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Internet Use and understanding democracy in Africa

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Abstract

This paper examines the impact of using the Internet and social networks as sources of information on individuals' understanding of democracy. The analysis draws on data from the sixth round of the Afrobarometer survey, conducted in 2014, across a sample of African countries, some of which are democracies and others non-democracies. This topic has received limited attention in the economic literature, despite its relevance in understanding political preferences and behaviors.

The sixth round of the Afrobarometer survey is particularly suited for this analysis, as it is the only wave to include both open-ended and closed-ended questions regarding individuals' understanding of democracy. In this study, we prioritize open-ended questions as we consider them to better capture individuals' conceptual grasp of democracy. However, we also use closed-ended questions to test the robustness of our results. Open-ended responses are structured and analyzed using the ChatGPT tool to extract meaningful insights.

The identification strategy leverages the interaction between lightning activity and 3G coverage. Lightning activity introduces random interruptions in Internet access, creating an exogenous source of variation that enables causal inference.

Our results indicate that the bias in understanding democracy induced by reliance on the Internet and social networks as information sources is predominantly negative. This negative bias extends to individuals' perceptions of freedom of expression and institutional corruption in political regimes. Conversely, we find a positive bias regarding perceptions of the fairness of the electoral process. These findings carry significant implications, as we document a positive association between the understanding of democracy and the preference for democratic systems. This suggests that distortions caused by Internet use, which has become a major source of information in Africa, may influence individuals' political preferences and attitudes.

Keywords: Internet news, Democracy, Misunderstanding of Democracy, Africa

JEL Codes: G2, G32, L25, L6, Q53

1 Introduction

New media have reshaped the political landscape around the world (itu (2022)). The rise of the Internet is a global phenomenon that affects everyone on the planet. The world is now connected, allowing people in every corner of every country to obtain information and be aware of what is happening, how it can be interpreted, judged, and criticized, even when the Internet space is censored or in nondemocratic regimes.

Despite this, recent literature shows that democracy is threatened by misinformation and the rise of populist and communitarian behavior, particularly in established democracies. However, a recent meta-analysis (Lorenz-Spreen et al. (2023)) suggests that these negative associations are not as prevalent in emerging democracies and autocracies, where positive patterns are observed. In these contexts, the Internet provides a source of independent information, facilitates the coordination of protests and the structuring of opposition, and exposes corruption within institutions and among their actors. This evidence is particularly strong in places where traditional media are controlled and the Internet escapes censorship.

The Internet is not neutral in its impact on political participation. In established democracies, it skews voting behavior toward extreme and radicalized parties, while in emerging democracies, it facilitates political change, as notably observed during the Arab Spring, challenging old autocracies and long-standing political powers. Overall, there is a consensus that the Internet is not neutral; it has the capacity to influence political preferences, sometimes in ways that threaten democracies (Enikolopov et al. (2018)) and increase the risk of political reversals (Enikolopov et al. (2020)).

This study examines the relationship between Internet accessibility and its impact on how well individuals in a selection of African nations understand democracy. The data, drawn from the Afrobarometer, encompass a wide range of contexts with varying levels of democracy. In the debate surrounding the preference for democracy in emerging countries, it is often assumed that certain preconditions (such as economic prosperity or experience of institutional and political stability) must be met for people to fully understand how

democratic principles work and why they are superior to other systems. For example, a dislike of democracy may arise when individuals associate it with corruption among actors and institutions, or when people struggling for economic survival view democratization as a source of public disorder, political instability, and a deteriorating business climate. It remains unclear whether these associations accurately reflect reality or stem from misunderstandings. This paper asserts the importance of distinguishing between the core principles of democracy and their comprehension, and the perceived outcomes of democracy, such as corruption and political order. We argue that the erosion of democratic understanding caused by the Internet, along with shifts in perceptions of critical democratic dimensions, such as freedom of expression, electoral fairness, and the integrity of democratic institutions, has the potential to undermine support for democracy, particularly in countries with stronger democratic traditions.

Hence, this study examines the extent to which the principles of democracy are better understood through the use of the Internet. It finds that using the Internet to obtain information diminishes people's understanding of democracy, particularly in relatively more democratic African countries. This is an important finding that aligns with the existing literature. For example, Bratton et al. (2004) report that *"understanding of democracy is a key element in explaining why some Africans demand democracy and others do not.*" Furthermore, the relationship between understanding democracy and democratic support is stronger in countries with a long history of democracy (Cho 2014). This study explores the Internet-induced bias in other outcomes. Internet users in democratic countries have a more negative view of democratic institutions and corruption than might be expected. For example, unlike their counterparts living in autocracies, they feel less free, report a sharper perception of corruption-related issues, are less satisfied with the way democracy functions in their country, and express a reduced preference for democracy. This dissatisfaction and reduced preference for democratic regimes can be partly explained by the heightened perception of corruption, which is more pronounced in democratic contexts compared to nondemocratic ones.

Our contribution is also empirical. We used information from an open question in the Afrobarometer survey, which was only included in one round (2016, Q29 question). We employ ChatGPT to assess whether an individual understands democratic principles. We check the consistency between responses to this open question and a corresponding closed-ended version, where respondents choose from predetermined answers. The closed-ended version is used to test the robustness of the results. Based on this analysis, we construct binary variables equal to one if the individual demonstrates understanding and zero otherwise. These variables are then used to examine the relationship between Internet use and understanding of democracy. Additionally, we propose an instrumental variable to identify a causal relationship from Internet use to democratic understanding, addressing simultaneity bias and potential reverse causality, i.e., from understanding democracy to Internet use.

The structure of this article is as follows. First, the literature review situates this work within the broader research landscape, highlighting key studies on the influence of the Internet on democratic perceptions. The second section introduces the data used in the analysis, sourced from the 2014 cross-sectional survey by Afrobarometer that covers several African countries. The third section outlines the identification strategy, employing both Ordinary Least Squares (OLS) regression and an instrumental variable approach to account for Internet exposure. Next, the main results are presented, focusing on the effect of Internet access on individuals' understanding of democracy. Secondary results are also discussed, including the impact of Internet access on perceptions of freedom of expression, the freeness and fairness of elections, and perceptions of corruption in political actors and institutions, with distinctions made between democratic and nondemocratic regimes. Finally, the conclusion summarizes the broader implications of these findings for understanding the role of Internet exposure in shaping democratic attitudes and preferences.

2 Literature review

Regarding the relationship between the Internet and political outcomes, Lorenz-Spreen et al. (2023) conducted a recent meta-analysis reporting that most studies examine associations, with only a few (24) able to establish causal inferences. They emphasize the importance of distinguishing evidence based on whether it originates from established democracies or emerging democracies and authoritarian regimes, as the interpretation of effects differs: "*For example, a loss of trust in government suggests a precarious development for an established democracy; in authoritarian regimes, however, it may indicate a necessary step toward overcoming an oppressive regime and, eventually, progressing towards a more liberal and democratic system.*" Moreover, democracies tend to promote exposure to democratic ideals and practices, unlike autocracies, which often disseminate propaganda and unofficial information (Cho 2014). Our study seeks to establish a causal link between the Internet and understanding of democracy, using the latter as an indicator of civic literacy to explain varying attitudes toward political outcomes. We distinguish between democracies and nondemocracies.

Knowledge of current affairs, civic literacy, and political participation is critical for the proper functioning of democratic societies, as they fundamentally depend on well-informed voters who actively participate in elections. A pertinent question in the new media environment, particularly with the rise of the Internet and social media, is whether access to these platforms improves political knowledge. Research has found positive relationships between Internet use and political knowledge during election campaigns, although documented effects are often weak. For instance, Dimitrova et al. (2014) assess political knowledge using a set of eight questions focused on recent political information, including events covered in major national news media during the final weeks of an election campaign. These items address issue positions and policy proposals from party manifestos or press conferences (five items), domestic real-world events and developments (two items), and foreign policy events (one item).

Cho (2014) defines understanding democracy as the ability to differentiate between the

characteristics of democracy and autocracy. Using data from the World Values Survey, which examines the social and political values of more than 80,000 people in 44 countries and seven regions, the study highlights that understanding democracy entails giving the highest importance to elements such as popular elections and civil liberties, the core components of democracy, while scoring authoritarian traits such as military takeovers and religious law interpretation the lowest. A related concept, civic literacy, was extensively discussed by Milner (2002) in a seminal book. This is evaluated using secondary survey data, which is tailored to gauge levels of factual knowledge and cognitive literacy, and has been shown to correlate with the average voter turnout in local elections.

Other studies have shown that an increase in available information within the media environment can raise political knowledge (Jerit et al. 2006; Lau et al. 2008). However, greater choice in the media can sometimes reduce political knowledge among individuals who avoid political information (Boomgaarden 2008). However, there is evidence that digital media, particularly social networks, can improve political knowledge (Bode 2016; Tewksbury et al. 2001). This aligns with recent data (Newman et al. 2017), showing that audiences increasingly learn about politics through non-traditional news sources such as social networks, Google, and various applications, although the findings remain contested (Toff and Nielsen 2018).

A notable characteristic of the Internet is its ability to enable cognitive offloading, thereby mitigating cognitive load, liberating working memory, and enhancing decision-making processes. For example, Allcott et al. (2020), through a randomized experiment, show that Facebook deactivation reduces news knowledge and political attention, though it has no detectable effect on political participation, as measured by voter turnout in the US midterm elections.

3 Data

Our main data source is Afrobarometer, an independent, nonpartisan research network that conducts public opinion surveys on governance, democracy, economic conditions, and related issues in Africa. These surveys provide valuable insights into the perceptions, attitudes, and behaviors of African citizens across more than 30 countries, using nationally representative samples. Established in 1999, Afrobarometer aims to amplify African voices in policy debates and support data-driven decision-making by governments, NGOs, and researchers. The surveys are conducted regularly, enabling the tracking of changes in public opinion over time and offering valuable longitudinal data on African socio-political trends.

The Afrobarometer survey series specifically focused on democracy is known as the "Democracy and Governance" survey. This series includes questions on citizens' satisfaction with democracy, their support for democratic principles, and their perceptions of democratic processes and institutions in their countries. Conducted periodically, the survey provides a detailed view of how Africans perceive democracy, elections, political freedoms, and institutional transparency.

3.1 Main dependent variables

A notable iteration of this survey focused on democracy was conducted in 2014 during Round 6 of Afrobarometer. In addition to the usual questions on democratic participation, quality of elections, political tolerance, and governance transparency, this cycle included open and closed-ended questions on respondents' understanding of democracy, which we utilize in our analysis (Q29).[1] This mixed-method approach provides a comprehensive assessment of democratic perceptions in various African nations.

[1]The series begins with Q29a, where interviewers assess respondents' initial comprehension of the term "democracy." The term is presented in English, French, or Portuguese, depending on the survey's language setting. If the respondent does not understand the term in these languages, it is translated into the local language to ensure clarity and uniform understanding before proceeding with more detailed questions.

3.1.1 Closed-ended Questions

Close-ended questions (Q29e to Q29g) directly assess the understanding of democracy of the respondents by asking them to categorize their views into predefined codes.[2] These codes represent key democratic principles such as civil liberties, voting, and government accountability.

To construct the "*understanding democracy*" variable from these responses, we first categorize each response according to predefined codes. The following codes are indicative of an understanding of democracy: "*Civil liberties / personal freedoms*", "*Government by for the people / popular rule*", "*Voting / elections / multiparty competition*", "*Equality / justice*", "*Majority rule*", and "*Governance / effectiveness / accountability / rule of law*". All other codes are excluded, particularly those such as "*Peace / unity / power sharing*", "*Social / economic development*", "*National independence / people's self-determination*", "*Mutual respect*", and "*Working together*". Next, we calculate the percentage of valid responses that align with these democratic principles.[3] If more than 50% of a respondent's valid responses align with these principles, we assign a value of 1, indicating understanding; otherwise, a value of 0.

[2]The codes are the following: 0= Nothing/Democracy has no meaning, Positive 1= Positive Replies: Civil liberties / personal freedoms (eg freedom of speech, religion, movement, etc...), 2=Positive Replies: Government by, for, of the people / popular rule, 3=Positive Replies: Voting / elections / multiparty competition, 4=Positive Replies: Peace / unity / power sharing, 5=Positive Replies Social / economic development, 6=Positive Replies Equality / justice, 7=Positive Replies Majority rule, 8=Positive Replies Governance / effectiveness / accountability / rule of law, 9=Positive Replies National independence / people's self-determination, 10=Positive Replies Mutual respect, 11=Positive Replies Working together, 12=Positive Replies Other positive meanings, Negative 13=Negative Replies: Conflict / confusion, 14=Negative Replies: Corruption / abuse of power, 15=Negative Replies: Social / economic hardship, 16=Negative Replies: Other negative meanings, Neutral 17=Null / neutral replies: Civilian politics / government, 18=Null / neutral replies: Change of government / leadership / laws, 19=Null / neutral replies: Other null/neutral meanings, 9999=Don't know / Did not understand the question, -1=Missing

[3]Responses categorized as "*No further reply*" are excluded to ensure that only meaningful and engaged responses are analyzed.

3.1.2 open Questions

The open questions (Q29b to Q29d) capture the spontaneous verbatim responses of the respondents about what democracy means to them.[4]

To construct the "*understanding democracy*" variable from these open responses, each non-English response is first translated into English. Then, the following prompt is used with ChatGPT to classify each response:

```
I'm trying to label a text from a survey.
The respondent should answer, "What, if anything, does 'democracy' mean to you?"
Here is the response: '{text}' I want you to tell if the respondent's answer
corresponds to the correct definition of democracy.
Select "YES" if yes, otherwise, "NO".
Format the answer as follows, and no explanation is needed:
{
"understanding": YES/NO
}
```

ChatGPT generates a response of "YES," "NO," for each open answer. We do not explicitly define "democracy" in the prompt because ChatGPT relies on its extensive training data to recognize and evaluate the concept based on widely accepted definitions and usage. If more than half of the valid responses are marked as "YES" by ChatGPT, it indicates a proper understanding of democracy.[5]

Using open responses provides a richer and more nuanced understanding of democracy.[6]

[4]Here are some examples of responses: "Good behavior.", "L'adoption de la stratégie établie.", "Right to decide on what you want.", "La liberté de vivre.", "C'est le pouvoir à la base au niveau des citoyens.", "To be a pluralistic system of power.", "Politics that are not right.", "Free to participate in elections.", "To have a right to own land.", "Luttons ensemble."

[5]ChatGPT's understanding of democracy is derived from its training data and aligns with common definitions. For example, democracy is defined as "*a system of government in which power is vested in the people, typically through elected representatives, and characterized by principles such as political equality, free and fair elections, and the protection of fundamental rights.*"

[6]Approximately 15% of respondents provided repetitive answers in the closed-ended questions, suggesting potential confusion or a lack of nuanced understanding.

These responses allow individuals to express their views freely, uncovering diverse and contextually relevant insights that closed-ended questions may overlook.

Table 1 compares responses to closed-ended questions (Q29e to Q29g) and open questions (Q29b to Q29d) to construct the "*understanding democracy*" variable. The columns "*Q29e*", "*Q29f*", and "*Q29g*" represent predefined responses to closed-ended questions, while "*Translation Q29b*", "*Translation Q29c*", and "*Translation Q29d*" display free-text responses to open questions, translated into English where necessary. The columns "*Understanding 1*", "*Understanding 2*", and "*Understanding 3*" indicate whether each response aligns with democratic principles based on evaluation criteria. "*Closed Understanding*" and "*Open Understanding*" are binary indicators that summarize whether the respondents demonstrated an understanding of democracy through closed-ended and open responses, respectively. Each row corresponds to a distinct scenario, capturing variations in understanding: respondents who failed to demonstrate understanding in both question types, those who demonstrated understanding in both, and those who showed understanding in only one of the formats. This comparison highlights differences in how people articulate and comprehend democratic principles in structured versus free-response formats.

In the survey data, there was a significant disparity in understanding democracy between open and closed questions. For the open question, 8,667 respondents were classified as not understanding democracy, while 18,427 were identified as understanding it. For the closed-ended question, 5,018 respondents were categorized as not understanding democracy, compared to 22,076 who did.

3.1.3 Internet and traditional media use

The African media landscape is undergoing a rapid transformation, marked by increasing reliance on the Internet for verified and unverified news. This trend highlights the growing significance of the Internet as a source of information, evidenced by the prominent role of social networks in shaping political events across the continent. To understand this phe-

Table 1: Comparison of Understanding Democracy: open vs Closed-Ended Responses

Scenario	Q29e	Q29f	Q29g	Translation Q29b	Translation Q29c	Translation Q29d	Understanding 1	Understanding 2	Understanding 3	Closed Understanding	Open Understanding
Did not understand open and closed	Other negative meanings	Civil liberties / personal freedoms	Corruption / abuse of power	Conquer young.	Women rights.	Thieves policy.	NO	NO	NO	0	0
Understood both open and closed	Civil liberties / personal freedoms	Government by for of the people / popular rule	Equality / justice	Freedom of expression.	People's choice.	Legal equality.	YES	YES	YES	1	1
Did not understand open but understood closed	Governance / effectiveness / accountability / rule of law	Voting / elections / multiparty competition	Other positive meanings	Finest policy.	Incision parties.	Reciprocal governance.	NO	NO	NO	1	0
Did not understand closed but understood open	Civil liberties / personal freedoms	Other positive meanings	Other positive meanings	Freedom.	Doing things without fear that you're being watched.	Walking without fear.	YES	YES	YES	0	1

This table compares responses to closed-ended questions (Q29e to Q29g) and open questions (Q29b to Q29d) to construct the "*understanding democracy*" variable. The columns "*Q29e*", "*Q29f*", and "*Q29g*" represent the responses to closed-ended questions, while "*Translation Q29b*", "*Translation Q29c*", and "*Translation Q29d*" capture open responses.
The columns "*Understanding 1*", "*Understanding 2*", and "*Understanding 3*" indicate whether each response aligns with democratic principles as determined by the evaluation criteria. "*Closed Understanding*" and "*Open Understanding*" are binary indicators summarizing the overall understanding from closed-ended and open responses, respectively.
Each row represents a scenario: "**Did not understand open and closed**" describes respondents who failed to demonstrate understanding in both formats. "**Understood both open and closed**" includes respondents who showed understanding in both formats. "**Did not understand open but understood closed**" represents respondents who understood the closed-ended questions but not the open ones. "**Did not understand closed but understood open**" includes respondents who showed understanding in open responses but not in closed-ended ones.

nomenon, the Afrobarometer survey includes questions such as, "*How often do you get news from the following sources: Internet?*" (Q12d) and "*How often do you get news from the following sources: Social media such as Facebook or Twitter?*" (Q12e), with responses ranging from "*every day*" to "*never.*"

We define a dummy variable to identify regular Internet users for news. This variable equals 1 if a respondent reports using the Internet or social media "*every day*" or "*a few times a week*" to get news, and 0 otherwise.[7]

The data reveal that 22. 85% of the people regularly use the Internet for news, while 77.5% do not. Similarly, 22. 42% use social networks frequently for news, compared to 77.24% who do not. There is considerable overlap between the consumption of news on the Internet and social media, reflecting the interconnected nature of these platforms in the dissemination of news.

The use of the Internet news varies significantly in African countries. Togo (11.43%) and Guinea (11.14%) have the highest proportions of regular Internet users for news, while Madagascar (3. 10%) and Niger (2. 90%) have the lowest. Furthermore, disparities emerge between democratic and nondemocratic countries, with 24.60% of individuals in nondemocratic countries regularly using the Internet for news compared to 21.45% in democratic countries.

These findings underscore the growing importance of the Internet as a news source in Africa, even as access and usage remain uneven between regions and political contexts.

3.1.4 Lighting

Given that Internet use may be influenced by unobserved factors correlated with our outcome of interest, and due to the potential for reverse causality, we employ lightning activity as an instrumental variable. Lightning activity introduces random disruptions to Internet connectivity by causing power outages and damaging infrastructure, thereby providing an ex-

[7]Throughout the text, "*Internet use*" and "*Internet use to get news*" are used interchangeably.

ogenous source of variation. This approach allows us to isolate the causal impact of Internet usage by using the unpredictability of lightning strikes as an instrument.

LIS 0.1-degree very high-resolution gridded lightning climatology (VHRcC) [8] serves as a valuable resource for understanding lightning activity. This dataset includes detailed climatologies of lightning flash rates observed by the Lightning Imaging Sensor (LIS), offering data on annual mean flash rates, diurnal cycles with 24-hour resolution, and annual cycles with daily, monthly, or seasonal resolution. The data span from 1998 to 2013, with a spatial resolution of 0.1 degrees. Each lightning flash is precisely located based on its longitude and latitude coordinates.

Our study uses the stock of lightning in Africa from the VHRFC dataset (Very High-Resolution Gridded Lightning Full Climatology). To integrate the lightning data with our primary Afrobarometer dataset, we proceed in two steps. First, we extracted the longitude and latitude of each district in our dataset using the Google Maps API. [9]

The table below displays examples of longitude and latitude coordinates obtained for selected districts.

Second, we computed the distance between the coordinates of each district and the nearest lightning data point. We used the Euclidean distance between the coordinates of each district and the points in the lightning data grid to find the nearest point.[10]

Table 3 below presents examples of geo-mapped districts with their corresponding latitude and longitude coordinates, the nearest lightning data point (*vhrfc lis frd*), and the calculated Euclidean distance to this lightning data point. For instance, the district Kecem Of Fakouss in Egypt experienced an average of 2.29 lightning events per year, with a distance of 0.035 meters between the district's coordinates and the nearest lightning data point.

[8]The dataset is available here: `https://ghrc.nsstc.nasa.gov/pub/lis/climatology/LIS/`

[9]More information about the API use can be found here: `https://developers.google.com/maps/documentation/geocoding/overview`

[10]AWS Athena has a built-in geospatial function. See `https://docs.aws.amazon.com/athena/latest/ug/geospatial-functions-list-v2.html` for more information.

Table 2: Examples of Retrieved Coordinates Using Google Maps API

Location Level	Country	Region	Latitude	Longitude
Kecem Of Fakouss	Egypt	Charqia	30.73	31.72
Al Dalnjjet	Egypt	Beheira	30.85	30.34
Markez Of Malaoui	Egypt	El Menya	28.28	30.53
West Gonja	Ghana	Northern	9.27	-1.91
Kpandai	Ghana	Northern	8.47	-0.01
Koundara	Guinea	Boké	12.49	-13.31
Borj Bou Arreridj	Algeria	East Highlands	36.07	4.76
Tipaza	Algeria	North Middle Region	36.59	2.44
Bugendana	Burundi	Gitega	-3.26	29.95
Gashoho	Burundi	Muyinga	-2.80	30.14

This table displays examples of geocoded coordinates retrieved using the Google Maps API. Each row represents a district-level location, including the corresponding country, region, latitude, and longitude.

Table 3: Geospatial Mapping of Districts with Lightning Data

	Latitude	Longitude	VHRFC LIS FRD	Distance (m)	Location	Country	Region
1	30.75	31.75	2.29	0.035	Kecem Of Fakouss	Egypt	Charqia
2	30.85	30.35	0.49	0.006	Al Dalnjjet	Egypt	Beheira
3	28.25	30.55	0.0	0.041	Markez Of Malaoui	Egypt	El Menya
4	9.25	-1.95	13.40	0.0464	West Gonja	Ghana	Northern
5	8.45	-0.05	20.49	0.043	Kpandai	Ghana	Northern
6	12.45	-13.35	12.97	0.058	Koundara	Guinea	Boké
7	36.05	4.75	4.37	0.027	Borj Bou Arreridj	Algeria	East Highlands
8	36.55	2.45	2.57	0.041	Tipaza	Algeria	North Middle Region
9	-3.25	29.95	10.24	0.012	Bugendana	Burundi	Gitega
10	-2.85	30.15	11.71	0.048	Gashoho	Burundi	Muyinga

This table integrates Afrobarometer district data with the VHRFC lightning dataset. For example, the district Kecem Of Fakouss in Egypt recorded an average of 2.29 lightning events per year, with a computed distance of 0.035 meters between the district and the nearest lightning data point.

4 Empirical strategy

4.1 Main specification

Our empirical strategy aims to estimate the effect of Internet use for accessing news on various political outcomes, with a particular focus on the understanding of the individual of democracy. The primary model specification is represented by the following equation:

$$\mathrm{Y}_{id} = \alpha + \beta \text{ Internet use }_{id} + \gamma \mathbf{X}_{id} + \delta_d + \epsilon_{id} \tag{1}$$

Here, Yid refers to Democracy understandingid, representing the understanding of democracy for individual i in district d. This variable is a binary indicator, equal to 1 if the respondent demonstrates a correct understanding of democracy, as assessed from free-text responses evaluated by ChatGPT, and 0 otherwise.

The main independent variable of interest, Internet use$_{id}$, captures the frequency of using the Internet to obtain information. It is coded on a scale from 0 to 4, where 0 indicates never using the Internet, 1 indicates usage less than once a month, 2 for a few times a month, 3 for a few times a week, and 4 for daily usage.

$\mathbf{X}_{id}$ is a vector of control variables that includes demographic and socioeconomic factors such as age, age squared, gender, interest in politics, level of education, employment status, urban or rural residence, perception of the country's economic condition, perception of personal living conditions, regular TV use, regular radio use, regular newspaper use, and the general level of democracy in the respondent's country as rated by the Polity2 index.

δ_d denotes district fixed effects, accounting for unobserved district-level characteristics that might influence both Internet use and understanding of democracy. Finally, ϵ_{id} is the error term, clustered at the district level to address potential residual correlations within districts.

A key concern in our analysis is the potential endogeneity bias stemming from omitted variable bias and the bidirectional relationship between Internet use for news and democracy

understanding. While Internet use can influence individuals' understanding of democracy, reverse causality is also possible. For instance, individuals with a strong understanding of or dissatisfaction with their country's democratic processes might be more inclined to use the Internet to deepen their knowledge or share their perspectives.

To address this endogeneity issue, we adopt an instrumental variable (IV) approach. Our instrument takes advantage of the methodology described in Cariolle et al. (2024), with minor adjustments to the shock variable and the level of disaggregation employed.

4.2 Identification strategy

To address the endogeneity concerns associated with the OLS regression, we employ an instrumental variable (IV) approach. Our instrument leverages the randomness of lightning strikes as an exogenous source of variation in Internet use. Specifically, we use the stock of lightning as an aggregate shock and interact it with district-level 3G network coverage to capture the differential exposure to Internet disruptions caused by lightning.

Lightning strikes introduce exogenous variations in Internet connectivity because they can cause power outages and damage telecommunications infrastructure, events that are largely unrelated to individual or district-level characteristics. The spatial randomness of lightning strikes, therefore, makes them an ideal instrument for Internet use. However, the actual impact of these lightning strikes on Internet usage depends on the presence of 3G network coverage, which varies between districts. This interaction is important for two reasons:

First, the presence of 3G network coverage determines the extent to which lightning strikes disrupt Internet access. In districts with high 3G coverage, lightning strikes are more likely to cause significant disruptions in Internet connectivity due to the higher dependency on this infrastructure. Conversely, in districts with low or no 3G coverage, the impact of lightning strikes on Internet use is minimal, as fewer people rely on this technology. Second, interacting lightning strikes with 3G coverage helps refine the exogenous variation in Internet use. By considering both the random occurrence of lightning and the varying levels of 3G

coverage, we can better isolate the causal effect of Internet disruptions.

Our method is similar in design to the approach used in Cariolle et al. (2024), which uses the deployment of submarine cables (SMC) as an instrument. However, lightning strikes are a more suitable instrument for our purposes because our study is limited to one year of data (2014),[11] whereas the SMC instrument benefits from a staggered deployment over multiple years (2011-2018). In addition, lightning strikes are more frequent and random than SMC deployment, providing greater variation in Internet disruptions and a cleaner source of exogenous variation. Additionally, in their paper, the SMC data are available at the country level, while our lightning data are at the district level, offering finer granularity for the instrument.

The main instrument is therefore the interaction between the lightning stock (from 1998 to 2013) and the fixed share of the district's 3G coverage at the time of the first Afrobarometer survey wave:

$$\text{IV}_d = \text{ Lightning Stock }_d \times \text{ Fixed 3G share }_d \tag{2}$$

The first stage of our IV estimation framework is given by the following equation:

$$\text{Internet use }_{id} = \alpha_1 + \beta_1 \text{IV}_d + \gamma \mathbf{X}_{id} + \delta_d + \epsilon_{id} \tag{3}$$

where IV_d is our main instrument, $\mathbf{X}_{id}$ represents individual-level controls, and δ_d denotes district-fixed effects, which control for unobserved district-level characteristics that could influence both Internet use and democracy understanding.

[11]The text-free question about the understanding of democracy is limited to the sixth round in 2014.

5 The effect of Internet use on understanding democracy

5.1 OLS results

The OLS results of equation 1 are presented in Table 4. These results show the effect of the use of the Internet on understanding democracy, derived from open responses. We use two definitions of *Internet use*: the first three columns (1-3) use the frequency of Internet use to obtain news, while the last three columns (4-6) focus on the frequency of social media use to get news. The findings indicate a positive and significant relationship in all specifications. For instance, column (1) demonstrates that increased frequency of Internet use for news is associated with a higher likelihood of understanding democracy, with a coefficient of 0.008. This positive association persists when the sample is split between democratic and nondemocratic countries.

The results based on close responses (available in the appendix) are slightly lower but remain positive and significant.

5.2 IV results

Table 5 presents the results of the instrumental variable (IV) regression, examining the impact of internet use on the understanding of democracy of individuals.[12] The analysis leverages the exogenous variation introduced by the interaction between the stock of lightning and the fixed 3G network as an instrument, addressing potential endogeneity concerns in the relationship between Internet use and democratic understanding.

The first stage results show that the interaction between the lightning stock and the fixed 3G share significantly predicts the use of the Internet. The coefficients for this interaction term are positive and highly significant across all specifications, with an F-statistic exceeding

[12]Results for the closed-ended response are provided in Table 10 in the Appendix.

Table 4: Internet impact on understanding democracy

	Dependent variable Understanding democracy					
	News			Social media		
	(1)	(2)	(3)	(4)	(5)	(6)
	Full	Democratic countries	nondemocratic countries	Full	Democratic countries	nondemocratic countries
Internet use	0.008***	0.006*	0.011***	0.010***	0.008***	0.012***
	(0.002)	(0.003)	(0.004)	(0.002)	(0.003)	(0.003)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Country control	Yes	Yes	Yes	Yes	Yes	Yes
district FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	27,094	15,047	12,047	27,094	15,047	12,047
R^2	0.154	0.158	0.150	0.154	0.158	0.150

This table reports the OLS results of the effect of Internet use to get news on individuals' understanding of democracy of democracy. The 'understanding democracy' variable is assessed from participants' free-text responses to the question, 'What, if anything, does "democracy" mean to you?' Responses, up to three per participant, were evaluated by ChatGPT to ascertain comprehension of democracy. A response is classified as '1' (indicating understanding) if over 50% of valid answers (ignoring 'no further reply') are confirmed as 'YES' by ChatGPT, signifying a correct understanding of democracy. Internet use is a composite variable constructed from two individual variables: frequency of getting news using the Internet or frequency of getting news using social media. Each variable is coded as follows: 0 for never using the Internet, 1 for usage less than once a month, 2 for usage a few times a month, 3 for usage a few times a week, and 4 for daily usage. Individual controls include age, age squared, gender, urban dummy, education, employment status, perception of own living conditions, perception of the country's economic condition, interest in politics, regular TV use dummy, regular radio use dummy, regular newspaper use dummy. Standard errors clustered at the district level are reported in parentheses; * Significance at 10%, ** Significance at 5%, *** Significance at 1%.

the conservative threshold of 10, indicating a strong instrument. For example, in column (1), the coefficient for the interaction term is 0.015, with a corresponding F-statistic of 12.89, confirming the instrument's validity.

The results of the second stage reveal a significant negative effect of the use of the Internet on the understanding of democracy. Specifically, a one-unit increase in Internet use frequency is associated with a 0.100-unit decrease in the likelihood of understanding democracy in the full sample (column 1). This negative effect is even more pronounced in democratic countries, with coefficients of -0.137 in column (2) and -0.187 in column (5) for the use of news and social networks, respectively. These findings suggest that increased Internet use, driven by exogenous variation in lightning strikes and 3G coverage, is linked to a reduced probability of understanding democracy.

The difference in the magnitude of the impact between democratic and nondemocratic countries likely reflects differing baseline levels of democratic knowledge and the distinct roles that Internet use plays in each context. In democratic countries, where information about democracy is more abundant, increased Internet use may expose individuals to more conflicting or superficial information, diluting their genuine understanding of democratic principles. Conversely, in nondemocratic countries, where access to balanced information is already constrained, the marginal impact of Internet use on democratic misunderstanding is less pronounced.

Comparing these IV results to the OLS estimates reveals notable changes in both the magnitude and direction of the coefficients. The OLS results suggested a positive association between Internet use and democratic understanding, whereas the IV estimates indicate a significant negative effect. This discrepancy suggests that the OLS estimates may suffer from upward bias, potentially due to omitted variable bias or reverse causality.

The negative coefficients from the IV analysis highlight the complexities of Internet influence, showing that while Internet access is often viewed as a tool for enhancing information dissemination, it can also facilitate the spread of misinformation or lead to a superficial

Table 5: Instrumental Variables Regression - Combined Stages

democratic understanding

	Dependent variable: Understanding democracy					
	News			Social media		
	(1)	(2)	(3)	(4)	(5)	(6)
	Full	Democratic countries	nondemocratic countries	Full	Democratic countries	nondemocratic countries
First stage regression (Instrument)						
Stock of lightning × fixed 3G share	0.015***	0.023***	0.014***	0.013***	0.016***	0.012**
	(0.004)	(0.002)	(0.004)	(0.004)	(0.002)	(0.005)
Second stage regression (Fitted)						
Internet use	−0.100**	−0.137***	−0.090	−0.122**	−0.187***	−0.105*
	(0.049)	(0.016)	(0.059)	(0.056)	(0.046)	(0.059)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Country control	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	27094	15047	12047	27003	15014	11989
KP Wald F-stat	12.89	81.87	10.07	8.61	49.97	5.50
KP LM P-val	0.00	0.00	0.01	0.01	0.00	0.03

This table reports the first and second stages of IV results of the effect of Internet use to get news on individuals' understanding of democracy. The 'understanding democracy' variable is assessed from participants' free-text responses to the question, 'What, if anything, does "democracy" mean to you?' Responses, up to three per participant, were evaluated by ChatGPT to ascertain comprehension of democracy. A response is classified as '1' (indicating understanding) if over 50% of valid answers (ignoring 'no further reply') are confirmed as 'YES' by ChatGPT, signifying a correct understanding of democracy. Internet use is a composite variable constructed from two individual variables: frequency of getting news using the Internet or frequency of getting news using social media. Each variable is coded as follows: 0 for never using the Internet, 1 for usage less than once a month, 2 for usage a few times a month, 3 for usage a few times a week, and 4 for daily usage. Stock of lightning × fixed 3G share is the interaction between the stock of lighnting from 1998 to 2013 and the 3G network coverage calculated both at the individual's district of residence of the respondent in the Afrobarometer's survey. Individual controls include age, age squared, gender, urban dummy, education, employment status, perception of own living conditions, perception of the country's economic condition, interest in politics, regular TV use dummy, regular radio use dummy, regular newspaper use dummy. Standard errors clustered at the district level are reported in parentheses; * Significance at 10%, ** Significance at 5%, *** Significance at 1%.

understanding of democratic principles.

6 The effect of Internet use on other political outcomes

In the previous section, we demonstrated that increased Internet use negatively impacts individuals' understanding of democracy. To delve deeper into the implications of this relationship, we analyze how Internet use affects perceptions of freedom of expression, evaluations of electoral fairness, and perceptions of corruption among public officials.

6.1 Perceptions of freedom to express opinions

To measure perceptions of freedom of expression, we use responses to the question "*In this country, how free are you to say what you think?*". The responses are categorized into two groups: those who felt *not at all* or *not very* free, and those who felt *somewhat* or *completely* free.[13]

Table 6 presents estimates of the effect of Internet use on the perception of freedom to express opinions, using two measures of Internet use: the frequency of receiving news from the Internet (columns 1-3) and the frequency of getting news from social networks (columns 4-6).

The impact of the Internet on perceptions of freedom of expression is predominantly negative, particularly in democratic countries. In contrast, in nondemocratic nations within our sample, this effect appears to be insignificant. This outcome lends itself to multiple interpretations. One possible explanation is that Internet access enables individuals in democracies to better recognize the inherent limitations on freedom of expression within these societies. However, this explanation does not fully account for the contrasting gap observed between democratic and nondemocratic regimes. If this interpretation were sufficient, we would expect perceptions of freedom of expression to be even more negative in nondemocratic

[13]Question Number: Q15A

Table 6: IV estimates of the effect of Internet use on the evaluations of electoral fairness.

	Dependent variable: In this country, how free are you to say what you think					
	News			Social media		
	(1)	(2)	(3)	(4)	(5)	(6)
	Full	Democratic countries	nondemocratic countries	Full	Democratic countries	nondemocratic countries
First stage regression (Instrument)						
Stock of lightning × fixed 3G share	0.010***	0.020***	0.007***	0.008**	0.015***	0.006*
	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Second stage regression (Fitted)						
Internet use	−0.328***	−0.269***	−0.344*	−0.417**	−0.356***	−0.418
	(0.098)	(0.040)	(0.168)	(0.175)	(0.108)	(0.287)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Country control	Yes	Yes	Yes	Yes	Yes	Yes
Observations	26,879	14,953	11,926	26,790	14,920	11,870
KP Wald F-stat	8.65	137.05	12.02	5.46	21.74	3.84
KP LM P-val	0.01	0.00	0.00	0.03	0.00	0.07

This table reports the first and second stages of IV results of the effect of Internet use to get news on individuals' evaluations of freedom. The dependent variable, "Freedom to say what you think," is derived from responses to the question, "In this country, how free are you to say what you think?" Responses range from 1 (Not at all free) to 4 (Completely free), with a dummy variable coded as 1 for "Somewhat free" or "Completely free. Internet use is a composite variable constructed from two individual variables: frequency of getting news using the Internet or frequency of getting news using social media. Each variable is coded as follows: 0 for never using the Internet, 1 for usage less than once a month, 2 for usage a few times a month, 3 for usage a few times a week, and 4 for daily usage. Stock of lightning × fixed 3G share is the interaction between the stock of lighnting from 1998 to 2013 and the 3G network coverage calculated both at the individual's district of residence of the respondent in the Afrobarometer's survey. Individual controls include age, age squared, gender, urban dummy, education, employment status, perception of own living conditions, perception of the country's economic condition, interest in politics, regular TV use dummy, regular radio use dummy, regular newspaper use dummy. Standard errors clustered at the district level are reported in parentheses; * Significance at 10%, ** Significance at 5%, *** Significance at 1%.

countries, where such limitations are generally more explicit and pervasive.

An alternative explanation relates to prior findings on the impact of the Internet and social media on individuals' understanding of democracy, of which freedom of expression is a fundamental component. These findings suggest that Internet use contributes to a negatively skewed understanding of democratic principles, an effect that appears to be more pronounced within democratic societies. This interpretation may help explain the observed contradiction, where the Internet deepens skepticism regarding democratic freedoms specifically within democracies, while not significantly affecting perceptions in nondemocratic states. Rather than fostering a nuanced or accurate understanding of the limitations on freedom of expression, the Internet may inadvertently amplify critical perceptions of democracy's ability to safeguard this essential right.

6.2 Assessments of electoral fairness

In this section, we examine the question of electoral fairness to understand how democratic understanding and Internet use influence perceptions of democracy. We analyze citizens' responses to the question about the freeness and fairness of the last national election: "*On the whole, how would you rate the freeness and fairness of the last national election?*". We construct a dummy variable equal to 1 for respondents who felt the election was free and fair, including those who reported minor or major problems, and 0 for those who felt the election was not free and fair.[14]

Table 7 presents the effect of Internet use on electoral fairness perceptions, using two measures of Internet use: the frequency of getting news on the Internet (columns 1-3) and the frequency of getting news on social networks (columns 4-6).

The impact of the Internet on perceptions of the "freeness and fairness" of elections is notably positive, with consistent results across both democratic and nondemocratic regimes. In democratic nations, the use of the Internet appears to improve public understanding

[14]Question Number: Q22. Freeness and fairness of the last national election.

Table 7: IV estimates of the effect of Internet use on the evaluations of electoral fairness.

	Dependent variable: how would you rate the freeness and fairness of the last national election					
	News			Social media		
	(1)	(2)	(3)	(4)	(5)	(6)
	Full	Democratic countries	nondemocratic countries	Full	Democratic countries	nondemocratic countries
First stage regression (Instrument)						
Stock of lightning × fixed 3G share	0.009**	0.019***	0.007**	0.007**	0.011**	0.006
	(0.004)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)
Second stage regression (Fitted)						
Internet use	−0.155	0.088***	−0.280**	−0.216	0.154***	−0.338
	(0.124)	(0.029)	(0.128)	(0.170)	(0.038)	(0.208)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Country control	Yes	Yes	Yes	Yes	Yes	Yes
Observations	24,993	14,106	10,887	24,913	14,076	10,837
KP Wald F-stat	6.92	92.25	6.43	4.78	7.76	2.78
KP LM P-val	0.01	0.00	0.02	0.04	0.01	0.12

This table reports the first and second stages of IV results of the effect of Internet use to get news on individuals' evaluations of electoral fairness. The dependent variable, "Freeness and fairness of the last national election," is derived from responses to the question, "On the whole, how would you rate the freeness and fairness of the last national election?" Responses range from 1 (Not free and fair) to 4 (Completely free and fair), with a dummy variable coded as 1 for "Free and fair, but with minor problems," "Free and fair, with major problems," or "Completely free and fair." Internet use is a composite variable constructed from two individual variables: frequency of getting news using the Internet or frequency of getting news using social media. Each variable is coded as follows: 0 for never using the Internet, 1 for usage less than once a month, 2 for usage a few times a month, 3 for usage a few times a week, and 4 for daily usage. Stock of lightning × fixed 3G share is the interaction between the stock of lighnting from 1998 to 2013 and the 3G network coverage calculated both at the individual's district of residence of the respondent in the Afrobarometer's survey. Individual controls include age, age squared, gender, urban dummy, education, employment status, perception of own living conditions, perception of the country's economic condition, interest in politics, regular TV use dummy, regular radio use dummy, regular newspaper use dummy. Standard errors clustered at the district level are reported in parentheses; * Significance at 10%, ** Significance at 5%, *** Significance at 1%.

that the electoral system aligns with democratic values. In contrast, in nondemocratic regimes, it highlights a recognition that these standards are not being met. This alignment between perceptions and regime type suggests that, regarding elections, Internet exposure helps individuals distinguish between democratic and nondemocratic systems.

This result is particularly striking, given that Internet use has been shown to introduce a generally negative bias in the understanding of democracy itself. Although the Internet may distort perceptions of certain democratic principles, such as freedom of expression, it simultaneously reinforces a more accurate assessment of electoral integrity in line with the political system. This divergence implies that the influence of the Internet on public understanding may vary by issue: fostering skepticism about democratic freedoms while promoting a clearer perception of electoral processes in contexts where these values are upheld.

6.3 Perceptions of corruption among officials

We analyze responses to questions about perceived corruption involving various political figures, including the President, Members of Parliament, and Judges or Magistrates. Specifically, we use the question asking respondents: "How many of the following people do you think are involved in corruption, or haven't you heard enough about them to say: The President and Officials in his Office?" Similar questions were posed regarding Members of Parliament and Judges or Magistrates. Responses were categorized into a binary variable: 1 for "Some of them," "Most of them," or "All of them," and 0 for "None" or "Don't know/ Haven't heard enough."

In Table 8, we present the effect of Internet use on perceptions of corruption, measured by the frequency of receiving news through the Internet. The same table provides analogous results using the frequency of getting news through social networks as a measure of Internet use.

The positive impact of Internet use on perceptions of corruption among political actors

Table 8: IV estimates of the effect of Internet use on the perceptions of corruption among officials.

	Dependent variable: How many of the following people do you think are involved in corruption in the presidency office					
	News			Social media		
	(1)	(2)	(3)	(4)	(5)	(6)
	Full	Democratic countries	nondemocratic countries	Full	Democratic countries	nondemocratic countries
First stage regression (Instrument)						
Stock of lightning × fixed 3G share	0.010***	0.021***	0.007***	0.008**	0.016***	0.006*
	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Second stage regression (Fitted)						
Internet use	0.002	0.063***	−0.063	0.004	0.084**	−0.072
	(0.096)	(0.017)	(0.138)	(0.120)	(0.030)	(0.183)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Country control	Yes	Yes	Yes	Yes	Yes	Yes
Observations	26,270	15,039	11,231	26,186	15,006	11,180
KP Wald F-stat	8.34	140.30	10.53	5.36	22.87	3.67
KP LM P-val	0.01	0.00	0.01	0.03	0.00	0.08

This table reports the first and second stages of IV results of the effect of Internet use to get news on individuals' perceptions of corruption in the presidency office. The dependent variable, "Corruption in the office of the Presidency," is derived from responses to the question, "How many of the following people do you think are involved in corruption, or haven't you heard enough about them to say: The President and Officials in his Office?" Responses range from 0 (None) to 3 (All of them), with a dummy variable coded as 1 for "Some of them," "Most of them," or "All of them." Internet use is a composite variable constructed from two individual variables: frequency of getting news using the Internet or frequency of getting news using social media. Each variable is coded as follows: 0 for never using the Internet, 1 for usage less than once a month, 2 for usage a few times a month, 3 for usage a few times a week, and 4 for daily usage. Stock of lightning × fixed 3G share is the interaction between the stock of lighnting from 1998 to 2013 and the 3G network coverage calculated both at the individual's district of residence of the respondent in the Afrobarometer's survey. Individual controls include age, age squared, gender, urban dummy, education, employment status, perception of own living conditions, perception of the country's economic condition, interest in politics, regular TV use dummy, regular radio use dummy, regular newspaper use dummy. Standard errors clustered at the district level are reported in parentheses; * Significance at 10%, ** Significance at 5%, *** Significance at 1%.

and institutions, particularly within democracies, adds further complexity to understanding how Internet exposure shapes views of democratic and nondemocratic systems. Interestingly, while Internet use leads individuals in democracies to view their political actors and institutions as more corrupt, this effect is more pronounced than in nondemocratic regimes. Given the assumption that nondemocratic regimes generally experience higher levels of corruption, this result appears counterintuitive, similar to the findings related to freedom of expression. Once again, this inconsistency suggests a negative bias introduced by the Internet in understanding democratic systems.

This finding on corruption is particularly notable because, unlike freedom of expression or electoral integrity, corruption is not a defining element of democracy. Although it is an important factor in public evaluations of political systems, it operates as an external issue rather than an intrinsic democratic principle. Thus, the increased perception of corruption in democratic environments, which typically feature robust transparency and accountability systems, might suggest a skewed interpretation by individuals regarding political integrity data. The Internet seems to enhance the visibility or awareness of issues that, although important, do not fundamentally undermine the democratic structure.

In conclusion, the influence of the Internet on the perceptions of democracy is multifaceted and often contradictory. On the one hand, Internet access improves public understanding of electoral processes, aligning perceptions of electoral fairness with actual political conditions across regime types. On the other hand, the Internet fosters a generally negative bias in the understanding of democratic principles, as seen in increased criticism of freedom of expression and heightened perceptions of corruption in democracies. These findings suggest that, while the Internet helps differentiate democratic and nondemocratic regimes on certain issues, it also introduces distortions that may undermine the perceived legitimacy of democratic institutions.

Thus, the Internet does not simply enhance public understanding of democracy in a straightforward manner. Instead, it shapes a nuanced, sometimes paradoxical perspective

that amplifies criticisms of the limitations and imperfections of democracy. This dual impact highlights the need for critical evaluation of online information sources and content, emphasizing the importance of digital literacy to help individuals navigate and interpret the complexities of democracy in the age of widespread Internet influence.

6.4 Further discussion

Speculatively considering the above findings, we hypothesize that the complex impact of the Internet on democratic understanding could have significant implications for individuals' preferences for democracy. This section investigates these implications. Although the primary approach is largely descriptive, focusing on associations and correlations rather than causation, the findings suggest that better comprehension of democratic principles such as freedom of speech, fair elections, and opposition to corruption could foster a greater affinity for democracy. This connection between understanding and preference aligns with the notion that people are more likely to support a political system when they perceive its principles and practices as both comprehensible and valuable.

To measure citizens' preference for democracy, we adopt the methodology outlined in Cariolle et al. (2024). Specifically, we construct four variables. The first variable, **preference for democracy**, is a dummy variable coded as 1 if respondents state that "*democracy is preferable to any other form of government*" and 0 otherwise. Respondents choose from the options: (A) "*Democracy is preferable to any other form of government*," (B) "*In certain situations, a nondemocratic government can be preferable*," and (C) "*To people like me, it doesn't matter what form of government we have*."

The second variable, **strict preference for democracy**, is also a dummy variable that takes the value of 1 if respondents not only prefer democracy (as indicated by choosing option A in the previous question) but also reject all three authoritarian alternatives: one-party rule, military government, and presidential dictatorship. The rejection of these alternatives is confirmed if respondents "*disapprove*" or "*strongly disapprove*" of each.

The third variable, **extent of democracy**, measures respondents' perceptions of how democratic their country is. It is coded as 1 if respondents perceive their country as either "*a full democracy*" or "*a democracy with minor problems*" and 0 otherwise.

The fourth variable, **satisfaction with democracy**, measures respondents' satisfaction with the functioning of democracy in their country. It is coded as 1 if respondents are "*very satisfied*" or "*fairly satisfied*" with how democracy works in their country and 0 otherwise.

The effect of Internet use and understanding of democracy on the preference of individuals for democracy is presented in Table 9. We report results for four different dependent variables: preference for democracy, strict preference for democracy, perceived extent of democracy, and satisfaction with democracy, each examined for the full sample, democratic countries, and nondemocratic countries.

The coefficient of understanding democracy is positive and significant in all specifications. For example, in column (1), individuals with a better understanding of democracy are 5.3 percentage points more likely to prefer democracy over other forms of government. This trend is consistent in both democratic and nondemocratic countries, highlighting the robust impact of democratic understanding on preferences. Internet use also shows a positive and significant association with the preference for democracy.

When comparing the open approach to the closed approach, we observe slightly higher coefficients for the closed-ended questions. However, the positive and significant relationship remains consistent across both methods, underscoring the robustness of our findings. Despite this consistency, we favor the open approach due to its ability to capture nuanced and genuine reflections of democratic understanding from respondents' free-text responses. These results reaffirm the strong link between understanding democracy and the preference for democracy.

The observed associations suggest that when individuals grasp the core attributes of democracy, they are likely to value these attributes, even when they recognize certain limitations. In democracies, the Internet's role in reducing awareness of electoral integrity and inflating critical perceptions of corruption could undermine the preference for democracy.

Table 9: OLS estimates of the effect of Democracy understanding on the preference for Democracy.

	Dependent variable Preference democracy											
	Preference			Strict preference			Extend			Satisfaction		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Full	Democratic countries	nondemocratic countries	Full	Democratic countries	nondemocratic countries	Full	Democratic countries	nondemocratic countries	Full	Democratic countries	nondemocratic countries
democratic understanding	0.053***	0.048***	0.057***	0.060***	0.069***	0.048***	0.012*	0.018*	0.005	0.009	0.036***	−0.022**
	(0.006)	(0.008)	(0.009)	(0.007)	(0.010)	(0.010)	(0.007)	(0.010)	(0.009)	(0.007)	(0.010)	(0.010)
Internet use	0.006**	0.006	0.007**	0.013***	0.015***	0.011***	−0.005*	−0.002	−0.009**	−0.002	0.002	−0.006
	(0.002)	(0.003)	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)	(0.005)	(0.004)	(0.003)	(0.004)	(0.004)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
district FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	27,094	15,047	12,047	27,094	15,047	12,047	27,094	15,047	12,047	27,094	15,047	12,047
R^2	0.192	0.155	0.232	0.247	0.212	0.280	0.236	0.179	0.275	0.267	0.235	0.297

This table reports the OLS results of the effect of individuals' understanding of democracy on the preference for democracy. The dependent variable in column (1) is a dummy variable equal to 1 if the individual says "democracy is preferable to any other kind of government" and 0 otherwise. In column (2), it is a dummy variable equal to 1 if the individual says "democracy is preferable to any other kind of government" and "rejects all three authoritarian alternatives" and 0 otherwise. In column (3), it is a dummy variable equal to 1 if the individual perceives his or her country as "a full democracy" or "a democracy with minor problems" and 0 otherwise. In column (4), it is a dummy variable equal to 1 if the individual is "very" or "fairly" satisfied with how democracy works in his or her country and 0 otherwise. "Democratic understanding" is a binary variable derived from responses to the question "What, if anything, does 'democracy' mean to you?" A response is categorized as '1' (indicating an understanding of democracy) if over 50% of valid answers (excluding 'no further reply') align with core democratic principles: "Civil liberties / personal freedoms", "Government by for of the people / popular rule", "Voting / elections / multiparty competition", "Equality / justice", "Majority rule", "Governance / effectiveness / accountability / rule of law". Individual controls include age, age squared, gender, urban dummy, education, employment status, perception of own living conditions, perception of the country's economic condition, interest in politics, regular TV use dummy, regular radio use dummy, regular newspaper use dummy. Standard errors clustered at the district level are reported in parentheses; * Significance at 10%, ** Significance at 5%, *** Significance at 1%.

Its negative influence on perceptions of freedom of expression might create disillusionment with democratic realities, eroding public trust in democratic institutions.

In nondemocratic contexts, the impact of Internet access on democratic preference may manifest differently. Given that Internet use has a less significant effect on perceptions of freedom of expression or corruption in these regimes, individuals in non-democracies may not experience the same bias against democratic systems. However, the positive effect of Internet access on perceptions of electoral fairness could provide citizens in non-democracies with a benchmark, fostering a preference for democratic systems where genuine political competition is more viable. This preference could be further shaped by the stark contrast they observe between their own systems and the more favorable standards they associate with democracies.

7 Conclusion

In democratic societies, Internet exposure paradoxically appears to diminish understanding of democratic principles. This trend may result from several characteristics specific to digital media: the nature of the information shared, the rise of fact-checking, and the tendency of social media to polarize and oversimplify opinions. The proliferation of fake news, particularly prevalent on these platforms, further blurs the perception of core democratic values.

Nevertheless, evidence indicates that a deeper understanding of democracy strengthens individuals' preference for this form of governance. When people comprehend the foundations of democracy, such as freedom of expression, electoral fairness, and anti-corruption efforts—they are more likely to value and support these ideals. In this context, the negative impact of the Internet on the comprehension of democracy, driven by informational biases and misinformation, contributes to a decline in preference for democratic governance.

The distortion of democratic principles through simplistic, biased, or false representations can foster a disillusioned view of democratic institutions. This undermines public trust in

these institutions and weakens citizens' commitment to democratic values. Consequently, the negative bias introduced by the Internet and social media raises significant concerns for the preference for democracy, as it erodes understanding and appreciation of the democratic model.

In conclusion, instead of reinforcing democratic engagement, Internet exposure in democracies, by distorting the understanding of democratic principles, may diminish citizens' preference for these regimes and weaken democratic resilience in the face of contemporary challenges.

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8 Appendix

Table 10: Internet impact on understanding democracy

	Dependent variable Understanding democracy					
	News			Social media		
	(1)	(2)	(3)	(4)	(5)	(6)
	Full	Democratic countries	nondemocratic countries	Full	Democratic countries	nondemocratic countries
Internet use	0.005***	0.007***	0.003	0.006***	0.007***	0.006*
	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Country control	Yes	Yes	Yes	Yes	Yes	Yes
district FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	27,094	15,047	12,047	27,094	15,047	12,047
R^2	0.147	0.141	0.150	0.147	0.141	0.150

This table reports the OLS results of the effect of Internet use to get news on individuals' understanding of democracy. The 'understanding democracy' variable is derived from responses to closed-ended questions (Q29e to Q29g) assessing key democratic principles. Specifically, responses categorized as "*Civil liberties / personal freedoms*", "*Government by, for, of the people / popular rule*", "*Voting / elections / multiparty competition*", "*Equality / justice*", "*Majority rule*", and "*Governance / effectiveness / accountability / rule of law*" are considered indicative of understanding. A response is classified as '1' (indicating understanding) if more than 50% of the valid responses align with these principles, and '0' otherwise. Internet use is a composite variable constructed from two individual variables: frequency of getting news using the Internet or frequency of getting news using social media. Each variable is coded as follows: 0 for never using the Internet, 1 for usage less than once a month, 2 for usage a few times a month, 3 for usage a few times a week, and 4 for daily usage. Individual controls include age, age squared, gender, urban dummy, education, employment status, perception of own living conditions, perception of the country's economic condition, interest in politics, regular TV use dummy, regular radio use dummy, and regular newspaper use dummy. Standard errors clustered at the district level are reported in parentheses; * Significance at 10%, ** Significance at 5%, *** Significance at 1%.

Table 11: Instrumental Variables Regression - Combined Stages

democratic understanding

	Dependent variable: Understanding democracy					
	News			Social media		
	(1)	(2)	(3)	(4)	(5)	(6)
	Full	Democratic countries	nondemocratic countries	Full	Democratic countries	nondemocratic countries
First stage regression (Instrument)						
Stock of lightning × fixed 3G share	0.015***	0.023***	0.014***	0.013***	0.016***	0.012**
	(0.004)	(0.002)	(0.004)	(0.004)	(0.002)	(0.005)
Second stage regression (Fitted)						
Internet use	−0.073***	−0.034	−0.092**	−0.088**	−0.046	−0.106**
	(0.024)	(0.027)	(0.034)	(0.032)	(0.044)	(0.044)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Country control	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	27,094	15,047	12,047	27,003	15,014	11,989
KP Wald F-stat	12.89	81.87	10.07	8.61	49.97	5.50
KP LM P-val	0.00	0.00	0.01	0.01	0.00	0.03

This table reports the first and second stages of IV results of the effect of Internet use to get news on individuals' understanding of democracy. The 'understanding democracy' variable is derived from responses to closed-ended questions (Q29e to Q29g) assessing key democratic principles. Specifically, responses categorized as "*Civil liberties / personal freedoms*", "*Government by, for, of the people / popular rule*", "*Voting / elections / multiparty competition*", "*Equality / justice*", "*Majority rule*", and "*Governance / effectiveness / accountability / rule of law*" are considered indicative of understanding. A response is classified as '1' (indicating understanding) if more than 50% of the valid responses align with these principles, and '0' otherwise. Internet use is a composite variable constructed from two individual variables: frequency of getting news using the Internet or frequency of getting news using social media. Each variable is coded as follows: 0 for never using the Internet, 1 for usage less than once a month, 2 for usage a few times a month, 3 for usage a few times a week, and 4 for daily usage. Stock of lightning × fixed 3G share is the interaction between the stock of lighnting from 1998 to 2013 and the 3G network coverage calculated both at the individual's district of residence of the respondent in the Afrobarometer's survey. Individual controls include age, age squared, gender, urban dummy, education, employment status, perception of own living conditions, perception of the country's economic condition, interest in politics, regular TV use dummy, regular radio use dummy, regular newspaper use dummy. Standard errors clustered at the district level are reported in parentheses; * Significance at 10%, ** Significance at 5%, *** Significance at 1%.