000 (0.006)	0.000 (0.005)
Income Ref: >3500	<1500€	0.008 (0.006)	0.019** (0.008)	0.013** (0.007)	0.010* (0.005)
	[1501–2500]	-0.008 (0.005)	0.008 (0.007)	0.000 (0.005)	-0.003 (0.004)
	[2501–3500]	-0.012*** (0.005)	-0.011* (0.006)	-0.013** (0.005)	-0.011*** (0.004)
	Constant	1.024*** (0.007)	1.012*** (0.010)	0.993*** (0.007)	1.020*** (0.006)
	Observations	3,163	3,163	3,163	3,163
	R-squared	0.075	0.182	0.244	0.122

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

5.4. Selective exposure at the extremes of the political spectrum

Discussions about the filter bubble and the role of social media in news consumption often focus on the impact on consumers at the extremes of the political spectrum. To explore the

relation between our index and consumers of far-right and far-left news, we changed the definition of political ideology used in section 4. In the following analysis, individuals with left-wing views are considered to be those who answered 1 or 2 to the political position question, while individuals with right-wing views are those who answered 9 or 10. Moderates comprise all individuals who selected a value between 3 and 8. Again, the value of I_i^{SE} reflects the way far-left and far-right news consumers are selectively over-exposed to like-minded content compared to a random consumer.

We then re-estimated the partisan selective exposure index. Table 8 presents the results of the estimation of the relationship between the index and the covariates used in the previous section. Specifications include the estimation of I_i^{SE} excluding social media (Column 1) and the three estimations of the index that include it (H1, H2 and H3 are shown, respectively, in Columns 2, 3 and 4).

If we compare Tables 8 and 7, the result is striking. First, even if we exclude the consumption of social media (Column 1), holding far-left or far-right views increases like-minded exposure to, respectively, 14% and 6.8% compared to moderates. But this effect increases considerably if we take social media into account. Under H1 (social media is as partisan as the most partisan pure players), selective exposure of far-left individuals increases by 78%, and 58% for far-right consumers compared to moderates. If we consider H3 (social media is as partisan as the most partisan television channel), far-left and far-right consumers are selectively exposed to, respectively, 55% and 40% of additional like-minded content. This result highlights that people who support far-right and far-left ideologies appear to favor outlets that support their beliefs. Social media are clearly their main source of news. This is unlike more moderate left- and right-wing consumers (whose behavior can be inferred by observing the difference in results with Table 7), where consumption appears to be moderated by information from other platforms. The difference in selective exposure between far-left and far-right users may be at least partly a consequence of our choice to give social media as much exposure power as other platforms. This is especially true for H1. As our choice of the most partisan pure players was not exhaustive, it is possible that the different effects for left and right-wing media on selective exposure reflects this decision; nevertheless, the overall effect for those at the extreme ends of the political spectrum should not be affected by this choice.

It is also interesting to note that the effect of age remains the same in Column 1 in Table 8, compared to Column 1 of Table 7, but disappears when we consider the effect of social media. This suggests that the strong correlation between political ideology and like-minded exposure partially crowds out the age effect.

Table 8: Estimation of the selective exposure index with far-left and far-right consumers.

VARIABLE		I_i^{SE}	With social media		
			I_i^{SE} H1	I_i^{SE} H2	I_i^{SE} H3
Political ideology Ref: moderate	Far-left	0.140*** (0.012)	0.783*** (0.032)	0.754*** (0.030)	0.547*** (0.020)
	Far-right	0.068*** (0.005)	0.576*** (0.023)	0.432*** (0.015)	0.399*** (0.014)
Online news	% of online consumption	0.021** (0.009)	0.014 (0.029)	0.002 (0.024)	0.008 (0.018)
Gender	Male	0.002 (0.004)	-0.012 (0.011)	-0.006 (0.009)	-0.003 (0.007)
Age Ref: 65+	[18–24]	-0.027*** (0.007)	0.089*** (0.028)	0.038 (0.025)	0.004 (0.018)
	[25–34]	-0.020*** (0.005)	0.061*** (0.020)	0.015 (0.016)	-0.001 (0.013)
	[35–49]	-0.011** (0.005)	0.046*** (0.016)	0.023* (0.013)	0.008 (0.010)
	[50–64]	-0.003 (0.005)	0.026* (0.015)	0.012 (0.012)	0.007 (0.009)
	Education Ref: Postgraduate	Did not complete high school	-0.017*** (0.006)	0.030 (0.019)	0.012 (0.016)
	High school	-0.016*** (0.005)	0.023 (0.015)	0.010 (0.013)	0.003 (0.010)
	Undergraduate	-0.005 (0.005)	0.020 (0.014)	0.009 (0.012)	0.006 (0.009)
City size Ref: Paris region	<2000	0.006 (0.006)	0.002 (0.018)	0.005 (0.015)	0.009 (0.012)
	[2000–20 000]	0.003 (0.005)	0.018 (0.019)	0.012 (0.016)	0.014 (0.012)
	[20 000–100 000]	0.001 (0.007)	0.002 (0.019)	0.003 (0.016)	0.003 (0.012)
	>100 000	-0.001 (0.005)	-0.004 (0.015)	-0.005 (0.012)	-0.003 (0.010)
Income (€) Ref: >3500	<1500	0.008 (0.006)	0.030 (0.019)	0.023 (0.016)	0.017 (0.012)
	[1501–2500]	0.001 (0.004)	0.010 (0.015)	-0.000 (0.013)	0.002 (0.010)
	[2501–3500]	0.002 (0.004)	0.011 (0.014)	0.007 (0.012)	0.007 (0.009)
	Constant	0.999*** (0.007)	0.877*** (0.020)	0.890*** (0.016)	0.907*** (0.013)
	Observations	3,163	3,163	3,163	3,163
	R-squared	0.214	0.475	0.492	0.527

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

6. Discussion and conclusion

Measuring the degree to which people are exposed to like-minded news is challenging. In this context, we built an index of individual selective exposure over a wide range of platforms and media. A survey provided information at individual level on political preferences and news consumption across both online and offline platforms engaged in production and/ or diffusion. This data allowed us to estimate, on an individual basis, how people are selectively exposed to different ideologies, and the role played by online media. We also studied the socio-demographic determinants of like-minded exposure and the role of political opinion.

Our main result highlights that, if we exclude social media, the index is low: the average news consumer is selectively exposed to 3.5% additional like-minded news compared to someone who is randomly exposed to a representative bundle of news outlets. We also document the unequal role played by some platforms: those who consume news via the radio and online newspapers are more selectively exposed to partisan content than those who consume more news on television and via aggregators. We also observe that social media are favored by those who seek news that is aligned with their political preferences. The youngest are most exposed to partisan content when social media are introduced, due to their high consumption of these media in general. Finally, we find that selective exposure to partisan content is higher for people who hold the most extreme political views, especially when we include social media consumption. We estimate that being a far-left(right)-wing consumer increases the selective exposure index by between 78% and 55% (58% and 40%).

Our study is not without limitations. First, as noted previously, the methodology used to estimate the political slant of an outlet consulted by an individual cannot be applied to social media. Hence, we use three proxies to characterize the share of partisan news in this context, ranging from a situation where it is as partisan as the most partisan platform, to a situation where it is as partisan as the least partisan platform. Which scenario is most realistic? The literature does not provide a clear answer to this question, but there are some clues that suggest that the news outlets available on social media are partisan. Bakshy *et al.* (2015), who are researchers at Facebook, collected data on a sub-sample of users who self-identified as liberal or conservative. They reported that the Facebook algorithm reduced exposure to news from different ideologies by 8% for liberals and 5% for conservatives. Similarly, Halberstam and Knight (2016) found that Twitter users are highly exposed to partisan news. Even if the Twitter and Facebook algorithms have changed over time, these earlier findings support our hypothetical scenarios.

Another potential limitation is that we considered online social media to be homogeneous, while in reality different networks have different abilities to provide like-minded content. WhatsApp, for instance, is closer to an instant messaging system than a social media outlet, which is likely to make its content less dependent on the platform's algorithm. Being able to estimate the partisan exposure of each form of social media would allow a more specific assessment of their impact. Tracking real-life consumption and exposure could be one way to measure this (Bakshy *et al.*, 2015; Flaxman *et al.*, 2016) and complement survey data.

Another limitation of our study is our measurement of the frequency of consumption, which is only available at the platform level. A specific evaluation of the time dedicated to consulting each news outlet or, optimally, the amount of news, would provide a more accurate estimation of individual selective exposure. Tracking methods could be a solution for online consumption and offline television, but not for offline radio and newspapers, which are highly

consumed. Such a method could partly help to overcome the problem of under- or over-reporting of news consumption that is inherent in the survey method (Prior, 2009).

As noted in section 3, 19% of the sample did not position themselves on the left/ right axis, either because they did not want to, or because they held no particular political position. Whatever the reason, they were excluded from the calculation of our index, and this might have weakened the representativeness of the sample. However, a comparison of the two groups only found a slight statistical difference, and this leads us to think that their exclusion had little impact on our main results. On average, these “abstentionists” are characterized by their lack of interest in news and consume fewer media outlets overall, but no more online social media. On the one hand, they might be more vulnerable to information provided by social media (as they represent a higher share of their news consumption) but, on the other hand, their lack of interest in news suggests the opposite.

Despite these limitations, the findings reported here are, to the best of our knowledge, the first investigation into selective exposure to partisan news outlets that considers the entire media diet. Our results make a significant contribution to the selective exposure literature. Overall, there is little over- or under-exposure in the French population, but social media tends to increase consumption of partisan news. As pointed out by Fletcher and Jenkins (2019), such results are highly dependent on the local political context and the structure of the local media market.

Our results are also related to another strand of the literature that focuses on selective sharing of information on social media. Studies of the extent to which internet users who hold a clear political position (politicians, political bloggers, etc.) share contents that match their own political position report overwhelming evidence of selective sharing of like-minded content on Twitter and Facebook (An *et al.* 2014; Aruguete and Calvo, 2018; Freitag *et al.*, 2021; Shin and Thorson, 2017).

Our contribution also helps to assess the consequences of data-driven journalism, and the use of artificial intelligence in news production. Social media has hit the headlines for using algorithms to select the news that is displayed to users, and the generalization of these programs into traditional journalism promises to drastically change the way citizens consume news and are exposed to different opinions (Claussen *et al.*, 2019; Marconi, 2020). The latter observation reinforces the need to measure and evaluate the consequences of selective exposure over a large range of platforms and media outlets.

Finally, this article is in line with the literature on the role of online media and the causes and effects of political polarization (Tucker *et al.*, 2018; Fletcher and Jenkins, 2019). Do people consume more like-minded content because online media, and particularly social media, provide outlets or algorithms that favor this partisan consumption? Or do people hold polarized opinions for various reasons, and find ways to satisfy their need for like-minded information online? Finding answers to these questions is a topic for further research.

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Appendix A - News outlets and media slant used in the survey

As explained in section 4, media slant is defined as N_{js_i}/N_j which indicates, for an individual i of a particular opinion s , her or his selective exposure to partisan opinion s when visiting a news outlet j . This slant ranges from 0 to 1, with 1 (resp. 0) being a news outlet that is only visited by people holding right-wing (left-wing/ moderate) views. Table A1 shows the political opinion of the audience for each news outlet. This table shows the estimation by platform (in France) with respect to the global audience, and then only considering left- and right-wing audiences to highlight the difference between the two most opposite opinions.

For television, radio and newspapers we aggregated data for offline and online visits. This is unlike Gentzkow and Shapiro (2011) who considered that, for instance, *nytimes.com* and the newspaper the *New York Times* were two different media with different audiences and thus two distinct slants. Our observations of the French media suggest that it is more appropriate to consider an outlet that is available online and offline as the same media. Using different channels to release news does not change the editorial policy or the perception that journalists, and those who help to produce the news, have. Aggregators and pure players are, on the other hand, only available online.

The bell curve shown in Figure A2 is the aggregation of all news outlets and suggests that the least (most) polarized media have the largest (smallest) audience. Moreover, this figure highlights that each platform has its own pattern. Pure players are the most polarized outlet as media are most widely distributed on the left-right axis. Examples encompass media that are strongly committed to far left (*Bastamag*, *Acrimed*, *Fakirpresse*) and far right (*Contre-info*, *Français de souche*) political ideologies. However, the global audience of pure players is low; the two most popular outlets (*Mediapart* and *the Huffington Post*) are each visited by only 10% of the sample. The pattern for television channels is very different, with little ideological dispersion and a large audience (the largest of all news outlets). The two most watched media are TF1 and BFMTV. The former is a generalist channel and the latter is a news channel, both are center-right media.

There is a wide range of newspapers. *Le Monde* is the establishment newspaper (center-left), while *Liberation* and *Le Figaro* are historically partisan. Other options are local newspapers, the magazine press and free newspapers, which attract large audiences with their more moderate content. Aggregators like *Google News* or *Yahoo News* are atypical media, as they do not (or marginally) produce news and are instead a source of information for online users. As the share of customized content is *a priori* low, we consider them in the same way as other platforms and they are positioned at the center right of the ideological distribution. We cannot determine the political slant of social media as they use algorithms to propose customized content to each user.

Table A1: Political slant of each news outlet.

	Audience			Global audience
	Left-wing	Moderate	Right-wing	
Télévision (online and offline)				
BFMTV	28.1%	32.0%	39.9%	1590
CNews	31.8%	29.4%	38.8%	721
Euronews	33.3%	25.6%	41.1%	270
France 2	36.9%	31.0%	32.1%	1526
France 3	35.9%	30.6%	33.4%	1149
France 24	39.0%	27.6%	33.4%	323
France Info	42.0%	27.1%	30.9%	676
LCI	27.6%	26.1%	46.4%	740
TF1	25.2%	32.0%	42.8%	1750
TV5	33.0%	25.9%	41.1%	282
M6	29.5%	33.7%	36.8%	932
ARTE	42.9%	28.8%	28.4%	560
TMC	35.1%	34.2%	30.7%	313
Radio (online and offline)				
Europe 1	28.6%	34.8%	36.6%	454
France Culture	49.2%	25.1%	25.7%	187
France Info	38.6%	29.6%	31.7%	678
France Inter	50.4%	25.2%	24.4%	504
RFI	38.5%	24.6%	36.9%	65
RMC	26.6%	32.4%	41.1%	448
RTL	27.4%	33.4%	39.2%	694
RFM	28.6%	31.7%	39.7%	252
RTL2	29.8%	32.4%	37.8%	238
NRJ	26.7%	33.8%	39.5%	337
Nostalgie	29.6%	23.9%	46.6%	247
Radio Classique	29.0%	26.0%	45.0%	100
France bleu	34.7%	29.0%	36.3%	303
Chérie FM	25.0%	30.2%	44.8%	212
Newspaper (online and offline)				
Le Monde	41.7%	29.8%	28.5%	688
Le Figaro	23.1%	29.5%	47.3%	687
Les Echos	27.7%	30.3%	42.0%	238
L'Equipe	32.5%	29.3%	38.2%	440
Libération	52.6%	26.5%	20.9%	344
La Croix	34.9%	20.2%	45.0%	109
Le Parisien - Aujourd'hui en France	31.5%	29.8%	38.7%	496
Paris Match	23.4%	27.5%	49.2%	244
Le Point	25.2%	28.1%	46.7%	484
L'Obs	44.1%	26.7%	29.3%	311

L'Express	31.4%	30.0%	38.6%	280
Marianne	44.5%	23.7%	31.8%	173
Courrier International	50.3%	24.5%	25.2%	163
20 Minutes	32.6%	30.7%	36.8%	946
CNews	34.7%	31.5%	33.8%	213
Le1hebdo	34.5%	17.2%	48.3%	29
Presse étrangère	40.8%	25.0%	34.2%	76
PQR	35.4%	28.2%	36.4%	797
L'Humanité	59.7%	16.9%	23.4%	77

Pure players

Agora Vox	36.8%	26.3%	36.8%	57
Huffington post	43.4%	30.9%	25.8%	392
Mediapart	42.0%	26.9%	31.1%	383
Slate	39.0%	28.0%	33.1%	118
Buzzfeed	34.1%	34.1%	31.8%	88
Les Jours	19.0%	20.7%	60.3%	58
Ohmymag	28.6%	42.1%	29.3%	140
Atlantico	23.4%	29.7%	46.8%	111
Acrimed	66.7%	4.2%	29.2%	24
Contre-Info	21.1%	15.8%	63.2%	19
Fdesouche	11.8%	20.6%	67.6%	34
Bastamg	61.9%	23.8%	14.3%	21
Fakir presse	64.0%	16.0%	20.0%	25
Hors-Série	24.2%	30.3%	45.5%	33
Là-bas j'y suis	44.0%	20.0%	36.0%	25
Reporterre	50.0%	17.3%	32.7%	52
Lundi Matin	35.7%	21.4%	42.9%	42
Orient XXI	37.5%	0.0%	62.5%	8

Aggregators

Apple News	26.8%	29.5%	43.6%	149
Flipboard	24.4%	33.3%	42.2%	135
Google News	30.4%	32.0%	37.7%	741
News Republic	19.3%	28.4%	52.3%	109
Orange.fr	28.2%	31.5%	40.3%	390
Upday	29.7%	28.4%	41.9%	155
Yahoo! Actualités	25.9%	30.9%	43.3%	460

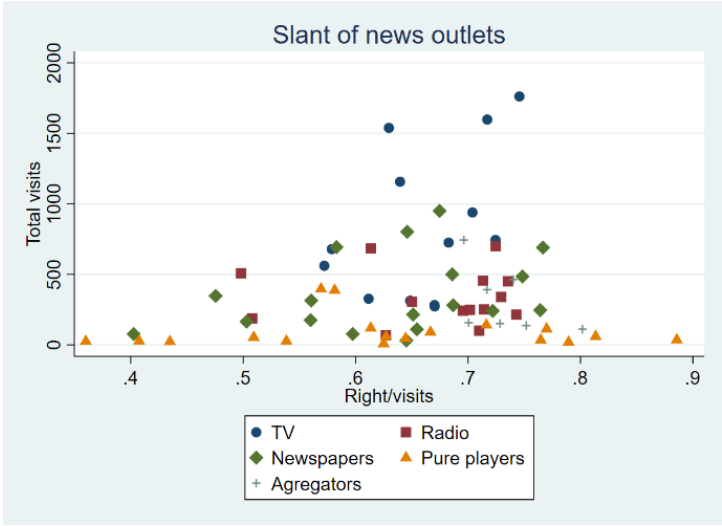


Figure A2: Political slant of news outlets.