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Social media and the fragility of Africa

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Social media and the fragility of Africa

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Abstract

This research empirically analyzes the effect of social media on fragility. It goes beyond political grounds which oppose techno-optimistic to techno-pessimistic perceptions of the impact of social media to analyze its consequences on global, Security fragility, economic and social fragilities. The research uses annual data from a panel of 47 African countries for the period 2000–2018. Results reveal that the use of social media by the public to organize offline political actions has no outcome on global fragility. However, its use by elites for the same end accentuates global state fragility. This operates through Security and political fragilities. Fragility is negatively associated with higher civil society participation, education and democracy. The use of social media to organize offline political actions either by people or by elites in the context of higher civil society participation reduces fragility, while its use either by people or by elites in the context of higher educational level accentuates state fragility. The use of social media to organize offline political actions by people in the context of democracy boosts fragility but its use by elites in the same framework reduces fragility. There is a need to sensitize people, especially elites in Africa on the threats and opportunities of social media. There is also a necessity to develop a dynamic, well-educated and well-organized civil society and population in order to better valorize the opportunities that social media represents.

Keywords: Social media, state fragility, security fragility, political fragility, economic fragility and social fragility.

JEL Classification: G20; O38; O40; O55; P37

1. Introduction

A fragile state refers to the incapacity of a state to provide basic public services to its people, irrespective of political violence considerations (DFID, 2005). It refers to the state's inability to implement adequate policies in reaction to a shock (Naudé, 2009). A fragile state combines various state dysfunctions. These include the inability of the state to provide basic needs and services, weak public governance, extreme poverty, weak territorial control, development traps, and a high probability for conflict and civil war (Collier, 2008; Park and Kim, 2014). From the 1990s, the concept of a fragile state became a concern in international development and economic growth discourse (Besley and Persson, 2011). The notion is one among the internationally acknowledged policy agendas which is fully accepted in most policy doctrines on global development.

According to Fund for Peace (FFP) report (2019), fragility is a phenomenon that is growing and which is widespread across Africa. Although it is not recent in the continent, its evolution is rapid and is caused by many factors, including economic characteristics (Robinson, 2009; Collier, 2009), historical factors (UNECA, 2007) and institutional features (Acemoglu et al., 2001). However, this paper highlights the correlation between social media and fragility. In fact, there has been, in recent decades, a substantial bulk of literature on issues related to the consequences of social media. Much of this literature has focused on the impact of social media corruption (Jha, 2019), political instability (Fomba et al., 2022), political action (Ngassam et al., 2023), governance (Asongu and Odhiambo, 2019a), crime (Asongu et al., 2019a), terrorism (Asongu et al., 2019b), democracy (Diabert, 2012; Morozov, 2011) and homicide (Asongu et al., 2019c). To the best of my knowledge, the impact of social media on fragility remains highly underexplored in Africa. This study fills this gap by exploring the results of social media on various dimensions of fragility. Africa is a fertile ground for such a debate on social media effects. Though the continent has the lowest rate of Facebook penetration (19.3% against 26% in Asia and 35.5% worldwide), it is worth noting that Africa has recorded the highest growth rate of Facebook adoption. In fact, the number of Facebook users has almost quintupled, moving from 55.4 million of users in 2013 to 255.4 million users in 2021 (Statista, 2021). At the same time, with the highest adoption rate of Facebook, Africa has recorded the highest rate of fragility. African countries were among the top fifty most fragile states around the world in 2013 and the top 35 in 2021. According to the categorization of the Center for Systemic Peace (CSP), most of these countries are categorized as alert and high alert. The paradoxical evolution of social media adoption,

associated to an increase in fragility, reinforces the necessity to analyze the relationship between social media use and state fragility. By undertaking this investigation, this paper takes a fresh look at and contributes to literature on the impact of social media in two aspects. First, to the authors' knowledge, there is no empirical study that investigates the direct influence of social media on various dimensions of fragility. This research analyses the consequence of social media on economic, social, political and Security fragilities. Second, Deibert (2010) highlights that civil society, education, democracy and political institutions create different incentives for democratic leaders to reduce fragility using social media. From this perspective, this work examines how social media interacts with democracy, education and civil society to reduce or increase fragility.

The remainder of this paper is organized as follows. Section 2 is concerned with the literature review on the import of social media on fragilities. Section 3 briefly focuses on the methodology of the study, while Section 4 presents the empirical results and Section 5 concludes and makes policy recommendations.

2. Literature review

The ubiquity of social media platforms impacts the economic (Dijk, 2006), politics (Żakowska & Domalewska, 2019), tourism (Asongu & Odhiambo, 2019b), inclusive development (Asongu & Odhiambo, 2021), social (Gawlik-Kobylińska & Maciejewski, 2019; Urych, 2019), and Security fragility (Bielawski & Grenda, 2019) dimensions of countries. Said simply, social media may impact our lives through fragility.

The Varieties of Democracy (2022) defines social media as a subset of internet platforms used by normal individuals to create and share content within network with other people. Although content on such networks may be shared privately within subgroups of users, these platforms are accessible to the public. Social media includes both publicly visible or semipublic platforms such as Facebook, Google+, Myspace, Twitter, Linkedln, Twitter, VKontakte, Flickr, Friendster and private social networking and messaging platforms such as Signal, Slack, Snapchat and WhatsApp.

This section discusses the role of social media on different dimensions of fragility, the incidence of other variables on fragility as well as the outcome of their interaction with social media on fragility.

2.1 social media and fragility

The OECD (2016) defines fragility as a mix of exposure to risks and the inability of State, system and/or communities to manage, to mitigate or to absorb risks to which they are exposed and which may lead to negative outcomes including violence, the breakdown of institutions, displacement, humanitarian crises or other emergencies. According to the CSP (2017), fragility refers to the state incapacity to prevent or manage conflicts, implement public policies, deliver essential services, maintain system of coherence, cohesion and quality of life. The CSP evaluates fragility in four dimensions: economic fragility, social fragility, Security fragility and political fragility. This part sheds light on the literature on the impact of social media on fragility.

Social media and economic fragility

The DFID (2005) defines economic fragility as the state's inability to implement adequate economic policies in three domains, namely: economic decline (as measured by low per capita GDP, unemployment, inflation, productivity, *inter alia*), uneven development (social hardship, inequalities, illicit trade of drugs) and loss of human resources (brain drain).

Hendel et al. (2017) in examining a boycott of cottage cheese by consumers organized in the summer of 2011 on Facebook in Israel following a sharp price increase, posit that the effectiveness of the boycott was apparent in the decline is had on sales, particularly in places where Facebook penetration was high. Social media can also reduce economic inequalities created by corruption.

Social media and social fragility

Social fragility refers to the state's inability to provide adequate social amenities such as safe water, health and safe food supply that are necessary to face or prevent diseases, disasters and epidemics in crises situations such as hurricanes, floods and earthquakes (FFP, 2017).

Social media can be used to coordinate efforts of both authorities and institutions such as the police and fire departments in monitoring threats, coordinating rescue operations, maintaining order in the public domain and addressing concerns linked to civil protection. Social media was first documented as well as employed during an emergency that occured after the terrorists' attacks of September 11, 2011 in New York on the World Trade Center where individual users created wiki with the help of which, information on missing persons was collected (Vieweg et al., 2008). Concerning floods, a study such as Vieweg (2010) argues

that wide-scale communication of social media often involves a self-organizing behavior that produces accurate situational information concerning victims, for the most part, in the process of official communications. It is worthwhile to note that social media plays a role fundamental in emergency situations, especially as it pertains to the mannner people gather and communicate information (Bruns, 2011; Vieweg, 2010). People turn to social media platforms before, during and after disasters (Young, 2020) to communicate information that may guide interventions in the case of emergencies and to coordinate activities on the field. According to Fraustino et al. (2012), information seeking is one of the drivers for social media use during disasters.

Social media and Security fragility

The FFP (2017) defines Security fragility as the state's inability to implement adequate policies in reaction or to prevent divisions and schisms between groups in society in three domains, namely the Security fragility apparatus (the Security fragility threats to a state such as bombings, rebel movements, attacks, mutinies/terrorism and battle-related deaths), the elite fractionalization along ethnic, clan, class, racial or religious lines, the ruling elite's employment of nationalistic political rhetoric, "ethnic cleansing" and the Group Grievance (schisms between different groups in society).

The fact that social media facilitate coordination and collective actions (Enikolopov et al., 2020) implies that the corresponding media could also do the same for potential perpetrators of hate crimes (Zhuravskaya et al., 2020). Laub (2019) has suggested that, social media**,** by easing hate speech circulation, are partly responsible for a boost in xenophobic attitudes as well as hate crimes. This has been confirmed by Bursztyn et al. (2019) on hate crimes in Russia, Müller and Schwarz (2018) in Germany, by Ndonye (2014) in Kenya and by Madanda et al. (2009) in Uganda. Social media have largely been used as instruments for perpetuating crimes such as violence against women and girls as well as cyber bulling (Effiom, 2013). Following Peoples under Threat (2019), outside powers can manipulate social media to gain support for policies that are not favorable for civilians.

Social media and political fragility

According to the FFP (2017), political fragility is the absence of the State legitimacy, that is, the level of confidence that the population has in state processes and institutions, the openness of government with respect to ruling elites to, *inter alia*, corruption levels, transparency, political representation and accountability. It also refers to the inability of a

state to provide quality public services, protecting citizens from terrorism and violence and to the lack of respect of human rights and rule of law. There is an ongoing debate on the effects of social media on political grounds. The so qualified techno-optimists in a stand of literature (Shirky, 2008; Diamond Jha & Sarangi, 2017; Enikolopov et al., 2018; Camaj, 2012; Kolstad & Wiig, 2010) see social media as a tool that strengthens democracy. The key role social media plays to empower individuals, increase their participation in the political process, facilitate communication, mobilize social concerns, and consolidate an emergent civil society has received substantial scholarly attention (Diamond, 2010; Shirky, 2008). As watchdogs, social media hold political decision makers accountable for their actions (Norris, 2004). They help prosecutorial institutions to investigate and report incidences of corruption (Camaj, 2012). By highlighting policy failures, poor administration by public officials, scandals in the corporate sector and corruption at the judicial level (Norris, 2004), social media boost public pressure and constraint politicians that are corrupt to resign and thus lose political power by providing information on corruption.

The techno-pessimist Gladwell (2010) argues that social media creates networks that are loose without leadership and thus, are unable to effectively mobilize and organize revolutions. The dark side of social media is provided by Morozov (2011) especially as it pertains to usage by authoritarian regimes for repression, surveillance, control of digital media space and propaganda as well as usage by autocratic regimes to distract voters from politics. Tufekci (2018), Mitchell et al. (2019) and Pomerantsev (2019) observe that, social media has been blamed in democracies for the rise of populism, the proliferation of fake news and the spread of xenophobic ideas.

Deibert (2012), though acknowledging some positive aspects of social media, also recognizes that there is a dark side to cyberspace, namely cybercrime, the fact that all by our own consent, our personal lives have been turned inside-out owing to the premise that it is possible to track us in space and time with a degree of precision that would render envious the greatest tyrants of the past. In the light of the above, the following hypothesis is formulated:

Hypothesis 1*: Social media use for political actions accentuates fragility in Africa.*

2.2 **Other determinants of fragility**

The literature also identifies many other determinants of fragility. Weak institutions, violent conflict, economic development, external shocks, natural resources, and the international system are among the drivers of state political fragility (Vallings et al., 2005; Carment et al., 2008). In the same vein, Bertocchi and Guerzoni (2012) argue those historical,

demographic, social and economic factors, the number of revolutions and restrictions of civil liberties and increase the likelihood of fragility in Sub-Saharan African countries.

Carment et al. (2008) and Feeny et al. (2015) found that higher income is being associated to lower fragility. Nations that are more open to trade are associated with less fragility (Carment et al., 2008, 2011). Moreover, state fragility is contingent on low values of the Human Development Indicator, a lower level of education and higher infant mortality rates (Feeny et al., 2015; Carment et al., 2011).

Very little empirical literature analyzes the determinants of fragility, focusing on the impact of inequalities. However, the effects of institutions such as democracy and the participation of civil society, of economic factors such as equalities in the distribution of resources and equal opportunities and the role of demographic factors such as the dependency ratio have not at all or have not been sufficiently explored to the best of knowledge. The following hypothesis is thus, formulated:

Hypothesis 2*: Democracy, the participation of civil society, equalities in the distribution of resources and equal opportunities reduce fragility in Africa.*

2.3 Social media and fragility: some transmission channels

The effect of social media on fragility may be influenced by several factors called moderators. In this research, we highlight democracy, civil society participation and education as potential channels through which social media may impact fragility.

Social media by improving the quality of democracy (Shirky, 2008) plays a key role in economic growth (Acemoglu et al., 2014; North, 1990) and hence on economic fragility. Theoretically, citizens and activists might use social media to share information about the wrongdoings of politicians or public officials, the way people and public officials behave since it encourages more transparency and improves accountability (Jha & Sarangi, 2017) which also contribute to economic growth. Furthermore, democracy is negatively associated with corruption (Asongu, 2013; Nur-Tegin & Czap, 2012), which in turn reduces growth (Asongu, 2013) and hence economic resilience. Diebert (2010) highlights the role of civil society, education and democracy in providing different incentives for leaders in democracy to effectively leverage on social media for political actions. While the interaction between revolutions and political interferences mitigates the likelihood of state fragility, the involvement of political interference and natural resources increase extreme state fragility (Asongu, 2013). However, it is warned by Shirky (2011) that political freedom has to be associated with the literal civil society, enough to enable the attendant society to be well and

densely connected to discuss the concerns that are apparent in the public domain. Moreover, Fomba et al. (2021) articulate that the impact of social media on political instability is contingent on other factors such as governance quality and the level of democracy. The underlying motivates the following hypothesis:

Hypothesis 3*: Democracy, civil society participation and the level of education reduce the effect of social media use for political action on fragility*.

3. Empirical methodology, data and descriptive statistics

3.1 Empirical methodology

3.1.1 Baseline Specification

This paper investigates the social media-state's fragility nexus. Also, by virtue of the dependency path, the intergenerational transmission of fragility implies that present levels of a state's fragility would determine future ones. To account for these drawbacks, we employ dynamic equation. For lack of space, the corresponding equation is available on request. The corresponding dependent variables are drawn from the CSP database.

The main advantage of the CSP indicator over that of the World Bank and FFP is its multidimensional character that enables one to equally appreciate the impact of social media on many aspects of human life. In addition, the CSP database has a longer time series compared to the FFP database.

Most studies capture social media use using the Facebook penetration rate, the leading but not the only social media platform with 59% of active social media users. Facebook does not account for the precise reason of social media use. In fact, 75% of Facebook users visit a local business page, 34% use Facebook to share information concerning family (Statista, 2021). These different aspects of social media use could potentially have different effects that need to be disentangled (Zhuravskaya et al., 2020). To circumvent this limitation, we instead use **the people's propensity to use social media to** organize offline political actions ($Socialmed_{it}$) provided by Varieties of Democracy (V-dem) database[1]. The peoples' propensity to use social media to organize offline political actions is ordinally measured and

[1] Varieties of democracy (V-Dem) is an institute located at the Department of Political Sciences of the University of Gothburg, Sweden. It was founded by Staffan I. Lindberg in 2014 with the aim of studying the qualities of government. The institute is in charge of executive management of most aspects of the data collection, management and coordination of several research programs. The institute conceptualizes and measures democracy, provides a multidimensional and disaggregated dataset that reflects the complexity of the concept of democracy as a system of rules that goes beyond the simple presence of elections.

then converted to interval by the measurement model. Score varies from 0 (Never used) to 4 (most regularly used).

Also, V-Dem database provides information on the use of social media for political actions by elites. Elites are group or class of persons that are qualified to be superior to others owing to their wealth, social standing and intelligence. This indicator is evaluated like the peoples propensity indicator, at the difference that, respondents are elites randomly selected through a surveys as indicated in V-Dem code book (2022). Moreover, we doubt that the utilization of social media by elites may affect fragilities in the same way it does in the case for the entire population. For sensitivity analysis, we replace the average propensity of people who utilize social media to organize offline political actions by elite's propensity to use social media to organize offline political actions (socialmelite) in the corresponding analyses.

A set of control variables is used to substantiate the relationship between social media and the state's fragility to avoid variable omission bias. These variables comprise:

- The educational level ($Educ_{it}$) captured by number of years of total schooling across all education levels for the population aged 25 years and more.
- The level of democracy ($Democracy_{it}$) is evaluated by the Center for systemic peace with the index ranging from (-10) least democratic to (10) more democratic.
- The participation of civil society (Civil society $participation_{it}$), that is the extent to which Civil Society Organizations (CSOs) are routinely consulted by policymakers, the involvement of people in CSOs, women prevention from participating and the extent of centralization of legislative candidate nomination within party organization.
- The equal distribution of resources ($Equalresces_{it}$): The index measures the extent to which tangible and intangible resources are equally distributed in society.
- Equal opportunities ($Equalopp_{it}$) evaluates the extent to which men and women, members of ethnic or religious groups have the same opportunities with access to education, public office and employment.
- The dependency ratio ($Depratio_{it}$) expresses the ratio of inactive population to active population expressed in percentage.

More detailed information on variables is presented in the Appendix Table 1.

3.1.2 Interaction variables

Based on the preceding literature review, we assume that the effect of social media on corruption could also be nonlinear as defended by Shirky (2011), Diebert (2012) and Fomba et al. (2021). This paper also considers the previous concern by assessing how education,

democracy, and civil society participation shape the relationship between social media and fragilities by incorporating interaction terms from which thresholds can be computed.

3.2 Estimation of coefficients

This study utilizes namely the two steps system GMM and the sequential linear panel data (SLPD) techniques, respectively for Equations (1) and (2). This paper avoids using OLS-fixed and random effects since some variables (social media use) are almost time-invariant and the estimation procedure fails to account for endogeneity issues. To circumvent this first drawback, this investigation relies on the *two step System* GMM, whose main advantage over *Difference* GMM is that the untransformed lags are weak instruments for transformed variables. Also, some variables in the model may be time invariant. Thus, an application of *Difference* GMM will not identify these variables. The lagged levels of the explanatory variables can be taken as instruments (Reed, 2015; Dithmer & Abdulai, 2017) under some circumstances. But their large use in recent literature has been highly criticized (Bellemare et al., 2017). This paper eludes these weaknesses of dynamic panels by prioritizing the sequential linear panel data (SLPD) estimator, which consists of a two-stage procedure that identifies the coefficients of regressors that are time-invariant (Kripfganz & Schwarz, 2019).

The first stage consists of estimating the coefficients associated with time-varying regressors. Moreover, in the first-stage estimated residuals are computed and regressed on the regressors that are time-invariant in the second stage. In opposition to usual techniques, identification is possible using this estimator by means of Hausman's and Taylor's (1981) instrumental variables before adjusting the second-stage standard errors in order to take into consideration any estimation error related to the first-stage (Kripfganz & Schwarz, 2019). Time-invariant regressors and identification are also accounted for following Kripfganz and Schwarz (2019).

3.3 Data and descriptive statistics

This write-up exploits annual data of a balanced panel of 47 African countries for the period 2000–2018. The choice of data and time period is dictated by their availability.

The descriptive statistics are summarized in Table 1. The mean value of social media use of offline political actions by people over the period 2000-2018 is 1.78 with a standard deviation of 0.803. Also, the mean value of elites who use social media for offline political actions over the same period is 1.881 with a standard deviation of 0.817. These dispersions on

social media requirement appropriately capture the time invariant character of the two variables than disparities in the level of social media adoption. In addition, the mean value of state fragility index is 14.23 with a standard deviation of 5.12. This dispersion reflects a wide disparity in the level of fragility between the countries in the sample.

Table 1: Descriptive statistics

	N	Mean	STD	Min	Max
Social media use by people to organize offline political actions	874	1.780	0.803	0.147	3.737
Social media use by elites to organize offline political actions	874	1.881	0.817	0.110	3.836
State fragility index	874	14.323	5.127	0.000	24.000
Security fragility	874	2.040	1.617	0.000	6.000
Political fragility	874	3.110	1.793	0.000	6.000
Economic fragility	874	4.833	1.932	0.000	7.000
Social fragility	874	4.336	1.538	0.000	6.000
Dependence ratio	874	0.820	0.160	0.413	1.118
Educational level	874	4.715	2.063	1.100	10.633
Democracy	874	1.631	5.090	-9.000	10.000
Equal opportunities	874	1.317	1.911	-16.63	5.075
Civil society participation	874	0.572	0.150	0.146	0.952
Equal distribution of resources	874	0.411	0.195	0.077	0.938

It is relevant to provide some insights into whether there is a higher proclivity of one particular country over others in the dataset and thus, whether such has any incidence on the estimated results. Concerning the variables of interest, the per country averages of social media use by people vary from 0.33 in Rwanda to 3.310 in South Africa while the per country averages of social media use by elites vary from 0.51 in Lesotho to 3.45 in the Democratic Republic of Congo. Since the gap between the country scores and the average was high, the proclivity was observed. We removed these two countries (i.e., the Democratic Republic of Congo and South Africa) from various regressions. The conclusions remained unchanged. Concerning control variables, we found some proclivity of countries such as South Africa, Mauritius and Botswana as well as in the Democracy variable for which, scores are among the highest in South Africa. The gap between the country scores and the average was again high. Once more, we run regressions without the three countries and conclusions remained unchanged.

In addition, Table 2 presents the correlation coefficients between different variables of the study. Social media as used by people or by elites is positively and significantly correlated with the state global fragility index, but significantly and positively associated with Security fragility, economic and social fragility dynamics. All fragility indicators are positively and

significantly connected with each other, showing that global state fragility may occur through one or many fragility indicators. Almost all correlation coefficients are low showing diminished risk of collinearity among explanatory variables.

Table 2: Correlation coefficients between variables

Variables	Social media use by people to organize offline political actions	Social media use by elites to organize offline political actions	Equal opportunities	Dependency ratio	Civil society participation	Equal distribution of resources	Educational level	Demo-cracy	State fragility index	Security fragility	Political fragility	Economic fragility	Social fragilty
Social media use by people to organize offline political actions	1,00												
Social media use by elites to organize offline political actions	0.68***	1,00											
Equal opportunities	0.04	-0.01	1,00										
Dependency ratio	-0.29***	-0.08	-0.07	1,00									
Civil society participation	0.11	0.30***	-0.01	0.14***	1,00								
Equal distribution of resources	0.16***	0.14***	0.0009	-0.5***	0.18***	1,00							
Educational level	0.28***	0.05	0.081	-0.68***	-0.01	0.41***	1,00						
Democracy	0.02	0.25***	-0.051	-0.03	0.67***	0.25***	0.16***	1,00					
State fragility index	0.28***	0.13***	-0.06	0.68***	-0.15***	-0.58***	-0.59***	-0.21***	1,00				
Security fragility	-0.12*	-0.08	-0.02	0.26***	-0.31*	-0.4***	-0.18***	-0.21***	0.70***	1,00			
Political fragility	-0.05	-0.002	0.004	0.23***	-0.28***	-0,40***	-0.21***	-0.30***	0.73**	0.48***	1,00		
Economic fragility	-0.38***	-0.2***	-0.09	0.75***	0.07*	-0.43***	-0.67***	-0.05*	0.83***	0.40***	0.42***	1,00	
Social fragility	-0.28***	-0.0958	-0.07	0.78***	0.07	-0.49***	-0.68***	-0.0713	0.67***	0.21***	0.22***	0.61***	1,00

Notes: *, **, *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

We can now run different regression equations to verify if results corroborate those obtained from the correlation analyses.

4. Results and discussions

4.1 The effects of social media on state fragility: preliminary results

This subsection presents the baseline results of the effects of social media on fragilities. The econometric model is estimated using the sequential panel linear data model and the results are summarized in Table 3.

Table 3: The effect Social media use by people on fragilities (SLPD estimator)

	State fragility index	Security fragility	Political fragility	Economic fragility	Social fragility
Panel A: Time-variant/first stage					
Civil society participation	-6.187*	-3.511**	-2.144	-0.638	0.107
	(3.571)	(1.464)	(1.748)	(1.186)	(0.771)
Dependency ratio	15.607***	2.512*	1.349	6.498***	5.248***
	(3.409)	(1.282)	(2.105)	(1.145)	(0.990)
Equal opportunities	-0.048	-0.018	0.002	-0.024	-0.008
	(0.067)	(0.030)	(0.036)	(0.026)	(0.020)
Educational level	-0.393*	0.059	0.009	-0.269***	-0.192***
	(0.238)	(0.102)	(0.126)	(0.092)	(0.064)
Democracy	0.019	0.024	-0.037	0.033	-0.001
	(0.112)	(0.042)	(0.060)	(0.039)	(0.028)
Equal distribution of resources	-5.898**	-2.006*	-2.453**	-0.496	-0.942
	(2.813)	(1.204)	(1.106)	(0.967)	(0.726)
Panel B: Time-invariant/Second stage					
Social media use by elites to organise offline political actions	-0.278	-0.022	0.096	-0.295*	-0.057
	(0.443)	(0.192)	(0.173)	(0.167)	(0.089)
Constant	0.495	0.040	-0.170	0.524*	0.101
	(0.784)	(0.341)	(0.310)	(0.294)	(0.156)
Observations	827	827	827	827	827
Countries	46	46	46	46	46

Notes: *, **, *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Results show that a one percent point increase in social media only significantly reduces economic fragility by 0.295. The consequences of other dimensions of fragility are not statistically significant. This relationship can be explained by the fact that, social media impacts economic fragility through its effect on democracy and consequently economic growth (Acemoglu et al., 2014; North 1990). Social media, by improving the quality of democracy (Shirky, 2008) can contribute to economic resilience. It can also occur through better transparency and accountability (Jha & Sarangi, 2017).

The existence of a dynamic civil society can contribute to improve resilience since a one-point increase in civil society participation significantly reduces global state fragility by 6.187. This occurs through its negative effect on Security fragility whose value is -3.511. This result partially confirms the views of Giffen and Judge (2010), who highlight the role assigned to civil society that acts as contractors to implement government programs, as 'watchdogs' to monitor the implementation of these programs. The previous also acted as substitutes for government agents in states that are fragile and to enlarge participation in development planning at the national level. The outcome is consistent with Shirky (2011), who posits that a civil society is densely connected and literate enough to better discuss public affairs.

Furthermore, fragility is also associated with higher dependency ratios. In Table 3, a one percentage point increase of dependence ratio increases global state fragility and Security fragility by 15.607. This effect occurs through Security fragility, economic and social fragilities whose effects are 2.512, 6.498, and 5.248 points, respectively. The positive effects of the dependency ratio on economic fragility are in line with the findings of Loser et al. (2017) who suggest that aggregate output grows as more old people remain employed. Saccone (2017), who argues that in emerging economies, high growth rate is related to declining age dependency ratios. It is the case particularly in Africa, where higher birth rates, coupled with unemployment, accentuate the dependency, therefore reducing saving capacities, investments and hence growth.

Equal opportunities have no significant outcome on fragilities, but a one-point increase on the index of equal access to resources reduces global state fragilities by 5.898. It occurs through their influence on Security fragility and economic fragilities whose negative and statistically significant effects are 2.006 and 2.453, respectively. These results are in line with the findings of Christian (2014), who stresses that inequality is the root of social evil and hence of social fragility. Similarly, Wilson and Pickett (2009) found that unequal countries suffer from relatively poor social indicators. They depart from Alesina and Rodrik (1994), who stipulate those countries with more equal distribution grew faster.

Democracy has no significant effect on fragilities, though coefficients are positive. These results contrast with the views of Acemoglu et al. (2014), but corroborate with the findings of Zakaria (2003) for whom democratization in developing countries produces poor economic outcomes, ethnic conflicts and political unrest that are detrimental to Security fragility and economic development.

One additional year of education reduces global state fragility by 0.393. It operates through the effects on economic and social fragilities whose negative and statistically significant effects are 0.269 and 0.192 points, respectively. Results also comfort the theoretical prediction of Novella et al. (2015), who argue that education, can reduce social and economic fragility; Winthrop and Matsui (2013) or Hanushek et al. (2007) who consider that education plays an essential role in economic growth across all contexts and Allison (2010) who opines that education plays an important role in addressing the consequences of and reducing the effects of disasters and climate change through knowledge and skills that young people learn within schools.

4.2 Analyses of some transmission channels

Diebert (2010) highlights the role of civil society, education and democracy in creating various incentives for democratic leaders to better leverage on social media for fragility reduction. From this perspective, we analyze the role of these variables in shaping the relationships under consideration. We also determine possible threshold[2] values of interaction variables using Equation (3). This is done only for coefficients that are statistically significant. Results are presented in Table 4.

The interacting effect of social media as used by the population and education on state fragility is positive and significant (0.401). It implies that education amplifies with no threshold, the positive effect of social media use for offline political actions on global state fragility. The threshold value of education when civil society participation remains constant is negative -2.44 (-0.98/0.401) which is not possible, meaning that there is no threshold value. The amplification effect of education on state fragility occurs through political and social fragility dynamics. In fact, the coefficients of interaction are significant and positive with respective values of 0.116 and 0.100. The positive intermingling effect of education and social media on political fragility corroborates with the worries of Morozov (2011), who doubts the power of social media in bringing about political stability.

Globally, the disappointing positive interaction effect of social media and education on fragility can be explained, among others, by the quality of education. Michaelowa (2001) stresses that many students in developing countries complete their schooling without developing the knowledge and skills prescribed in the curriculum. Dufflo et al. (2005) point out the unethical behavior of teachers as an impediment to the quality of education since their

[2] In this research, we mean by threshold, the value of the variable below or above which the effect of social media on fragility becomes positive or negative.

recruitment and promotion is based on subjective practices such as corruption, favoritism, nepotism and political clientelism.

Table 4: The effect Social media use on fragilities: Some transmission channels (SLPD estimator)

	State fragility index	Security fragility	Political fragility	Economic fragility	Social fragility
	Panel A: Time-variant/first stage				
Social media use by elites to organise offline political actions×Educational level	0.401**	0.105	0.116*	0.081	0.100**
	(0.168)	(0.084)	(0.062)	(0.067)	(0.045)
Social media use by elites to organise offline political actions×Democracy	0.143	0.101**	0.023	0.0001	0.019
	(0.107)	(0.039)	(0.054)	(0.044)	(0.024)
Social media use by elites to organise offline political actions×Civil society participation	-4.474***	-1.315*	-0.936	-1.260*	-0.962***
	(1.649)	(0.676)	(0.575)	(0.659)	(0.337)
Civil society participation	3.181	-0.430	-0.411	2.034	1.988*
	(5.379)	(2.069)	(2.224)	(1.847)	(1.109)
Dependency ratio	15.126***	2.679**	1.423	5.867***	5.156***
	(3.827)	(1.259)	(2.210)	(1.283)	(1.010)
Equal opportunities	0.005	0.008	0.015	-0.021	0.002
	(0.056)	(0.029)	(0.032)	(0.019)	(0.019)
Educational level	-1.188***	-0.134	-0.230	-0.428***	-0.396***
	(0.431)	(0.224)	(0.170)	(0.151)	(0.122)
Democracy	-0.291	-0.181*	-0.086	0.019	-0.043
	(0.220)	(0.094)	(0.097)	(0.084)	(0.060)
Equal distribution of resources	-5.680**	-2.170**	-2.328**	-0.353	-0.830
	(2.453)	(1.082)	(1.118)	(0.826)	(0.689)
Panel B: Time-invariant/Second stage					
Social media use by elites to organise offline political actions	0.098*	0.039	0.053**	0.017	-0.011
	(0.051)	(0.026)	(0.024)	(0.020)	(0.015)
Constant	9.207**	2.048	4.240*	1.627	1.291
	(3.763)	(1.603)	(2.195)	(1.349)	(1.316)
Observations	827	827	827	827	827
Countries	46	46	46	46	46

Notes: *, **, *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

The interacting effect of social media as used by the population and democracy on state fragility is positive but not significant. The interacting effect of social media as used by the population and democracy on Security fragility is positive and significant (0.101). It

implies that democracy amplifies without any threshold the effect of social media on security fragility since the direct effect of social media use on Security fragility is not significant. However, the high adoption rate of social media for offline political action may amplify state fragility. Globally, results concerning the role of democracy reinforce the worries of Tufekci (2018) and Mitchell et al. (2019), who observe that social media has led to the spread of xenophobic ideas. This argument is consistent with Zakaria (2003), who established that democratization in developing countries produces political instability and ethnic conflict. This is partly a sign of immature democracy in Africa.

The interacting effect of civil society participation and social media on state fragility is negative and significant (-4.474). Civil society participation mitigates the state fragilization effect of social media use for political actions. However, this mitigating effect occurs only when the civil society participation score exceeds the threshold value of 0.219 (0.98/4.474). The mitigating effect of civil society participation occurs with no threshold through the Security fragility (-1.315), economic fragility (-1.260) and social fragility (-0.962). This is the case because on the one hand, the interaction coefficient of political fragility is not significant and the direct effect of social media on Security fragility, economic, social fragilities are not significant statistically.

These findings are in line with the views of Shirky (2011), who argues that a more organized civil society, literate enough and densely connected enough, can better discuss the issues presented to the public and therefore reduce fragilities.

To sum up, results suggest that, education and democracy matter in the relationship between social media use for political actions and state fragility, while civil society participation does not.

4.3. Sensitivity of results to elites' use of social media

We now analyze the sensitivity of the results of this study to the nature of social media users, namely elites. Results presented in Table 5 below show that globally, signs and significance of all our control variables remained unchanged, except for dependence ratios and equality of opportunities.

The main differences between the effects of social media as used by the population (in Table 3) with respect to the effects of social media as used by elites (in Table 5) are that:

i) A one-point increase in social media as used by elites positively and significantly increases political fragility by 0.287 point against the non-significant value of 0.096 as used by the population. This result, in as much as social media is used by elites, comforts the view

of Morozov (2011), who doubts the power of the Internet and social media in bringing about democratic change. This result also contradicts the position of Shirky (2008), who proposes a positive transformation effect of social media on political fragility.

ii) A one-point increase in social media as used by elites negatively harms economic fragility (-0.310) more than when used by the population (-0.295).

Table 5: The effects of social media use by elites on fragilities (SLPD estimator)

	State fragility index	Security fragility	Political fragility	Economic fragility	Social fragility
			Panel A: Time-variant/first stage		
Civil society participation	-0.048	-0.018	0.002	-0.024	-0.008
	(0.067)	(0.030)	(0.036)	(0.026)	(0.020)
Dependency ratio	-6.187*	-3.511**	-2.144	-0.638	0.107
	(3.571)	(1.464)	(1.748)	(1.186)	(0.771)
Equal opportunities	15.607***	2.512*	1349	6.498***	5.248***
	(3.409)	(1.282)	(2.105)	(1.145)	(0.990)
Educational level	-0.393*	0.059	0.009	-0.269***	-0.192***
	(0.238)	(0.102)	(0.126)	(0.092)	(0.064)
Democracy	0.019	0.024	-0.037	0.033	-0.001
	(0.112)	(0.042)	(0.060)	(0.039)	(0.028)
Equal distribution of resources	-5.898**	-2.006*	-2.453**	-0.496	-0.942
	(2.813)	(1.204)	(1.106)	(0.967)	(0.726)
			Panel B: Time-invariant/Second stage		
social media use by elites for offline political actions	0.022	0.090	0.287*	-0.310*	-0.046
	(0.415)	(0.205)	(0.162)	(0.159)	(0.099)
Constant	9.441***	2.537	4.280**	1.353	1.270
	(3.426)	(1.683)	(2.134)	(1.248)	(1.262)
Observations	827	827	827	827	827
Countries	46	46	46	46	46

Notes: *, **, *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

We now turn to the interacting effects of social media as used by elites and education, democracy and civil society participation on fragilities. Results are presented in Table 6. The interacting effect of social media as used by elites and education on state fragility remains positive, but becomes non-significant (0.099), against a positive and significant value (0.401) when social media is used by the total population. There is no threshold value therefore.

Table 6: The effects of social media used by elites on fragilities: Some transmission channels (SLPD estimator)

	State fragility index	Security fragility	Political fragility	Economic fragility	Social fragility
	Panel A: Time-variant/first stage				
social media used by elites for offline political actions ×Educational level	0.099	0.021	0.095***	-0.014	-0.003
	(0.089)	(0.049)	(0.033)	(0.035)	(0.024)
social media used by elites for offline political actions ×Democracy	-0.153**	-0.016	-0.073**	-0.077***	0.012
	(0.068)	(0.042)	(0.030)	(0.030)	(0.025)
social media used by elites for offline political actions ×Civil society participation	-0.124	0.021	-0.099*	-0.071***	0.026
	(0.101)	(0.032)	(0.054)	(0.025)	(0.026)
Civil society participation	-4.968	-3.990**	-1.175	0.469	-0.272
	(3.544)	(1.578)	(1.653)	(1.157)	(0.782)
Dependency ratio	13.048***	2.924**	-0.417	4.773***	5.768***
	(3.357)	(1.479)	(1.968)	(1.115)	(1.112)
Equal opportunities	-0.078	-0.012	-0.014	-0.051**	-0.001
	(0.057)	(0.028)	(0.033)	(0.022)	(0.020)
Educational level	-1.188***	-0.134	-0.230	-0.428***	-0.396***
	(0.431)	(0.224)	(0.170)	(0.151)	(0.122)
Democracy	-0.291	-0.181*	-0.086	0.019	-0.043
	(0.220)	(0.094)	(0.097)	(0.084)	(0.060)
Equal distribution of resources	-5.680**	-2.170**	-2.328**	-0.353	-0.830
	(2.453)	(1.082)	(1.118)	(0.826)	(0.689)
	Panel B: Time-invariant/Second stage				
social media used by elites for offline political actions	-0.036	0.015	0.082*	-0.060	-0.073**
	(0.144)	(0.076)	(0.045)	(0.046)	(0.034)
Constant	9.207**	2.048	4.240*	1.627	1.291
	(3.763)	(1.603)	(2.195)	(1.349)	(1.316)
Observations	827	827	827	827	827
Countries	46	46	46	46	46

Notes: *, **, *** denote statistical significance at the 10%, 5% and 1% levels, respectively. Robust standard errors reported in parenthesis.

The interacting effect of social media as used by elites and education on political fragility is also positive and significant, but lower than the interacting effect of social media, as used by the total population (0.095 against 0.116). For the levels of democracy and civil society participation remaining constant, education still amplifies with no threshold, the political fragilization effect of social media use by elites. In fact, the threshold value of -0.863 (-0.082/0.095) is negative.

The interacting effect of social media as used by elites and education on social fragility becomes negative and non-significant (-0.003) against the positive and significant value of (0.100) when social media is used by the total population. Once more, education does not shape the relationship between social media as used by elites and social fragility.

The interacting effect of social media as used by elites and democracy on state fragility becomes negative and significant (-0.153) against the positive and non-significant interacting effect of social media as used by the total population and democracy on state fragility (0.143). Since the direct effect of social media on state fragility (-0.036) is not significant, democracy mitigates with no threshold, the effect of social media use by elites on global state fragility.

The interacting effect of democracy and social media use by elites on political fragility is negative (-0.073). When the levels of education and civil society participation remain constant, democracy mitigates the effect of social media use by elites on political fragility. The effect of social media use by elites on political fragility becomes negative for any level of democracy exceeding the threshold value of 1.123 (0.082/0.073).

The interacting effect of the democracy and social media use by elites on economic fragility is also negative (-0.077). But as the direct effect of social media use by elites on economic fragility (-0.060) is not significant, democracy mitigates without a threshold, the effect of social media use by elites on economic fragility. This finding, in as much as social media is used by elites, corroborates with the view of Shirky (2008), who upholds that the political use of social media ultimately enhances freedom to speak online, thus to publish online. The latter enables one to connect with others and by so doing reduces fragility. The previous finding contradicts the view of Zakaria (2003), who contend that democratization in developing countries produces poor economic outcomes, political instability and ethnic conflict.

Contrarily to social media as used by the entire population, the interacting effects of social media as used by elites and civil society participation on state fragility, on Security

fragility and on social fragility are not significant with respective values of -0.124 and 0.021 and 0.026 against respective negative and significant values of -4.474, -1.315 and -0.962. Civil society participation does not shape the relationship between social media as used by elites and global state fragility, Security fragility and social fragility.

The interacting effect of social media as used by elites and civil society participation on political fragility is negative and significant (-0.099). When the levels of education and democracy remain constant, civil society participation mitigates the effect of social media use by elites on political fragility. The effect of social media use on political fragility becomes negative when civil society participation exceeds the threshold value of 0.82 (0,082/0,099).

The interacting effect of social media as used by elites and civil society participation on economic fragility remains significant and negative (-0.071). Since the direct effect of social media use by elites on economic fragility is not significant (-0,060), civil society participation mitigates the effect of social media as used by elites on economic fragility with no threshold.

4.4 Robustness check

Although the results in previous sections provide strong evidence of correlations between social media and fragilities, it seems realistic to examine the outcomes using different estimators. Thus, the empirical results of this exercise, which are presented in Table 7, are almost similar to the panel sequential linear estimations. The corresponding regressions with the remit of GMM satisfy the AR (1), AR (2) as well as Hansen specification tests. Accordingly, evidence of a second serial correlation is not apparent while there is strong evidence of a first serial correlation. Furthermore, the regressions were positive to the Hansen test and hence, confirmed the validity of the instruments.

Table 7: The effects of social media as used by peoples on fragilities, GMM estimator

	State fragility index	Security fragility	Political fragility	Economic fragility	Social fragility
State fragility index L1	0.292*** (0.062)				
Security fragility L1		0.548*** (0.022)			
Political fragility L1			0.442*** (0.036)		
Economic fragility L1				0.241*** (0.008)	
Social fragility L1					0.101*** (0.027)
Social media use by elites to organize offline political actions	-0.399*** (0.111)	-0.269*** (0.044)	0.052 (0.050)	-0.162*** (0.007)	-0.018 (0.020)
Equal opportunities	-0.007 (0.007)	0.004* (0.002)	0.011*** (0.002)	-0.004*** (0.001)	-0.009*** (0.002)
Dependency ratio	5.533*** (1.892)	0.108 (0.433)	-0.054 (0.536)	0.842*** (0.126)	3.310*** (0.474)
Civil society participation	-2.239*** (0.458)	-0.756*** (0.214)	-0.815*** (0.311)	-0.077 (0.051)	-0.065 (0.246)
Educational level	-0.489*** (0.090)	-0.131*** (0.024)	-0.032 (0.040)	-0.074*** (0.002)	-0.488*** (0.047)
Democracy	-0.167*** (0.037)	-0.033*** (0.009)	-0.082*** (0.012)	0.003* (0.002)	-0.003 (0.006)
Equal distribution of resources	-1.136* (0..709)	0.957*** (0.353)	-0.172 (0.219)	0.957*** (0.130)	-0.522 (0.574)
Constant	7.960*** (1.492)	1.010** (0.425)	2.286*** (0.627)	3.178*** (0.184)	3.769*** (0.430)
Countries	46	46	46	46	46
Instruments	41	41	41	41	41
AR (1)	-3.552***	-3.540***	-3.581***	-2.106**	-4.206***
AR (2)	1.107	1.531	2.426	-.7077	1.461
Hansen	35.073	29.009	30.912	36.560	35.898
Wald (Chi2)	372.86***	123.49***	108.57***	167.49***	131.28***

Notes: *, **, *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Baseline results using the GMM estimator confirm the negative effect of social media as used by the population on state fragility, Security fragility, economic fragility and social fragility. The effect of social media's use on political fragility remains positive but not significant. It could therefore be concluded that social media globally reduces state fragility and its different components except political fragility. Baseline results also confirm the negative effects of equal opportunities on state fragility, economic and social fragility dynamics and the positive effect on political fragility.

The negative effects of civil society participation on state fragility and different components of fragility are confirmed, except for social fragility. The GMM estimator

confirms the negative effects of education on state fragility, economic fragility and social fragility. In addition, the GMM estimator also confirms the negative effect of democracy on political fragility and social fragility but a positive effect on economic fragility.

The GMM estimator (Table 8) also confirms the positive effect of social media as used by elites on state fragility, Security fragility and political fragility as well as the negative effect of social media as used by elites on economic and social fragility.

Table 8: The effects of social media as used by elites on fragilities (GMM estimator)

Variables	State fragility index	Security	Political fragility	Economic fragility	Social fragility
State fragility index L1	0.268*** (0.061)				
Security fragility L1		0.553*** (0.022)			
Political fragility L1			0.376*** (0.042)		
Economic fragility L1				0.216*** (0.012)	
Social fragility L1					0.090*** (0.027)
Social media use by elites for offline political actions	0.215** (0.106)	0.089* (0.055)	0.124*** (0.040)	-0.042** (0.021)	-0.096*** (0.023)
Equal opportunities	0.005 (0.007)	0.005** (0.002)	0.016*** (0.002)	-0.006*** (0.001)	0.009*** (0.002)
Dependency ratio	6.024*** (1.718)	-0.097 (0.374)	-0.293 (0.543)	0.988*** (0.207)	3.375*** (0.463)
Civil society participation	-2.034*** (0.409)	-0.622*** (0.220)	-0.494* (0.304)	-0.151* (0.084)	-0.074 (0.253)
Educational level	-0.404*** (0.081)	-0.066*** (0.020)	-0.016 (0.033)	-0.128*** (0.004)	-0.479*** (0.047)
Democracy	-0.167*** (0.036)	-0.037*** (0.009)	-0.097*** (0.015)	0.003* (0.002)	-0.001 (0.006)
Equal distribution of resources	-0.939 (0.623)	-0.966*** (0.299)	-0.508*** (0.176)	0.983*** (0.176)	-0.403 (0.574)
Constant	7.769*** (1.564)	1.079*** (0.400)	2.876*** (0.625)	3.165*** (0.239)	3.827*** (0.426)
Countries	46	46	46	46	46
Instruments	41	41	41	41	41
AR (1)	-3.386	-3.594	-3.641	-2.124	-4.193
AR (2)	1.062	1.526	.208	-.547	1.375
Hansen	33.620	31.110	34.929	36.174	35.555
Wald (Chi2)	1339.70***	3651.50***	390.04***	687.41***	231.62***

Notes: *, **, *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

The signs and significance of effects of civil society participation on state fragility and their different components remains almost unchanged, confirming that globally, these variables reduce fragilities. Also, signs and the significance of effects of democracy on political, economic and social fragility remain unchanged, confirming that democracy reduces both political and social fragilities but increases economic fragility. Finally, the negative and significant effects of education on state, economic and social fragilities are confirmed.

In an attempt to confirm the existence of some transmission channels, we run the regression of Equation (2) using the system GMM estimator. The results in Table 9 show that the positive interaction effect of social media, as used by the population and education, has been confirmed for economic and social fragilities.

Table 9: The effects of social media as used by people on fragilities: Some transmission channels (GMM estimator)

Variables	State fragility index	Security fragility	Political fragility	Economic fragility	Social fragility
State fragility index L1	0.364***				
	(0.042)				
Security fragility L1		0.507***			
		(0.018)			
Politic L1			0.441***		
			(0.040)		
Economic fragility L1				0.184***	
				(0.011)	
Social fragility L1					0.067**
					(0.026)
Social media use by elites to organize offline political actions×Educational level	0.273***	-0.030*	0.273***	0.015**	0.097***
	(0.071)	(0.016)	(0.027)	(0.007)	(0.012)
Social media use by elites to organize offline political actions×Democracy	0.088***	0.042***	0.055***	0.014***	0.003
	(0.018)	(0.004)	(0.011)	(0.002)	(0.004)
Social media use by elites to organise offline political actions×Civil society participation	-0.599	-0.468**	-1.610**	-0.018	-0.476**
	(0.858)	(0.190)	(0.639)	(0.127)	(0.222)
Equal opportunities	-0.003	0.002	0.015***	-0.005***	-0.010***
	(0.007)	(0.003)	(0.003)	(0.001)	(0.002)
Dependency ratio	5.240***	-0.099	0.640*	0.985***	2.972***
	(1.844)	(0.418)	(0.377)	(0.149)	(0.485)

Civil society participation	-3.155*	-1.622***	2.770*	0.065	0.730**
	(1.738)	(0.390)	(1.565)	(0.184)	(0.368)
Social media use by elites to organize offline political actions	1.275**	0.074	2.261***	-0.227***	-0.224**
	(0.502)	(0.075)	(0.326)	(0.080)	(0.108)
Educational level	0.151	-0.064***	-0.597***	-0.109***	-0.725***
	(0.194)	(0.033)	(0.044)	(0.012)	(0.046)
Democracy	0.364***	-0.126***	-0.202***	-0.026***	-0.010
	(0.042)	(0.007)	(0.024)	(0.004)	(0.011)
Equal distribution of resources	-0.273***	1.104***	0.205	0.874***	-0.511
	(0.071)	(0.376)	(0.243)	(0.144)	(0.549)
Constant	0.088***	1.548***	-3.200***	3.390***	4.873***
	(0.018)	(0.351)	(1.053)	(0.174)	(0.496)
Countries	46	46	46	46	46
Instruments	44	44	44	44	44
AR (1)	3.86***	-3.580***	-3.812***	-1.959**	-4.313***
AR (2)	1.217	1.388	.115	-.463	1.543
Hansen	38.300	33.371	28.093	32.791	37.277
Wald (chi2)	4582.78***	4169.15***	7843.64***	7739.48***	8774.11***

Notes: *, **, *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

The interacting effect of social media as used by elites and civil society participation on state fragility in Table 10 is negative and remains significant (-0.029). There is no threshold value of civil society participation as the direct effect of social media use by elites on state fragility (0.243) is not significant.

Also, the interacting effect of social media as used by elites and civil society participation on political fragility is negative and remains significant (-0.009). If the democracy and educational levels remain constant, the threshold value of civil society participation is 4.9 (0.441/0.009). In other words, the effect social media on political fragility becomes negative only when the civil society participation score exceeds the value of 4.9.

Furthermore, the positive interacting effect of social media, as used by elites and civil society participation, on Security fragility is also confirmed with no threshold value.

Table 10: The effects of social media as used by elites on fragilities: some transmission channels (GMM estimator)

As the direct effect of	State fragility index	Security fragility	Political fragility	Economic fragility	Social fragility
State fragility index L1	0.301*** (0.070)				
Security fragility L1		0.540*** (0.023)			
Political fragility L1			0.369*** (0.037)		
Economic fragility L1				0.183*** (0.021)	
Social fragility L1					0.113*** (0.031)
Social media use by elites to organize offline political actions ×Educational level	0.018 (0.043)	0.007 (0.026)	0.099*** (0.023)	0.013 (0.016)	0.061*** (0.017)
Social media use by elites to organize offline political actions ×Democracy	-0.052** (0.023)	-0.011 (0.013)	-0.021** (0.011)	-0.007*** (0.002)	-0.011*** (0.004)
Social media use by elites to organize offline political actions ×Civil society participation	-0.029*** (0.007)	0.004** (0.002)	-0.009*** (0.002)	0.000 (0.001)	-0.013*** (0.004)
Equal opportunities	-0.008 (0.006)	0.005** (0.003)	0.015*** (0.003)	-0.006*** (0.001)	-0.009*** (0.002)
Dependency ratio	5.738*** (1.859)	0.195 (0.448)	0.375 (0.336)	1.053*** (0.207)	3.479*** (0.434)
Civil society participation	-1.909*** (0.361)	-0.706*** (0.200)	-0.593** (0.277)	-0.170** (0.082)	-0.082 (0.283)
Social media use by elites to organize offline political actions	0.243 (0.204)	0.100 (0.125)	0.441*** (0.082)	-0.120 (0.084)	-0.351*** (0.089)
Educational level	-0.455*** (0.098)	-0.088 (0.062)	0.205*** (0.063)	-0.151*** (0.029)	-0.573*** (0.060)
Democracy	0.008 (0.049)	0.000 (0.019)	-0.044* (0.024)	-0.013*** (0.004)	0.024*** (0.009)
Equal distribution of resources	0.741 (0.636)	0.778** (0.306)	-0.640*** (0.237)	1.028*** (0.177)	-0.222 (0.575)
Constant	7.685*** (1.246)	0.994** (0.515)	1.380*** (0.507)	3.349*** (0..239)	4.001*** (0.512)
Countries	46	46	46	46	46
Instruments	44	44	44	44	44
AR (1)	-3.318	-3.560	-3.693	-1.959	-4.082
AR (2)	1.120	1.542	.229	-.470	1.370
Hansen	32.358	29.075	35.166	33.123	35.093
Wald (Chi2)	1631.89***	1823.93***	6839.92***	4168.62***	4456.82***

Notes: *, **, *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

5. Conclusion

Departing from the ongoing debate on the effects of social media on political fragility, which opposes the techno-optimistic position to the techno-pessimistic one, this research participates in this intellectual confrontation by empirically analyzing the effect of social media on fragilities. The paper goes beyond political grounds and integrates other dimensions of fragility such as Security fragility, economy and social. It uses annual data, within a balanced panel, including 47 African countries for the period 2000–2018. This work applies the SLPD estimation and system GMM techniques to investigate the social media-fragility relationship and to address time invariant variables. The study analyzes the role of democracy, education and civil society participation in shaping the relationship between social media and fragilities.

Results reveal that the use of social media by the public to organize offline political activities has no effect on global fragility, but it instead reduces economic fragility. However, the use of social media by elites to organize offline political actions significantly boosts global state fragility. This operates through Security fragility and political fragilities. The techno-pessimistic perception of the effect of social media fragility is founded, especially when used by elites. The first hypothesis of the study is valid as far as social media is used for offline political actions by elites but it is unconfirmed when is used by people.

Among other findings, social media used either by people or by elites to organize offline political actions is significantly and negatively associated with higher civil society participation, education and democracy. The second hypothesis is valid in Africa.

The use of social media to organize offline political actions either by people or by elites in the context of higher civil society participation reduces fragility, while its use either by people or by elites in the context of higher educational level accentuates state fragility.

The use of social media to organize offline political actions by people in the context of democracy accentuates fragility but its use by elites in the same context reduces fragility. Moreover, a higher rate of social media, as used by elites to organize offline political actions in a context of higher democracy, reduces global state fragility. Social media represent a tool that can enable one to improve the resilience of African countries. However, to seize this opportunity, policies with more provisions for a dynamic civil society are among important levies. Also, programs based on sensitizing people on the threats and opportunities of social media and civic education will help to better valorize social media. The quality of education and democracy should be improved in order to profit from the potentials of social media used

by populations, while sensitizing elites on dangers of the wrong use of social media for political action is necessary.

The findings in this study evidently leave space further research, especially in the light of assessing the influence of social media on inclusive development outcomes. Moreover, examining the proposed nexuses within country-specific remits would improve room for policy implications. Future studies should also avoid multiple interactions when assessing the relevance of moderators in order to facilitate the computation of potential tipping points. In this requested future research direction, one interaction per specification can more conveniently provide insights from which to compute tipping points.

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Appendices

Appendix 1: List of countries involved in this study

Algeria, Benin, Burkina Faso, Cameroon, Congo Republic, Ivory coast, Gabon, Bissau Guinea, Lesotho, Mali, Namibia, Niger, Central Africa Republic, Eswatini, Chad, Togo, South Africa, Botswana, Burundi, Ethiopia, Egypt Gambia, Ghana, Guinea, Kenya, Madagascar, Malawi, Maurice, Nigeria, Niger, Sierra Leone, Tanzania, Tunisia, Uganda, Zambia, Angola, Morocco, Mozambique, equatorial guinea, Democratic Republic of Congo, Liberia, Libya, Mauritania, Rwanda, Senegal, Sierra Leone, South Africa, Sudan, Zimbabwe.

Appendix 2

Appendix table 1: Data and sources.

Variables	Codes	**Proxy**	**Source**
State fragility index	$Fragility_{it}$	The composite index of fragility with four dimensions: economic, social, security and political fragilities	Center for systemic peace database
Economic fragility	$Economic_{it}$	The economic index is calculated using the economic decline, uneven economic development, human flight and brain drain,	Center for systemic peace database
Political fragility	$Politic_{it}$	The index is estimated using the state legitimacy, public services, human right and rule of law.	Center for systemic peace database
Social fragility	$Social_{it}$	The index is calculated using the demographic pressure, the refugees and internal displaced persons and external intervention.	Center for systemic peace database
Security fragility	$Security_{it}$	The index is calculated using three Security fragility apparatus, fractionalized elites and group grievance	Center for systemic peace database
People use of Social media to organize offline political actions	$Socialmed_{it}$	Average propensity of people to use social media to organize offline political actions such as petition signing, voter turnout, street protests, strikes/labor actions, riots, organized rebellion, terrorism, genocide.	V-dem database (2020)
Elite use of social media for off line political actions	$Socialmelite_{it}$	Average propensity of elites to use social media to organize offline political action.	V-dem database (2020)
Equal opportunity	$Equalopp_{it}$	Extent to which men and women, members of ethnic or religious groups have the same opportunities with access to education, public office and employment. Score ranges from 0 (inequality) to 10 (equality).	V-dem database (2020)
Equal distribution of resources	$Equalreses_{it}$	It is an index that measures the extent to which tangible and intangible resourses are equally distributed in society. The values of the index vary from unequal distribution (0) to equal distribution of resources (1).	V-dem database (2020)
Level of democracy	$Democracy_{it}$	It is calculated using **P-polity** score from Center for systemic peace. The score ranges from (-10) least democratic to (+10) most democratic.	Center for systemic peace database
Civil society participation	$CSOP_{it}$	Extent to which Civil Society Organizations (CSOs) are routinely consulted by policymakers, the involvement of people in CSOs, women prevention from participating and the extent of centralization of legislative candidate nomination within party organization.	V-dem database (2020)
The Educational level	$Educ_{it}$	Average number of years of total schooling across all education levels for the population aged 25 years and more. It ranges from 0 lowest to 1 highest and drawn from	WDI database
Dependency ratio	$Depratio_{it}$	Ratio of inactive population to active population expressed in percentage	WDI database