Who Owns the Online Media?

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We examine the ownership structure and reach of thousands of news websites in the U.S., Canada, and Europe. By combining data on domain registrants, firm ownership, and domain-level web traffic, we draw detailed ownership networks behind news domains. We find that more than half of these websites have one ultimate owner. Otherwise, they tend to have highly diversified ownership structures, making it non-transparent as to who is ultimately responsible for the content. Moreover, the market concentration for online news is moderate to high and varies substantially across countries. Financial industry firms ultimately own substantial shares in the online news market.

JEL: D72, L82, L86

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I Introduction

The shift from traditional mass media to online media has sparked hope and concern regarding the media's role as the fourth estate. On the one hand, the prospect of a more "participatory" online news provision is seen as a democratizing force (see, e.g., Rushkoff, 2003). On the other hand, there is fear in the shift to online media potentially leading to less transparency and lower or adverse journalistic standards, manifesting, for example, in copy-pasting (Cagé, Hervé and Viaud, 2019) or fake news (Lazer et al., 2018). To understand the social and political implications of the evolving online media landscape, the question of who owns the online media is of substantial relevance. This paper provides the first comprehensive picture of the ownership structure and reach of thousands of news websites in the U.S., Canada, and Europe. We integrate data on domain registrants, firm ownership, and web-traffic data. We then draw highly detailed ownership networks behind news domains, which allows us to assess ownership concentration, transparency, market concentration, and the involvement of firms outside of the media industry.

As of 2020, the majority of U.S. citizens consume news on digital devices (primarily via news websites; Shearer, 2021). However, it is not clear how the transition to online media affects media markets, in general. Compared to traditional mass media, news websites are easily established and potentially harder to capture (see, e.g., Sobbrio, 2018). Yet, the view of a diverse online news provision with many outlets stands in contrast to previous theoretical and empirical work on media ownership. Due to the benefits of controlling media outlets beyond profitability, private ownership of media outlets is generally expected to be highly concentrated (Demsetz and Lehn, 1985; Grossman and Hart, 1988; Djankov et al., 2003). Moreover, reduced profitability, particularly due to the rise of online advertising (Evans, 2009; Rolnik et al., 2019; Durante, Fabiani and Peydro, 2020; Djourelova, Durante and Martin, 2021) has likely contributed to recent consolidation waves in the media industry (e.g., Finacial Times, 2019). While economic arguments in favor of large outlets can be made due to economies of scale (Cagé, 2020), recent consolidation waves have also raised concerns about less diverse news reporting (Martin and McCrain, 2019).

With the rise of online media, news websites become a key information resource for citizens to keep their governments accountable.[1] Thereby, issues of media ownership and market concentration are closely tied to the effectiveness of the media as the fourth estate. Diversity in media ownership (or limited *ownership concentration*) is often considered crucial to strengthen political accountability (McMillan and Zoido, 2004; Besley and Prat, 2006). Particular owners have been shown to influence the reporting towards their special interests (Gilens and Hertzman, 2000; Szeidl and Szucs, 2021). As it gives rational news consumers a chance to discount potential owner-driven biases in report-

[1] See Eisensee and Strömberg (2007), Ferraz and Finan (2008), Gerber, Karlan and Bergan (2009), Snyder and Strömberg (2010), Kendall et al., 2015, Arias et al. (2018*a*), Arias et al. (2018*b*), Cruz, Keefer and Labonne (2021), Chen and Yang (2019), Knight and Tribin (2019) for the disciplining effect of mass media.

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ing, *ownership transparency* is also relevant for political accountability (Cagé et al., 2017). Finally, questions of ownership concentration, ownership interests, and ownership transparency should also consider the reach (*market share*) of individual outlets and owners.

The previous empirical literature on media ownership focuses on traditional mass media. In their seminal contribution, Djankov et al. (2003) examine media ownership in 97 countries, considering the top five TV stations and top five newspapers per country. Cagé et al. (2017) investigate ownership structures of media companies in France and Spain. Finally, Durante, Fabiani and Peydro (2020) compile ownership data on 20 news outlets across four European countries.

So far, little is known about ownership structures in the online media market. We aim to fill this gap by documenting basic facts about ownership, transparency, and reach of online media outlets. To this end, we integrate domain registry data from thousands of news websites with an established firm database and domain-level web traffic data. We also consider aggregated data from the content of the news website to identify approximately 4,700 "hard" news websites[2] located across the U.S., Canada, the U.K., France, Germany, Italy, Poland, Romania, Spain, and Switzerland. After matching the domain registrants with the firm database, we deduce the ownership structures behind these news websites. Thereby, we identify over 80 million firms that have some stakes in news websites. The resulting ownership networks, combined with the web traffic data, allow us to compute country-level market shares for each news domain, the domain-registering entity, as well as the entities owning the registering entity (we call these the *"ultimate owners"* of online news domains). We then assess the complexity/transparency of ownership structures and the involvement of owners that are not part of the media industry (e.g., banks). Finally, we compute market concentration at the country level (again, either considering individual news domains, domain owners, or the owners of domain owners). Our standardized data collection approach provides consistently comparable measures across thousands of news websites and across all ten countries. Contrasting with previous work based on (cross-country) media ownership data, we achieve close to market-wide coverage.

We learn that the ownership of news websites is highly concentrated for a large share of the news websites. 57% of outlets are ultimately owned by one owner. Most of the remaining news websites are owned by a large number of small-scale shareholders, rendering a transparent assessment of the ultimate responsibility for a news website's content almost impossible. Outlets with a large reach, in particular, have hard-to-track ownership networks. Moreover, a large share of the online news market is ultimately owned by firms outside of the media industry, in particular from the financial industry. Taking web traffic into account, we find that market concentration based on domain-level market shares (in terms of unique website visitors or visits) is moderate to high, with considerable

[2]We differentiate between "soft" news (entertainment, sports) and "hard" news (political issues). Our main analyses focus on outlets frequently providing hard news.

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variation between countries. The market share of the top four news outlets (the C_4 metric) ranges from 24% in the U.S. to 70% in Poland. Importantly, the national market concentration figures decrease substantially when we measure market shares at the level of the ultimate owners.

Section II describes our data collection procedure, how we draw ownership networks, and how we measure market concentration. Section III presents our main results. Section IV shows robustness checks and extensions. Section V puts our findings into perspective and concludes this paper.

II Data and Measurement

Our study builds on domain registry data, data on firm ownership, content data, and domain-level web traffic data. We describe our data collection and measurement approach step-by-step.

A Data Collection, Matching, and Coding

First, we collect data on all major news websites associated with a given country. Then, combining various sources, we generate a list of domains pointing to news websites. After, we collect the domain registry information of these websites, match the registrant information with the firm database, and filter out websites primarily providing "soft news".

Initial sample of "news" websites. We use three sources for our initial set of news websites: ABYZ News Links (ABYZ News Links, 2021), Media Cloud (Roberts et al., 2021), and domains broadly labeled with "news" or "media" by Amazon's Alexa Web Information Services (AWIS).[3] AWIS collects traffic and metadata on various websites, while ABYZ and Media Cloud exclusively collect links to websites with "news" content. First, we compile a list of domains from ABYZ, uniquely identifying news websites by country. We then cross-check whether these websites are also covered in AWIS and Media Cloud, and extend the list if necessary. We also drop some domains from this list, such as news aggregators (see Appendix A for details). Our approach identifies an initial 11,953 news domains/websites. Our sample of countries includes the U.S., Canada, Germany, France, the U.K., Italy, Spain, Poland, Romania, and Switzerland. We focus on North America and Europe because of their economic and technological development (a well-established online media industry), political institutions (free media and internet, but variation regarding the role of public broadcasters), and the availability of standardized firm-level data.

Identifying hard news websites. AWIS, ABYZ, as well as Media Cloud define "news" broadly. Some of their listed websites focus primarily on sports (such as espn.com), or on "news" primarily relevant for very specific audiences (like nam.edu – the National Academy of Medicine). We, therefore, categorize the news websites into "soft news" (sports, entertainment, etc.) and "hard" news

[3] We focus exclusively on canonical domains (e.g., we consider nytimes.com as one website and do not consider open.nytimes.com and krugman.blogs.nytimes.com separately).

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providers (outlets engaging in journalism that fosters political accountability). As a proxy for hard-news-providing websites, we filter for news sites where at least one in four articles covers politics: we collect the content of the news websites (from 2018 through 2020) via the GDELT database[4]. Appendix F describes the procedure to filter for political content from automated annotations performed by GDELT and provides examples on how articles and outlets were classified. Our main analyses focus on 4,722 hard news websites.

Domain registrant and direct ownership information. To collect ownership information for each news website, we exploit that web domains must register with the Internet Corporation for Assigned Names and Numbers (ICANN).[5] For each domain on our list, we programmatically query data on the registrant. We collect the data via a commercial provider (WHOIS API LLC) and by directly querying the WHOIS service. Next, we match the registrant information to firms in Bureau van Dijk's Orbis database.[6] Identifying owners involves a lot of manual data handling due to unsuitable formatting of the raw registry data and a lack of exact matches with Orbis. A team of research assistants verified and completed all matches.

B Drawing Ownership Networks

Once we have identified a registrant in Orbis, we recursively extract the entire ownership structure from the database (the entities that own the registrant, their owners, the owners of these owners, etc.). We can thus capture the ownership relationships of a news website in the form of an *ownership network*. To draw ownership networks, we devise the following graph traversal algorithm (starting at the domain registrant entity): (1) find all entities that have a stake in the current entity, (2) draw a directed edge (weighted with the corresponding ownership share) from the current (owned) entity to each of the owning entities, (3) follow each of these links and continue with step (1).[7] Based on recursion, the algorithm continues traversing and drawing the ownership network behind a given domain until there are no more entities to visit that own more than 1% of the current entity. We consider the leaf nodes in this network – that is, the last firms that held a share of 0.01 or more – as the *ultimate owners* of the corresponding registrant and thus the registered website.[8] To calculate the share of an ultimate owner, we compute the product of the ownership percentages from each level in a branch leading to that owner. If several branches link to the same ultimate owner, these

[4]The Global Database on Events, Language, and Tone (GDELT) monitors worldwide news by scraping content from online newspapers, TV station websites, and other online news sources.

[5]The Internet Assigned Numbers Authority (IANA, overseen by the ICANN) manages the registration of domains. IANA delegates most of its domain name authority to other domain name registries, such as registries for country-code top-level domains (e.g., DENIC in Germany for the top-level domain .de). Many such registries can be queried via the WHOIS protocol. A WHOIS lookup provides information about who (a person or organization) officially registered the domain. The *registrant of a domain* is the entity controlling the content provided via this domain (for nytimes.com, the registrant is The New York Times Company).

[6]Orbis is a global database for standardized information on 280 million firms.

[7]With circular ownership, the entry point into the circle is coded as the owner. For example, let X% of an outlet be owned by UBS, and then Y% out of these X% owned by CS, that is in turn owned to Z% by UBS. Then, the $X \times Y \times Z\%$ are assigned to UBS.

[8]The halting criterion (1% of shares) is, of course, somewhat arbitrary. It is a pragmatic choice as smaller thresholds would be computationally demanding, yet not necessarily informative.

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products are summed up to this owner's total share. Ultimate owners are important for considerations of transparency, ownership concentration, and potential influence on news content. Suppose a news domain is registered by a media corporation which is ultimately owned by one person (either directly or through a network of firms and trusts). We would consider the ownership of this news website to be highly concentrated and this owner's influence on the content as *potentially* big. Alternatively, suppose that the registrant of a news domain is a media corporation owned by many other firms which are owned by a myriad of retail investors. In that case, one might argue that the potential influence of one ultimate owner on the content is relatively small.

The ownership networks allow us to find (influential) ultimate owners of a particular news website. The other way around, we can examine which portfolio of news domains are (partially) owned by an individual registrant or ultimate owner. Both of these perspectives matter for the analyses that follow. Figure 1 illustrates the concept of ownership networks with two examples. The network diagram in the upper panel displays the ownership network behind nytimes.com. The yellow shaded nodes are entities identified as ultimate owners. For the sake of the illustration, we prioritize the plotting of the four largest ultimate owners. Smaller owners are sometimes subsumed under "other owners". The lower panel displays a sample portfolio of news domains (indirectly and/or partially) owned by one person (here: the American stock investor and billionaire Mario J. Gabelli). The yellow shaded leaf nodes indicate the share of a given news domain owned by the entity in the root node. For example, we see that Mario J. Gabelli, through several layers, owns 5.4% of cbsnews.com.

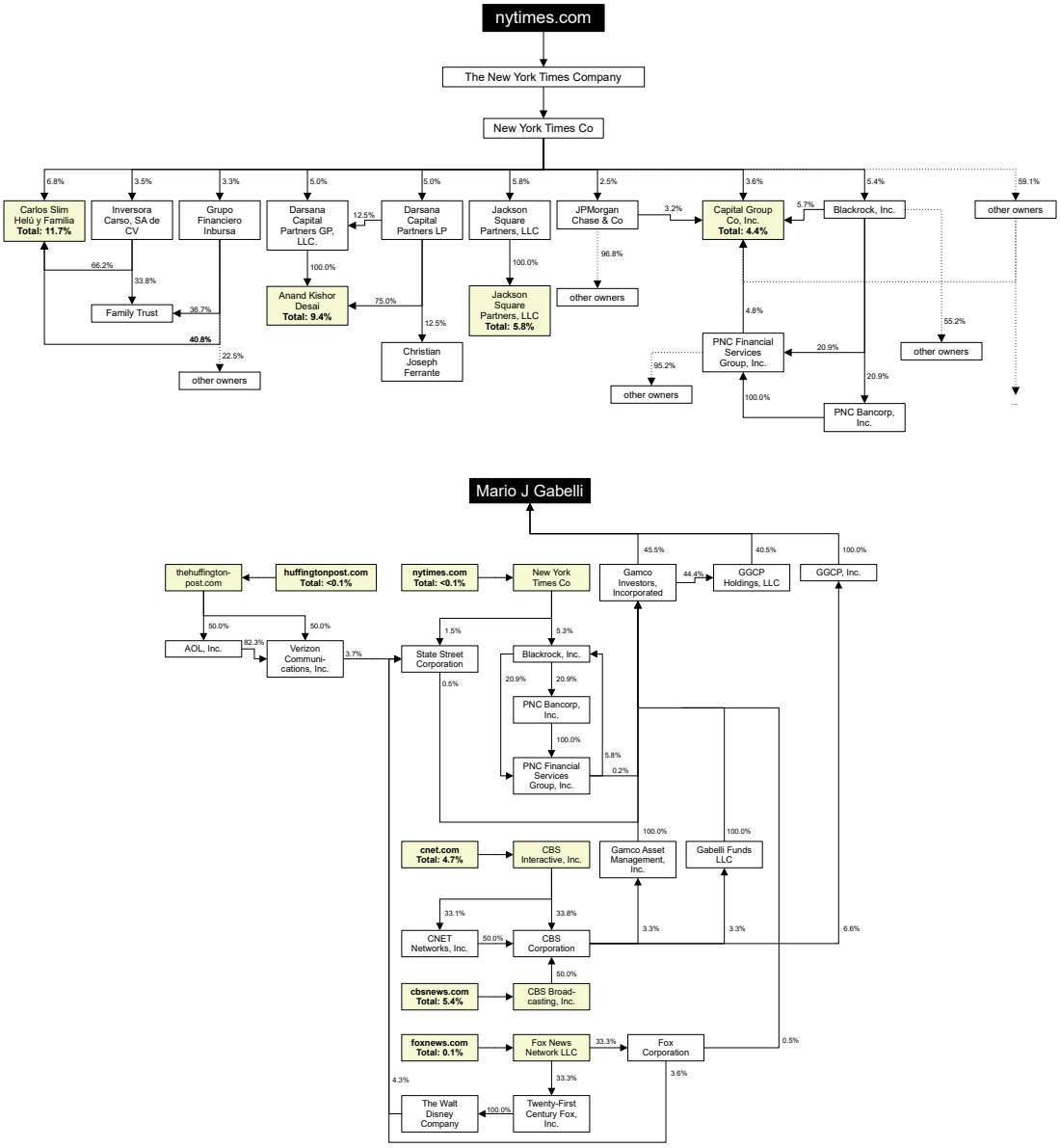
Taken together, in the case of the domain-rooted network (upper panel), we can infer whether the ownership of one particular domain is diverse or concentrated, and identify particularly influential ultimate owners (e.g., Carlos Slim Helu in the case of nytimes.com). From the ultimate-owner-rooted network (lower panel), we can infer whether a specific entity might be particularly influential in a portfolio of news websites.

C Measuring Ownership Concentration, Transparency, and Market Shares

Based on the drawing of ownership networks, we identify almost 80 million firms that have financial stakes in news websites. We analyze these ownership structures, assessing ownership concentration, transparency, and market shares (of registrants, ultimate owners, and industry sectors). We also compute market concentration at the country level. To assess ownership concentration, we count the number of ultimate owners for each ownership network and identify ultimate owners with majority shares in an outlet. To measure ownership transparency, we follow Cagé et al. (2017) and count the number of nodes (owning entities) as well as the number of ownership levels per network (i.e., the "depth" of the network). We extend our database with domain-level web traffic data to understand which news websites, domain registrants, ultimate owners, and industry sectors reach how

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FIGURE 1. NEWS WEBSITE OWNERSHIP NETWORKS



Note: The upper panel shows the ownership network for The New York Times. The New York Times Company is the registrant of nytimes.com and it has a corresponding match in Orbis (New York Times Co). The network diagram shows the path to the top four ultimate owners (to keep the visualizations tractable, some branches are simplified to "other owners", but our database contains the complete ownership networks). The lower panel displays a sample ownership network with the opposite perspective: we focus on the portfolio of news domains partially owned by one person – here Mario J. Gabelli (an American stock investor and billionaire).

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many internet users. We acquire traffic information (estimates of website reach and page views) from AWIS.[9] As we are primarily interested in level differences between individual outlets, we compute the average reach and page views from 2018 through 2020 per domain. The web-traffic data is normalized by one million active website visitors or one million page views (on all domains tracked by AWIS) during the measurement period. For a reading example, consider nytimes.com and its average reach (page view) figure of 6,818 (396): for every million unique visitors present on any website (every million page views that accrued) between 2018 and 2020, an average of 6,818 (396) went to nytimes.com. For comparison, the reach (page view) figures for google.com are 574,893 (195,269). For country-level analyses, we scale all traffic data by visitors that originate from the country of interest. For instance, when calculating the market share of nytimes.com, we re-scale the reach (page views) by the share of visitors located in the U.S. We then infer market shares based on the number of unique domain visitors relative to the total number of visitors of all news domains in a country. That is, we compute market shares for each news website i in country c based on the reach of the website:[10]

$$marketShare_{ci} = \frac{reach_{ci}}{\sum_{i=1}^{N} reach_{ci}}. \tag{1}$$

We then measure market concentration with the C_M metrics (particularly the common C_4). The C_M metric captures the cumulative market share of the top M outlets in country c:

$$C_M = \sum_{j=1}^{M} marketShare_{cj}. \tag{2}$$

For each country, we compute C_M measures for the following levels of the ownership networks: (i) news domains, (ii) domain registrants (i.e., several domains can belong to the same registrant), and (iii) ultimate owners (considering the entire ownership tree).

III Results

We now analyze transparency and ownership concentration, the industry sector affiliation of owners, and market concentration.

[9] These metrics are used in digital marketing and are often the basis for advertisement placement decisions. These metrics are, therefore, closely monitored by an outlet's management (indicator of success vis-à-vis competitors). We use web traffic (e.g., as opposed to revenues) because online news are often freely accessible, and inferring reach from advertisement spending would not be straightforward.

[10] In robustness checks, we use page views.

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A Ultimate Owners, Ownership Concentration, and Involved Industries

From a corporate control perspective, ultimate owners are particularly relevant because they finance a news website and, arguably, have the primary responsibility for the site's content. For 39% of the news websites researched, we find that the registering entity is directly the ultimate owner (often a media company or an individual). For an additional 14% of outlets, the registering entity is 100% owned by one ultimate owner. Additionally, another 4% of news websites have one ultimate owner through an extended network. Hence, in total, 57% of outlets have one ultimate owner. Another 8% of outlets have more than one owner, but in those cases, one of those owners holds 50% or more of the site. We thus identify one entity that potentially has ultimate responsibility for the website's content in 65% of cases. If we re-weight the outlets by their reach, 58% of the total market across the ten countries (compared to 65% of outlets) falls into this category. Overall, ownership is very concentrated for more than half of the market.

Identifying ultimate owners allows us to assess the involvement of industry sectors in the online media market. Consistent with the concern that majority owners might imprint their personal views in their outlet's reporting, it is questionable whether news outlets can act as the fourth estate if their owners have significant economic interests outside of news reporting.[11] Accordingly, a crucial aspect of transparency regarding the potential interests of owners is the sector of their primary economic activity. We find that more than 95% of ultimate owners with shares in the online media industry are primarily active outside of the media industry ("Banking, Insurance & Financial Services" hold 74%, "Business Services" 17%,[12] and "Public Administration" 4%).

The degree to which we should be concerned about individual majority owners (or non-media industry owners) is directly related to ownership transparency. That is, how easily can a rational news consumer recognize relevant aspects of the ownership structure in order to discount a potential bias? Next, we approximate this aspect of transparency by analyzing the topology of the ownership networks behind news websites.

B Ownership Network Topology and Transparency

We assess the transparency (or "complexity") of ownership relationships with the breadth (number of nodes) and depth (number of ownership levels) of the networks. For almost half of the news domains in our sample, the underlying ownership structure is non-transparent. While 57% of outlets have less than five nodes in their ownership network, the remaining outlets have a mean (median) number of nodes of 115,416 (73,973). Figure 2 (upper panel, left) shows the full distribution of node counts, aggregated for the ten countries examined. Appendix Figure B3 shows country-level

[11] Historically, it was considered essential that shareholders of media outlets did not have substantial financial interests in other economic sectors (see Cagé et al., 2017).

[12] For more on the firms in this sector, see Section III.C.

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distributions. In all ten countries, at least one third of outlets have five or more nodes in their ownership network, with considerable cross-country variation. In the U.S., this applies to 30% of outlets. In France, Germany, Italy, and the U.K., at least two thirds of websites have complex ownership networks (for example, 84% in the U.K.).[13]

Following up on our results on ownership concentration, we are particularly interested in owners that may influence editorial decisions. Imagine outlet X. The domain owner of X (i.e., the Orbis match) is held by two entities, $E1$ and $E2$. $E1$ holds 80% of the domain owner, and $E2$ 20%. $E1$ is not owned by further shareholders. However, $E2$ is split up among thousands of owners. In this case, we may not be concerned about the lack of transparency for the 20%. To check whether low transparency comes from minority shareholders like this, we redo the node count, but only with the portion of the ownership network that accounts for the first 50% of ownership, cumulatively. With this filtering, 64% of outlets have less than 5 nodes (compared to 57% with the entire network). Accordingly, 36% of outlets are still characterized as having a relatively untraceable ownership network. Again, this is the case for larger outlets. If we re-weight outlets by traffic, 53% of the market comes with hard-to-track ownership networks. In conclusion, cases like hypothetical outlet X drive only a small amount of the uncovered lack of transparency. Also, even with the 50%-filtering, for 4 out of the 10 countries examined, the share of non-transparently-held outlets stays at around half (France) or clearly above (Germany, Italy, and the U.K.). For the U.S., this share only decreases by 2 percentage points with the filtering (from 30% to 28%). Consistent with the cross-country aggregate result, the *market share* of hard-to-track outlets is higher than the share of hard-to-track outlets in most countries.

Next, we investigate whether outlets with a substantial amount of nodes have many ultimate owners. In principle, an outlet could have countless nodes that all lead to the same (or a few) ultimate owner(s). This does not seem to be the case, as the number of nodes and the number of ultimate owners is strongly correlated (83%). Panel B in Figure 2 illustrates this. Many nodes tend to come with multiple ultimate owners. Outlets with one ultimate owner (57%, see above) tend to only have one or two nodes. Thus, their ownership is relatively transparent. Outlets scarcely have one ultimate owner but more than five nodes. For news websites with one ultimate *majority* owner (65%, see above), the part of the ownership network leading to the majority owner(s) consists of five or more nodes for 6% of outlets. Overall, when we combine information on ultimate owners, nodes, and majorities, this does not change our conclusion that a sizeable share of outlets have hard-to-track ownership structures.

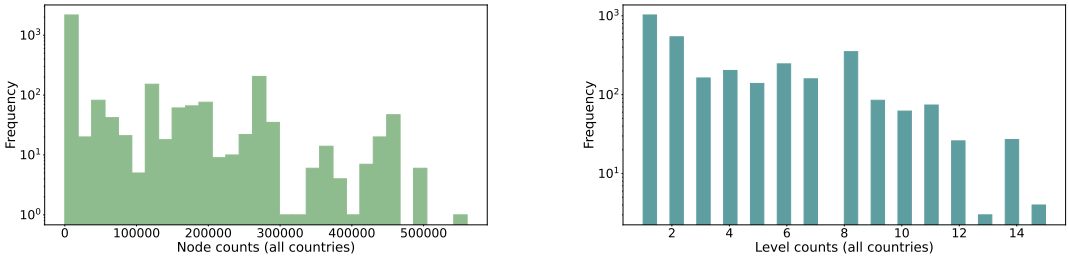
An additional measure of ownership transparency are level counts. The right side of Panel A in Figure 2 shows that the number of levels ranges from 1 to 15. Unsurprisingly, node counts and level

[13] Appendix Figure B4 covers country-level node count distributions for outlets not specializing in political content.

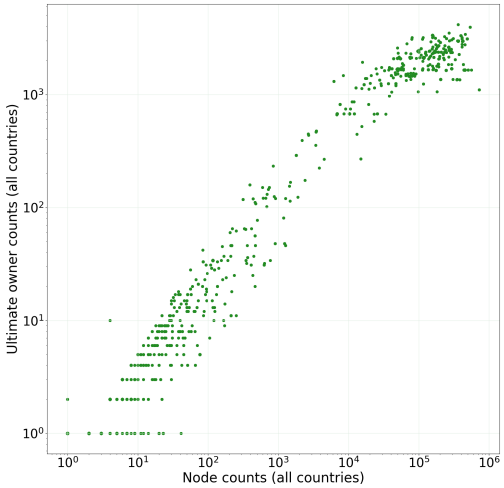
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FIGURE 2. OWNERSHIP NETWORKS: NODES, LEVELS, AND ULTIMATE OWNERS

Panel A



Panel B



Note: Panel A shows the distribution of node counts (left) and level counts (right). The node counts show the total number of owners with any stake ($> 1\%$) in an outlet (at any point in the network). The level counts show the number of levels in the ownership network for owners with $> 1\%$. For example, if an immediate domain owner is owned by another entity with no further owners, the network has two levels. Panel B plots the node count (horizontal axis) against the ultimate owner count (the number of final nodes, or leafs, in the network – see vertical axis). This figure considers all "hard" news-reporting outlets for which ownership data is available from all ten countries.

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counts correlate (67%).[14] Out of the aforementioned 19% of outlets with more than one but less than five nodes, the number of levels ranges from 2 to 4. The mean (median) level count amounts to 2.1 (2). Around one tenth of outlets in this group have three or four levels, suggesting that even for outlets with a "tractable" number of nodes, some sophistication can be needed to understand their ownership structures. For the 43% of outlets with > 5 nodes, the level count ranges from 2 to 15, with a mean (median) of 6.5 (6).[15]

We conclude that, on the one hand, between one half and two-thirds of news domains are (mainly) owned by one ultimate owner, and this is tractable. On the other hand, however, we find highly diverse ownership structures for most of the remaining news domains. Assessing individual countries, the share of news websites with hard-to-track ownership is also mostly between one third and one half (even when abstracting from minorities). Section V discusses potential implications.

C Market Shares by Sector

Building on our analysis of the ultimate owners' industry sector affiliation, we ask what market shares (in terms of the news sites' reach) are ultimately owned by firms from a given industry sector. For all ten countries, at the level of direct domain owners (registrants), media companies own more than three quarters of the market.[16] In some countries, this figure amounts to more than 95% (U.K., Poland, Italy, and France). Manual checks reveal that cases where domain owners are not in the media sector often reflect sector coding idiosyncrasies (e.g., Orbis codes some newspapers as "Travel, Personal, and Leisure", like the "Journal Gazette" from Indiana, U.S.). In conclusion, the vast majority of domain owners are from the media sector.

However, when moving to the ultimate owner level, the media sector share drops in all countries, see Table 1. Media companies retain around 10% in France, Italy, and Poland, and 20% in Germany and the U.K. In the U.S., Canada, Romania, and Switzerland, they still own 50% or more of the market. Across all ten countries, the financial industry ultimately owns considerable shares of the online media market.[17] In all countries (except for Romania), the financial industry is the most or second-most dominant sector for ultimate owners. It is the most dominant sector in the U.K., Poland, Italy, and France. It is the second-most dominant sector after media companies in the U.S., Switzerland, Spain, and Canada, and after the public sector in Germany.[18]

In sum, examining domain owners is not enough to uncover whether those ultimately financing the

[14] Given our coding procedure, ownership networks of outlets with more than one node come with more than one level. Recall that our registrant data is matched to one domain owner in Orbis (first level), which can then in turn be owned by > 1 shareholders).

[15] Figure B5 and B6 cover the level counts by country, for outlets specializing in political content and for all outlets.

[16] The Orbis categories "Printing & Publishing" and "Media & Broadcasting" are grouped into "Media Sector (broad)" (manual inspection reveals that the two categories describe outlets interchangeably, e.g., they do *not* distinguish native print or TV).

[17] We group "Banking, Insurance & Financial Services" and "Business Services" into "Financial Sector (broad)" (manual inspection reveals that business services mostly refer to holding or asset management companies). We find similar patterns when only considering "Banking, Insurance & Financial Services", see Appendix Table B1.

[18] Appendix Tables B1 and B2 provide more disaggregated sector shares, for outlets specialized in "hard" news and for all outlets (similar patterns emerge for the former and the latter).

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TABLE 1—COUNTRY-LEVEL OWNERSHIP SHARES BY SECTORS

Country	Sector	Share Owner Level 1 Visitors	Share Ult. Owners Visitors
UNITED STATES	Media Sector (broad)	0.84	0.59
	Financial Sector (broad)	0.07	0.34
UNITED KINGDOM	Media Sector (broad)	0.98	0.17
	Financial Sector (broad)	0.00	0.74
SWITZERLAND	Media Sector (broad)	0.90	0.85
	Financial Sector (broad)	0.10	0.09
SPAIN	Media Sector (broad)	0.82	0.38
	Financial Sector (broad)	0.16	0.38
ROMANIA	Media Sector (broad)	0.79	0.50
	Financial Sector (broad)	0.20	0.23
POLAND	Media Sector (broad)	0.98	0.14
	Financial Sector (broad)	0.01	0.74
ITALY	Media Sector (broad)	0.98	0.12
	Financial Sector (broad)	0.02	0.72
GERMANY	Media Sector (broad)	0.82	0.16
	Financial Sector (broad)	0.08	0.31
FRANCE	Media Sector (broad)	0.98	0.08
	Financial Sector (broad)	0.02	0.83
CANADA	Media Sector (broad)	0.77	0.49
	Financial Sector (broad)	0.18	0.43

Notes: Ownership shares by sector based on unique visitors. Column 2 shows the sectors to which the owners belong according the Orbis database. The Orbis categories "Printing & Publishing" and "Media & Broadcasting" are grouped into "Media Sector (broad)". Similarly, we group "Banking, Insurance & Financial Services" and "Business Services" into "Financial Sector (broad)". Sectors with ownership shares >5% both for immediate and ultimate owners are not shown. Column 3 shows the sector-specific ownership shares for domain owners (e.g., the immediate owner of the nytimes.com, according to the Orbis database, is the *NEW YORK TIMES COMPANY*). In column 4, the shares are for ultimate owners (e.g., there are around 3,000 ultimate owner entities for nytimes.com).

news have economic interests outside of the news sector. Given the often hard-to-track ownership networks, such interests remain non-transparent to consumers. It also shows that the answer to "who owns the online media?" is, to a significant degree, the financial industry.

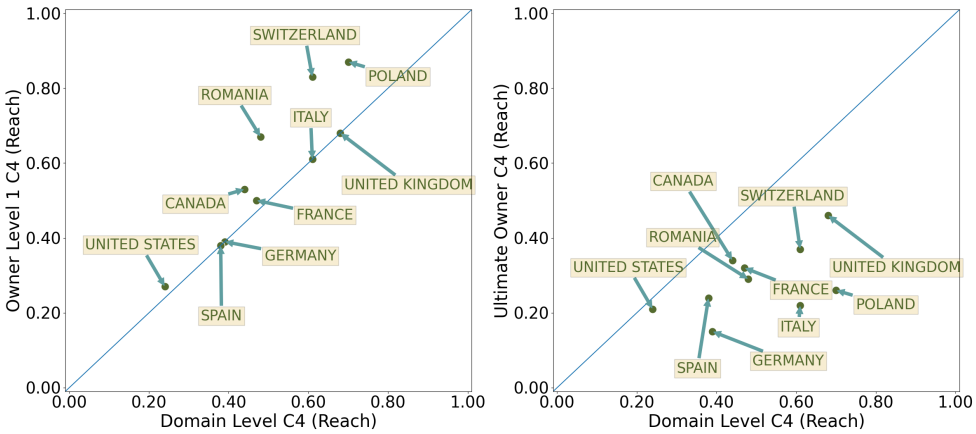
D Market Concentration

Building on the firm-level market share figures, we turn to country-level market concentration. Figure 3 shows the results regarding the country-level market concentration (based on the C_4 measure). The horizontal axes in both panels show the cumulative market shares for the top four domains (in terms of reach). The left panel plots these values against the C_4 measure of *domain* owners (i.e., considering that several domains can belong to one owner; vertical axis). The right panel plots the domain-level C_4 measures against those of the top four *ultimate* owners (vertical axis). Consider the U.S., for example: the top four domains cover 24% of the market, the top four domain owners 27% (left panel), and the top four ultimate owners 21% (right panel).

At the domain-level, concentration is highest in Poland, with a C_4 of 70%. The top domain, onet.pl,

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FIGURE 3. C_4 MEASURES BY COUNTRY FOR DOMAINS, DOMAIN OWNERS, AND ULTIMATE OWNERS



Note: The left panel shows the cumulative market shares (in terms of reach) for the top four domains (the C_4) on the horizontal axis. For example, the domain-level C_4 measure in Poland is 70%. The vertical axis shows the C_4 at for domain owners (87% for Poland). In the right panel, the horizontal axis replicates that on the left panel. However, the vertical axis now shows the C_4 for ultimate owners. For Poland, the C_4 is 26%. Both panels include a 45° line. The Figure includes all outlets specialized in "hard news".

already covers 49% of the market. Concentration is similarly high in the U.K. (with C_4 at 68%). The top outlet, bbc.co.uk, covers 40%. Concentration in Italy and Switzerland is also high. Domain-level concentration is lowest in the U.S. (24%), with cnn.com holding the highest market share (9%). The other countries lie between these poles.

In all ten countries, market concentration increases when moving from domains to domain owners. All points lie on or above the 45° line, by construction (if domain owners hold $>=1$ domains).

When inspecting immediate domain owners (vertical axis on the left), ownership is still most concentrated for Poland (with a C_4 of 87%), Switzerland (83%), the U.K. (68%), and Italy (61%). Again, concentration is lowest in the U.S. (27%), with the remaining countries lying in between.

Finally, when considering ultimate owners, the general picture points to lower concentration levels. All points are below the 45° line, reflecting the highly dispersed ownership networks of many outlets. In most countries, the C_4 now lies below 50% (with the exception of Switzerland at 62%).

At the level of domains, domain owners, and ultimate owners alike, the relative ranking based on market concentration remains relatively unchanged for most countries when the top outlet numbers are varied (e.g., when using C_8 instead of C_4). Appendix Figures B7 and B8 show the C_M measures for $M = 1, ..., 20$ (for outlets specializing in "hard news" and all outlets).

In sum, market concentration at the level of news sites and the level of domain owners is moderate to high in all of the countries in our sample (except for the U.S.). The ultimate owner analysis reveals a substantially lower market concentration in most countries. Adding to the evidence from our ownership network analysis, our findings imply that the online media markets in the U.S., Canada, and Europe are not dominated by a few influential ultimate owners.

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IV Extensions

A Robustness to Alternative Measures

To verify the robustness of our main results, we re-compute market shares based on page views instead of reach. As reach and page views are generally highly correlated (see Appendix Figure C1), we find similar sector shares (see Appendix Tables B1 and B2) and similar market concentrations (see Appendix Figures C2 and C3).

We also compute market concentration results based on the Herfindahl-Hirschman Index (HHI). This exercise confirms the relative ranking of countries, as well as the qualitative differences between concentration at the level of domains, domain owners, and ultimate owners (see Appendix Table D1).

B Robustness to Missing Domains

Missing news domains in our seed sample or missing data (on traffic or ownership) could produce imprecise market concentration estimates. Given the way in which we compile our sample, we expect (if at all) hypothetically missing outlets to attract low to moderate traffic. To estimate the impact of missing data in a "worst case scenario", we run a simulation. Suppose there are several hypothetical outlets missing in our data. Under certain assumptions, we simulate how market concentrations would look if we were to include these websites. Specifically, we assume that the missing websites would receive traffic amounting to the median of all outlets for which we have complete data. Then, we ask how the market concentration results would change if Z such outlets were missing. The simulation confirms a high robustness of our estimates against such missing data (see Appendix Figure E1).

C Market Concentration Based on Attention Shares

Prat (2018) emphasizes the importance of voters' attention dedicated to specific outlets, when assessing the potential political influence ("power") of media outlets. Suppose outlet A is read by 10 individuals, who also dedicate equal amounts of attention to 9 other outlets (A gets 10% of each individuals' attention). Then, A influences 1 voter (10 voters $\times$ 10%). In contrast, only two individuals read outlet B, but they do not consume any other news. B then influences 2 voters (2 $\times$ 100%).

In this framework, to understand our findings regarding market shares as a proxy for the potential influence of a news website, we need to assume that the reach of news websites is correlated with voter attention. As we can only measure web traffic at the domain-level (not for individual users), we do not directly observe attention shares. We, therefore, proxy for whether an individual visits a news domain by whether they follow the same outlet on Twitter. We justify this proxy by the fact that the

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number of followers of a news site and our measure of reach correlate almost perfectly (0.91).[19] We draw a random sample of 6,475 U.S. Twitter users, extract all the accounts that they follow, identify accounts of news sites, and match these accounts to our news domains.[20] Hence, for each random Twitter user, we know the combination of outlets they follow. We then calculate the attention shares and find that their correlation with our market share figures is 70%.

V Discussion and Conclusion

We present first evidence on the current composition of the online news media landscape in the United States, Canada and eight European countries. Our results have several politico-economic implications.

Regarding concerns of media capture by owners our results highlight two crucial aspects. On the one hand, we find that almost two-thirds of outlets have one ultimate owner or at least one majority owner. However, many of those have a rather small reach. On the other hand, many online media outlets with large market shares tend to have diverse ultimate owners without a majority owner. Therefore, almost half of the online news market have hard-to-track ownership networks. While seminal contributions on the persuasive power of outlets typically assume that one owner controls the contents of a news outlets (e.g., Prat, 2018), this may be a relatively strong abstraction, especially for many large outlets.

Regarding transparency and the involvement of non-media industries, our findings are consistent with previous results on general, cross-sector firm ownership.[21] Accordingly, while the hard-to-track ownership networks in the media sector may not stand out as special relative to other sectors, they still raise political concerns. With such ownership structures, it becomes almost impossible for consumers or regulators to understand who is (ultimately) responsible for the content. Accordingly, it is difficult to anticipate potential bias of any sort. The extent to which consumers can (and want) to correct for potential biases in reporting (by switching away from a certain outlet, for instance), has been proposed as one key determinant of the persuasive power of the media (see, e.g., Prat, 2018). Even if readers were highly motivated to correct for biases they are aware of, it is prohibitively costly to do so with the prevailing lack of transparency.

Finally, regarding market concentration, at the level of news sites and the level of domain owners, concentration is moderate to high in all countries in our sample (except for the U.S.). When analyzing

[19] We collect data on the total number of Twitter followers of each outlet in our sample by manually matching news domains and their Twitter accounts. Then, we scrape the follower number for each account.

[20] To obtain a seed sample of U.S. Twitter users, we scrape *all* English-language Tweets on three days (1 October, 1 November, and 1 December 2020). We randomly sampled 100,000 users active on any of these days. For each such user, we query their location via the Twitter API. We send the location information to the Google Location API to determine if the user is based in the U.S. We match 11,230 individuals (out of the 100,000) to the U.S. Thus, we drop English-tweeting users from other countries or without location information). Out of the 11,230 U.S. users, we focus on the 6,475 users that use Twitter for news consumption – defined as following ≥ 1 outlet(s) from our sample.

[21] Aminadav and Papaioannou (2020) find that, globally and as of 2012, slightly more than half of firms are diversely held (their work does not inform on media sector ownership).

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ultimate owners, concentration falls substantially in most countries. Consequentially, the online media markets in the U.S., Canada, and Europe do not seem to be dominated by just a few influential ultimate owners.

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Who Owns the Online Media?

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November 22, 2021

ONLINE APPENDIX

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A Details on Data Collection and Database

Data coverage Table A1 shows the data coverage for the news outlet characteristics. Specifically, how many canonical domains are assigned to a given country (*No.*), for how many of these domains we can identify an owner in the Orbis database (*Owners*), for how many domains we obtain traffic information from AWIS (*Traffic*), for how many domains weighted by traffic we identify an owner (*Traffic* $\times$ *owners*), for how many domains we can collect information on the reporting from GDELT (*%Content*), and for how many domains weighted by traffic we obtain reporting information (*%(Traffic* $\times$ *content)*). Ownership data availability ranges from almost 40% (U.S.) to 90% (Germany). Ownership information tends to be unavailable for small outlets. This is reflected in the fifth column (*Traffic* $\times$ *owners*). This column zooms in on outlets for which traffic data is available and then calculates traffic-weighted ownership coverage. It is high for all countries, for some even (close to) 100% (Germany, Spain, Poland, and Switzerland).

Traffic data coverage (see fourth columns) ranges from 85% Canada to 96% in Poland. The stories featured by an outlet are covered in GDELT for 40% (Canada) to 69% (U.K.) of outlets. Again, content coverage seems to correlate with the traffic size of the outlet: if we weight the GDELT coverage by traffic, we obtain figures from 62% (Poland) to 96% (Switzerland). The positive relationship between traffic and coverage implies that errors in our market concentration estimates due to lack of coverage are likely small.

Finally, a note on the sector information coverage. Unfortunately, sector information is not available for all Orbis entries. For domains with an Orbis match, but without sector information, we manually collect sector information at the domain level. Thereby, we use data from Bloomberg and, sometimes, other online sources. Finally, sector information for domain owners is available for $>$90% of domains in seven countries (U.S., Germany, France, Spain, Poland, Romania, Switzerland). For the U.K., Italy, and Canada, it is available for $>$75%. At the level of ultimate owners, sector information is available for around half of the ultimate owners that have any stakes in outlets specializing in politics (this figure is rather stable across countries). For the ultimate owners, the sector information comes only from Orbis. We do not engage in a manual search for ultimate owners, given their sheer number (circa 2.1 million).

Summary statistics Table A2 shows summary statistics for the number of domains, their traffic (in terms of page views and unique visitors), the share of traffic from domestic users, the stories published, and the share of political content. All figures are averages based on weekly measurements from 2018 through 2020. The number of domains ranges from 78 in Poland to 8,805 in the United States. *Avg. page views* shows the number of page views for each country according to AWIS (normalized by one million page views across the internet worldwide, to account for seasonal fluctuations, changes in the number of internet users, etc.). Average page views vary between 0.23

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TABLE A1—DATA COVERAGE

Country	*No.*	*%Owners*	*%Traffic*	*%(Traffic × owners)*	*%Content*	*%(Traffic × content)*
UNITED STATES	8804	0.39	0.86	0.85	0.41	0.87
CANADA	1283	0.61	0.85	0.85	0.40	0.86
UNITED KINGDOM	598	0.79	0.91	0.99	0.69	0.95
SPAIN	349	0.65	0.89	0.97	0.39	0.93
GERMANY	340	0.90	0.86	0.98	0.48	0.95
ITALY	144	0.75	0.88	0.92	0.60	0.77
ROMANIA	142	0.58	0.89	0.85	0.46	0.85
FRANCE	113	0.80	0.90	0.88	0.56	0.88
SWITZERLAND	112	0.78	0.86	1.00	0.49	0.96
POLAND	78	0.83	0.96	1.00	0.63	0.62

Notes: The following data coverage statistics are shown: how many domains are assigned to a given country (*No.*), for how many of these domains we can identify an owner in the Orbis database (*%Owners*), for how many domains we obtain traffic information (*%Traffic*), for how many domains weighted by traffic we identify an owner (*%(Traffic × owners)*), for how many domains we can collect information on the reporting (*%Content*), and for how many domains weighted by traffic we obtain reporting information (*%(Traffic × content)*).

(Canada) and 4.79 (Poland). For each of the 10 countries, page views are skewed; most domains get a low number of page views and only very few get relatively many views (see Figures B1 and B2). The average unique visitors per domain (again normalized by one million) ranges from around 4.3 in Canada to 59.5 in France (see *Avg. reach*). In the next two columns, we show the share of page views that come from domestic users and the share of the domestic unique visitors (out of all unique visitors). Both domestic page views and domestic reach are at three quarters or higher for all countries (see *Domestic page views* and *Domestic reach*). The domestic shares are highest for Germany and Poland (around 90% for both page views and reach). *Ultimate owners* lists the average number of ultimate owners for each outlet. The minimum lies at 5,263 in Canada, the maximum at 23,386 in Spain. The second-last column (*No. stories*) shows the average yearly number of stories published. These figures range from 5,263 in Canada to 23,387 in Spain. In the last column (see *Political stories*), we calculate the share of stories that cover political content. The shares are surprisingly stable across countries, lying roughly between 40% and one half. In the main part, we focus on outlets that specialize in reporting on politics (defined as $>$25% cover containing political content).

Excluded Domains

From the list of outlets provided by ABYZ, we drop the following domains. Note that the traffic data is available at the canonical domain level (e.g., google.com instead of news.google.com). Thus, we drop the following domains because the major share from their traffic does not come from their function as news providers. That is, the traffic figures for news.google.com or tech.mit.edu also include all page views of Google as a search engine or MIT as a university, respectively. Also, most of the domains we drop do not provide own news content, but aggregate it (such as yahoo.com). Hence, some of their traffic is indirectly captured by the page views of the actual news outlets the

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TABLE A2—SUMMARY STATISTICS

Country	*No.*	*Avg. page views*	*Avg. reach*	*Domestic page views*	*Domestic reach*	*Ultimate owners*	*No. stories*	*Political stories*
UNITED STATES	8804	0.70	12.39	0.89	0.88	576	6235	0.42
CANADA	1283	0.23	4.27	0.81	0.79	351	5263	0.45
UNITED KINGDOM	598	2.67	38.72	0.75	0.74	1499	9482	0.38
SPAIN	349	2.30	37.97	0.83	0.81	271	23386	0.48
GERMANY	340	1.83	28.34	0.90	0.90	178	21345	0.38
ITALY	144	2.99	45.15	0.89	0.89	359	12451	0.41
ROMANIA	142	0.61	10.00	0.83	0.83	11	11305	0.48
FRANCE	113	3.06	59.49	0.81	0.80	164	19371	0.39
SWITZERLAND	112	0.70	10.99	0.79	0.75	360	12392	0.42
POLAND	78	4.79	56.73	0.90	0.91	693	9735	0.46

Notes: The summary statistics are shown: how many domains are assigned to a given country (*No.*), the average page views per domain per one million page views on the internet (*Avg. page views*), the average reach (i.e., unique users) per one million unique users (*Avg. reach*), the share of domestic page views (*Domestic page views*), the share of domestic reach (*Domestic reach*), the average number of ultimate owners, the average yearly total of stories published by the outlet (*No. stories*), and the share of these stories that cover political content (*Political stories*). The traffic- and content-related figures reflect averages for the time period 2018 through 2020, while the ownership-related figures are based on a cross-section compiled during the same period.

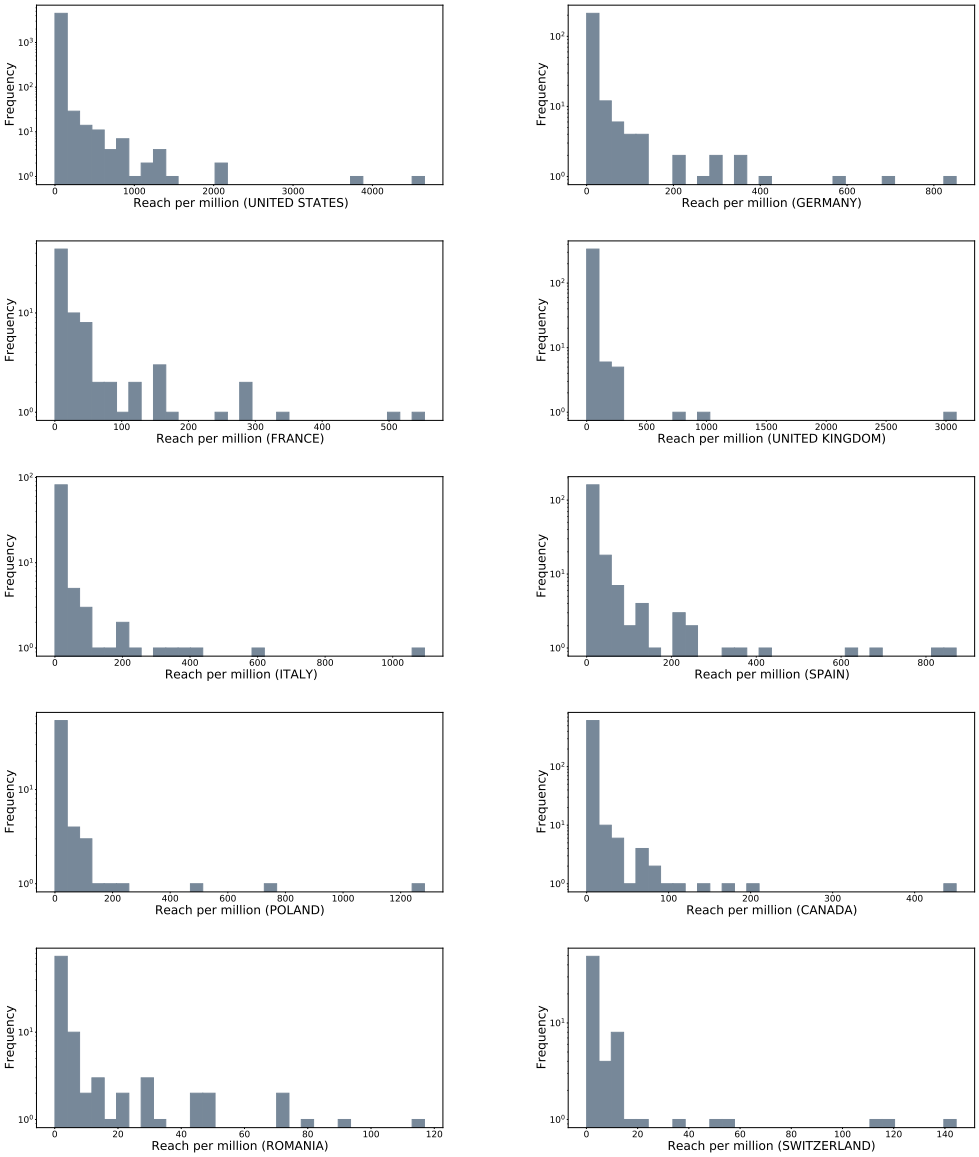
aggregators point to.

- All domains ending in reuters.com, such as de.reuters.com or es.reuters.com
- All domains ending in yahoo.com, such as ca.news.yahoo.com or fr.news.yahoo.com
- Blogs on university websites, identified as ending in .edu, such as tech.mit.edu
- All domains ending in msn.com, such as uk.msn.com
- All domains ending in google.com, such as news.google.com or sites.google.com
- facebook.com
- issuu.com
- nasa.gov
- expatica.com

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B Additional Figures and Tables

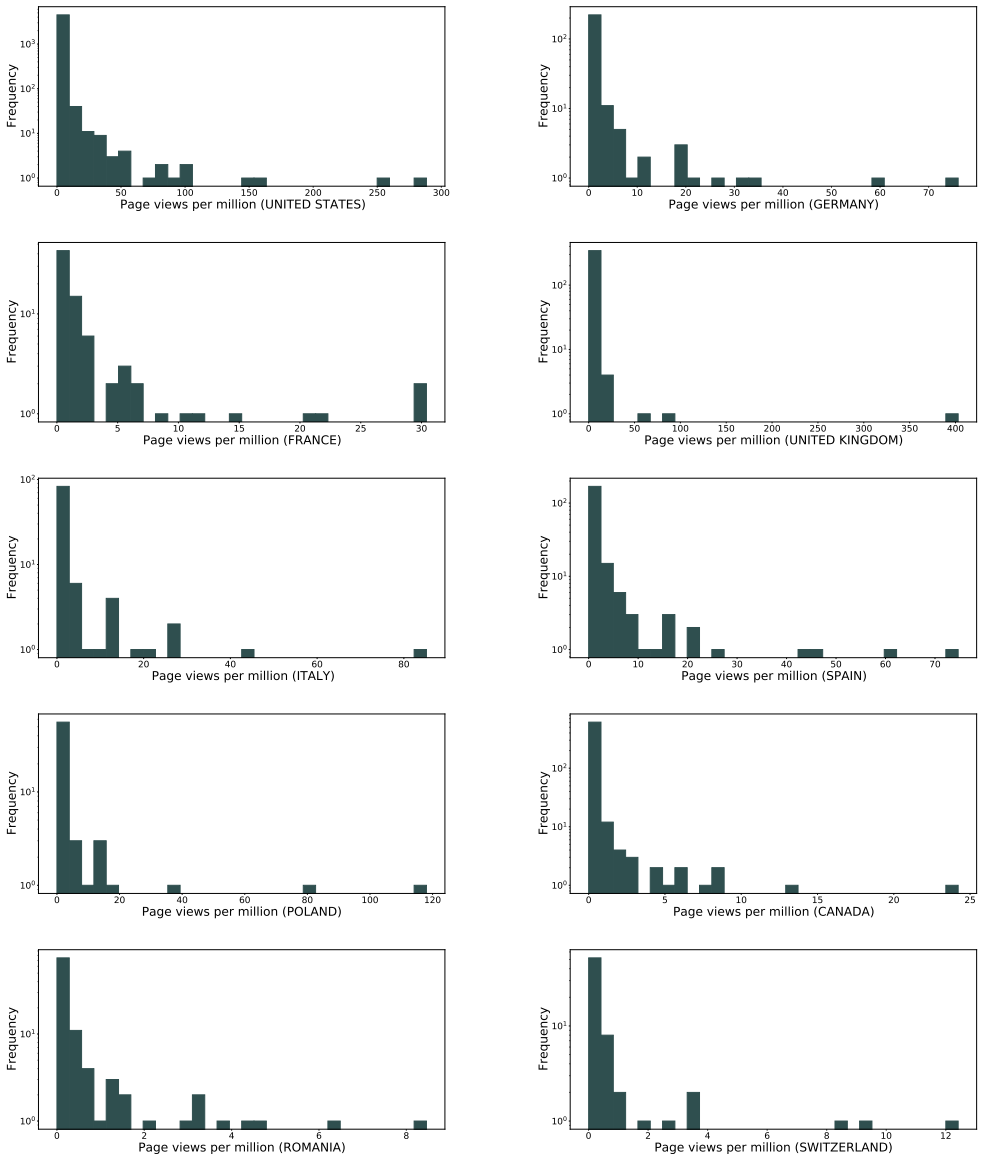
FIGURE B1. HISTOGRAMS OF REACH PER MILLION, BY COUNTRY



Note: The figure shows the distribution of the reach figures by country – for all outlets reporting on politics in more than 25% of their articles.

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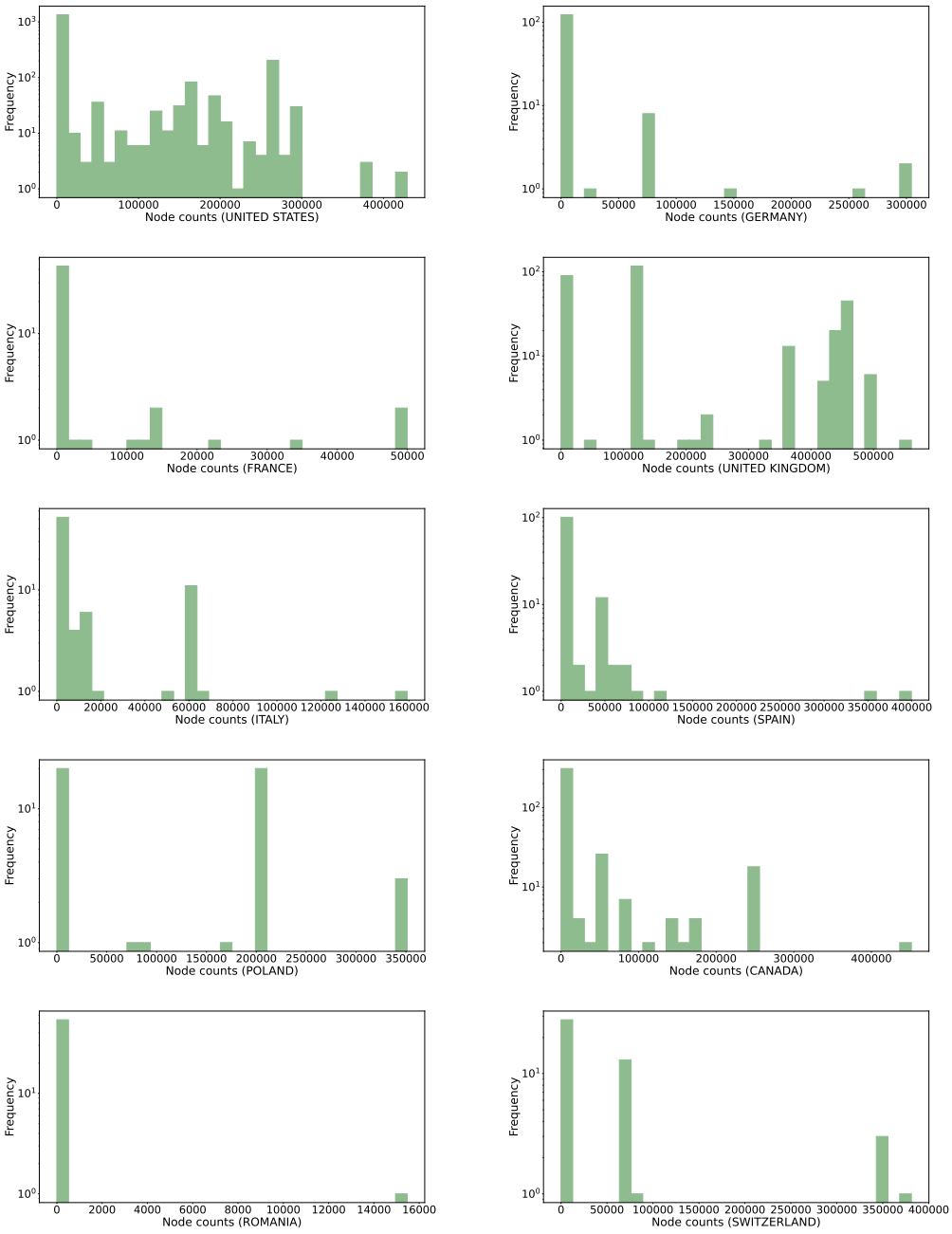
FIGURE B2. HISTOGRAMS OF PAGE VIEWS PER MILLION, BY COUNTRY



Note: The figure shows the distribution of page views by country – for all outlets reporting on politics in more than 25% of their articles.

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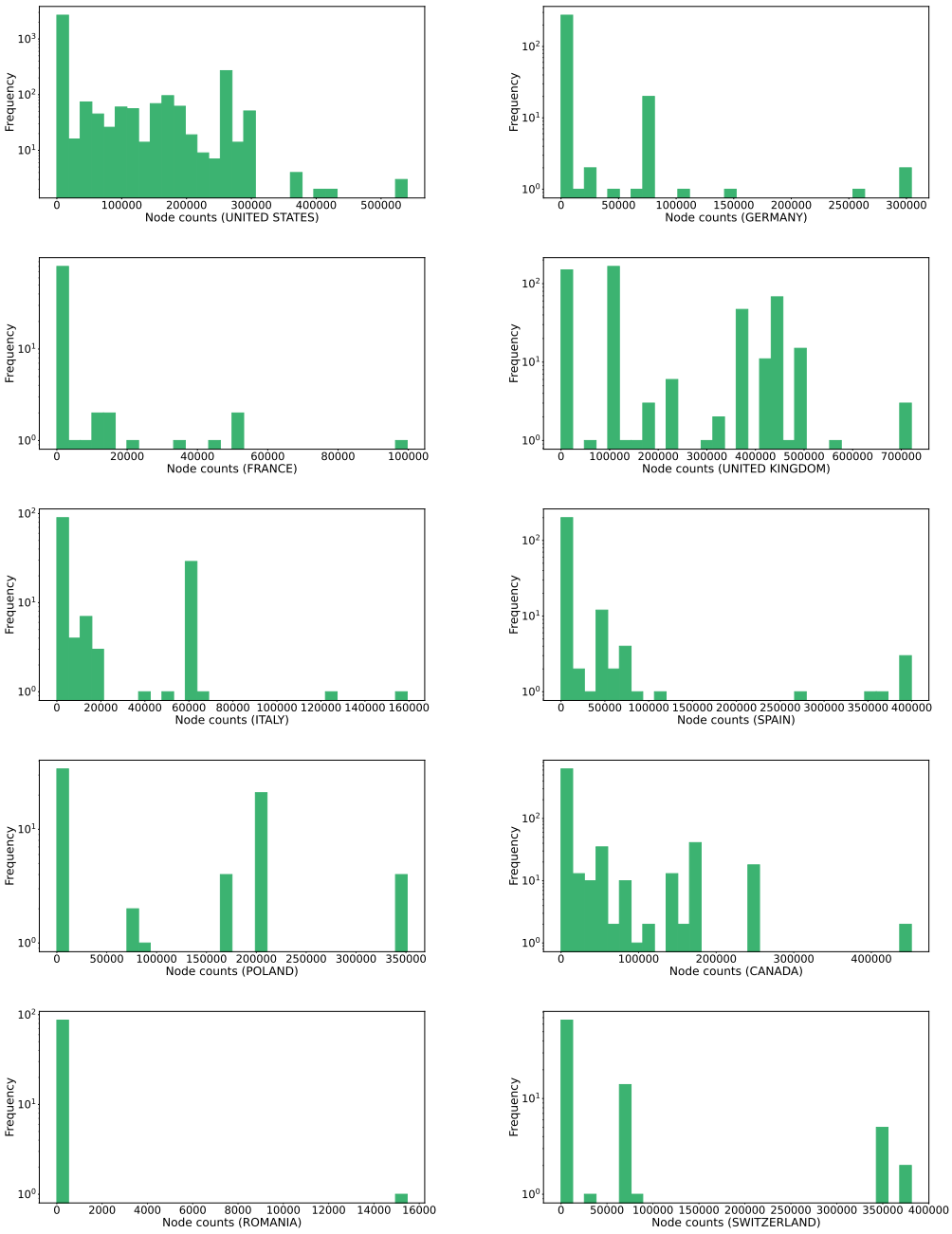
FIGURE B3. NODE COUNT DISTRIBUTION, BY COUNTRY



Note: The figure shows the distribution of node counts by country – for all outlets reporting on politics in more than 25% of their articles. The node counts show the total number of owners that have any stakes ($> 1\%$) in an outlet.

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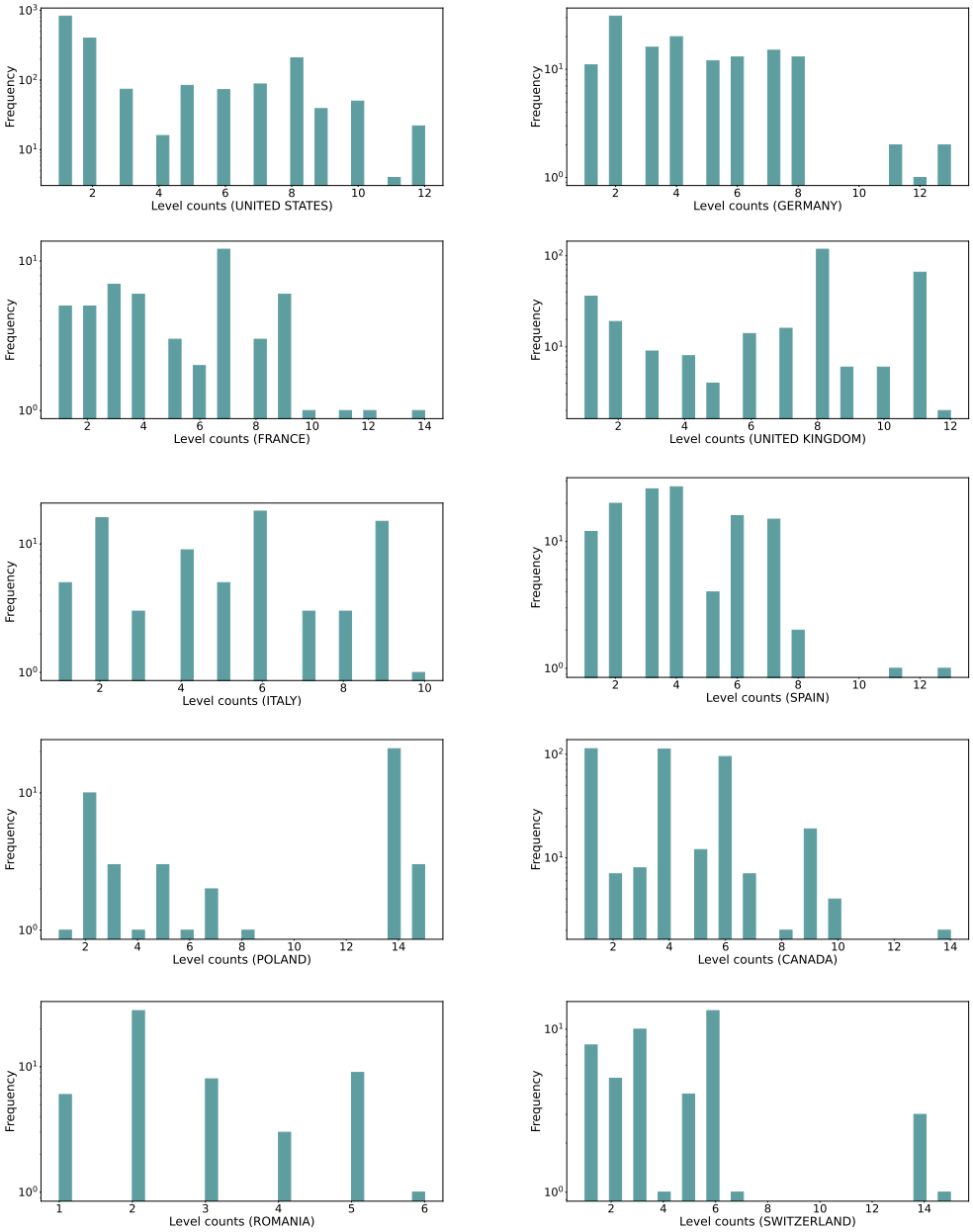
FIGURE B4. NODE COUNT DISTRIBUTION, BY COUNTRY (ALL OUTLETS, INCL. NON-POLITICAL)



Note: The figure shows the distribution of node counts by country – for all outlets, including those not specializing in political content. The node counts show the total number of owners that have any stakes ($> 1\%$) in an outlet.

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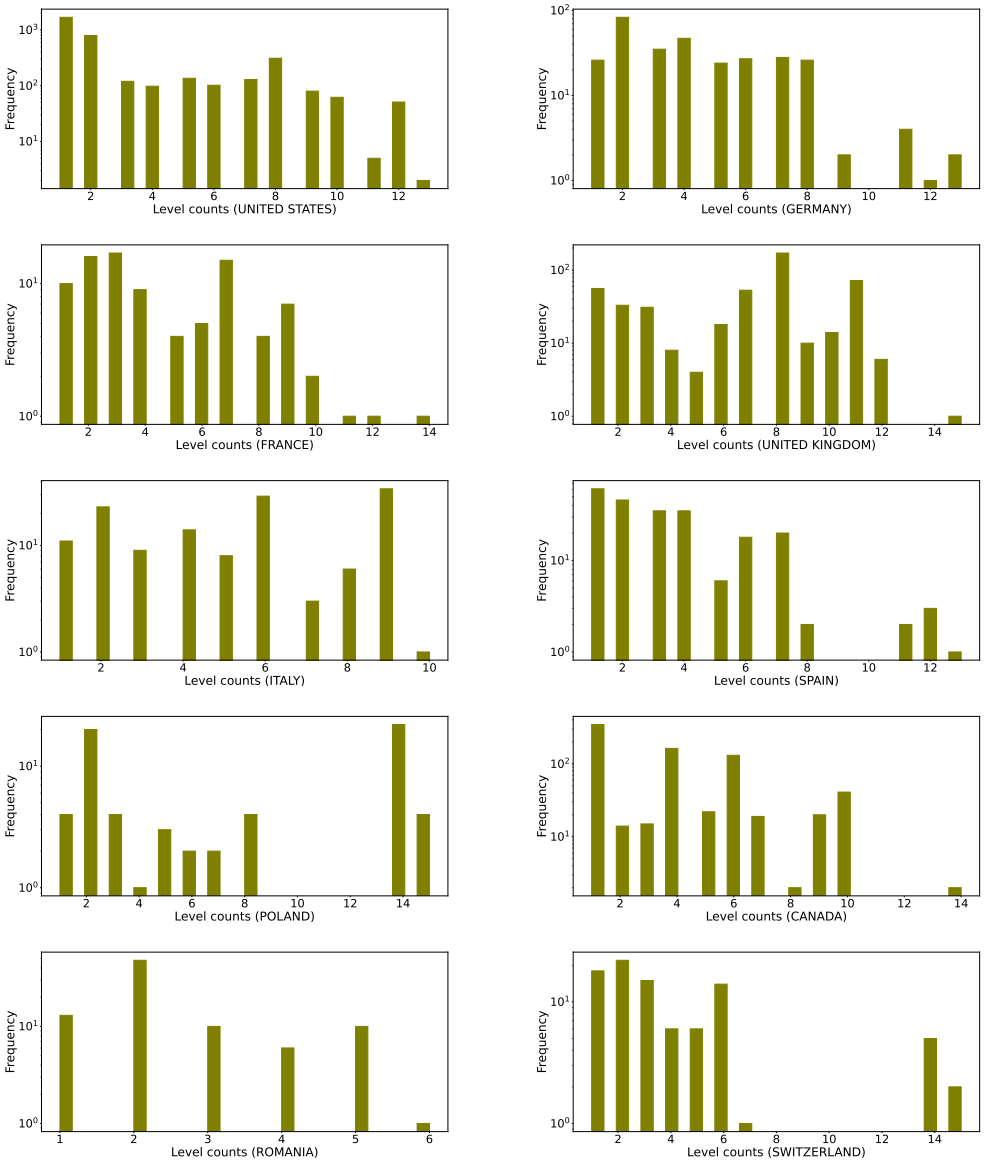
FIGURE B5. LEVEL COUNT DISTRIBUTION, BY COUNTRY



Note: The figure shows the distribution of level counts by country – for all outlets reporting on politics in more than 25% of their articles. The level counts show the total number of levels in the ownership network (considering owners with any stakes $> 1\%$ in an outlet).

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FIGURE B6. LEVEL COUNT DISTRIBUTION, BY COUNTRY (ALL OUTLETS, INCL. NON-POLITICAL)



Note: The figure shows the distribution of level counts by country – for all outlets, including those not specializing in political content. The level counts show the total number of levels in the ownership network (considering owners with any stakes $> 1\%$ in an outlet).

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TABLE B1—COUNTRY-LEVEL OWNERSHIP SHARES BY SECTORS

Country	Sector	Share Owner Level 1 Page views	Share Owner Level 1 Visitors	Share Ult. Owners Page views	Share Ult. Owners . Visitors
UNITED STATES	Printing & Publishing	0.53	0.55	↘ 0.29	↘ 0.29
	Media & Broadcasting	0.31	0.28	0.29	0.26
	Business Services	0.07	0.07	0.14	0.16
	Banking, Insurance & Financial Services	0.00	0.00	↗ 0.17	↗ 0.18
UNITED KINGDOM	Printing & Publishing	0.81	0.82	↘ 0.01	↘ 0.01
	Media & Broadcasting	0.15	0.14	↘ 0.0	↘ 0.0
	Information Services	0.03	0.02	↗ 0.21	↗ 0.16
	Business Services	0.00	0.00	↗ 0.19	↗ 0.23
	Banking, Insurance & Financial Services	0.00	0.00	↗ 0.49	↗ 0.51
	Public Administration	0.00	0.00	0.07	0.06
SWITZERLAND	Printing & Publishing	0.67	0.67	↘ 0.09	↘ 0.09
	Media & Broadcasting	0.25	0.23	↗ 0.79	↗ 0.76
	Business Services	0.08	0.10	0.02	0.02
	Banking, Insurance & Financial Services	0.00	0.00	0.06	0.07
	Public Administration	0.00	0.00	0.04	0.05
SPAIN	Printing & Publishing	0.70	0.71	↘ 0.44	↘ 0.38
	Business Services	0.18	0.16	0.15	0.17
	Media & Broadcasting	0.08	0.09	0.0	0.0
	Banking, Insurance & Financial Services	0.00	0.00	↗ 0.19	↗ 0.21
	Public Administration	0.00	0.00	↗ 0.14	↗ 0.15
ROMANIA	Printing & Publishing	0.50	0.47	0.54	0.5
	Media & Broadcasting	0.22	0.24	↘ 0.0	↘ 0.0
	Business Services	0.19	0.20	↘ 0.03	↘ 0.03
	Information Services	0.09	0.08	0.0	0.0
	Public Administration	0.00	0.01	↗ 0.16	↗ 0.25
	Banking, Insurance & Financial Services	0.00	0.00	↗ 0.26	↗ 0.2
POLAND	Media & Broadcasting	0.67	0.65	↘ 0.06	↘ 0.08
	Printing & Publishing	0.32	0.33	↘ 0.04	↘ 0.06
	Business Services	0.01	0.01	↗ 0.37	↗ 0.36
	Banking, Insurance & Financial Services	0.00	0.00	↗ 0.42	↗ 0.38
	Public Administration	0.00	0.00	0.08	0.08
ITALY	Printing & Publishing	0.87	0.83	↘ 0.11	↘ 0.11
	Information Services	0.09	0.12	0.01	↘ 0.01
	Business Services	0.01	0.02	↗ 0.44	↗ 0.42
	Banking, Insurance & Financial Services	0.00	0.00	↗ 0.3	↗ 0.3
	Public Administration	0.00	0.00	0.09	0.1
GERMANY	Printing & Publishing	0.44	0.48	↘ 0.04	↘ 0.05
	Media & Broadcasting	0.23	0.20	↘ 0.11	0.11
	Information Services	0.19	0.14	↘ 0.0	↘ 0.0
	Business Services	0.06	0.08	↗ 0.2	↗ 0.21
	Banking, Insurance & Financial Services	0.00	0.00	0.1	0.1
	Public Administration	0.00	0.00	↗ 0.54	↗ 0.52
FRANCE	Printing & Publishing	0.95	0.94	↘ 0.06	↘ 0.07
	Business Services	0.02	0.02	↗ 0.64	↗ 0.63
	Banking, Insurance & Financial Services	0.00	0.00	↗ 0.19	↗ 0.2
	Public Administration	0.00	0.00	0.08	0.09
CANADA	Media & Broadcasting	0.42	0.47	0.39	0.43
	Printing & Publishing	0.28	0.30	↘ 0.05	↘ 0.06
	Business Services	0.25	0.18	↗ 0.38	↗ 0.3
	Communications	0.04	0.04	0.05	0.05
	Banking, Insurance & Financial Services	0.00	0.00	↗ 0.11	↗ 0.13

Notes: Ownership shares by sector and country, based on page views (columns 3 and 5) and unique visitors (columns 4 and 6) – considering all outlets reporting on politics in more than 25% of their articles. Column 2 shows the sectors to which the owners belong according the Orbis database. Sectors with ownership shares below 5% both for immediate and ultimate owners are not shown (for better readability). Columns 3 and 4 show the sector-specific ownership shares at the level of the immediate owner (e.g., the immediate owner of the nytimes.com, according to the Orbis database, is the *NEW YORK TIMES COMPANY*). In column 7 and 8, the measures are calculated at the level of ultimate owners (e.g., there are around 3,000 ultimate owner entities for nytimes.com, among others *CARLOS SLIM HELU Y FAMILIA*, *JACKSON SQUARE LLC*, or *VANGUARD GROUP INC*). Sectors where the share changes by more than 10 percentage points when moving from the immediate owner to the ultimate owner (i.e., moving from column 3 to 5 or from column 4 to 6) are highlighted with an arrow (↗ for increases and ↘ for decreases).

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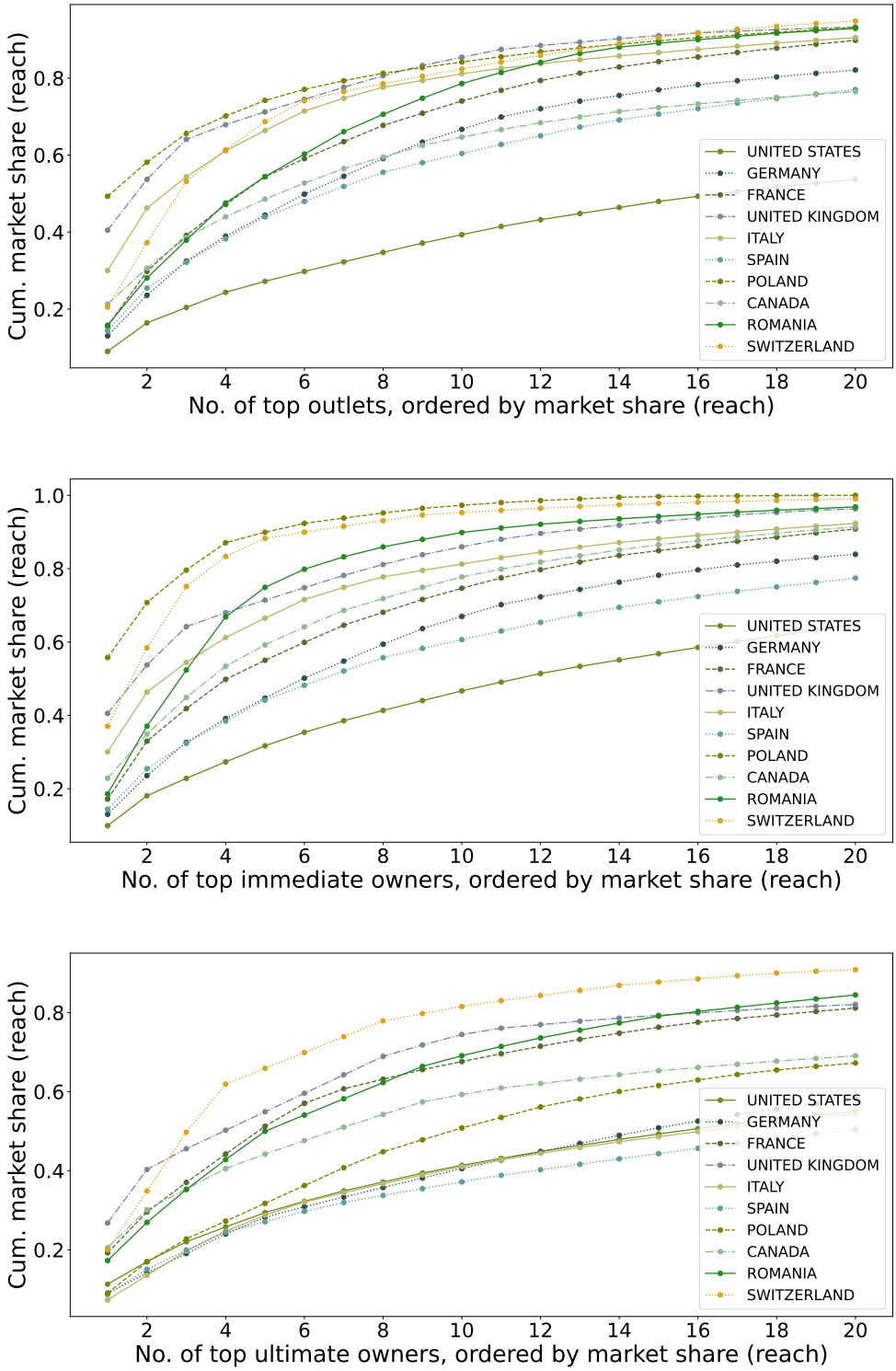
TABLE B2—COUNTRY-LEVEL OWNERSHIP SHARES BY SECTORS (ALL OUTLETS, INCL. NON-POLITICAL)

Country	Sector	Share Owner Level 1 Page views	Share Owner Level 1 Visitors	Share Ult. Owners Page views	Share Ult. Owners . Visitors
UNITED STATES	Printing & Publishing	0.48	0.51	↘ 0.29	↘ 0.29
	Media & Broadcasting	0.29	0.26	0.29	0.26
	Business Services	0.10	0.08	0.14	0.16
	Communications	0.06	0.06	0.03	0.03
	Banking, Insurance & Financial Services	0.00	0.00	↗ 0.17	↗ 0.18
UNITED KINGDOM	Printing & Publishing	0.77	0.79	↘ 0.01	↘ 0.01
	Media & Broadcasting	0.19	0.17	↘ 0.0	↘ 0.0
	Information Services	0.03	0.02	↗ 0.21	↗ 0.16
	Business Services	0.00	0.00	↗ 0.19	↗ 0.23
	Banking, Insurance & Financial Services	0.00	0.00	↗ 0.49	↗ 0.51
	Public Administration	0.00	0.00	0.07	0.06
SWITZERLAND	Printing & Publishing	0.65	0.66	↘ 0.09	↘ 0.09
	Media & Broadcasting	0.27	0.24	↗ 0.79	↗ 0.76
	Business Services	0.07	0.09	0.02	0.02
	Banking, Insurance & Financial Services	0.00	0.00	0.06	0.07
	Public Administration	0.00	0.00	0.04	0.05
SPAIN	Printing & Publishing	0.78	0.77	↘ 0.44	↘ 0.38
	Business Services	0.12	0.12	0.15	0.17
	Media & Broadcasting	0.06	0.07	0.0	0.0
	Public Administration	0.01	0.01	↗ 0.14	↗ 0.15
	Banking, Insurance & Financial Services	0.00	0.00	↗ 0.19	↗ 0.21
ROMANIA	Printing & Publishing	0.46	0.48	0.54	0.5
	Computer Software	0.17	0.10	↘ 0.0	0.0
	Media & Broadcasting	0.16	0.19	↘ 0.0	↘ 0.0
	Business Services	0.14	0.16	↘ 0.03	↘ 0.03
	Information Services	0.06	0.06	0.0	0.0
	Public Administration	0.00	0.01	↗ 0.16	↗ 0.25
	Banking, Insurance & Financial Services	0.00	0.00	↗ 0.26	↗ 0.2
POLAND	Media & Broadcasting	0.68	0.65	↘ 0.06	↘ 0.08
	Printing & Publishing	0.31	0.34	↘ 0.04	↘ 0.06
	Business Services	0.01	0.01	↗ 0.37	↗ 0.36
	Banking, Insurance & Financial Services	0.00	0.00	↗ 0.42	↗ 0.38
	Public Administration	0.00	0.00	0.08	0.08
ITALY	Printing & Publishing	0.71	0.69	↘ 0.11	↘ 0.11
	Business Services	0.11	0.10	↗ 0.44	↗ 0.42
	Media & Broadcasting	0.11	0.12	↘ 0.0	↘ 0.0
	Information Services	0.07	0.09	0.01	0.01
	Banking, Insurance & Financial Services	0.00	0.00	↗ 0.3	↗ 0.3
	Public Administration	0.00	0.00	0.09	0.1
GERMANY	Printing & Publishing	0.43	0.46	↘ 0.04	↘ 0.05
	Media & Broadcasting	0.24	0.21	↘ 0.11	0.11
	Information Services	0.17	0.13	↘ 0.0	↘ 0.0
	Business Services	0.07	0.08	↗ 0.2	↗ 0.21
	Public Administration	0.01	0.01	↗ 0.54	↗ 0.52
	Banking, Insurance & Financial Services	0.00	0.00	0.1	0.1
FRANCE	Printing & Publishing	0.91	0.90	↘ 0.06	↘ 0.07
	Media & Broadcasting	0.08	0.08	0.01	0.01
	Business Services	0.01	0.01	↗ 0.64	↗ 0.63
	Banking, Insurance & Financial Services	0.00	0.00	↗ 0.19	↗ 0.2
	Public Administration	0.00	0.00	0.08	0.09
CANADA	Media & Broadcasting	0.43	0.47	0.39	0.43
	Business Services	0.25	0.19	↗ 0.38	↗ 0.3
	Printing & Publishing	0.24	0.26	↘ 0.05	↘ 0.06
	Communications	0.07	0.07	0.05	0.05
	Banking, Insurance & Financial Services	0.01	0.00	0.11	↗ 0.13

Notes: Ownership shares by sector and country, based on page views (columns 3 and 5) and unique visitors (columns 4 and 6) – considering all outlets, including those not specializing in political content. Column 2 shows the sectors to which the owners belong according the Orbis database. Sectors with ownership shares below 5% both for immediate and ultimate owners are not shown (for better readability). Columns 3 and 4 show the sector-specific ownership shares at the level of the immediate owner (e.g., the immediate owner of the nytimes.com, according to the Orbis database, is the *NEW YORK TIMES COMPANY*). In column 7 and 8, the measures are calculated at the level of ultimate owners (e.g., there are around 3,000 ultimate owner entities for nytimes.com, among others *CARLOS SLIM HELU Y FAMILIA*, *JACKSON SQUARE LLC*, or *VANGUARD GROUP INC*). Sectors where the share changes by more than 10 percentage points when moving from the immediate owner to the ultimate owner (i.e., moving from column 3 to 5 or from column 4 to 6) are highlighted with an arrow (↗ for increases and ↘ for decreases).

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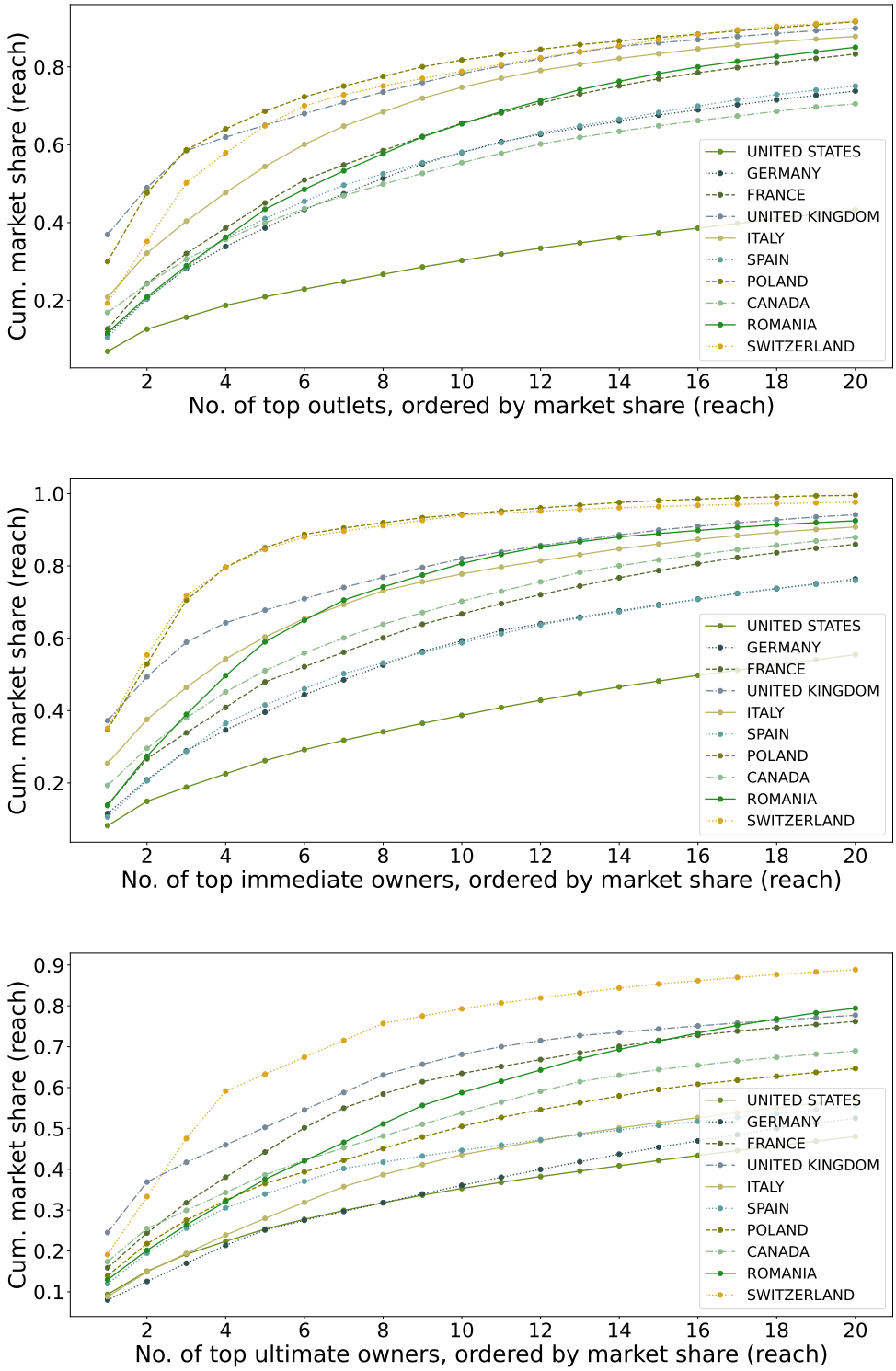
FIGURE B7. MARKET CONCENTRATION (C_M) BASED ON REACH



Note: Cumulative market shares of the top M domains by country – for all outlets reporting on politics in more than 25% of their articles. The C_M (plotted on the Y-axis) is computed based on the top 1 to top 20 entities: domains, domain owners, and ultimate owners in the upper, middle, and lower panels, respectively. The market shares are based on individual visitors (i.e., reach). The number of domains M is plotted on the X-axis.

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FIGURE B8. MARKET CONCENTRATION (C_M) BASED ON REACH (ALL OUTLETS, INCL. NON-POLITICAL)



Note: Cumulative market shares of the top M domains by country – for all outlets, including those not specializing in political content. The C_M (plotted on the Y-axis) is computed based on the top 1 to top 20 entities: domains, domain owners, and ultimate owners in the upper, middle, and lower panels, respectively. The market shares are based on individual visitors (i.e., reach). The number of domains M is plotted on the X-axis.

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C Alternative Traffic Measures

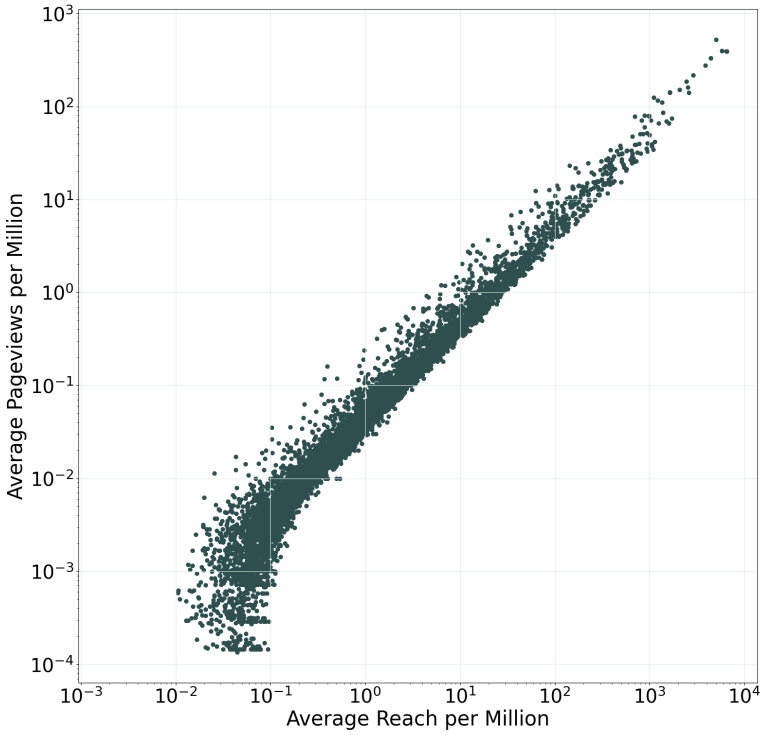
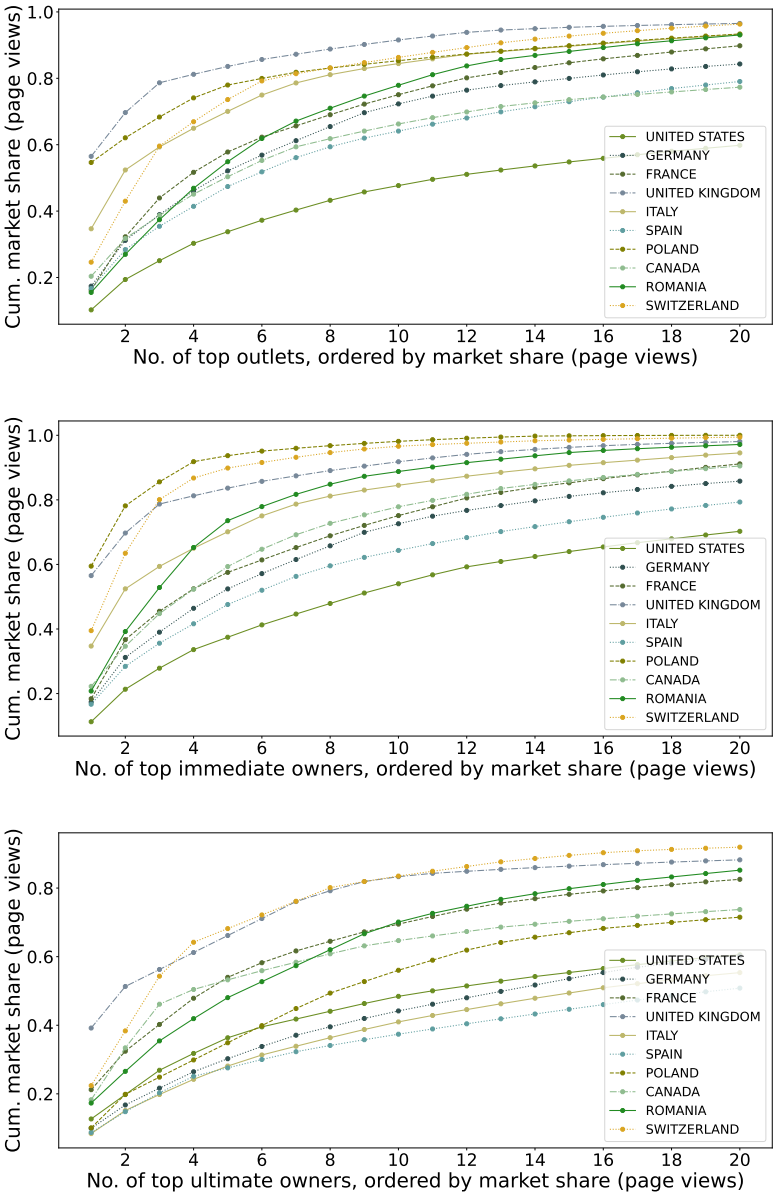


FIGURE C1. CORRELATION BETWEEN REACH AND NO. OF VISITS

Note: This figure shows a scatterplot of news website reach (no. of unique visitors per million website visitors) on the x-axis vs. no. of visits per one million website visits in the entire world wide web on the y-axis. Each dot represents one news website in our database. The figure shows that the extensive margin (reach) vs. intensive margin (no. visits) correlate almost perfectly.

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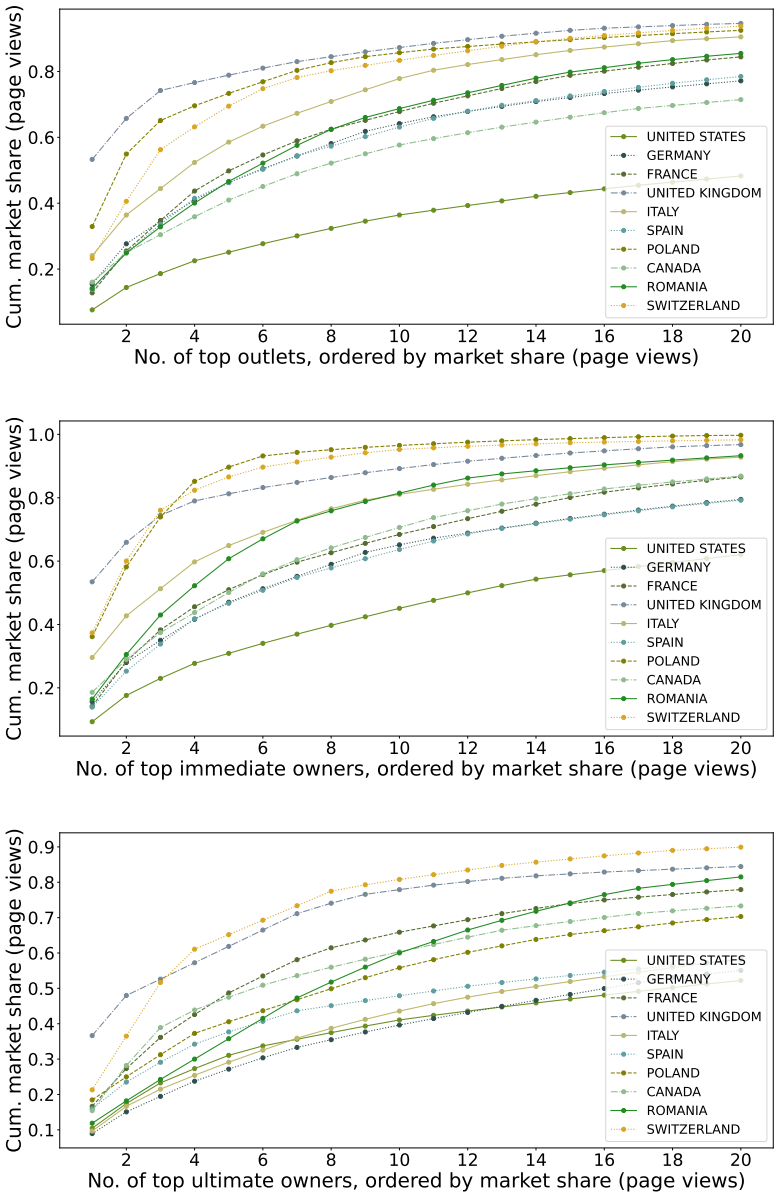
FIGURE C2. MARKET CONCENTRATION (C_M) BASED ON PAGE VIEWS



Note: Cumulative market shares of the top M domains by country- - for all outlets reporting on politics in more than 25% of their articles. The C_M (plotted on the Y-axis) is computed based on the top 1 to top 20 entities: domains, domain owners, and ultimate owners in the upper, middle, and lower panels, respectively. The market shares are based on page views. The number of domains M is plotted on the X-axis.

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FIGURE C3. MARKET CONCENTRATION (C_M) BASED ON PAGE VIEWS (ALL OUTLETS, INCL. NON-POLITICAL)



Note: Cumulative market shares of the top M domains by country – for all outlets, including those not specializing in political content. The C_M (plotted on the Y-axis) is computed based on the top 1 to top 20 entities: domains, domain owners, and ultimate owners in the upper, middle, and lower panels, respectively. The market shares are based on page views. The number of domains M is plotted on the X-axis.

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D Alternative Concentration Measure

We also compute market concentration results based on the Herfindahl-Hirschman Index (HHI): $HHI_c = \sum_{i=1}^{N} marketShare_{ci}^2$. Typically, market concentration is seen as low for HHI values between 0 and 0.15, moderate for values between 0.15 and 0.25, and high for values of 0.25 and higher.

In line with Figure B7 from the main part, Table D1 below corroborates that market concentration is highest in Poland, the U.K., Italy, and Switzerland (both for domains and domain owners). Their HHI values lie between 0.14 and 0.40. Again, concentration is lowest in the U.S. (the HHI is 0.02 for domains and 0.04 for domain owners). Table D1 also confirms that concentration tends to increase when moving from domains to domain owners, and to decrease when moving to ultimate owners. For ultimate owners, the HHI values lie clearly below 0.1 in all countries, except for the U.K.

TABLE D1—COUNTRY-LEVEL HHI VALUES

Country	# Domains	HHI Domain Page views	HHI Domain Visitors	HHI Owner Level 1 Page views	HHI Owner Level 1 . Visitors	HHI Ult. Owners Page views	HHI Ult. Owners Visitors
UNITED STATES	3213	0.03	0.02	0.04	0.03	0.02	0.02
CANADA	461	0.07	0.07	0.10	0.10	0.06	0.05
UNITED KINGDOM	348	0.35	0.20	0.35	0.20	0.16	0.09
GERMANY	140	0.07	0.06	0.08	0.06	0.02	0.01
SPAIN	130	0.06	0.05	0.06	0.05	0.04	0.02
ITALY	75	0.17	0.14	0.17	0.14	0.02	0.02
ROMANIA	62	0.08	0.08	0.12	0.13	0.03	0.04
FRANCE	55	0.08	0.08	0.09	0.08	0.05	0.04
POLAND	48	0.31	0.26	0.40	0.35	0.04	0.03
SWITZERLAND	46	0.14	0.11	0.25	0.22	0.06	0.05

Notes: Market concentration in terms of HHI values based on page views (uneven columns) and unique visitors (even columns). Column 2 shows the number of domains. Columns 3 and 4 show the C_4 measure values at the domain level (such as nytimes.com or wsj.com). In columns 5 and 6, the measures are calculated at the level of the immediate owner (e.g., the immediate owner of the nytimes.com, according to the Orbis database, is the *NEW YORK TIMES COMPANY*). In column 7 and 8, the measures are calculated at the level of ultimate owners (e.g., there are around 3,000 ultimate owner entities for nytimes.com, among others *CARLOS SLIM HELU Y FAMILIA*, *JACKSON SQUARE LLC*, or *VANGUARD GROUP INC*).

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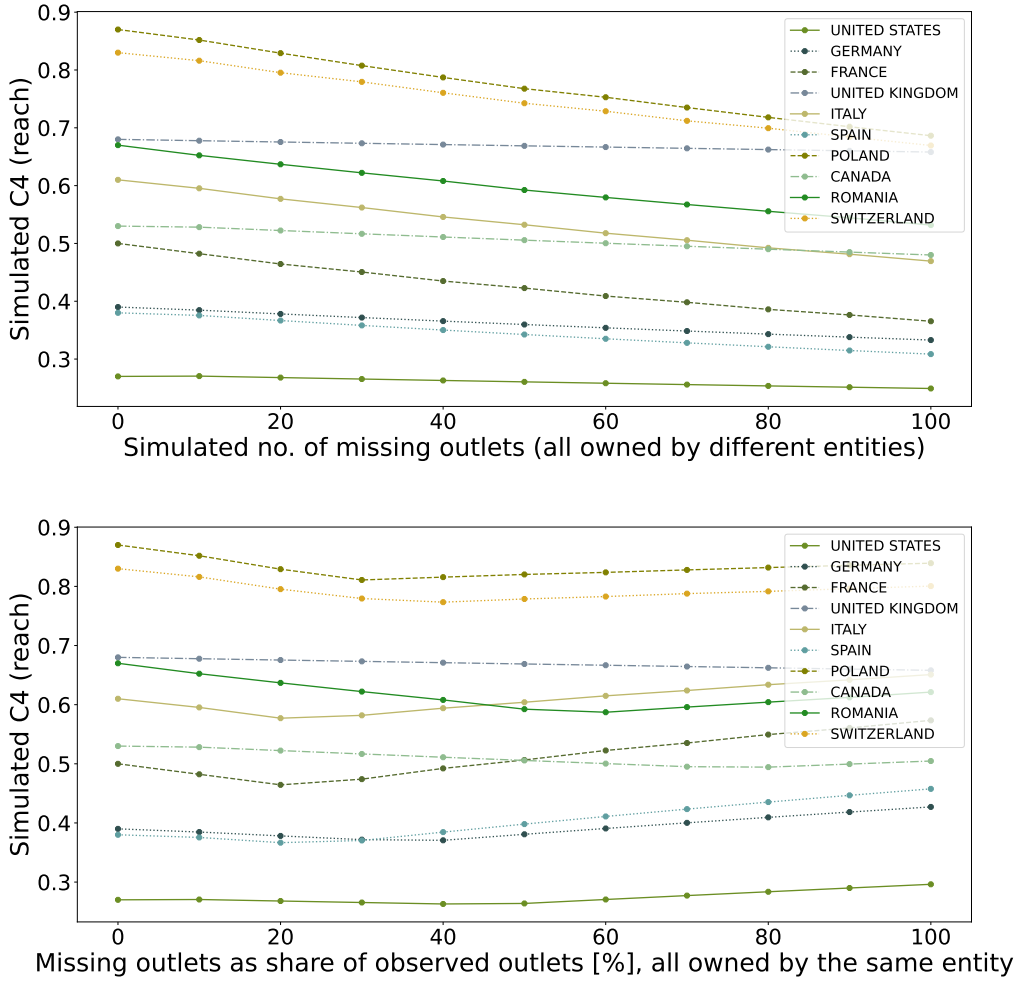
E Robustness to Missing Traffic and Ownership Information

There are two potential ways how data coverage issues could produce biased market concentration estimates in our approach. First, we could miss outlets entirely or, equivalently, not have traffic data for them (recall that all concentration measures require traffic data, hence an outlet that does not enter our list and an outlet that enters our list but comes without traffic data, distort the concentration measure in the same way). Second, we could capture these outlets and their traffic, but remain without information on their ownership. Given the way we compile our sample, it is unlikely that we would miss a very large outlet: we cross-check our with different open-source/academic datasets (ABYZ, AWIS, and Media Cloud). In particular, Amazon's AWIS (from where we obtain our traffic data) is a for-pay service used by marketing departments of large companies around the world. It thus appears unlikely that a site with large traffic not being covered would remain unnoticed for long. Along similar lines, outlets listed in AWIS, but for which traffic data values are missing, are likely small. This assumption is based on the fact that AWIS estimates web traffic to domains based on a large sample of individual internet users' browsing data. When a domain is visited only very few times/by very few users, rendering a proper estimate of overall traffic to this domain unfeasible, AWIS does not provide traffic data for this domain. Therefore, we expect (if at all) potentially missed outlets to be small or of moderate size. Following this reasoning, we devise a simulation approach to assess the remaining issue of potential errors. Suppose there are one or several hypothetical outlets that we have missed in our data collection procedure. Our simulation procedure poses the question of how the market concentration (specifically, the C_4 measure) would look if we were to include such hypothetical outlets. Thereby, we assume that the missing outlets would receive traffic amounting to the median of all outlets for which we have complete data (both traffic and ownership data). Then, we ask how the C_4 value would change if, in our sample, Z such outlets were actually missing. Overlooking Z outlets in, say, Switzerland, where the total number of outlets is relatively low, would mean missing more of the market than, say, in the United States. Therefore, we scale Z by the total number of observed outlets in the country. In other words, we evaluate how the C_4 measure would change, in every country, if we overlooked 10%, 20%, ..., up to 100% of the current outlets (all assumed to have a circulation amounting to the current median). That is, for every country, our checks extend up to doubling the number of outlets. Figure E1 shows the simulation results. We distinguish between two corner cases: all the Z overlooked outlets are owned by separate owners (upper panel) or they are all owned by the same owner (lower panel). The latter case also serves as a test to what extent it would be problematic if a lot of the outlets for which we do not find ownership information belonged to the same conglomerate (recall that the outlets with missing ownership data tend to be small, see coverage statistics above). Are results are shown for the first-level domain owners. With different owners (upper panel), the C_4 values remain rather stable for all countries, as

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long as we do not miss more than 50% of the currently observed market. In this (unlikely) scenario, even for the countries that react most sensitively in our simulation, like Switzerland and Poland, our C_4 would not overstate concentration by more than ten percentage points. With the same owner (lower panel), the C_4 values remain rather stable for all countries, even if we had overlooked as many median-sized outlets as the currently observed market contains (here, the missing outlets have opposing effects, they increase the market, but also become a large player as we move along the x-axis). Overall, under the assumption that our data cross-checking renders it unlikely that large outlets are missing in our data, we conclude that our estimates are rather robust against missing data.

FIGURE E1. SIMULATION: EFFECT OF OUTLETS POTENTIALLY MISSING IN OUR DATA



Note: C_4 values by country (y-axis) under the assumption that a certain percentage of outlets, out of the currently observed outlets (e.g., 10% of currently observed outlets) are missing. The percentage of hypothetically missing outlets is shown on the the x-axis. Missing outlets are assumed to have a median reach (based on our actual country sample). In the upper panel, we simulate missing outlets that are all owned by different entities. In the lower panel we simulate missing outlets that are all owned by the same owner.

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F Tagging Political Content

To identify content that covers the political process, we rely on the collection of news outlet links and their automated tagging by the Global Database on Events, Language, and Tone (GDELT). From all the available tags by GDELT, we select all that contain any of the following key words (the available tags are listed here).

- POLITIC
- GOVERNMENT
- POLICY
- POLITIC
- ELECTION

F1 Examples of Political/Non-political Articles

The following table shows examples of news stories classified as political or non-political (based on the chosen tags).

nytimes.com	
Political Articles	*Non-Political Articles*
House Votes 223-205 to Call on Pence to Strip Trump of Power Lawmakers adopted a resolution that would compel Vice President Mike Pence to invoke the 25th Amendment after President Trump incited a mob attack on the Capitol last week. In a letter to Speaker Nancy Pelosi earlier in the evening, Mr. Pence rejected the effort.	**Jupiter and Saturn Head for Closest Visible Alignment in 800 Years** On Dec. 21, Jupiter and Saturn will appear to be no more than a dime's width apart in the night sky. The last time that could be seen was in 1226.
Pelosi defends demand for broad stimulus package as Senate prepares scaled-down bill Speaker Nancy Pelosi of California defended her unwillingness to accept anything less than a broad coronavirus stimulus package in negotiations with the administration, on the same day that President Trump called on Twitter for negotiators to "go big or go home!!!"	**More Than 90,000 Without Power After New England Winter Storm** Around 85,000 customers in Maine alone still don't have electricity after a nor'easter brought high winds and heavy snow.

cnn.com	
Political Articles	*Non-Political Articles*

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Thousands protest in Bangkok after Thai parliament votes on constitutional reform
Thailand's parliament on Wednesday voted to move forward with two proposals on amending the constitution but stopped short of backing a motion that included monarchical reform, amid intensifying protests against the country's military-backed government.

Trump's "mountains of misinformation" at rally not helping Republican Senate chances, Georgia's GOP lieutenant governor says
Georgia Republican Lt. Gov. Geoff Duncan said Sunday that the "mountains of misinformation" about the election that President Donald Trump is spreading, most recently in his remarks at a rally in the state Saturday night, could hurt GOP chances in upcoming Senate runoff races.

40 endangered sea turtles were brought to Florida to warm up after suffering from 'cold stunning'
Forty critically endangered sea turtles were brought to Florida after suffering from "cold stunnin" off the coast of Massachusetts.

Fantasy football is a billion-dollar pastime. Covid-19 is wreaking havoc with it
This NFL season has been a chaotic mix of coronavirus precautions, postponed games and infected players, all unfolding under a looming concern for the health of players, staff and spectators.

foxnews.com

Political Articles

RNC Chair McDaniel: Democrats wrong to attack Trump supporters who question election irregularities
States and the courts have a duty to ensure the election was conducted properly and that similar irregularities don't arise in future elections

Trump "surprised" some congressional Republicans think Biden won election
Last week, Senate Majority Leader Mitch McConnell, R-Ky., dodged questions about Trump's claims of fraud

Non-Political Articles

Baker Mayfield becomes first Browns QB to do this since 1951
Mayfield followed in the footsteps of Hall of Fame signal-caller Otto Graham

California man punches 350-pound bear in face to save beloved dog "Buddy"
The bear has returned to Kaleb Benham's home several times since the attack

thesun.co.uk

Political Articles

Boris Johnson urged to hold nerve as France hijack Brexit talks at the eleventh hour
BORIS Johnson was urged to stand firm last night after Brexit talks stretched to the eleventh hour.

Tory MPs demand Labour leader Sir Keir Starmer backs deportation flights for convicted foreign offenders
TORY MPs have written to Sir Keir Starmer demanding he backs the removal of convicted foreign offenders from the U.K.

Non-Political Articles

Five iPhone security settings you should check NOW to protect yourself from snoopers
APPLE is known for its top security - but there are ways you can secure your devices further.

PS5 "glitch" spotted on Argos app lets shoppers buy consoles as soon as they are restocked
A SHOPPER has spotted a "glitch" on the Argos app that lets customers add a PlayStation 5 to their basket ready for when they're back in stock.

theguardian.com

Electronic copy available at: https://ssrn.com/abstract=3969253

Political Articles	*Non-Political Articles*
As we close in on a Brexit that pleases next to nobody, how did we end up here? Blame staunch Leavers or purist Remainers, but the real fault might lie in our wantonly destructive politics	**'It's all about the cracking noise': the unlikely cult of the online chiropractor** Back pain has become rife in lockdown. But that's not the only reason chiropractors are being hailed as YouTube influencers – there's a horror movie thrill, too
Spain marks 42 years since return of democracy as retired officers dissent PM lauds 1978 constitution after some former armed forces members rue demise of Franco dictatorship	**Netflix has 'no plans' to add disclaimer that The Crown is work of fiction** Statement comes after the U.K. culture secretary said he was going to write to company to request caveat

cbc.ca

Political Articles	*Non-Political Articles*
Report says U.S. diplomats likely targeted in energy attack, unsure about Canadians Stops short of saying the same about Canadian diplomats and families in Havana	**Winnipeg care home recovery parades bring hope — 'something that we all need right now,' says CEO** 'We wanted to be the bright light during a very dark time,' says Laurie Cerqueti, Simkin Centre CEO
Venezuelans vote amid allegations of fraud against Nicolas Maduro Opposition urges citizens to take part in referendum to push demands for new vote	**High winds knock out power to homes, businesses** At one point overnight, about 2,200 customers were affected

bild.de

Political Articles	*Non-Political Articles*
Wollten Chinesen Bundeswehr-Geheimnisse abfischen? Bundeskanzlerin Angela Merkel und Bundeswirtschaftsminister Peter Altmaier (beide CDU) haben die Uebernahme eines deutschen Hightech-Unternehmens (u.a. Satelliten) durch eine chinesische Schachtel-Struktur verboten.	**Innenstädte machen den Deutschen Angst** Aus Angst vor Infektion gehen die Deutschen immer weniger in die Innenstädte.
2000 Demonstranten gegen G20-Prozess Seit Donnerstag müssen sich in Hamburg fünf junge Leute im Alter von 19 bis 21 Jahren vor Gericht verantworten, weil sie sich 2017 an den Krawallen während des G20-Gipfels beteiligt haben sollen. Samstagnachmittag gingen in Hamburg zahlreiche Demonstranten auf die Straße, um gegen die Verhandlung zu protestieren.	**Erster Drive-in-Weihnachtsmarkt** Sonst verkaufte Sandra Behrens (38) um diese Zeit auf dem Weihnachtsmarkt in Merseburg oder dem Christkind'l-Markt in Bad Lauchstädt Süßigkeiten oder Herzhaftes. So viel Zulauf wie an diesem Wochenende im Gewerbegebiet Stöbnitz, einem Ortsteil von Mücheln (Saalekreis), hatte die Unternehmerin dort nie.

lemonde.fr

Electronic copy available at: https://ssrn.com/abstract=3969253

Political Articles	*Non-Political Articles*
Dans les pays musulmans, la trilogie politique-religion-développement ne peut pas fonctionner harmonieusement L'économiste Taha Oudghiri analyse dans une tribune au Monde ce que sont les principes d'une gouvernance économique islamique, et ce qui pourrait en advenir	**Trois heures et 20 km ? Cinq balades autour de Bordeaux, Lyon, Nantes, Strasbourg et Paris** La Matinale vous invite au voyage. Cette semaine, notre sélection d'itinéraires périurbains pour prendre l'air sur l'île Clémentine, dans la forêt de la Robertsau ou le long de l'Eau Bourde.
Président Trump, an IV : le poison du désintérêt Même s'il en a profité pour parler principalement de lui, et de nier à nouveau sa défaite à l'élection, le président américain est allé en Géorgie pour essayer de sauver la majorité républicaine au Sénat.	**Roberto Saviano : Maradona était à la fois le meilleur et le pire de tout ce que ma terre a généré** Les Napolitains se sont intensément identifiés au gosse misérable de Buenos Aires devenu un dieu du football. Ses vices et ses erreurs n'étaient que des ombres qui le rendaient plus lumineux encore, note, dans une tribune au Monde, l'écrivain et journaliste napolitain, menacé de mort par la Camorra.

F2 Examples of Outlets Specializing in Political Articles

The following table shows, the top five outlets that report on politics in *more* than 25% of their articles (to the left), and those that report on politics in less than 25% of their articles (to the right).

Specialized in Political Articles	*Not Specialized in Political Articles*
United States	
cnn.com	buzzfeed.com
nytimes.com	bleacherreport.com
washingtonpost.com	cbssports.com
foxnews.com	people.com
forbes.com	tmz.com
United Kingdom	
bbc.co.uk	ft.com
theguardian.com	dailystar.co.uk
dailymail.co.uk	liverpoolecho.co.uk
telegraph.co.uk	espn.co.uk
sky.com	londonist.com
Switzerland	
20min.ch	bote.ch

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blick.ch	shn.ch
srf.ch	jungfrauzeitung.ch
nzz.ch	rro.ch
tagesanzeiger.ch	news.ch
Spain	
elpais.com	marca.com
elmundo.es	as.com
abc.es	mundodeportivo.com
lavanguardia.com	hola.com
elconfidencial.com	cuatro.com
Romania	
adevarul.ro	gsp.ro
stirileprotv.ro	agerpres.ro
libertatea.ro	primatv.ro
hotnews.ro	(not more outlets in our sample)
realitatea.net	
Poland	
onet.pl	noizz.pl
tvn24.pl	(not more outlets in our sample)
wyborcza.pl	
fakt.pl	
naszemiasto.pl	
Italy	
repubblica.it	gazzetta.it
corriere.it	lanazione.it
ansa.it	napolitoday.it
ilsole24ore.com	corriereadriatico.it
lastampa.it	padovaoggi.it
Germany	
spiegel.de	wdr.de
bild.de	express.de
focus.de	rtl.de
welt.de	derwesten.de

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heise.de	bz-berlin.de
France	
lefigaro.fr	lequipe.fr
lemonde.fr	tf1.fr
20minutes.fr	ledauphine.com
leparisien.fr	lavoixdunord.fr
ouest-france.fr	dna.fr
Canada	
cbc.ca	tsn.ca
globalnews.ca	rds.ca
ctvnews.ca	thescore.com
theglobeandmail.com	hellomagazine.com
thestar.com	chch.com

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