Social Networks - Paving the Way for Misinformation? A Media Systems Approach

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A Media Systems Approach

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Abstract: Social networks have paved the way for news, media influence, public opinion and political participation. While the introduction of 'new media' in a networked participatory media environment is proven in some cases to be beneficial for democracies, the reverse side of the story shows that in social networks, political actors have found a privileged channel to spread misleading narratives at the expense of society. This thesis integrates economic, political and social theories in the growing debate about misinformation and formulates them into the framework of media systems developed by Hallin and Macini and Hardy. Four components of media systems, i.e., 'media-party parallelism', 'instrumentalization of social media', 'government regulatory burden' and 'fractionalization of media outlets', are theorized to impact the dissemination of false and/or inaccurate information. Through a panel data regression and an analysis on democracy, this thesis finds robust evidence in favor of 'instrumentalization of social media'. For the remaining three components, some evidence is found, namely within certain democratic regimes.

Keywords: information disorders, misinformation, media systems, social networks

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Introduction

"Ukraine in your ('Russian') news and Ukraine in reality are two different countries. The most important difference is that ours is real."

- Ukrainian President Volodymyr Zelenskyy's plea to the Russian people. (24th February 2022)

As the world continues to grow, it does so by becoming more connected. The Internet expedited globabalization as it helped the different corners of the globe to communicate and become virtually interconnected despite never having met (Floridi, 1996). Research from 2020 shows that, on average, a user spends 145 minutes per day on the World Wide Web (Statista Research Department, 2022), browsing through a plethora of social networks and media channels, which has allowed any event taking place in the world to be shared and replicated in a matter of seconds (Saldaña & Vu, 2021).

While this upturn in how information is produced, communicated and distributed has significant merits for equal access to information, it has also created a propagation leverage of false information (Caled & Silva, 2021). At worst, several political agents - i.e., domestic governments, domestic political parties and foreign governments - have taken advantage of social platforms to shape public opinion and, in turn, achieve desirable political outcomes (van Dijck & Poell, 2015).

The election of Donald Trump as the United States' president in 2016 and the Cambridge Analytica scandal are amongst the most recent events demonstrating how social

networks can have detrimental impacts on democracies (Allcott & Gentzkow, 2017; Berghel, 2018). In the former case, the electorate's trust in fake news tending to favour Trump and the mediatism revolving around the Republican candidate over his counterpart played a major role in his election (Hendricks & Schill, 2017; Pickard, 2019). In the latter, the collection of users' data without their consent for political advertising has created a wave of distrust among social media users (Berghel, 2018). Ultimately, this has caused a focus shift in the misinformation research to social networks, whose structure does not resemble previous media outlets: unfiltered content is relayed among users without significant fact-checking or editorial judgment (Allcott & Gentzkow, 2017).

Similarly, the spread of misinformation was of high concern during the recent Covid-19 crisis. The World Health Organization named “infodemic” after the misleading information - not supported by clear scientific evidence - revolving on the origin, harmfulness and spread of the virus (Su, 2021). In this context, media was “a powerful avenue for the dissemination of wellness education” between governments, health institutions and mainly, people. More importantly, traditional media played the role of supplying the public with accurate information and scientific facts. This has proven to be extremely challenging to achieve, given the spread of unverified and misleading information on social platforms (Mheidly & Fares, 2020).

The aforementioned examples, where the recent war in Ukraine could be included, have shown that to some extent traditional media outlets are accountable for democratic backsliding, which was caused by the unsustained rise of the ‘new media’. Because “systemic problems typically remain overlooked until shocks to the *status quo* render them more visible” (Pickard, 2019, p.1), this thesis identifies which structural pathologies across media

systems - “points of convergence of political, economic, social, and cultural forces grounded in the local, the national and the global” (Chadwick, 2017; Curran et al., 2020) – have contributed to the proliferation of misinformation through social networks. On the bright side, lessons will be derived on which characteristics of media systems have been more effective in preventing the dissemination of false and/or inaccurate information and, ultimately, evaluating whether these solutions are applicable on a larger, global scale. Consequently, the following research question is answered:

Under what conditions are media systems more effective in countering the spread of false and/or inaccurate information?

This thesis begins with an outline of the issue of misinformation in the context of the changing dynamics in the market of information media, with the rise of the ‘new media’, and reviews the existing approaches - at the individual level - to correct for this issue. After developing standardized conceptualization to define which 'information disorders’ will be covered for, this thesis presents an integrated approach to find out which characteristics of media systems have reflected the increase of misinformation on a global scale the most. Similarly, this approach looks for characteristics that have rendered effective in preventing the contamination of misinformation in social networks. All in all, this thesis expects to find evidence that countering the spread of ‘information disorders’ can be done by acknowledging societal mechanisms, i.e., media-party parallelism, instrumentalization of social media, government regulatory burden and fractionalization of media outlets, which are inherent to media systems.

Literature review

Information Market: A New Paradigm?

The ongoing digital revolution has fundamentally changed the way information is produced, communicated and distributed (Caled & Silva, 2021). Online news and social media became an intrinsic part of modern society, whose demands have shifted to more personalized and timely journalistic coverage (Rajendran & Thesinghraja, 2014). As traditional news sites are no longer efficient to supply readers with diversified, interactive and up-to-date content, social networks - such as Instagram, Facebook, Tiktok, Twitter or WhatsApp - have filled the existing information gaps with amateur content (p. 610).

The issue of market failure in the press is framed by scholars as lacking investments in the production of journalism with positive externalities (Allern & Pollack, 2017; Møen, 2011). These include democratic contributions in the formation of unbiased opinions that lead to a more well-grounded public opinion and decision-making (Pickard, 2019). Quality journalism, however, is often costly for the investing news organization, while the costs of replicating information for competitors are substantially lower (Allern & Pollack, 2017). Therefore, online media business models are more attractive to investors, whose focus lies only upon an individual cost-benefit analysis.

Similarly, the interplay between ‘traditional’ and ‘new media’ has developed over time. While in their embryonic stages most social platforms were used as neutral reproducers of media content, it soon changed after these ecosystems became commercially exploitable (Chao-Chen, 2013). In response to these commercial pressures, public broadcasting redefined the “public” value of social platforms, leading to the creation of “public” social broadcasting

(Collins et al., 2001). In recent years, social networks have been strategically incorporated in public broadcasting to reach wider audiences, however, the use of 'new media' is seen as a double-edged sword, as they have become a vehicle for the diffusion of misleading information (van Dijck & Poell, 2015).

This debate has shed light on the characteristics of information goods, which resemble those of public goods: indivisibility in use and consumption, as an individual's consumption of news content does not reduce any other individual's enjoyment of the good, and non-excludability regarding access, as the marginal cost of an extra reader of news content equals zero (Samuelson, 1954). The rise of 'new media' has led investigative, independent information outlets to diversify their sources of revenue. With the inclusion of technology and legislation (i.e., patents, copyrights), information became a 'club good' - non-rival, but excludable (Allern & Pollack, 2017; Krugman & Wells, 2013). Comprehensive studies on how false information is spread across traditional and new media should therefore acknowledge the shifting paradigm in the information market and identify which economic, social and political interests have caused a higher spread of false information. The next section delves into the terms used to refer to misleading information, namely 'fake news', as well as the limitations of 'fake news' being used to refer to all kinds of 'pollutive information'.

Beyond 'Fake News'

Since its introduction in 2017 Donald Trump's electoral campaign, the term 'fake news' has often been vulgarized by political agents to classify news that compromise their political aspirations and delegitimize the role of media (Meneses, 2018). While 'fake news'

are consensually ‘pollutive’ to the information ecosystems (Farkas & Schou, 2018), there are several viewpoints through which authors have approached the phenomenon of ‘fake news’. ‘Fake news’ are instruments that create financial and political gains to their sender (Reilly, 2021). From another point of view, ‘fake news’ have contributed to the emergence and consolidation of the ‘post-truth’ era, such that they have replaced evidence and knowledge with “alternative facts” (Bhaskaran et al., 2017). These approaches are, however, too limited in their framework to differentiate between what is ‘true’ and what is ‘fake’, such that they have missed the bigger picture of “how and why misleading content is produced, disseminated and accepted as legitimate” (Farkas & Schou, 2018). Moreover, ‘fake news’ is not a generalizable term to refer to the event of “false and/or inaccurate information” (Kyriakidou & Cushion, 2021, p.529).

In the context of the changing media landscape and the digital era, the terms ‘misinformation’ and ‘disinformation’ have been widely adopted to distinguish among different types of ‘pollutive information’ (Hendricks & Hansen, 2014; Wardle, 2018). Notwithstanding, there is a lack of consensus in literature on how those two concepts work together in the production and dissemination of misleading content. ‘Misinformation’ and ‘disinformation’ are either used interchangeably (Floridi, 1996) or separately, to differentiate between intentional and unintentional misleading content (Fallis, 2015; Keshavarz, 2014). This debate made clear that the study of the dissemination of ‘pollutive information’ in information markets goes beyond the phenomenon of ‘fake news’. However, differences in approaches to defining “false and/or inaccurate information” call for a standardized framework of conceptualization, that sets clear standards on which types of ‘pollutive information’ are considered.

Approaches to Correct Misinformation/Disinformation

Following a characterization of what 'pollutive information' entails, the present section draws on the existing approaches to counter their burden. These approaches can be aggregated into two main types: ex-ante and ex-post (Peter & Koch, 2019). Ex-ante strategies are targeted at detecting misinformation/disinformation and protecting individuals from their detrimental impact (p. 438). Ex-post strategies have a "correcting when damage is done" approach, being a collection of trial and errors on how to effectively counter misinformation/disinformation (p. 436).

Fostering an individual's capacity to distinguish between accurate and inaccurate information is at core of ex-ante approaches. Mena (2020) argues in favor of warning labels to raise awareness for future encountering of 'pollutive information'. Nielsen and Graves (2017) have conducted focus groups to discuss what false information entails and how it is weaponized to delegitimize the role of media. Ultimately, psychology theories have also served as a basis for ex-ante approaches. The inoculation theory, i.e., if people are forewarned that a certain message might mislead them, then they are more likely to become immune to it, was found to be effective in protecting users from the detrimental effects of misleading information (Lewandowsky & Van Der Linden, 2021). This theory has also been experimented within social networks, namely Twitter, to send alerts on the spread of false information during election periods (p. 375).

Misinformation/disinformation generates misperceptions that can compromise the societal ability to build informed and unbiased opinions (Fernandez & Alani, 2018). Once those misperceptions are acquired and encoded by individuals, their influence persists over

time (p. 596). Ex-post approaches have in debunking, i.e., the presentation of an ex-post corrective perception that is effective in allowing recipients to abandon the initial and wrong perception, their most popular method to correct for information disorders (Jerit, 2008). Cook and Lewandowsky (2011) explain that debunking is only effective to counter information disorders if there is a clear distinction between the facts and the fallacies in the refutation. Otherwise, corrective measures may fail to reduce misperceptions and, in some cases, cause them to increase (Nyhan & Reifler, 2010).

Existing research has in bottom-level approaches, i.e., at the individual level, their main tool to correct for the proliferation of misinformation/disinformation. Although this section sheds light on the usefulness of these methods in preventing and correcting misleading information at the level of the receiver, this thesis explores integrated approaches instead, i.e., at a country/regional-level, to tackle the dissemination of false information. These theories not only capture mechanisms inherent to information markets that have caused the spread of 'pollutive information' but also correct them at the societal level.

Theoretical framework

This section lays out a conceptualization framework to refer to 'dissemination of false information', explores the main theoretical arguments in favour of an integrated approach to measure how 'pollutive news' spread across information markets, and presents the hypotheses that are further analyzed in this thesis.

The most nuanced framework to standardize the terminology used to differentiate among different types of 'pollutive information' was developed by Wardle and Derakhshan (2017). The inclusion of the term 'information disorders' captures the process through which (in)accurate information with/without the intention to harm is shared and developed (p.43). This process has three dimensions: agent, message and interpreter (p. 45). Political agents can act on behalf of a government, a party, a cause, etc. or simply be an individual seeking an opportunity for financial gain (Wardle, 2018). Motivations for producing unreliable information can be financial, political, social or psychological; while their targets range from individuals, political parties, governments, or the country as a whole (p. 956). Messages also vary broadly in duration (event-based, short/long-term) and accuracy (misleading, manipulated, fabricated). Lastly, an audience's interpretation of a certain message varies not only on its origin - source and creator - but also on how it relates to the reader's beliefs (p. 957).

Henceforth, three types of information disorders can be distinguished: disinformation, misinformation and malinformation. The two former are false in their content and only diverge in the intention of harm. Disinformation is intentionally misleading content that is likely to cause people to hold false beliefs (Fallis, 2015). In contrast, misinformation is not

purposely misleading, resulting from factors other than the intention to harm such as journalistic incompetence or wrong sourcing (Meneses, 2018; Wardle, 2018). Finally, malinformation is accurate in its content. However, it is purposefully injurious, including the deliberate publication of private information serving personal and corporate interests (Wardle 2018, p. 954).

The criteria for conceptualizing information disorders can then be summarized regarding their 1) accuracy of information and 2) intention to harm. Kyriakidou and Cushion (2021) have conceptualized 'pollutive information' as "spread of fallacious and/or inaccurate information" (p.529). In light of the framework developed by Wardle and Derakhshan (2017), Kyriakidou and Cushion's (2021) conceptualization only considers information disorders that are inaccurate, i.e., 'misinformation' and 'disinformation', regardless of their intention to harm. Building upon that, this thesis refers to "spread of fallacious and/or inaccurate information" as 'misinformation' and 'disinformation', being 'malinformation' excluded. For simplification purposes, in the next sections, both terms will be referred to as 'misinformation'.

Theoretical Argument

The changes in the information market have influenced the way media research has treated the study of misinformation. This section expands on how integrated approaches have evolved over time to incorporate the new dynamics of a networked participatory media environment. Ultimately, it relates to the media systems comparative framework developed by Hardy (2021) and Hallin and Mancini (2004), which serves as a quantifiable approach to the study of misinformation in the context of the new dynamics within information markets.

Foucault (1976/2000) advocates that every society has its own mechanisms - so-called ‘regimes of truth’ (ROT) - to distinguish between true and false statements (Foucault, 1976/2000). News media are an important constituent of ROTs, as they are issues of political discussion and social confrontation, produced and controlled by political and economic apparatuses (Foucault, 1976/2000, p. 131; Harsin, 2015). However, the dynamics between apparatuses and discourses have no longer become linear with the changing media landscape, and the ROT approach as Foucault defined seems too limited to capture them (Anderson, 2014).

Following Foucault’s work (1976/2000), Curran et al. (2020) and Chadwick (2017) develop a framework that not only integrates these changing dynamics but also the interplay between political and economic agents in the old and new media logics: ‘(hybrid) media systems’ (p. 252). ‘Media systems’ are “points of convergence of political, economic, social, and cultural forces grounded in the local, the national and the global” (Chadwick, 2017; Curran et al., 2020). While these ‘logics’ can refer to “technologies, genres, norms, behaviours and organizational forms” (Chadwick, 2017), they can also embody media practices and policies within and across territories, ranging from the role of the state or the organization of markets (Hardy, 2012).

Hardy’s (2021) approach to Curran et al.‘s (2020) ‘(hybrid) media systems’ allows for a quantification of the societal mechanisms inherent to the ‘regimes of truth’ (ROTs) and evaluates their capacity to counter information disorders across information ecosystems. Combining it with Hallin and Macini’s ‘media systems’ (2004) framework, i.e., a systematic approach that analyzes the differences and similarities of media-politics relationships (p. 27),

‘media systems’ are perceived as analytical units that capture the intersections among economic and political apparatuses and their discourse in the media (Anderson, 2014; Hallin & Mancini, 2004). Moreover, this common framework helps to identify which information disorders are inherent to each ‘regime of truth’ and which political agents are behind their dissemination (Flew & Waisbord, 2015; Hallin & Mancini, 2004). Finally, it also frames the existence of information disorders as a collective action issue, where the shift of information goods from ‘public’ towards ‘club’ has presented new challenges in countering the use of social networks as vehicles of dissemination of information disorders (Allern & Pollack, 2017; Chao-Chen, 2013; Hardy, 2021).

Hypothesis-Testing

Having discussed the usefulness of Hallin and Macini (2004) and Hardy’s (2021) comparative framework in acknowledging the existing differences among ‘(hybrid) media systems’ (Curran et al., 2020) and their relationship with the spread of information disorders, the present section delves into four different components of media systems that are theorized to impact the dissemination of false and/or inaccurate information:

Media-party parallelism is defined by Seymour-Ure (1974) and Hardy (2008) as the existence of ties between media and political actors. Media-party parallelism does not only encapsulate the traditional links between the media and political parties (Hallin & Mancini, 2004), but it also reflects the political tendencies in society (Mancini, 2012). In recent years, media-party parallelism has been fueled by media commercialization and increased involvement of owners and journalists who are not politically neutral (p. 271). Media-party parallelism in a given media system can thus be measured by how representative of relevant

political ideologies its traditional and new media outlets are (Hallin & Mancini, 2004; Hardy, 2021). This can also be translated into the existence (or not) of bias towards political candidates during election periods (Van Kempen, 2007). Hereby, the following hypothesis can be formulated:

H1: A wider, more inclusive representation of political ideologies in media outlets decreases the spread of fallacious and/or inaccurate information.

The involvement of outside actors, parties, politicians and social movements in media ownership has created room for the use of the media as an instrument to serve political interests (Hallin & Mancini, 2004). Mungiu-Pippidi (2008) defines "instrumentalization" as the lack of autonomy from the media to exercise their main function of reporting and being an intermediary actor for political exploitation (p. 91). With the rise of new media, social networks have become a tool for political and social control (Yerlikaya & Aslan, 2020). Following Yerlikaya and Aslan's (2020) findings that the instrumentalization of social media tools by political actors in the service of propaganda and manipulation is detrimental to democracy (p. 184), **H2** claims that:

H2: A higher instrumentalization of social media networks increases the spread of fallacious and/or inaccurate information.

Regulation offers the possibility to hinder not only the instrumentalization of media but also the spread of misinformation. Regulation comprehends all types of legal approaches pursued by the state to control how the market of media operates (Sjovaag, 2014). Legal approaches to handling misinformation include rules on anti-defamation, media censorship,

sanctions or fact-checking platforms (Roudik, 2019). Regulation, on the other hand, can be a perplexing tool. When used excessively, it might be perceived as an attempt to censor and restrict freedom of speech (Caled & Silva, 2021). When the content is imprecise, it creates incentives for political agents to evade (Búzás, 2017). While states should strive to achieve a balanced exchange of rights and obligations, there is no consensus on the ideal amount of regulation that it entails (Sjovaag, 2014).

The rise of the new media has led to an increase in political support in favor of government regulation to prevent the spread of fake information on social networks. After the Cambridge Analytica scandal exposed that social media was being used to manipulate the social and political lives of users, governments sought to introduce new legal boundaries at the cost of individual freedoms to prevent democratic backsliding (Cheng & Chen, 2020; Caled & Silva, 2021). The question of whether higher government regulation has increased the diffusion of misinformation is answered by **H3**:

H3: A higher government regulation of media platforms increases the spread of fallacious and/or inaccurate information.

While the wide availability of user-provided content in online social media has facilitated the aggregation of people around common interests and views, it has also led to higher segregation of users with opposing political views (Del Vicario et al., 2016). Due to the filtering effects of online media algorithms that generate filter bubbles, online media users are becoming more isolated from one another, since they are only exposed to clickbait or hyper-partisan content that reinforces their political ideologies (Pariser, 2011; Yerlikaya & Aslan, 2020). Building upon the arguments above, the study on the spread of misinformation

on online media platforms not only looks at the consumption patterns of domestic users but also at the level of political polarization they are exposed to:

H4: A higher consumption of fractionalized online media outlets increases the spread of fallacious and/or inaccurate information.

Methodology

Outline

This thesis makes use of quantitative methodology[1] to study cross-country variation in the spread of false and/or inaccurate information in light of the media systems framework (Hallin & Mancini, 2004; Hardy, 2021). The Varieties of Democracy (V-Dem) survey is utilized to retrieve the dependent variables as well as the main predictors used in this thesis. Reflecting on "the complexity of the concept of democracy as a system of rule that goes beyond the simple presence of elections" (Coppedge et al., 2021), the V-Dem survey measures how recent changes in media systems - with the inclusion of the 'new media' - have impacted democracy, for a total of 177 countries. On top of that, data for control variables was drawn from the World Development Indicators.

Two variables were used as proxies for the spread of false and/or inaccurate information in social networks, which reflect the government and political parties' use of online media outlets to diffuse misleading viewpoints and shape public opinion (see *Section B*). Additionally, each hypothesis discussed in the theoretical framework (**H1-H4**) corresponds to one or more indicators from the V-Dem survey (see *Section B*). In order to perform a country-comparative analysis, the Z-scores version of both dependent and independent variables is used (retrieved from the V-Dem survey). Z-scores compare a country's score to the mean for all country-years in the sample (see **Figure A1**).

The period of analysis ranges from 2005 to 2020. As 1995 marked the birth of the 'new media', characterized by a significant increase in the number of Internet users all over

[1] This analysis was carried out through SPSS, version 27.

the globe (Rajendran & Thesinghraja, 2014), this time frame accommodates the changes in the market of media - with the introduction of social networks - and measures how political agents have been impacted by them. Furthermore, this analysis includes 147 of the initially 177 countries available in the dataset, spread across the 5 continents. The number of observations (of 2349) is also significantly large to derive conclusions.

The dataset used in this thesis is an example of panel data. Panel data consists of multi-dimensional data, i.e., observations of several phenomena that are collected over a certain period of time, for the same group of entities (in this thesis's case, countries) (Hsiao, 2007). Observations in panel data contain at least two components: cross-sectional and time series. While the former reflects the observed differences between countries, the latter expresses the differences observed over time for a single country (pp. 1-2). Panel data has several advantages over cross-sectional or time-series data, as it controls for autocorrelation, i.e., a degree of similarity between a variable's current value and its past values (p. 3). Moreover, it generates more accurate estimates of long-run relationships between the variables and allows for the testing of more complex hypotheses (Kennedy, 2003), which is rendered useful in the study of media systems. For the aforementioned reasons, a panel data regression with country fixed-effects is run. Country-fixed effects consist of creating dummies for each country to control for changes that are common to all countries, in a given year (Jauch & Watzka, 2016).

At a preliminary stage, a larger number of predictors were included in this analysis to measure each media system characteristic (**H1-H4**) from several standpoints. However, an issue of multicollinearity was created, since a wide number of predictors were highly correlated with each other. This ultimately compromised the estimation of each predictor's

effect separately (Abdi & Williams, 2010), making it inconceivable from a statistical point of view to verify whether **H1-H4** hold. In order to overcome the issue of multicollinearity among the predictors, some were "linearly combined" through principal component analysis (PCA) (see *Section A)*.

Section A: Principal Component Analysis (PCA)

PCA (factor analysis on SPSS) combines variables linearly from a complex dataset to reveal inherent, simplified structures underlying it (Abdi & Williams, 2010). Specifically, PCA is a mathematical tool used to compress the size of the model and tackle multicollinearity among the predictors (p. 434). The feasibility of PCA as a method to establish linear combinations among variables is measured through statistical and interpretability criteria. The former looks at metrics such as communalities - how much variance from each factored variable is accounted for - and eigenvalues - cumulative % extracted by the first component (Abdi & Williams, 2010; Shlens, 2014). The latter examines whether the newly-created variable is sound in interpretation (Lever et al., 2017). This criteria ensures that none of the pre-existing variables have lost their own interpretability by being factored into a new variable. Therefore, PCA should only be considered feasible in cases where variables measure similar outcomes, such as political perspectives, instrumentalization or government regulation (see analysis below), and follow a similar order - every value on a scale from 0 to 4 corresponds to the same result, for each factored variable (p. 641).

Figure A2 presents the descriptive statistics of the three factored variables in this thesis. 'Media-party parallelism' measures the extent to which media (print/broadcast and online) are tied to certain political ideologies/parties (**H1**), by looking at how traditional and

new media platforms are representative of a wide range of political perspectives (Hallin & Mancini, 2004; Hardy, 2012). A higher Z-score on 'media-party parallelism' (**H1**) entails a higher representation of political ideologies, leading to a lower bias on the ideologies that media platforms represent. 'Instrumentalization of social media' assesses whether Yerlikaya and Aslan's theory (2020) on the exploitative use of social media in the service of manipulation and propaganda is verified (**H2**). A higher Z-score on 'instrumentalization of social media' (**H2**) reflects a more exploitative use of social networks by political actors - elites, political parties and candidates. 'Government regulation' tests whether a governmental approach to regulation in the traditional and new media platforms (**H3**) is "balanced" and effective to counter misinformation (Cheng & Chen, 2020). A higher Z-score on 'government regulation' represents a lower governmental control of print-broadcast and social media (see Appendix, **Figure A6**).

'Media-party parallelism' (**H1**) results from the linear combination of three variables, i.e., 'online and print/broadcast media perspectives' and 'media bias' (**Figure A3**). 'Instrumentalization of social media' (**H2**) is generated from factor analysis of two variables, i.e., 'elites' use of social media to organize offline action' and 'party/candidate use of social media in campaigns' (**Figure A4**). Finally, 'government regulation' (**H3**) is created from factor analysis of two variables, i.e., 'government social media alternatives' and 'government censorship effort' (**Figure A5**). **Figure A6** displays the Z-scores of the newly-created variables and delves into their definitions. The interpretation and order of each factored variable were respected and incorporated into the newly-created variables, as can be seen in **Legend a-c)** under **Figure A6**. The interpretability criterion is thus fulfilled.

Statistical evidence for PCA is found under **Figures A7-A12**. Looking at the communalities tables, which represent the % of variance extracted from each of the variables included in PCA, there is no factored variable whose % of variance extracted is lower than 80%: 'media-party parallelism' lowest = 86,1% (**Figure A7**), 'instrumentalization of social media' lowest = 80,5% (**Figure A9**), and 'government regulation' lowest = 82,4% (**Figure A11**). Similarly, by looking at the cumulative % of eigenvalues extracted by the first component, all three first components have extracted a relatively high percentage of eigenvalues: 90,18% for 'media-party parallelism' (**Figure A8**), 80,75% for 'instrumentalization of social media' (**Figure A10**), and 82,45% for 'government regulation' (**Figure A12**). These results illustrate that the statistical criterion for the reliability of PCA has been fulfilled.

Section B: Variables Overview

Figure A13 presents the descriptive statistics of all the variables included in this thesis.

Starting by the dependent variable, i.e. spread of fallacious and/or inaccurate information is proxied by 'dissemination of false information domestically'. This variable is two-folded, i.e., includes government and political parties as agents of propaganda (Lancendorfer & Lee, 2010). While the diffusion of misinformation could have been estimated by other variables, these two proxies were chosen to estimate the real capacity of these two political agents in using social networks to their own benefit, by diffusing misleading viewpoints or false information to shape political outcomes (Arayankalam & Krishnan, 2021). **Figures A14 and A16** present the Z-scores of both dependent variables, i.e., 'party and government dissemination of false information domestic', respectively.

Figures A15 and A17 show the top-5 with highest and lowest Z-scores on party and government misinformation, respectively. A higher/lower Z-score corresponds to lower/higher levels of dissemination of false and/or inaccurate information.

Concerning the main predictors, 'media-party parallelism' (**H1**), 'instrumentalization of social media' (**H2**) and 'government regulation' (**H3**) were defined in *Section A* (PCA). For the third hypothesis on government regulation and its repercussions on the spread of false and/or inaccurate information (**H3**), the predictor 'government online content regulation approach' is incorporated into the analysis together with 'government regulation' to evaluate the effects of a higher regulatory burden on private or public agents. A higher Z-score corresponds to a higher online regulatory burden on private parties (**Figure A18).** Therefore, there is only evidence in favor of this hypothesis if both Z-scores of 'government regulation' and 'government online content regulation approach' correlate positively with 'party and government dissemination of false information domestic' (a higher government regulation of media platforms raises the spread of fallacious and/or inaccurate information).

The study on the consumption of fractionalized media outlets (**H4**) is supported by two indicators, 'online media existence' and 'online media fractionalization'. A higher Z-score on the former entails a higher domestic consumption of online media. A higher Z-score on the latter implies a lower fractionalization of domestic online media, i.e., a more impartial presentation of the major political news on domestic online media (**Figure A19**). Therefore, there is only evidence in favor of this hypothesis if the Z-scores of 'online media existence' and 'online media fractionalization' correlate negatively and positively with 'government/party dissemination of false information domestic', respectively (higher consumption of fractionalized online media is correlated with the spread of misinformation).

There are several variables to control for (see **Figure A13**). 'Electoral democracy index' is a composite index (type-D variable), computed by aggregating indexes such as 'freedom of expression' or 'clean elections', and measures the extent to which the ideal of electoral democracy is achieved. It ranges from 0 "perfect autocracy" to 1 "perfect democracy". Countries are categorized as being: 0 "closed autocratic", 0.25 "autocratic", 0.5 "ambivalent", 0.75 "minimally democratic" and 1 "democratic" (Coppedge et al., 2019). This indicator is of special relevance to the analysis of misinformation, since the growth of social networks has created unprecedented challenges not only to the population's capacity to base their political judgments on facts but also to the credibility of democratic institutions (Allcott & Gentzkow, 2017). President Trump's election in 2016 is one among several examples of how social networks are used as vehicles of political propaganda, thus becoming detrimental to democracy (Pickard, 2019).

'Logged population' controls for the size of each country's domestic information market (Allern & Pollack, 2017). The level of internet penetration - measured by 'percentage of Internet users in a certain country' - controls for a population's level of exposure to the Internet and, indirectly, to social networks. 'Logged GDP per capita' enhances cross-country differences in economic capacity, which may: 1) drive higher/lower economic interests in the market of media or 2) increase/decrease investments in tools to combat misinformation such as regulation or fact checking (Wilson & Wiysonge, 2020; Nieminen & Rapeli, 2019). GDP per capita is measured in Purchasing Power Parity (PPP), in 2017 constant prices (in US$). 'Average years of schooling' is retrieved from Barro and Lee (2013), and accounts for the level of knowledge of the population across the globe, working as a proxy for consciousness and alertness to the spread of fake information (p. 184).

It is also important to control for the 'percentage of female journalists' in a media system. This indicator draws back to Saldaña and Vu (2021), who have found that female journalists are more likely to confront or report misinformation on social media than their male counterparts (p. 18). Finally, 'Gini index' is used as an income inequality measure within a country, complementary to GDP per capita. It measures the extent to which the distribution of income among individuals or households within an economy deviates from a perfectly equal distribution, ranging from 0 "perfect equality" to 100 "perfect inequality" (World Bank, 2021).

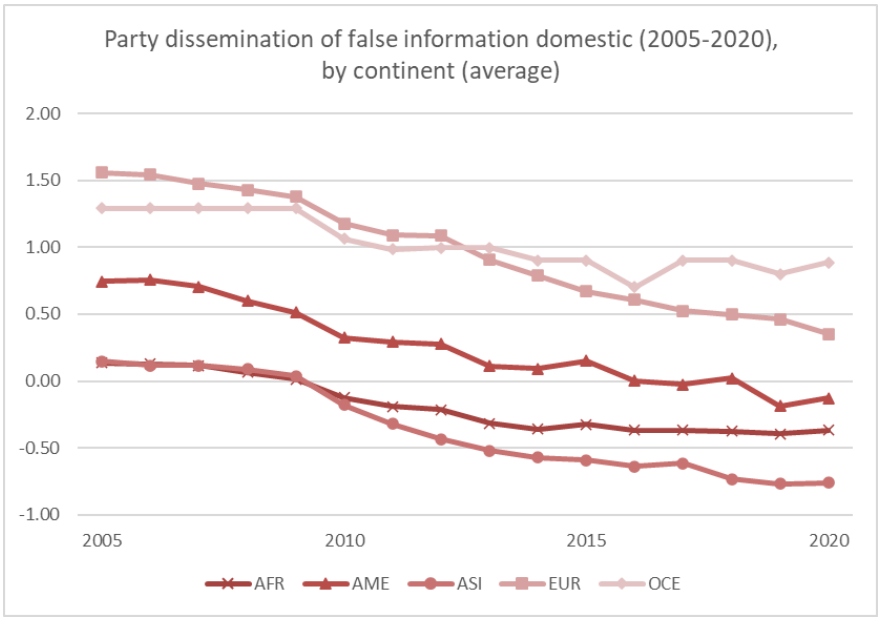
An issue of particular importance to data collection was missing values. Given that data was not available for all countries and years, proxies for missing values were estimated. **Figure A23** summarizes the process of identifying and estimating missing values among the control variables. Estimating missing values may come at the cost of the coefficients found not reflecting the real characteristics of the countries proxied. This issue is especially concerning among the control variables '% of Internet users' and 'Gini index' (see *Limitations*). Despite the relatively high number of countries with missing values, some of them had only a few that did not compromise the estimations. Moreover, control variables were only used to account for certain characteristics of media systems going beyond the main predictors. With the exception of extreme cases such as Venezuela where the proxies were not relied upon, the ground rule was to privilege the observations that had values for the main predictors and therefore not exclude any that could be estimated with a certain degree of accuracy.

Analysis

Prior to laying out the main results of this study, a regional analysis on the variation of the dependent variables, i.e., 'party and government dissemination of false information domestic' is carried out. **Figures 1 and 2** exhibit the continental averages for both variables, from 2005 to 2020. The decreasing trend in both graphs expresses that the spread of false and/or inaccurate information has increased during the past fifteen years (see Appendix, **Figures A14 and A16** to understand the Z-scores distribution for 'party and government dissemination of false information domestic'). Despite being a global trend, the phenomenon of party and government misinformation is more substantial in the continents of Africa and Asia, with major repercussions for democracy and institutions.

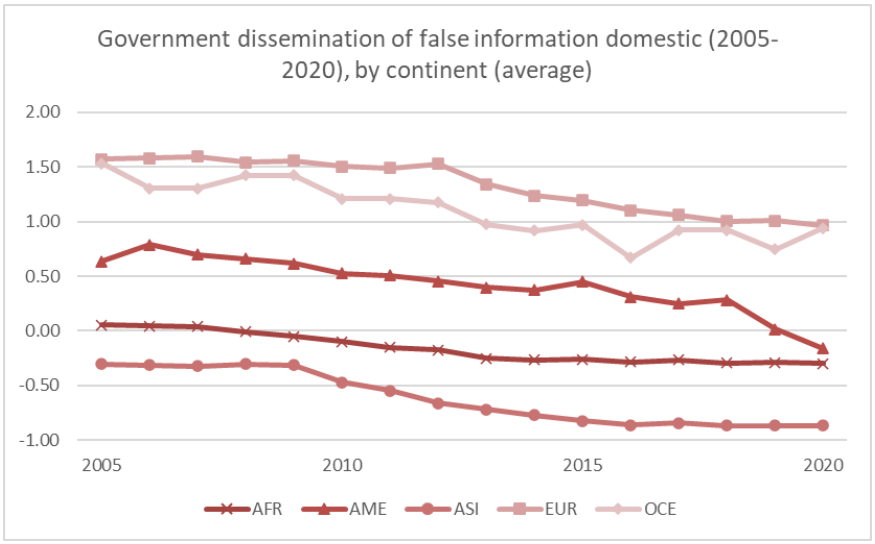
This vindicates what is suggested by Caled and Silva (2021), that the changes in the information market, with the introduction of the 'new media', have created incentives not only for governments, but also for other political agents to spread false information, and benefit from it (p. 124). Considering this, the following analysis is useful for policy-makers not only to grasp what has led misinformation to rise but also to assess whether certain tools to prevent the spread of misinformation are applicable to their own countries. Moreover, it should be taken into account that a more regular use of traditional and new media platforms not to inform, but rather to control public opinion, has several societal repercussions, namely, the crisis of democratic backsliding we are living in.

Figure 1: Party dissemination of false information domestic (2005-2020), by continent (average)



Label: AFR - Africa, **AME -** America, **ASI** - Asia, **EUR** - Europe, **OCE** - Oceania

Figure 2: Government dissemination of false information domestic (2005-2020), by continent (average)



Label: AFR - Africa, **AME -** America, **ASI** - Asia, **EUR** - Europe, **OCE** - Oceania

Main Results

Figure 3 presents the main results of the panel data regression model, with 'party dissemination and government dissemination of false information domestic' as dependent variables (**Model (1)** and **(2)**, respectively):

Figure 3: Panel data regression model of the perception level of party and government dissemination of false information domestic

	Model (1) *Party dissemination of false information domestic*	**Model (2)** *Government dissemination of false information domestic*
Media-party parallelism	0,010 (0,047)	0,192*** (0,045)
Instrumentalization of social media	-0,403*** (0,020)	-0,266*** (0,019)
Government regulation	0,530*** (0,047)	0,681*** (0,045)
Government online content regulation approach	-0,114** (0,041)	-0,055 (0,039)
Online media existence	-0,087*** (0,023)	0,031 (0,022)
Online media fractionalization	0,237*** (0,026)	0,111*** (0,025)
Electoral democracy index	0,575*** (0,161)	1,176*** (0,154)
Population (ln)	0,138 (0,107)	-0,193 (0,102)
% of Internet users	-0,005*** (0,001)	-0,002** (0,001)
GDP per capita (ln)	-0,070 (0,073)	-0,055 (0,070)

	Model (1) *Party dissemination of false information domestic*	**Model (2)** *Government dissemination of false information domestic*
% of female journalists	-0,006 (0,003)	0,003 (0,003)
Gini Index	-0,006* (0,003)	-0,004 (0,003)
Constant	-0,765 (1,759)	3,028 (1,681)
Country fixed-effects	Yes	Yes
R^2	0,931	0,948
Adj. R^2	0,925	0,944
N	2349	2349

Note: panel data regression model with country-fixed effects
***p<0,001, **p<0,01, *p<0,05

Main Results Discussion

The results found in **Figure 3** are discussed below. All coefficient interpretations discussed below are *ceteris paribus*, i.e., all other things being equal.

Starting with 'media-party parallelism', there is strong statistical evidence - at the highest confidence level of p<0,001 - that media outlets (traditional and online) that are narrower in their representation of political ideologies (in the worst case, only the government's perspective) are more prone to disseminate government misinformation. There is no proof that confirms this relationship for 'party dissemination of false information domestic'. **H1**, i.e., a wider, more inclusive representation of political ideologies in media outlets decreases the spread of fallacious and/or inaccurate information, can only be confirmed for government misinformation.

There is sufficient statistical evidence - at $p<0,001$ - to support that a greater political exploitation of social media (either by domestic elites or parties/candidates) leads to a higher spread of false and/or inaccurate information by both political parties and governments (see 'instrumentalization of social media'). In other words, political actors around the globe have used social networks as instruments to serve their own political aspirations, at the societal cost of misinformation. **H2,** stating that a higher instrumentalization of social media networks is positively correlated with the spread of fallacious and/or inaccurate information, can therefore be confirmed.

Analyzing 'government regulation', both coefficients show consensual evidence that a higher government intervention in the market of information - in the means of regulation of social media and censorship of traditional media - raises the dissemination of party and government misinformation. This result is statistically significant at $p<0,001$. Nevertheless, the coefficients on 'government online content regulation approach' are not in favor of these results. A greater governmental burden in monitoring and regulating online content coexists with a lower spread of false and/or inaccurate information by political parties in **Model (1)** (result significant at $p<0,01$). For **Model (2),** nothing can be concluded about the impact of governmental monitoring and regulation of online content on the spread of government misinformation. In sum, **H3**, asserting that a higher government regulation of media platforms increases the spread of fallacious and/or inaccurate information, is contradictory in the case of 'party dissemination of false information domestic' and inconclusive for 'government dissemination of false information domestic'.

For 'online media existence', the coefficient in **Model (1)** suggests that a higher consumption of domestic online media is positively correlated with a higher spread of false

and/or inaccurate information by political parties (result significant at p<0,001). There is not enough evidence in **Model (2)** to demonstrate the effect of domestic online media consumption on the dissemination of government misinformation. Meanwhile, there is sufficient statistical evidence for both models - at p<0,001 - to support that a more partial presentation of the major political news on domestic online media impacts positively the spread of party and government misinformation (see 'online media fractionalization'). In conclusion, while it is possible to conclude that **H4**, i.e., a higher consumption of fractionalized online media outlets increases the spread of fallacious and/or inaccurate information, is applicable within 'party dissemination of false information domestic' - **Model (1)** -, there is not sufficient proof to support this hypothesis in the case of 'government dissemination of false information domestic' - **Model (2)**.

Among the control variables, only the coefficients on 'electoral democracy index' and '% of Internet users' were found to be statistically significant in predicting the variation of 'party and government dissemination of false information domestic'. The former indicates that the countries converging to higher electoral democratic indexes register lower levels of party and government dissemination of false and/or inaccurate information domestically. This result is statistically significant at p<0,001. Therefore, the level of (electoral) democracy in a country is an important predictor of its institutions' ability to counter the dissemination of misinformation. The latter suggests that a higher level of internet penetration in a media system increases the spread of party and government misinformation. A higher number of Internet users at a given information market creates more leverage on the dissemination of false information. This result is significant at p<0,001 for 'party dissemination of false information domestic' and at p<0,01 for 'government dissemination of false information domestic'.

Finally, R^2, i.e., proportion of the variance of the dependent variables that is explained by the independent variables, is substantially high for both **Models (1)** and **(2)**. 93,1% of the variance of 'party dissemination of false information domestic' and 94,8% of the variance of 'government dissemination of false information domestic' is explained by the predictors in this model. The discussion on the credibility of this result will follow in the *Limitations* section.

After discussing the main results of the panel data regression, the conclusions on whether **H1-H4** are applicable in this sample of 147 countries (between 2005-2020) can be seen in **Figure 4**:

Figure 4: Summary of the main results on **H1-H4** applicability (retrieved from **Figure 3**)

Dependent Variable	*Party dissemination of false information domestic*	*Government dissemination of false information domestic*
Media-party Parallelism (**H1**)	*	***
Instrumentalization of social media (**H2**)	***	***
Government regulation (**H3**)	(**)	**
Fractionalization of media outlets (**H4**)	***	**

Label: *** Evidence, (**) Contrasting evidence, ** Limited evidence, * No evidence

Democracy Analysis

In the *Main results discussion* section, the level of electoral democracy (measured by EDI) is the most significant among the control variables to explain the cross-country variation of party and government spread of false and/or inaccurate information domestically. Therefore, the upcoming section groups the observations according to their levels of electoral democracy (EDI) and runs similar regressions as in the panel data regression presented in **Figure 3**. Drawing back on the label of EDI (see *Section B*, **Methodology**), three different groups were created: *Autocracies*, if EDI ≤0,25; *Hybrid democracies*, if 0,25<EDI≤0,75 and *Democracies*, if EDI>0,75. The number of observations for each group (N=316 for *Autocracies*, N=1349 for *Hybrid democracies* and N=684 for *Democracies*) is sufficiently large to draw significant conclusions on the validity of **H1-H4.** Finally, Total N=2349, as in the main model.

The panel data regressions can be found in **Figures A20-22.** In order to simplify the analysis, **Figure 5** depicts the main conclusions of *Democracy analysis*, evaluating the applicability of **H1-H4** in the context of three different democratic regimes:

Figure 5: Summary of the main results on **H1-H4** applicability in the context of *Autocracies*, *Hybrid democracies* and *Democracies* (retrieved from **Figures A20-A22**)

Dependent Variable	*Party dissemination of false information domestic*			*Government dissemination of false information domestic*		
EDI	***Autocracy***	***Hybrid Demo.***	***Democracy***	***Autocracy***	***Hybrid Demo.***	***Democracy***
Media-party Parallelism (**H1**)	*	*	*	*	***	(**)
Instrumen--talization of social media (**H2**)	*	***	***	***	***	***
Government regulatory burden (**H3**)	***	(**)	*	***	**	(**)
Fractiona--lization of media outlets (**H4**)	*	***	***	*	**	*

Label: *** Evidence, (**) Contrasting evidence, ** Limited evidence, * No evidence

Democracy Analysis Discussion

In this section, the results from **Figure 5** are analyzed in comparison to the main conclusions found in **Figure 4** (derived from the model in **Figure 3**). There are three possible scenarios: the results summarized in **Figure 5** may either confirm, contradict or not add any substantial evidence to the *Main results*.

Looking at 'media-party parallelism', there is no strong statistical evidence asserting that **H1**, i.e., a wider, more inclusive representation of political ideologies in media outlets decreases the spread of fallacious and/or inaccurate information, is applicable in the case of 'party dissemination of false information domestic'. However, the case of 'government dissemination of false information domestic' illustrates that differences in representation of

political ideologies in traditional and new media between democratic regimes influence the spread of false and/or inaccurate information by government agents. While there is no evidence to support **H1** in *Autocracies*, there is evidence that in *Hybrid democracies*, a less inclusive representation of political ideologies in print-broadcast and online media coexists with a higher dissemination of government misinformation (**H1** is confirmed). For *Democracies* there is evidence that contradicts **H1**. In fact, the more ideology-representative media systems are more prone to registering higher levels of government dissemination of false and/or inaccurate information. In short, while in some democratic regimes the ties between political parties/candidates and media outlets are detrimental towards the spread of false and/or inaccurate information, in others no evidence of such ties can be found.

The effect of 'instrumentalization of social media' on party and government dissemination of false and/or inaccurate information is the most consensual among the main predictors, regardless of a country's electoral democracy index. **Figure 5** ratifies that **H2**, i.e. a higher instrumentalization of social media networks leads to a higher spread of fallacious and/or inaccurate information, is applicable to all cases, except for *Autocracies* with party spread of misinformation. Notwithstanding a country's level of electoral democracy, its political agents (namely, domestic elites and parties/candidates) still have the incentives to use social networks as political instruments of government propaganda.

The case of 'government regulatory burden' is more complex. Recall that **H3** is constituted by two indicators, 'government regulation' and 'government online content regulation approach', and it is only confirmed if both coefficients are positively correlated with the spread of government and party misinformation. There is sufficient statistical evidence to support **H3**, that greater government regulatory intervention (in the forms of

censorship and control) leads to a higher party and government dissemination of false information, in the case of *Autocracies*. For *Hybrid democracies,* there is contrasting (spread of party misinformation) and limited (spread of government misinformation) evidence on the applicability of **H3**. In the former case, data refutes **H3**, meaning that a higher regulatory burden on the government decreases the dissemination of false information domestically (see 'government online content regulation approach'). Evidence against **H3** can also be found under *Democracies'* 'government dissemination of false information domestic' (see 'government online content regulation approach'). All in all, state intervention in the form of regulation is only effective to counter the spread of party and government misinformation within *Autocracies*. It is not possible to draw any conclusion about the other two democratic regimes, as the findings are either inconclusive or contradictory. Each case should therefore be analyzed distinctively, i.e., governments should infer what the balanced level of regulation in their media system is.

'Fractionalization of media outlets' (**H4**) is composed of the indicators 'online media existence' and 'online media fractionalization' and is only validated if the former correlates negatively and the latter positively with the dissemination of false information domestically. For the dependent variable 'party dissemination of false information domestic' there is enough statistical evidence to confirm that **H4**, i.e., a higher consumption of fractionalized online media outlets increases the spread of fallacious and/or inaccurate information, is applicable within *Hybrid democracies* and *Democracies*. The same cannot be concluded for *Autocracies* - no evidence. For 'government dissemination of false information domestic', no strong statistical evidence is found in favor of **H4**. The case of *Hybrid democracies*, on the other hand, should serve as a cautionary note about the impact of more fragmented domestic online media on the dissemination of government misinformation. Despite not having found

enough statistical significance in favor of a positive correlation between ‘online media existence’ and the dependent variable, data suggests that a more partial representation of major political events in domestic online media increases the spread of false and/or inaccurate information by government agents.

Conclusion

Going back to the research question "*Under what conditions are media systems more effective in countering the spread of false and/or inaccurate information?"*, this thesis has found robust evidence in favor of one out of four societal mechanisms inherent to media systems which have been hypothesized to influence the increase of misinformation in social networks. 'Instrumentalization of social media' (**H2**) is among the four mechanisms the one that more consistently predicts the cross-country variation of 'party/government dissemination of false information domestic', and is found to positively impact the dissemination of misinformation within social networks.

Some evidence was found for the remaining mechanisms (**H1**, **H3**, **H4**). The effect of 'media-party parallelism' **(H1)** on the spread of false and/or inaccurate information is ambiguous, as the mechanisms implying the existence of ties between media outlets and political parties are not easy to capture. However, there is evidence asserting that media outlets which are narrower in their incorporation of major political perspectives are more prone to disseminate government misleading information in the case of *Hybrid democracies*. The case of 'government regulatory burden' (**H3**) illustrates that government regulation is a dubious instrument to counter the spread of misinformation on social networks. While there is no clear evidence in favor of its use to counter government and party misinformation, a higher government regulatory burden is proven to increase the spread of government and party misinformation within *Autocracies*. Finally, 'online media fractionalization' (**H4**) is issue and democratic regime-characteristic, meaning that a more partial representation of major political events in domestic online media leading to an increase in the dissemination of

false and/or inaccurate information is only verified among certain social networks and agents, i.e., the case of government misinformation, within *Hybrid democracies* and *Democracies*.

Two main strengths of this thesis are highlighted. Firstly, this thesis is a representative study (of 147 countries) of how misinformation is reflected upon the characteristics of media systems globally. Therefore, the results provide an accurate representation of how information markets on a global scale have been affected by the increase of misinformation in recent years. Secondly, the section on *Democracy analysis* evaluates the changes in the main results when the observations are split according to their levels of electoral democracy. Moreover, it identifies which democratic regimes - *Autocracies*, *Hybrid democracies*, *Democracies* - each of the four hypothesized media systems' mechanisms is more significant. Consequently, this thesis has several policy implications. These findings allow policy-makers to identify the driving factors of higher dissemination of false and/or inaccurate information in their own countries and design efficient policies to counter the detrimental impacts of misinformation on democratic backsliding.

Finally, while this thesis has contributed to the existing research by providing a wider picture on how misinformation is proliferated among social networks by the government and political parties in the context of the changing media landscape, future research should look at whether these results can be generalized to other political actors. In the future, researchers should also be able to evaluate how events such as the Covid-19 crisis or the war in Ukraine have played a role in changing not only the dynamics of '(hybrid) media systems' but also how misleading content is produced and disseminated within social networks.

Limitations

This section explores the limitations of this thesis. The first constraint relates to the choice of the V-Dem survey as a source for this analysis. Despite measuring how the spread of misinformation is reflected upon the characteristics of media systems, with a wide country representation (177), it did not account for all relevant media systems' characteristics and all influential political agents. An example of this is the predictor on 'instrumentalization of social media', which assumes that only elites and political parties use social networks as political tools to shape public opinion. Even if limited in scope, the evidence found in favour of this hypothesis in particular is still an important finding of this thesis.

The process of estimating proxies for missing values should also be scrutinized. As discussed under Methodology, *Section B,* the rule to avoid the exclusion of observations where the values for main predictors were available may have led to some imprecisions in the estimation of the coefficients '% of Internet users' and 'Gini index'. Thus, the real impact of both variables on 'party and government spread of misinformation domestic' may not have been fully captured.

Finally, the results found under the R^2, i.e., proportion of the variance of the dependent variables that is explained by the independent variables, were treated with skepticism, as they were exceptionally high (0,931 and 0,948 for the main models). A possible explanation for this problem has to do with the fact that SPSS accounts for within and between country-effects in computing for the R^2, which is a comparative disadvantage to other programs such as STATA or R.

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Appendix

Figure A1: Description of model estimates, with Z-score measurement scale

Several C-variables from the V-Dem Survey, *de facto* state of affairs in a particular country at a particular point in time (Coppedge et al., 2019), are used in this study[2]. Despite being ordinal variables, measured on a scale from 0 to 4, the V-Dem survey converts these rankings into model estimates. Their scale of measurement is similar to a normal ("Z") score, which typically ranges between -5 and 5, with 0 approximately representing the mean for all country-years in the sample. It does not necessarily follow a normal distribution. Model estimates with Z-score measurement scale are used for time-series regressions and other estimation strategies (Coppedge et al., 2019). Graphic representations of these variables can be found later in this Appendix, **Figures A3-A6, A14, A16** and **A18-A19**.

[2] These are the cases of 'Party and government dissemination of false information domestic', 'Online and print-broadcast media perspectives', 'Media bias', 'Elites' use of social media to organize offline action', 'Party/candidate use of social media in campaigns', 'Government social media alternatives', 'Government censorship effort', 'Government online content regulation approach', 'Online media existence' and 'Online media fractionalization'.

Figure A2: Descriptive frequencies of the variables to which Principal Component Analysis (PCA) is applied

	Variable	Description	Min	Max	Mean	Std. Dev.	Total N
Media-Party Parallelism (H1)	Online media perspectives *	Do the major domestic online media outlets represent a wide range of political perspectives?	-3,95	2,60	0,058	1,37299	3038
	Print-broadcast media perspectives *	Do the major print and broadcast media represent a wide range of political perspectives?	-3,11	2,85	0,945	1,37673	3071
	Media bias*	Is there media bias against opposition parties or candidates? Higher values represent higher impartial representation of all newsworthy parties and candidates.*	-3,35	3,15	0,862	1,35523	3078

***** retrieved from V-Dem Survey, C-variables where "model estimates" were used.

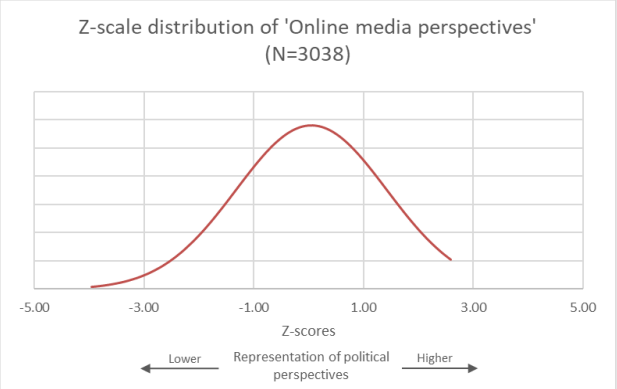
	Variable	Description	Min	Max	Mean	Std. Dev.	Total N
Instrumenta--lization of social media (H2)	Elites' use of social media to organize offline action*	How often do domestic elites use social media to organize offline political action of any kind?	-3,64	3,34	-0,059	1,20892	3035
	Party/ candidate use of social media in campaigns*	To what extent do major political parties and candidates use social media during electoral campaigns to communicate with constituents?	-4,38	2,10	-0,336	1,28319	3035

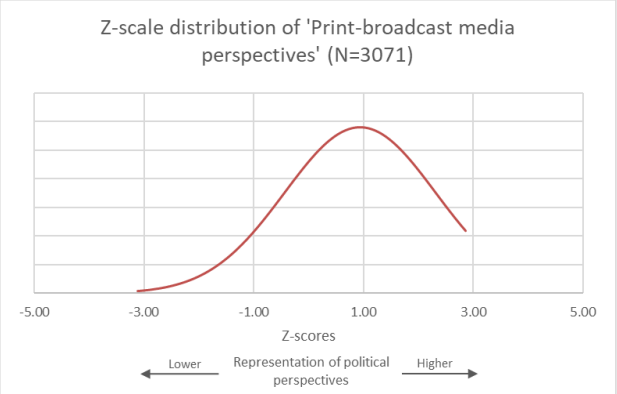
***** retrieved from V-Dem Survey, C-variables where "model estimates" were used.

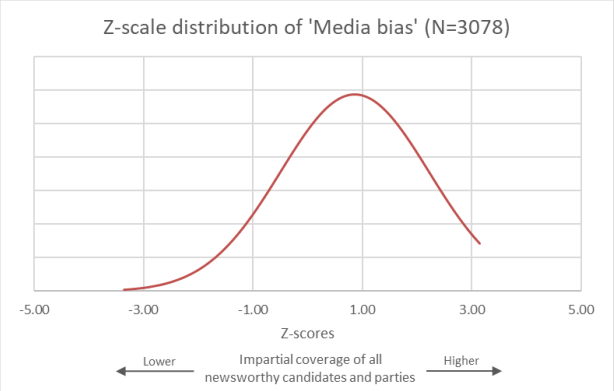
	Variable	Description	Min	Max	Mean	Std. Dev.	Total N
Government regulation (H3)	Government social media alternatives*	How prevalent is the usage of social media platforms that are wholly controlled by either the government or its agents in this country?	-5,00	2,21	0,245	1,30200	3035
	Government censorship effort*	Does the government directly or indirectly attempt to censor the print or broadcast media?	-2,96	3,52	0,673	1,50850	3118

***** retrieved from V-Dem Survey, C-variables where "model estimates" were used.

Figure A3: Z-scale distribution of 'online media perspectives', 'print-broadcast media perspectives' and 'media bias', factored variables under PCA 'media-party parallelism' (**H1**)





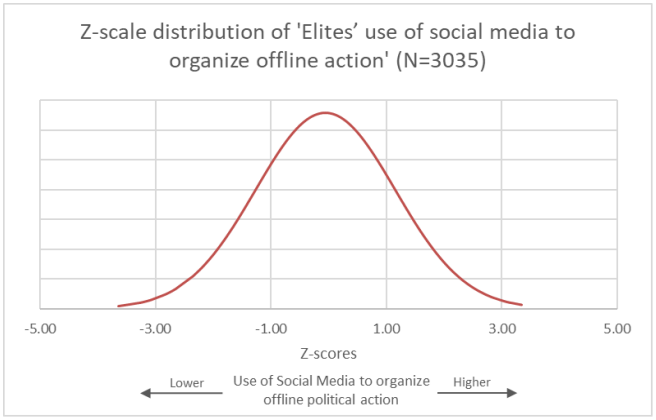


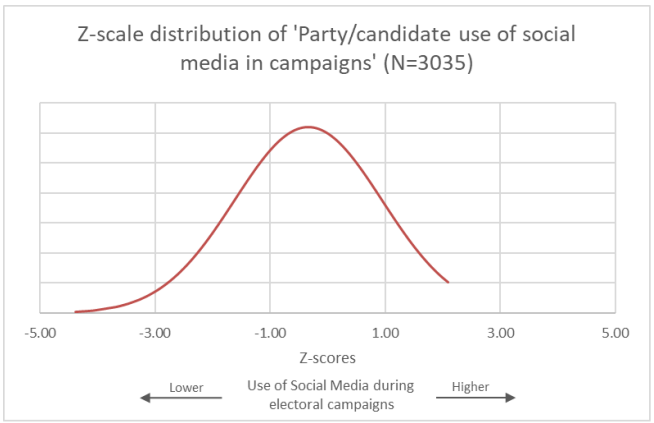
Legend:

a) '<u>Online and print/broadcast media perspectives</u>': **0** "the major domestic online and print-broadcast media outlets represent only the government's perspective" to **4** " all perspectives that are important in this society are represented in many major domestic online and print-broadcast media outlets";

b) '<u>Media bias</u>': **0** "the print and broadcast media cover only the official party or candidates, or have no political coverage, or there are no opposition parties or candidates to cover" to **4** "the print and broadcast media cover all newsworthy parties and candidates more or less impartially and in proportion to their newsworthiness".

Figure A4: Z-scale distribution of 'elites' use of social media to organize offline action' and 'party/candidate use of social media in campaigns', factored variables under PCA 'instrumentalization of SM' (**H2**)



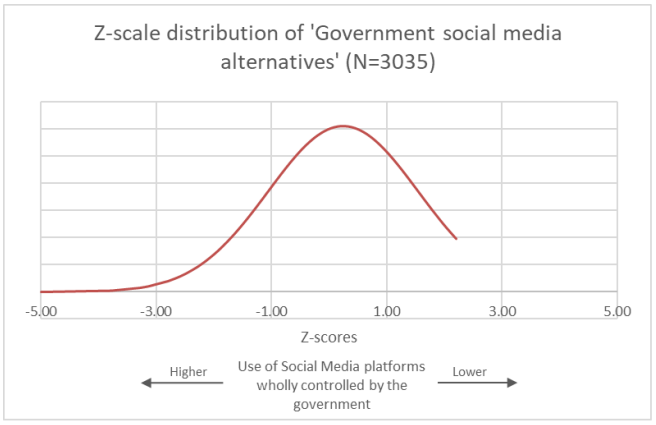


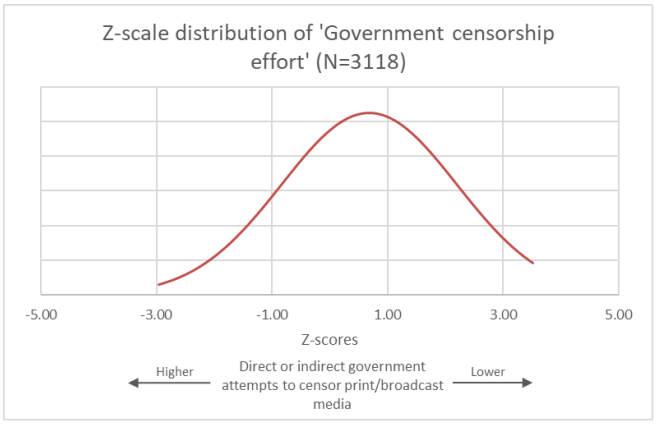
Legend:

a) 'Elites' use of social media to organize offline action': **0** "never or almost never. Elites have almost never used social media to organize offline political action" to **4** "regularly. There are numerous cases in which elites have used social media to organize offline political action";

b) 'Party/candidate use of social media in campaigns': **0** "non-existent. Major political parties and candidates do not use social media during electoral campaigns to communicate with constituents" to **4** "substantial, frequente use. Major political parties and candidates frequently use social media during electoral campaigns to communicate with constituents."

Figure A5: Z-scale distribution of 'government social media alternatives' and 'government censorship effort', factored variables under PCA 'government regulation' (**H3**)



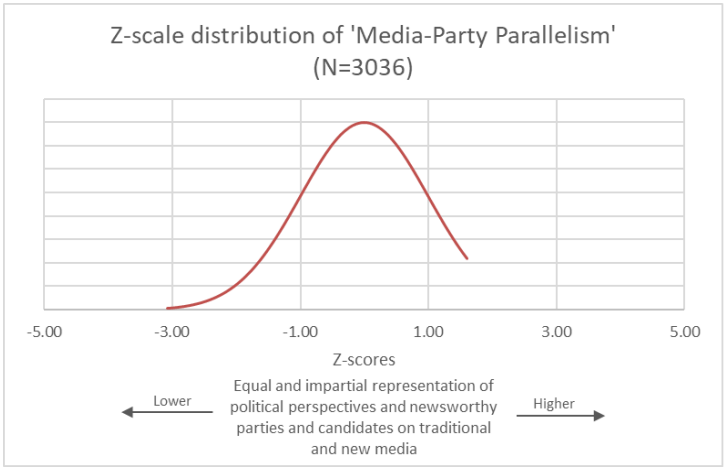


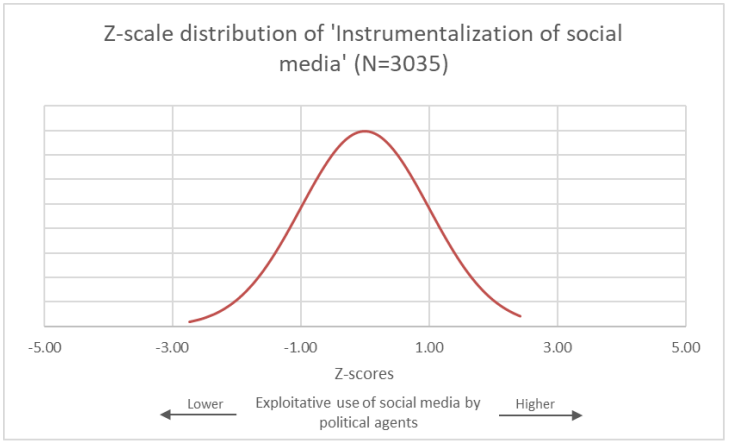
Legend:

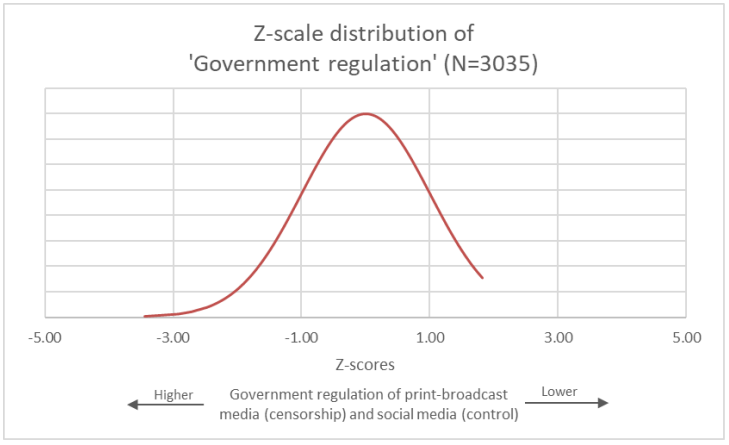
a) '<u>Government social media alternatives</u>': **0** "essentially all social media usage takes place on platforms controlled by the state" to **4** "practically no one uses state-controlled social media platforms";

b) '<u>Government censorship effort</u>': **0** "direct and routine attempts to censor major media" and **4** "rare attempts to censor major media in any way and when such exceptional attempts are discovered, the responsible officials are usually punished."

Figure A6: Z-scale distribution of newly-created variables (through PCA): 'media-party parallelism' (**H1**), 'instrumentalization of social media' (**H2**) and 'government regulation' (**H3**)







Legend:

a) 'Media-Party Parallelism (**H1**)': **0** "the major domestic online and print-broadcast media outlets represent only the government's perspective and cover only the official party or candidates, not giving any political coverage to opposition parties or candidates" to **4** "all political perspectives that are important in this society are represented in many major domestic online and print-broadcast media outlets. Similarly, all newsworthy parties and candidates are covered more or less impartially and in proportion to their newsworthiness";

b) 'Instrumentalization of social media **(H2)**': **0** "elites never or almost never use social media to organize offline political action. Parties and political candidates do not make use of social media during electoral campaigns to communicate with their constituents' to **4** "elites use social media regularly to organize offline political action. Major political parties and candidates frequently use social media during electoral campaigns to communicate with constituents".

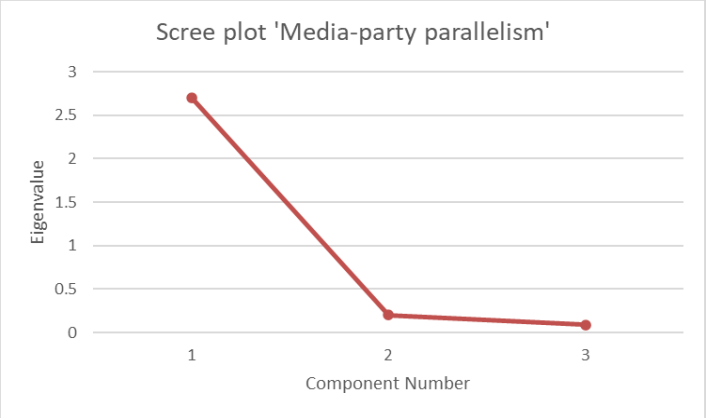
c) 'Government regulation (**H3**)': **0** "essentially all social media usage takes place on platforms controlled by the state. Similarly, the government executes direct and routine attempts to censor major media" to **4** "practically no one uses state-controlled social media platforms. Similarly, the government executes rare attempts to censor major media in any way and when such exceptional attempts are discovered, the responsible officials are usually punished."

Figure A7: Communalities table (with % Variance extracted) from Principal Component Analysis (PCA) on 'media-party parallelism'

Variables	**Initial**	**Extraction**
Online media perspectives	1,000	0,861
Print-broadcast media perspectives	1,000	0,924
Media bias	1,000	0,920

Note: Extraction Method: PCA.

Figure A8: Scree plot and Total Variance Explained (Eigenvalues) from Principal Component Analysis (PCA) on 'media-party parallelism'



	Initial Eigenvalues		
Component	Total	% of Variance	Cumulative %
1	2,705	90,176	90,176
2	0,203	6,783	96,959
3	0,091	3,041	100,000

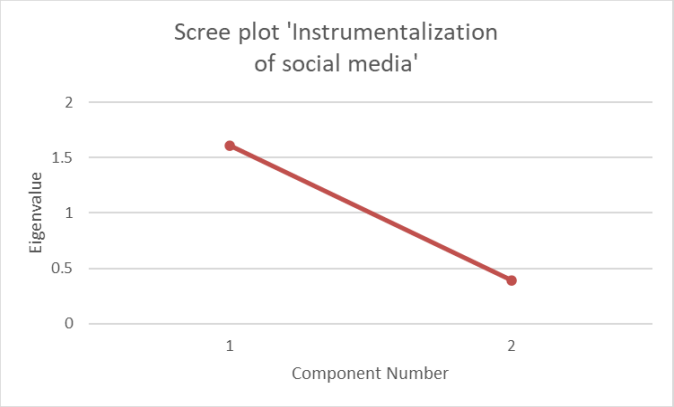
Note: Extraction Method: PCA. Only Component number 1 (corresponding to 'Media-party parallelism') was extracted.

Figure A9: Communalities table (with % Variance extracted) from Principal Component Analysis (PCA) on 'instrumentalization of social media'

Variables	**Initial**	**Extraction**
Elites' use of social media to organize offline action	1,000	0,805
Party/candidate use of social media in campaigns	1,000	0,805

Note: Extraction Method: PCA.

Figure A10: Scree plot and Total Variance Explained (Eigenvalues) from Principal Component Analysis (PCA) on 'instrumentalization of social media'



	Initial Eigenvalues		
Component	Total	% of Variance	Cumulative %
1	1,609	80,474	80,474
2	0,391	19,526	100,000

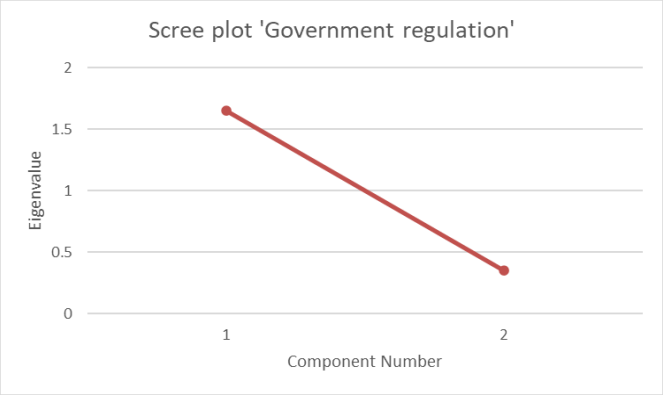
Note: Extraction Method: PCA. Only Component number 1 (corresponding to 'Instrumentalization of media') is extracted.

Figure A11: Communalities table (with % Variance extracted) from Principal Component Analysis (PCA) on 'government regulation'

Variables	Initial	Extraction
Government social media alternatives	1,000	0,824
Government censorship effort	1,000	0,824

Note: Extraction Method: PCA.

Figure A12: Scree plot and Total Variance Explained (Eigenvalues) from Principal Component Analysis (PCA) on 'government regulation'



	Initial Eigenvalues		
Component	Total	% of Variance	Cumulative %
1	1,649	82,445	82,445
2	0,351	17,555	100,000

Note: Extraction Method: PCA. Only Component number 1 (corresponding to 'Government regulation') was extracted.

Figure A13: Descriptive frequencies of all variables used in this study

	Variable	Description	Min	Max	Mean	Std. Dev.	Total N
DVs	**Party dissemination of false information: domestic***	How often do major political parties and candidates for office use social media to disseminate misleading viewpoints or false information to influence their population?	-3,55	2,92	0,0946	1,39205	3057
	Government dissemination of false information: domestic*	How often do the government and its agents use social media to disseminate misleading viewpoints or false information to influence their population?	-3,69	2,99	0,0865	1,23266	3044
IVs	Media-Party Parallelism*	PCA of a) Online media perspectives, b) Print/broadcast media perspectives and c) Media bias	-3,08	1,61	0,0000	1,00000	3036
	Instrumentalization of social media*	PCA of a) Elites' use of social media to organize offline action and b) Party/candidate use of social media in campaigns	-2,73	2,42	0,0000	1,00000	3035
	Government regulation*	PCA of a) Government social media alternatives and b) Government censorship effort*	-3,44	1,82	0,0000	1,00000	3035
	Government online content regulation approach*	Does the government use its own resources and institutions to monitor and regulate online content or does it distribute this regulatory burden to private actors such as Internet service providers?	-3,05	3,62	0,3763	1,11648	3035

***** retrieved from V-Dem Survey, C-variables where "model estimates" were used.

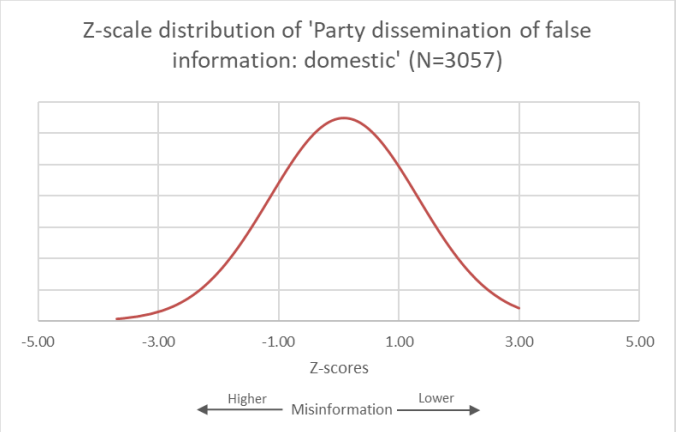
	Variable	Description	Min	Max	Mean	Std. Dev.	Total N
IVs	Online media existence*	Do people consume domestic online media?	-3,48	3,02	0,0778	1,23907	3035
	Online media fractionalization*	Do the major domestic online media outlets give a similar presentation of major (political) news?	-3,33	3,40	0,1738	1,11820	3037
Control variables	Electoral democracy indexº	To what extent is the ideal of electoral democracy in its fullest sense achieved?	0,02	0,93	0,5250	0,25614	8198
	Population (ln)	Logarithm (base e) of total population. Total population is based on the *de facto* definition of population, which counts all residents regardless of legal status or citizenship.	11,3	21,1	16,063	1,63407	9018
	% of Internet users	Individuals using the Internet (% of population). Internet users are individuals who have used the Internet (from any location) in the last 3 months.	0,00	100,00	39,82	30,736	8953
	GDP per capita (ln)	Logarithm (base e) of GDP in Purchasing Power Parity (PPP), 2017 US$ constant prices	5,96	11,7	9,2293	1,20890	8934

***** retrieved from V-Dem Survey, C-variables where "model estimates" were used.

º retrieved from V-Dem Survey, D-variables ("highly aggregated variables")

	Variable	Description	Min	Max	Mean	Std. Dev.	Total N
Control Variables	Average years of schooling	Mean years of total schooling across all education levels	1	14	8,21	3,301	8862
	% of female journalists	Percentage (%) estimation of journalists in the print and broadcast media who are women.	3,00	76,25	37,789	11,5417	3047
	Gini Index	Extent to which the distribution of income among households within an economy deviates from a perfectly equal distribution. An index of 0 represents perfect equality, while an index of 100 implies perfect inequality.	23	70	37,79	7,996	7718
	Year		2005	2021	2013,1	4,8443	9716

Figure A14: Z-scale distribution of the dependent variable ‘party dissemination of false information: domestic’



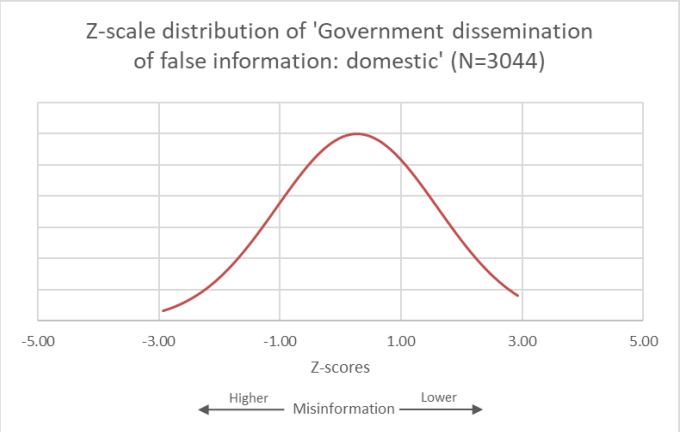
Legend:

a) 'Party dissemination of false information: domestic': **0** "extremely often. Major political parties and candidates disseminate false information on all key political issues" to **4** "never, or almost never. Major political parties and candidates never disseminate false information on key political issues."

Figure A15: Top-5 countries with highest and lowest Z-scores on 'party dissemination of false information: domestic'

Party dissemination of false information: domestic					
Lowest Z-scores			Highest Z-scores		
Country	Year	Z-score	Country	Year	Z-score
Syria	2020	-3.69	Denmark	2020	2.99
Central African Republic	2012	-3.13	Lithuania	2011	2.86
Yemen	2020	-2.94	Estonia	2013	2.86
Cuba	2020	-2.90	Costa Rica	2018	2.77
Eritrea	2020	-2.64	Ireland	2018	2.73

Figure A16: Z-scale distribution of the dependent variable 'government dissemination of false information: domestic'



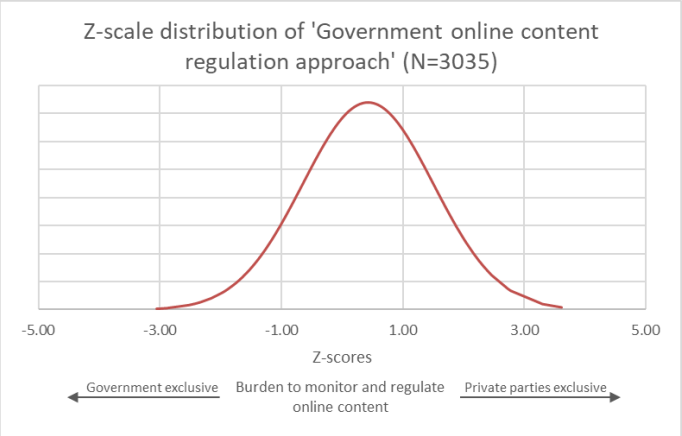
Legend:

a) 'Government dissemination of false information: domestic': **0** "extremely often. The government disseminates false information on all key political issues" to **4** "never, or almost never. The government never disseminates false information on key political issues"

Figure A17: Top-5 countries with highest and lowest Z-scores on 'government dissemination of false information: domestic'

Government dissemination of false information: domestic					
Lowest Z-scores			Highest Z-scores		
Country	Year	Z-score	Country	Year	Z-score
Cuba	2005	-2.93	Belgium	2013	2.92
Azerbaijan	2018	-2.83	Latvia	2020	2.86
Russia	2020	-2.72	Portugal	2018	2.81
Somalia	2020	-2.70	Germany	2016	2.76
Yemen	2011	-2.67	Finland	2020	2.75

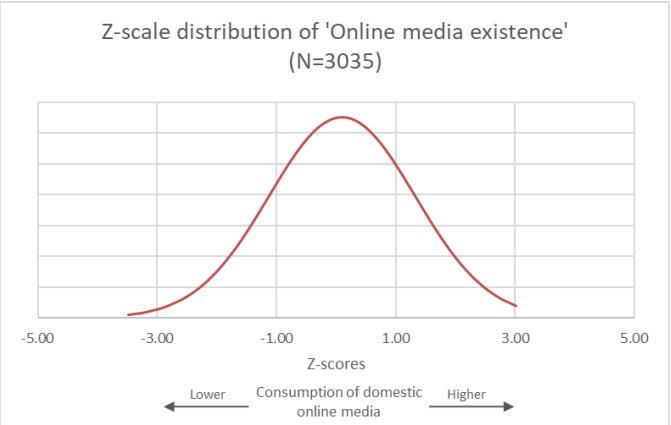
Figure A18: Z-scale distribution of the predictor 'government online content regulation approach' (**H3**)

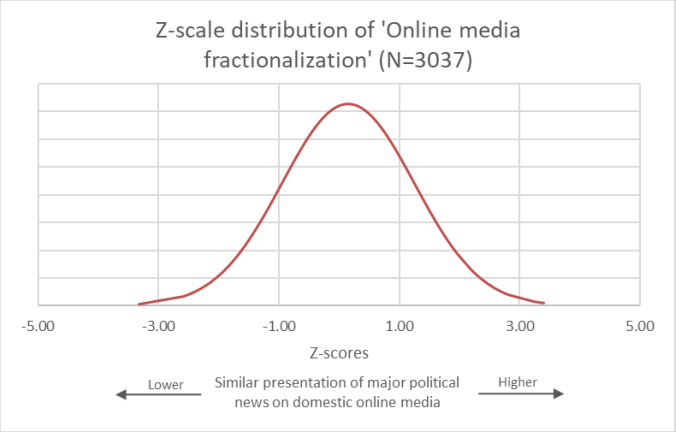


Legend:

a) '<u>Government online content regulation approach</u>': **0** "all online content monitoring and regulation is done by the state" to **4** " the state off-loads all online content monitoring and regulation to private actors".

Figure A19: Z-scale distribution of the predictors 'online media existence' and 'online media fractionalization' (**H4**)





Legend:

a) '<u>Online media existence</u>': **0** "no consumption of domestic online media" to **4** "extensive [almost everyone] consumption of domestic online media";

b) '<u>Online media fractionalization</u>': **0** "the major domestic online media outlets give opposing presentation of major events" to **4** "although there are small differences in representation, the major domestic online media outlets give a similar presentation of major events".

Figure A20: Panel data regression model of the perception level of party and government dissemination of false information domestic within *Autocracies*

Autocracies (EDI ≤0,25)	**Model (1)** *Party dissemination of false information domestic*	**Model (2)** *Government dissemination of false information domestic*
Media-party parallelism	-0,187 (0,113)	0,139 (0,121)
Instrumentalization of social media	-0,102 (0,066)	-0,188** (0,071)
Government regulation	0,481*** (0,100)	0,539*** (0,107)
Government online content regulation approach	0,308*** (0,079)	0,414*** (0,085)
Online media existence	0,108 (0,069)	0,005 (0,073)
Online media fractionalization	0,162* (0,067)	0,146* (0,071)
Electoral democracy index	1,903 (0,994)	4,237*** (1,066)
Population (ln)	0,095 (0,227)	0,515* (0,243)
% of Internet users	-0,010*** (0,002)	-0,005** (0,002)
GDP per capita (ln)	-0,150 (0,097)	-0,133 (0,104)
Average years of schooling	-0,002 (0,039)	-0,142*** (0,042)
% of female journalists	0,000 (0,005)	0,008 (0,006)

Autocracies (EDI ≤0,25)	**Model (1)** *Party dissemination of false information domestic*	**Model (2)** *Government dissemination of false information domestic*
Gini Index	0,007 (0,007)	0,009 (0,007)
Constant	-0,318 (3,719)	-6,470 (3,988)
Country fixed-effects	Yes	Yes
R^2	0,975	0,948
Adj. R^2	0,970	0,938
N	316	316

Note: panel data regression model with country-fixed effects
***p<0,001, **p<0,01, *p<0,05

Figure A21: Panel data regression model of the perception level of party and government dissemination of false information domestic within *Hybrid democracies*

Hybrid democracies (0,25< EDI ≤ 0,75)	**Model (1)** *Party dissemination of false information domestic*	**Model (2)** *Government dissemination of false information domestic*
Media-party parallelism	-0,090 (0,071)	0,310*** (0,060)
Instrumentalization of social media	-0,469*** (0,029)	-0,312*** (0,024)
Government regulation	0,603*** (0,066)	0,613*** (0,055)
Government online content regulation approach	-0,123* (0,058)	-0,028 (0,048)
Online media existence	-0,064* (0,032)	0,014 (0,027)
Online media fractionalization	0,153*** (0,036)	0,083** (0,030)
Electoral democracy index	0,586** (0,217)	0,689*** (0,181)
Population (ln)	0,370* (0,149)	0,061 (0,125)
% of Internet users	-0,005*** (0,001)	-0,003** (0,001)
GDP per capita (ln)	-0,079 (0,119)	0,227* (0,100)
Average years of schooling	-0,044 (0,036)	-0,099*** (0,030)
% of female journalists	-0,007 (0,005)	0,000 (0,004)

Hybrid democracies (0,25< EDI ≤ 0,75)	**Model (1)** *Party dissemination of false information domestic*	**Model (2)** *Government dissemination of false information domestic*
Gini Index	-0,010** (0,003)	-0,009** (0,003)
Constant	-4,176 (2,433)	-2,707 (2,034)
Country fixed-effects	Yes	Yes
R^2	0,883	0,917
Adj. R^2	0,872	0,909
N	1349	1349

Note: panel data regression model with country-fixed effects
***p<0,001, **p<0,01, *p<0,05

Figure A22: Panel data regression model of the perception level of party and government dissemination of false information domestic within *Democracies*

Democracies (EDI >0,75)	**Model (1)** *Party dissemination of false information domestic*	**Model (2)** *Government dissemination of false information domestic*
Media-party parallelism	-0,113 (0,098)	-0,282** (0,104)
Instrumentalization of social media	-0,329*** (0,030)	-0,117*** (0,032)
Government regulation	-0,021 (0,104)	0,322** (0,111)
Government online content regulation approach	-0,172* (0,071)	-0,188* (0,076)
Online media existence	-0,096** (0,036)	-0,043 (0,038)
Online media fractionalization	0,367*** (0,075)	0,219* (0,079)
Electoral democracy index	4,404*** (0,923)	11,207*** (0,981)
Population (ln)	0,712* (0,298)	-1,188*** (0,316)
% of Internet users	-0,005*** (0,002)	0,003*** (0,002)
GDP per capita (ln)	-0,366* (0,148)	-0,294 (0,157)
Average years of schooling	0,038 (0,035)	0,034 (0,037)
% of female journalists	-0,013* (0,006)	-0,003 (0,006)

Democracies (EDI >0,75)	**Model (1)** *Party dissemination of false information domestic*	**Model (2)** *Government dissemination of false information domestic*
Gini Index	0,016 (0,009)	0,012 (0,009)
Constant	-10,460* (4,964)	12,689* (5,273)
Country fixed-effects	Yes	Yes
R^2	0,929	0,904
Adj. R^2	0,922	0,895
N	684	684

Note: panel data regression model with country-fixed effects
***p<0,001, **p<0,01, *p<0,05

Figure A23: Cautionary notes on the estimation of missing values

Variable	***Missing values***	***Solution***
Population (ln)	Eritrea	Estimation of proxies from the values (from 2005-2020) available in the dataset[3]
% of Internet users	92 of 177 countries	Estimation of proxies from the values (from 2005-2020) available in the dataset[3]
GDP per capita (ln)	Djibouti, Kosovo, Somalia	Estimation of proxies from the values (from 2005-2020) available in the dataset[3]
	Cuba, South Sudan, Eritrea, Syria, North Korea	Computed manually, with GDP at current prices / Population at a given year t
	Venezuela	Proxies computed are not trustworthy due to the inflationary crisis in the country
Gini Index	119 of 177 countries	Estimation of proxies from the values (from 2005-2020) available in the dataset[3]. For a total of 12 countries, the value of Gini Index remained constant throughout the period of analysis (2005-2020)[4]

[3] An average yearly variation was computed within the years where data was available. This value corresponds to a prediction of yearly variation and it was used to estimate proxies for the missing years. Example: Missing value (t+1) = Value available (t) + Average yearly variation.

[4] Given the lack of at least two values to compute an average yearly variation, all missing values were equal to the single value available in the dataset.