

# Do online social networks affect information asymmetry?

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## Abstract

*This paper empirically explores the impact of online social networks on information asymmetry, based on an international survey conducted in January - August 2021, with 930 respondents. The methodology follows cross-sectional multivariate regressions augmented by a Structural Equation Modeling (SEM) approach. The findings show that young people living in their origin country are more prone to check the veracity of information read, especially those who are Non-Governmental Organization (NGO) activists. Europeans are very sensitive regarding the veracity of posted information. The number of spoken languages facilitating both processes. Additionally, the information asymmetry is attenuated when the users spend more hours on online social networks or use more platforms. The core result is very interesting, showing that the posted information without serious filters during the reading stage is a serious source of asymmetry. Not least, the owner and government restrictions nonlinearly affect information asymmetry by inverted U-shape. This reinforces the idea that none of those characteristics can be absolutized to improve information asymmetry.*

**Keywords:** Information asymmetry, online social network, determinants, effects.

## Introduction

In the last decades, the rapid spread of the Internet generated ample and irreversible mutations in most domains of activity worldwide. Those transformations generated very complex implications, especially from an informational point of view. As traditionally current sources of information were the written and audio-visual media, step-by-step the online facilities alternatively started to replace them, running from the online written press, blogs, and online audio-video platforms to social networks. This culminates with Facebook's vanguard online 'metaverse' concept, creating an advanced virtual reality.

Out of those new online facilities, Online Social Networks (OSNs) raise a particular interest, radically changing the approach to information asymmetry. While the quality and flow of information are fully managed by their 'producer' in the classical online environment, the user is alternatively 'consumer' and 'producer' in the OSNs. According to Stefanone et al. (2010), the netizen often self-discloses high levels of personal information on social platforms (e.g. live, favorite hobbies, relationship status, etc.), offering them to a largely anonymous audience. In

parallel, other valuable information is also posted. Those tend to be more relevant than the information accessed via the usual channels (Granovetter, 1983), are more reliable, and less redundant (Kauffman et al., 2019). Unfortunately, the users do not share information with other users with the same magnitude and quality (Berger & Luckmann, 2008). Not least, the OSNs mitigate the cost of information for both consumers and producers, facilitating the spread of information given their free general access (i.e., low barriers to entry and reliance on user-generated content). All these characteristics raise “questions about possible information asymmetric situations” (Stefanone et al., 2015, p. 376), occurring in every sphere of life that supposes information exchange. Information asymmetry is an economics concept developed by Akerlof (1970), revolutionizing many domains further. The theory's central idea is that asymmetric information occurs when one of two dealing parties in a transaction owns more relevant information than the other. The better-informed part will adjudicate benefits in detriments of the less informed part who will assume costs. This approach can be easily extrapolated to OSNs. Herein, besides the information asymmetry generated by the technical access to the virtual environment, a second type can derive from the veracity of shared information. In other words, the users share true and/or false information differently, irrespective of whether they are 'consumers' or 'producers' of information. Buechel et al. (2023) defined two kinds of information asymmetry related to the veracity of shared information: decay asymmetry and network asymmetry. The *decay asymmetry* means that “the false information tends to be shared further in a network than true information”, while the *network asymmetry* supposes that “true and false information is shared more or less heavily in different parts of a given network” (Buechel et al., 2023, p. 2). Two derived issues can also follow this information asymmetry: adverse selection (i.e., the dealing parties have different information) and moral hazard (i.e. one of the dealing parts increases its risk exposure because it does not bear the full costs of that risk).

OSNs' effects of information asymmetry can be treated from two perspectives. On the one side, the positive effects of OSNs in society are incontestable (Bekalu et al., 2019): build personal relationships and businesses, facilitate the freedom of expression, support empathy and kindness, improve the quality of communication, and support learning, education and creativity. On the other side, the information asymmetry generated by OSNs also has various negative implications in almost all domains of activity. The OSNs can amplify “economic, political, and cultural grievances across the globe” (Zhuravskaya et al., 2020, p. 416). For example, they can generate additional transaction costs, especially in the capital market, forcing the appearance of so-called 'market failure'. From a political perspective, the OSNs were blamed in democracy for promoting populism (Pomerantsev, 2019). However, they helped coordinate the protests in autocratic regimes as they gave a voice to the opposition (Ghonim, 2012). Morozov (2011) also observes that autocratic regimes can use social media for surveillance and propaganda and distract voters from the political agenda. Finally, the sociocultural effects are mainly related to the spread of xenophobia and the proliferation of fake news, as Pomerantsev (2019) noted.

The theoretical ground of this study is given by Akerlof's (1970) theory of information asymmetry but assumes a dynamic individual asymmetry derived from the contribution of Buechel et al. (2023). In other words, as the people are differently impacted by the information shared via the OSNs, they will develop heterogeneous socio-economic, political, and cultural dynamic perceptions related to a given topic. More precisely, there is a continuous 'update stand-by' status

that dynamically modifies the level of information asymmetry. Besides access to information, decay, and network asymmetries also play a crucial role. On this ground, this paper analyses the impact of OSNs on information asymmetry, based on a survey conducted over the period January - August 2021, with more than 900 respondents. The empirical part follows cross-sectional multivariate regression analysis augmented by a Structural Equation Modeling (SEM) approach. The key interesting finding shows that the posted information without serious filters during the reading stage is a serious source of asymmetry. At the same time, the owner and government restrictions have a nonlinear effect on asymmetry by inverted U-shape.

The contribution of this paper is threefold. First, to the best of our knowledge, this paper is one of the first studies investigating the factors of information asymmetry in the social area by considering the 'consumer' and 'producer' behavior as well as the quality and flow of information. Second, unlike the rest of this paper focused on a strictly linear approach, as a novelty, the analysis considers the nonlinear effects of several determinants. Third, this study also investigates the sensitivity of the signs of variables by alternatively testing them in different scenarios. The rest of this paper is structured as follows: Section 2 offers the theoretical background, Section 3 presents the data and methodology, and Section 4 shows the empirical results. Finally, Section 5 reveals the conclusions.

## **Theoretical Background**

The literature regarding the information asymmetry generated by OSNs is minimal. Most of the papers treat information asymmetry from an economic perspective, focusing on financial market transactions (Healy & Palepu, 2001). Despite this scarcity, many papers indirectly treat the OSNs related to information asymmetry. There are two strands of literature. The first strand is linked to the veracity of information read/posted on OSNs, while the second strand regards the control of information flow and information content. Both aspects strongly influence information asymmetry.

The strand devoted to the **veracity of information** read/posted on OSNs explores the issue of content validity. The information rapidly spreads on online media in various forms, ranging from true to fake news, malicious rumors, fabricated reviews, or generated images and videos (Lozano et al., 2020). In this case, the validation check process follows a specific personal assessment. This step strongly depends on the profile and background of users and their trust perception of reality (i.e., the perception is often altered by motivational reasoning). For example, Khan and Idris (2019) conduct a survey with 396 respondents to study the ability to identify false information and the behavior of informational sharing without verification. Their results reveal that income, level of education, Internet skills of information seeking and verification, and attitude related to verification are the main factors in misinformation detection on social media. Moreover, the “sharing of information on social media without verification is predicted by Internet experience, Internet skills of information seeking, sharing, and verification, attitude towards information verification, and belief in the reliability of information” (Khan & Idris, 2019, p. 1194). Unlike them, Buchanan (2020) found that personality (i.e., lower agreeableness and conscientiousness, higher extraversion and neuroticism) and demographic background (i.e., male gender, lower age, and lower education) are weakly correlated with the propensity of informational sharing on social

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media platforms. In parallel, Brashier and Schacter (2020) focused on older adults, claiming that late adulthood generates less accuracy in communication. More precisely, as newcomers to social media, older adults function with more difficulty with respect to spotting sponsored content and manipulated images. Based on this literature strand, the first general hypothesis can be constructed, as follows:

*H<sub>1</sub>: The demographic profile and background of the users of OSNs influence the veracity of information read/posted.*

The second strand of literature treats the **control of information flow and information content**. Herein, the technical access limitations, owner censure, government regulation, or proposed topics have a crucial impact on asymmetry. Technically speaking, referring to investors, Hodge et al. (2004) appreciate that Internet technology facilitates access to information, allowing better analyzing and understanding of them, with a superior degree of interpretation. Moreover, Black (1998) emphasizes that the Internet can accentuate information asymmetry via the costs by undercutting the effectiveness of institutions in charge of monitoring information quality provided by issuers. Policymakers also play an important role, as Buechel et al. (2023) emphasized. Without the knowledge of the true state of information, they have the propensity to mitigate information asymmetry by fostering informational shareability. Unlike them, Heinrichs et al. (2011) focused on the users of OSNs, analyzing their access methods and social networking tool usage. The main findings show that the high-usage groups seem to have the highest perception of ease of use for both access methods and types of social networking sites. Not least, Momeni et al. (2018) revealed that older people experienced more barriers and difficulties in using online social networks because of their low web-based skills. In this context, a second hypothesis can be formulated as follows:

*H<sub>2</sub>: The intensity of access to OSNs influences information asymmetry.*

After the ‘Trump incident’, when Facebook banned the former US president's page, a vast debate arose about the right of OSNs to restrict some users for various motives. On the one side, private companies have the right to choose whom to have as their customers. In contrast, on the other side, private companies cannot ban any individuals as they provide vital communication networks. Those companies can modify the flow of information received by 'consumers' by banning access or moderating the content regardless of the situation. Gillespie (2018) showed that it is appropriate for OSNs “to protect one user from another, or one group from its antagonists, and to remove the offensive, vile, or illegal - as well as to present best face to new users, to their advertisers and partners, and the public at large” (p. 5). Cobbe (2020) offered a generous literature review on this topic. Therefore, the third hypothesis can be as follows:

*H<sub>3</sub>: The restrictions imposed by OSNs modify the information asymmetry.*

Similarly, government intervention also can influence asymmetry by disrupting the information flow in specific cases. For example, Tucker et al. (2017) analyzed the ethical and technological challenges regarding Internet regulation in democratic regimes. According to Zhuravskaya et al. (2020), many countries already regulate the propagation of hate speech on OSNs, while many more started the discussions. A handy review of the literature regarding the opportunity for government regulation of OSNs is offered by Samples (2019) by showing that many people “believe that government should actively regulate the moderation of social media platforms to

attain fairness, balance, or other values” (p. 1). The fourth hypothesis can be developed in this context:

*H<sub>4</sub>: The government regulation of OSNs influences information asymmetry.*

Finally, the information content can also be a source of asymmetry. These are true or false information that can manipulate the users in different ways, having a strong persistence in networks (Buechel et al., 2023). For example, Aly and Simpson (2018) explained that many people combat the use of political correctness in OSNs as resentment over the increasing influence of progressive activists. Otherwise, freedom of speech is also investigated. Graciyal and Viswam (2018) stated that social media platforms support the freedom of speech to a very high degree, but this can be understood as a form of limited rights. Finally, the fifth hypothesis is as follows:

*H<sub>5</sub>: The information content on OSNs influences information asymmetry.*

To summarize, the literature exploring the information asymmetry determined by OSNs is in its incipient stage, missing especially the studies focused on the main determinants of asymmetry. In this context, the study addresses this gap by offering a comprehensive analysis based on an international survey.

## **Data and Methodology**

### **Dataset**

The dataset is constructed based on a survey conducted in January - August 2021, the questionnaire being administrated via both online social and professional platforms, more precisely LinkedIn, and subsequently Facebook. Both English and French languages have been used in the questionnaire. Additionally, the questionnaire has been shared in academic and professional international environments through emails. The questionnaire is anonymous, with 31 questions, including two sets. The first set (Set A) captures respondents' demographic profile and background (i.e. 15 questions, the last one conditioning the second set). The second set (Set B) includes questions regarding the use of OSNs, including intensity of use, restrictions imposed by owners, governmental regulations, and the information content (i.e., 16 questions). One follow-up was done in April 2021 to improve the number of respondents, fitting the rule of thumb suggested by Roscoe (1975). More precisely, in multivariate regression analyses, as in this study, the sample size is recommended to be preferably 10 times or larger than the number of variables (i.e., minimum 31 x 10).

All details regarding the questions, types of scales, transformed types of scales, and names of variables are presented in Appendix A. Each collected answer represents an item further converted into a variable, having a transformed scale, as Appendix A shows. Except for dummies, the rest of the variables are finally rescaled from 1 to 100 in order to ensure a comparative scale, as follows:

$$Xr_i = \frac{(b-a)(X_i - X_{min})}{X_{max} - X_{min}} + a \quad (1)$$

where,  $X_i$  is the targeted variable to be rescaled of interviewed person  $i$ ,  $Xr$  is the rescaled variable,  $X_{min}$  and  $X_{max}$  are the minimum and maximum values, while  $a$  and  $b$  denote the minimum and

maximum values of chosen scale (i.e.  $a=1$  and  $b=100$ ). Besides its statistical descriptive valence, Set A is also considered to investigate the main determinants of information validity, which are read or posted on the OSNs. The core of the empirical part is based on Set B, analyzing the impact of OSNs' use on information asymmetry. Herein, as a dependent variable, the information asymmetry measurement represents a considerable challenge as this study covers a more general socio-economic approach. To this end, the Probability of Informed Trading (PIN) proposed by Easley et al. (1996) is called to support this target. The PIN is related to the capital market field, capturing the order imbalances between the buys and sells signal under adverse selection risk. The measure is not directly observable, being a function of estimated theoretical parameters of a microstructure model, as follows:

$$PIN = \frac{\alpha\mu}{\alpha\mu + E_r + E_p} \quad (2)$$

where  $\alpha$  is the probability of an information event to occur between trading days,  $\mu$  is the arrival rate of orders from the informed traders, while  $E_r$  and  $E_p$  are the arrival rates of buy and sell orders.

Inspiring from PIN, in our approach, the buyers are considered the OSNs users as readers, while sellers are the OSNs users who post information. The probability of an information event occurring is assimilated to the measure in that information is validated by reality, while the arrival rate of orders is related to the measure in that the information posted on the OSNs is/was helpful for socio-economic life. Unlike PIN, given the individual perception of users with respect to online information, information asymmetry is seen as a dynamic and individual construct in our approach, being directly observable. Inspired by PIN, four variables from the second set are used to construct the individual Information Asymmetry Index (IAI), as follows:

$$IAI_i = \frac{(1-\gamma)(1-\delta)}{(1-\gamma)(1-\delta) + \Pi_r + \Pi_p}, \text{ with } IAI_i \in [0,1] \quad (3)$$

where  $IAI_i$  is the information asymmetry index attributed to the individual  $i$ ,  $\gamma$  denotes how much of the information from OSNs is validated by reality (i.e. validated\_reality), while  $\delta$  represents the measure in that the information posted on the OSNs is/was helpful for socio-economic life (i.e. info\_helpful).  $\Pi_r$  and  $\Pi_p$  capture the measures in that the information read/posted on the OSNs are checked for validity (i.e. verify\_read, and verify\_post). The formula clearly shows that  $IAI$  decreases when  $\gamma$  or  $\delta$  increases, reducing the information asymmetry. Similarly, when  $\Pi_r$  and  $\Pi_p$  improve, the  $IAI$  also mitigates, attenuating the information asymmetry. Conversely, the information asymmetry increases as  $\gamma$  or  $\delta$ , and  $\Pi_r$  or  $\Pi_p$ , reduce.

## Methodology

The methodology has three parts: the first part explores the dataset's quality, the second part is devoted to the cross-sectional multivariate regression analysis, and the last part considers an SEM approach. The *dataset's quality* is tested from both reliability (i.e. Cronbach's alpha test) and validity (i.e. Pearson correlations) perspectives. Descriptive statistics are also presented. The *cross-sectional multivariate regression analysis* represents the core methodological part, being split into two stages.

(1) The first stage is devoted to analyzing **determinants of information validity** in OSNs based on the user's demographic profile and background (i.e. Set A). This stage highlights the

characteristics of users and their influences on the validity of both read and posted information. These have a crucial impact on information asymmetry. The information validity model is as follows:

$$V_{r/p\ i} = a + bX_{1i} + cX_{2i} + \varepsilon_i \quad (4)$$

where,  $V_{r/c\ i}$  is the dependent variable attributed to the individual  $i$  capturing the measures in that the information read/posted by users on the OSNs are checked for validity (i.e., `verify_read`, and `verify_post`),  $X_1$  includes the variables measuring the demographic profile of the user (i.e. gender, age, `origin_country`, continent, and urban), while  $X_2$  represents the variables capturing the background of users (i.e. education, employed, `private_sector`, active, `income_net`, languages, `political_activist`, `ngo_activist`, and `religious_activist`). The constant term is  $a$ , the coefficients of independent variables  $b$  and  $c$ , and the errors  $\varepsilon$ .

(2) The second stage investigates the **impact of the use of OSNs on information asymmetry**, extensively analyzing the impact of different factors on information asymmetry (i.e. Set B). Their nonlinear effects are considered as well. The information asymmetry model has this form:

$$IAI_i = a' + b'X'_{1i} + c'X'_{2i} + d'X'_{3i} + \varepsilon'_i \quad (5)$$

where,  $IAI_i$  is the dependent variable attributed to individual  $i$ ,  $X'_1$  includes variables capturing the access to OSNs (i.e. `access_network`, `hour_network`, and `nr_used_network`),  $X'_2$  refers to variables measuring the restrictions imposed by owners or government (i.e. `owners_restriction`, `owners_innapr`, `already_fully_reg`, `should_be_reg`, `past_restrict_innapr`, and `past_restrict_pol`), and  $X'_3$  denotes the variables regarding the content of information (i.e. `infl_politic_envir`, `red_freedom_speech`, and `presence_pol_correc`). The constant is  $a'$ , the coefficients of independent variables are  $b'$ ,  $c'$  and  $d'$ , while  $\varepsilon'$  stands for errors.

A robustness check is done by sequentially entering the independent variables, also considering their nonlinear effects. This approach offers superior information compared with factor analysis as the sensitivity of signs is checked, and nonlinear effects of several regressors are considered, such as `owners_restriction`, `already_fully_reg`, and `presence_pol_correc`. Concretely, it tested their polynomial order 2. The biological, natural, and social processes that generally follow nonlinear dynamics, as Jordanov and Nikolova (2013) claimed, motivate nonlinearity terms. The access to OSNs is treated as a technical group of factors, not being tested for nonlinearity. Not least, the approach alternatively tests variables with seemingly identical content but differing in terms of 'nuance' (i.e. `owners_restriction` vs. `owners_innapr`; `already_fully_reg` vs. `should_be_reg`).

(3) Finally, the **SEM methodology** extends the regressors with determinants of information veracity pass-through 'verify\_read' and 'verify\_post' variables. In this case, the 'verify\_read' and 'verify\_post' play the role of mediators between determinants of information veracity and IAI and have a direct impact on IAI, as equation (3) shows. In order to ensure the accuracy of estimations, only the significant and robust variables from the 'determinants of information validity' stage are retained (i.e. 'verify\_read' - age, `origin_country`, languages and `ngo_activist` variables; and 'verify\_post' - continent, active and languages). In this SEM stage, there are two measurement models (i.e. 'verify\_read', and 'verify\_post') and one structural model with IAI as a dependent variable (see Appendix A).

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## Findings

### Sample Analysis

A total of 1,001 persons have accessed the questionnaire, seven of them not accepting to participate (i.e. 0.6% of the total). Out of 994 persons who filled out the form, 930 also filled out the second part being users of OSNs (i.e. 93.5% of total respondents). Descriptive statistics of the rescaled sample are presented in Appendix B. Appendix C reveals the frequency of variables related to respondents' demographic profile and background. Table A3 shows that 60% of total respondents are female users, while more than 90% are between 16-49 years old, and 84.5% live in their country of origin (i.e. 87.2% in Europe). Out of 930 users, 96.1% are active persons, 84% are based in the urban area, 65.4% have bachelor's or master's degrees, and 73.8% are employed (i.e. 56.6% in the private sector). More than 50% of total users have a monthly net income between 1,000 and 4,999 Euros, with 77.6% speaking more than two languages. Finally, most of them are not political, NGO, or religious activists (i.e. more than 85% of total respondents). Overall, the respondents belong to the middle-income social class and are young and educated persons, being active in the urban area. They are culturally assimilated into the European profile, living in their countries of origin as non-activist persons.

Set A supports the analysis of determinants of information validity in OSNs based on the user's demographic profile and background. Its related Cronbach's alpha test and Pearson correlations are reported in Appendix D. Cronbach's Alpha test of 0.468 is relatively low, around the accepted limit of 0.5 (George & Mallery, 2003), but is preponderantly explained by dummy variables in the sample. The Pearson coefficients of correlation do not exceed the maximum level of 0.75 suggested by Sekaran and Bougie (2016), indicating that no collinearity issues can arise in employed regressions.

Set B is the ground of analysis regarding the impact of the use of OSNs on information asymmetry. Cronbach's alpha test and Pearson correlations are shown in Table A5 (Appendix). Cronbach's Alpha test of 0.697 is more than reasonable, exceeding the accepted limit of 0.5 suggested by George and Mallery (2003). No collinearity issue is observed as the Pearson coefficients of correlation do not exceed the maximum level of 0.75 recommended by Sekaran and Bougie (2016). Finally, the SEM estimations are employed based on both sets A and B.

### Baseline Regression Results

Table 1 shows the analysis results regarding the **determinants of information validity** for both `verify_read`, and `verify_post` dependent variables. Models 1 and 2 are related to the determinants that can influence the validity of information read on OSNs. Herein, two demographic variables are robust and significant to IAI: age and `origin_country`. Out of them, age is negatively correlated to the `verify_read` dependent variable, while `origin_country` has a positive sign. This suggests that the intensity of the validity check of reading information is higher for young users and more pronounced for people based in their origin country. In other words, mature users are less interested in checking the read information than young ones. The languages regressor is significant by entering the respondents' background profile, positively influencing the dependent `verify_read` variable. This supports the idea that a higher number of spoken languages can improve the capacity

**Table 1.** Regression Results Regarding the Determinants of Information Validity

Variable	Dependent variable: verify_read		Dependent variable: verify_post	
	Model 1	Model 2	Model 3	Model 4
gender	3.286 (1.901)	3.568 (1.903)	-0.631 (1.681)	-0.656 (1.689)
age	<b>-0.112**</b> (0.043)	<b>-0.123*</b> (0.054)	-0.061 (0.038)	<b>-0.081*</b> (0.048)
origin_country	<b>6.659**</b> (2.547)	<b>7.754**</b> (2.636)	4.085 (2.253)	<b>5.702*</b> (2.341)
continent	5.069 (2.777)	4.571 (2.814)	<b>10.41**</b> (2.456)	<b>10.04**</b> (2.498)
urban	-1.299 (2.546)	-1.537 (2.588)	-1.191 (2.252)	-1.435 (2.298)
education		-0.036 (0.064)		0.039 (0.057)
employed		2.043 (2.632)		-2.165 (2.337)
private_sector		-1.642 (2.055)		0.861 (1.825)
active		6.315 (4.824)		<b>7.528*</b> (4.283)
income_net		-0.064 (0.051)		-0.021 (0.045)
languages		<b>0.221**</b> (0.058)		<b>0.199**</b> (0.051)
political_activist		7.025 (3.927)		-0.612 (3.486)
ngo_activist		<b>6.085*</b> (2.772)		1.867 (2.461)
religious_activist		-3.456 (2.671)		-3.236 (2.372)
Constant	<b>63.34**</b> (4.729)	<b>52.26**</b> (7.432)	<b>75.83**</b> (4.183)	<b>61.45**</b> (6.599)
Type of estimation	OLS	OLS	OLS	OLS
R-squared	0.021	0.052	0.028	0.052
F-statistic [prob.]	4.072 [0.000]	3.651 [0.000]	5.438 [0.000]	3.633 [0.000]
Durbin-Watson stat	1.891	1.897	1.885	1.884
Obs.	930	930	930	930

Note: (a) (...) denotes the standard error; (b) \*\* and \* show significance at 0.01 and 0.05 level of significance; (c) OLS is Ordinary Least Squares.

of users to check the validity of reading information. Not least, political\_activist and ngo\_activist determinants are also significant with positive signs, showing that the political and NGO activists are more prone to check the Models 3 and 4 treat the determinants that can influence the check of information validity posted on OSNs. Unlike the models regarding the read information, the continent is a significant and robust demographic regressor, with a positive sign, indicating that the posted information on OSNs is better filtered for validity by European users than the rest ones. Out of background profile determinants, only the active and language variables are significant and

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positively linked to `verify_post`. The number of spoken languages seems to support the validity check of the posted information, the active users being more prone to this process. For all models, the rest of the regressors are either not significant or not robust to the dependent variable. No autocorrelations in the residuals are observed (i.e. Durbin-Watson stats are centered around 2 in all models), while F-stat indicates that the models fit the data better than the models with no independent variables. R-squared values seem to be apparently low but are characteristic for such a type of analysis. This can be due to sample size, different scales of measurements and/or variables capturing heterogeneous contents, as in Guess et al. (2018). The findings confirm the H<sub>1</sub>. They are in line with Buchanan (2020), partially validate Khan and Idris (2019) and are not consistent with Brashier and Schacter (2020). Table 2 presents the analysis results regarding the **determinants of information asymmetry**, also considering the nonlinear terms.

Irrespective of scenarios, Models 5-14 clearly show that the `hour_network` and `nr_used_network` are significant and robust to IAI, registering negative signs. This reveals that IAI is attenuated as the number of hours and used OSNs increases. `Access_network` has a neutral effect as the variable is inconclusive in all models. H<sub>2</sub> is partially confirmed. The results reinforce the outputs of Black (1998) and Heinrichs et al. (2011), being in dissonance with Hodge et al. (2004). Models 6 and 7 indicate that `owners_restriction` is robust and negatively correlated to IAI, `owners_innapr` being insignificant. The finding suggests the owners' general objectivism in the imposed restrictions but neutral for inappropriate information. Withdrawing the effects of `owners_restriction` and `owners_innapr`, Model 11 shows that `past_restrict_innapr` is not conclusive, while `past_restrict_pol` is significant, with a negative sign. This denotes that the restrictions imposed in the past political messages for inappropriate information reduce IAI. Those results drastically change by entering the nonlinear term of `owners_restriction`, as Model 12 illustrates. Interestingly, `owners_restriction2` is significant, with a negative sign, an inverted U-shape being observed between `owners_restriction` and IAI. In other words, as the restrictions imposed by owners increase, the IAI augments, reaching a maximum point after that falls.

Table 2. Regression Results Regarding the Determinants of Information Asymmetry

Dependent variable: IAI	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14
access_network	-0.038 (0.037)	-0.032 (0.037)	-0.033 (0.037)	-0.046 (0.036)	-0.035 (0.037)	-0.052 (0.036)	-0.039 (0.037)	-0.052 (0.036)	-0.057 (0.036)	-0.046 (0.036)
hour_network	<b>-0.064**</b> (0.021)	<b>-0.056**</b> (0.021)	<b>-0.056**</b> (0.021)	<b>-0.051*</b> (0.021)	<b>-0.055**</b> (0.021)	<b>-0.049*</b> (0.021)	<b>-0.063**</b> (0.021)	<b>-0.054**</b> (0.021)	<b>-0.052**</b> (0.019)	<b>-0.049*</b> (0.021)
nr_used_network	<b>-0.071**</b> (0.024)	<b>-0.062*</b> (0.024)	<b>-0.063**</b> (0.024)	<b>-0.062**</b> (0.024)	<b>-0.061*</b> (0.024)	<b>-0.061*</b> (0.024)	<b>-0.068**</b> (0.021)	<b>-0.061*</b> (0.023)	<b>-0.059*</b> (0.023)	<b>-0.059*</b> (0.023)
owners_restriction		<b>-0.116**</b> (0.021)	<b>-0.112**</b> (0.021)	<b>-0.101**</b> (0.021)	<b>-0.112**</b> (0.021)	<b>-0.097**</b> (0.021)		<b>0.139*</b> (0.067)	<b>-0.099**</b> (0.021)	<b>-0.097**</b> (0.021)
owners_innapr			-0.015 (0.021)							
already_fully_reg				<b>-0.087**</b> (0.021)		<b>-0.083**</b> (0.021)		<b>-0.074**</b> (0.021)	<b>0.235**</b> (0.064)	<b>-0.077**</b> (0.021)
should_be_reg					-0.029 (0.017)					
infl_politic_envir						0.026 (0.024)				
red_freedom_speech						0.004 (0.021)				
presence_pol_correc						<b>-0.052**</b> (0.019)	<b>-0.062**</b> (0.021)	<b>-0.051**</b> (0.019)	<b>-0.048**</b> (0.019)	0.087 (0.065)
past_restrict_innapr							0.045 (0.026)			
past_restrict_pol							<b>-0.079**</b> (0.025)			
owners_restriction <sup>2</sup>								<b>-0.002**</b> (0.001)		
already_fully_reg <sup>2</sup>									<b>-0.003**</b> (0.001)	
presence_pol_correc <sup>2</sup>										<b>-0.001*</b> (0.001)
Constant	<b>98.36**</b> (3.724)	<b>102.8**</b> (3.749)	<b>103.3**</b> (3.831)	<b>106.7**</b> (3.827)	<b>103.9**</b> (3.813)	<b>107.1**</b> (4.049)	<b>102.9**</b> (3.924)	<b>105.1**</b> (3.958)	<b>105.0**</b> (3.884)	<b>106.2**</b> (3.998)
Type of estimation	OLS									
R-squared	0.034	0.066	0.067	0.084	0.069	0.092	0.061	0.103	0.115	0.095
F-statistic	11.08	16.47	13.27	16.99	13.73	11.69	9.875	15.23	17.27	13.91
[prob.]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Durbin-Watson stat	2.083	2.093	2.092	2.081	2.094	2.081	2.085	2.085	2.085	2.056
Obs.	930	930	930	930	930	930	930	930	930	930

Note: (a) (...) denotes the standard error; (b) \*\* and \* show significance at 0.01 and 0.05 level of significance; (c) OLS is Ordinary Least Squares.

**Table 3.** Structural Equation Modeling Results Regarding Information Asymmetry

Dependent variable: Information Asymmetry Index (IAI)			
Variable	Model 13	Model 14	Model 15
	Measurement model 'verify_read'	Measurement model 'verify_post'	Structural model IAI
age	<b>-0.131**</b> (0.042)		
origin_country	<b>8.427**</b> (2.561)		
continent		<b>10.72**</b> (2.413)	
activ		7.537 (4.177)	
languages	<b>0.211**</b> (0.057)	<b>0.158**</b> (0.049)	
ngo_activist	<b>6.762*</b> (2.714)		
verify_read			<b>-0.119**</b> (0.023)
verify_post			<b>0.053*</b> (0.025)
hour_network			<b>-0.045*</b> (0.019)
nr_used_network			<b>-0.057*</b> (0.023)
owners_restriction			0.067 (0.069)
already_fully_reg			<b>0.184**</b> (0.066)
presence_pol_correc			0.004 (0.066)
past_restrict_pol			-0.016 (0.021)
s_owners_restriction			<b>-0.001*</b> (0.0006)
s_already_fully_reg			<b>-0.002**</b> (0.0006)
s_presence_pol_correc			-0.0003 (0.0006)
constant	<b>59.65**</b> (3.943)	<b>61.84**</b> (4.977)	<b>100.1**</b> (2.776)
Type of estimation	ML	ML	
R-squared	0.037	0.034	0.148
Overall R-squared			0.174
Obs.	930	930	930

Note: (a) (...) denotes the standard error; (b) \*\* and \* show significance at 0.01 and 0.05 level of significance; (c) ML is Maximum Likelihood.

Models 8 and 9 treat the impact of government restrictions. In Model 8, the already\_fully\_reg determinant is significant, having a negative sign. It remains generally robust for the rest of the

employed models (i.e. Model 10, and Models 12-14). Unlike it, the `should_be_reg` variable is not conclusive in Model 9. The finding indicates that the IAI mitigates as the government imposes more restrictions, a hypothetical intervention being not conclusive. Further, testing for the nonlinear effect of `already_fully_reg`, Model 13 also validates an inverted U-shape between the `already_fully_reg` and IAI. This means that government restrictions are more than welcome but with moderate intensity. The same effect is observed under overregulation, with the platforms becoming fully ‘controlled’ by the government in this case. Finally, Model 10 enters the information content by considering `infl_politic_envir`, `red_freedom_speech`, and `presence_pol_correc`. Only the last variable is significant, with a negative sign, remaining robust to the IAI over Models 11 and 12. IAI mitigates, as the political correctness speech is present in information. Curiously, the IAI is not affected if the users consider that OSNs can influence both the political environment and freedom of speech. The nonlinear check of `presence_pol_correc` is done in Model 14. As in the previous cases, an inverted U-shape regarding IAI is registered. More precisely, a low or high intensity in political correctness speech ensures a low IAI. Therefore, H<sub>3</sub>-H<sub>5</sub> are fully confirmed, the outputs being consistent with Gillespie (2018), Samples (2019), as well as Graciyal and Viswam (2018). The quality of models is validated by the Durbin-Watson stat (i.e., around 2), with no serial autocorrelation being registered. Additionally, F-stat clearly shows that the models fit the data better than those with no independent variables. Moreover, R-squared is quite modest in almost all employed models, its level characterizing such a survey approach. Finally, Table 3 shows the **SEM estimations regarding information asymmetry** and their related outputs.

Models 13 and 14 are devoted to the measurement of ‘`verify_read`’ and ‘`verify_post`’ and show that, with the exception of the active determinant, the explanatory variables maintain their significance and signs registered in the ‘determinants of information validity’ stage, reinforcing their explanatory power. Finally, the structural estimation in Model 15 reveals very interesting findings. Herein, `hour_network` and `nr_used_network` remain robust to the ‘determinants of information asymmetry’ stage, while `already_fully_reg` is rather not conclusive as its sign changed. Two nonlinear terms remain robust (i.e. `s_owners_restriction` and `s_already_fully_reg`), with `s_presence_pol_correc` becoming insignificant.

The most interesting findings with respect to IAI are related to the `verify_read` and `verify_post`, both variables being significant but with contrary signs. More precisely, `verify_read` reports a negative correlation with IAI, suggesting that the information asymmetry decreases as the verification for validation of read information increases. This also reinforces the construction of IAI, as in equation (3). Otherwise, a contrary effect is curiously induced by `verify_post` pass-through its determinants, IAI mitigating when the validation of posted information decreases. This is in dissonance with the constructed IAI in equation (3), where a negative link between `verify_post` and IAI is assumed. In this case, a potential explanation is that much information is qualitatively alerted, their verification statistically inducing a false impression of veracity.

## Conclusions

This paper investigates the relationship between OSNs and information asymmetry, having as ground an international survey conducted in January – August 2021. 99.4% of accessing persons filled out the questionnaire. The general profile of the respondent is represented by a young and

educated person, who belongs to a medium social class and activates in the private sector, being based in the urban area, with a dominant European background. The cross-sectional multivariate regressions show that young people are more prone to check the veracity of reading information as well as NGO activists, with this propensity increasing for the users living in their origin country. Otherwise, it seems that the Europeans intensively check the posted information, the rest of the determinants being neutral. For both read and posted information, the importance of validity check is higher for the users who speak more languages. This ensures high flexibility in accessing various OSN posts, allowing cross-checking of the shared information. The core study offers hard results, revealing that the users who check the veracity of reading information can strongly attenuate the information asymmetry. Moreover, many posted information wrongly passes the validation control, being profoundly altered from a qualitative point of view in reality. This suggests that the posted information without serious filters during the reading stage is a serious source of asymmetry. In other words, the validation check of posted information is rather marginal, being much more superficial compared with the read stage. Therefore, the interpretation and perception of the read information are more important than their sources, the capacity of informational processing in terms of quality being crucial to mitigate the information asymmetry. Further, the findings reveal that the information asymmetry reduces as the number of hours dedicated to social networks increases in parallel with an extended pallet of used platforms. Owner restrictions accelerate the information asymmetry but only until a given point. This suggests that alternative sources of information can be found when the owners of OSNs impose very aggressive restrictions. In the same direction operates the government regulation. Information asymmetry increases as the government regulates more, reaching a maximum point after that falls. Beyond that level, when the government continues to regulate more and more, the owners go out of business, and/or users migrate to other sources of information that are less regulated.

Regarding the policy implications, the results are useful for users of OSNs, owners of OSNs, and policy-makers. The users should carefully manipulate the read information. The veracity check of any information is mandatory, irrespective of their posting status. Finally, government regulation is more than welcome, but the adjustments should be reasonably focused on the platform's owners. This should be correlated with similar measures done in alternative media. The information asymmetry can also be indirectly attenuated by supporting the educational process, with a particular accent on foreign languages. This research has several limitations. The first limit is given by the period of collecting data that covers the pandemic disease (i.e. COVID-19) and a low number of targeted OSNs. This can slightly alter the user's perception. The second limit is related to the honesty of respondents. Not least, the results should be considered with caution due to low correlation coefficients in the baseline regressions as well as a very low coefficient of determination ( $R^2$ ). Further research can be orientated to other determinants by conducting a similar survey during a period without a pandemic crisis. The collection of data through an extensive number of OSNs is also desirable.

## **Acknowledgments**

We want to thank Professor Meir Russ and all anonymous reviewers for their valuable comments and suggestions that allowed us to substantially improve this paper.

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**Appendix A - Structure of the Questionnaire**

No.	Question and Answer	Type of scale	Transformed Scale	Variable
<b>A</b>	<b>Demographic profile and background</b>			
1	What is your gender? <ul style="list-style-type: none"> <li>• Female</li> <li>• Male</li> </ul>	Nominal scale	Dummy (1 - Male; 0 - Female)	gender
2	What is your age? <ul style="list-style-type: none"> <li>• 1 - Under 16 years</li> <li>• 2 - 16-25 years</li> <li>• 3 - 26-49 years</li> <li>• 4 - 50-65 years</li> <li>• 5 - Over 65 years</li> </ul>	Nominal scale	Ordered scale (1 - Under 16 years to 5 - Over 65 years)	age
3	Do you live in your origin country? <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	Dichotomous scale	Dummy (1 - Yes; 0 - No)	origin_country
4	Which continent do you live in? <ul style="list-style-type: none"> <li>• North America</li> <li>• Europe</li> <li>• Australia</li> <li>• Asia</li> <li>• Latin America</li> <li>• Africa</li> <li>• Antarctica</li> </ul>	Nominal scale	Dummy (1 - Europe; 0 - Otherwise)	continent
5	Do you live in urban area? <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	Dichotomous scale	Dummy (1 - Yes; 0 - No)	urban
6	What is your education level? <ul style="list-style-type: none"> <li>• 1 - Primary education</li> <li>• 2 - Secondary education</li> <li>• 3 - Tertiary education</li> <li>• 4 - Bachelor or equivalent</li> <li>• 5 - Master or equivalent</li> <li>• 6 - Doctoral or equivalent</li> <li>• 7 - Postdoctoral or equivalent</li> </ul>	Nominal scale	Ordered scale (1 - Primary to 7 - Postdoctoral or equivalent)	education
7	Are (were) you an employed person (most of the time)? <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	Dichotomous scale	Dummy (1 - Yes; 0 - No)	employed
8	Do (did) you mainly activate in the private sector? <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	Dichotomous scale	Dummy (1 - Yes; 0 - No)	private_sector
9	Are you currently an active or retired person? <ul style="list-style-type: none"> <li>• Active person</li> <li>• Retired person</li> </ul>	Dichotomous scale	Dummy (1 - Active person; 0 - Retired person)	active
10	What is your household monthly net income (average, Euro)? <ul style="list-style-type: none"> <li>• 1 - Below 1,000</li> </ul>	Nominal scale	Ordered scale	income_net

	<ul style="list-style-type: none"> <li>• 2 - Between 1,000-4,999</li> <li>• 3 - Between 5,000-9,999</li> <li>• 4 - Between 10,000-14,999</li> <li>• 5 - Between 15,000-19,999</li> <li>• 6 - Between 20,000-25,000</li> <li>• 7 - Over 25,000</li> </ul>		(1- Below 1,000 to 7 - Over 25,000)	
11	<p>How many languages do you currently speak, with the exception of your native language?</p> <ul style="list-style-type: none"> <li>• 0</li> <li>• 1</li> <li>• 2</li> <li>• 3</li> <li>• 4</li> <li>• 5</li> <li>• 6 (or more)</li> </ul>	Interval scale	Interval scale (0 to 6)	languages
12	<p>Are you currently a political activist?</p> <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	Dichotomous scale	Dummy (1 - Yes; 0 - No)	political_activist
13	<p>Are you currently an NGO (Non-Governmental Organization) activist?</p> <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	Dichotomous scale	Dummy (1 - Yes; 0 - No)	ngo_activist
14	<p>Are you currently a religious activist?</p> <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	Dichotomous scale	Dummy (1 - Yes; 0 - No)	religious_activist
15	<p>Do you currently use online social networks?</p> <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	Dichotomous scale	Dummy (1 - Yes; 0 - No)	use_online_network
<b>B</b>	<b>Online social network use</b>			
16	<p>Do you have any difficulty in accessing the online social networks (i.e. device availability, access to Internet, internet speed, other technical restrictions)? (Very difficult access -1 to 10 - Very facile access).</p>	Interval scale	Interval scale (1 to 10)	access_network
17	<p>How many hours do you spend daily on the online social networks</p> <ul style="list-style-type: none"> <li>• 1</li> <li>• 2</li> <li>• 3</li> <li>• 4</li> <li>• 5</li> <li>• 6 (or more)</li> </ul>	Interval scale	Interval scale (1 to 6)	hour_network
18	<p>How many online social networks are you currently using?</p> <ul style="list-style-type: none"> <li>• 1</li> <li>• 2</li> <li>• 3</li> <li>• 4</li> <li>• 5</li> <li>• 6 (or more)</li> </ul>	Interval scale	Interval scale (1 to 6)	nr_used_network

19	How much information posted on the online social networks is/was helpful for your socio-economic life (0 - useless, 100 - extremely useful, insert an integer number)?	Ratio scale	Ratio scale (0 to 100)	info_helpful
20	Do you consider that the information from online social networks is validated by reality? To what degree (0 - strongly disagree, 100 - fully agree, insert an integer number)?	Ratio scale	Ratio scale (0 to 100)	validated_reality
21	Do you verify the validity of information that you read on online social networks? To what degree (0 - not at all, 100 - every time, insert an integer number)?	Ratio scale	Ratio scale (0 to 100)	verify_read
22	Do you verify the validity of information that you post on online social networks? To what degree (0 - not at all, 100 - every time, insert an integer number)?	Ratio scale	Ratio scale (0 to 100)	verify_post
23	Do you consider that the owners of online social networks objectively restrict the users? To what degree (0 - strongly disagree, 100 - fully agree, insert an integer number)?	Ratio scale	Ratio scale (0 to 100)	owners_restriction
24	Do you consider that the online social networks restrict inappropriate messages all the time (i.e. violent, racist, extremist etc.)? To what degree (0 - strongly disagree, 100 - strongly agree, insert an integer number)?	Ratio scale	Ratio scale (0 to 100)	owners_inappr
25	Do you consider that the online social networks should be regulated by Government in terms of information content? To what degree (0 - strongly disagree, 100 - strongly agree, insert an integer number)?	Ratio scale	Ratio scale (0 to 100)	should_be_reg
26	Do you consider that the online social networks are already fully regulated by different Governments in the world? To what degree (0 - strongly disagree, 100 - strongly agree, insert an integer number)?	Ratio scale	Ratio scale (0 to 100)	already_fully_reg
27	Do you consider that the online social networks can influence the political environment by restricting some users? To what degree (0 - strongly disagree, 100 - strongly agree, insert an integer number)?	Ratio scale	Ratio scale (0 to 100)	infl_politic_envir
28	Do you consider that the online social networks can reduce the freedom of speech by restricting some users? To what degree (0 - strongly disagree, 100 - strongly agree, insert an integer number)?	Ratio scale	Ratio scale (0 to 100)	red_freedom_speech
29	Do you consider that in the past recent years the owners of online social networks started to restrict more intensively some users for their inappropriate messages? To what degree (0 - strongly disagree, 100 - strongly agree, insert an integer number)?	Ratio scale	Ratio scale (0 to 100)	past_restrict_innapr
30	Do you consider that in the past recent years the owners of online social networks started to restrict more intensively some users for their political messages? In which measure (0 - strongly disagree, 100 - strongly agree, insert an integer number)?	Ratio scale	Ratio scale (0 to 100)	past_restrict_pol
31	Do you consider that 'political correctness' is present in online social networks? In which measure (0 - inexistent, 100 - fully present, insert an integer number)?	Ratio scale	Ratio scale (0 to 100)	presence_pol_correc

**Appendix B - Descriptive Statistics (N=930)**

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Sum	Sum Sq. Dev.
Gender	0.4	0	1	0	0.490162	372	223.2
age	2.648387	3	5	1	0.657836	2463	402.0226
origin_country	0.845161	1	1	0	0.361946	786	121.7032
continent	0.872043	1	1	0	0.334222	811	103.7731
urban	0.839785	1	1	0	0.367003	781	125.128
education	4.808602	5	7	1	1.158082	4472	1245.931
employed	0.737634	1	1	0	0.440157	686	179.9828
private_sector	0.564516	1	1	0	0.496087	525	228.629
active	0.96129	1	1	0	0.193006	894	34.60645
income_net	1.949462	2	7	1	1.161188	1813	1252.625
languages	1.944086	2	6	0	0.990315	1808	911.0925
political_activist	0.060215	0	1	0	0.238013	56	52.62796
ngo_activist	0.129032	0	1	0	0.335416	120	104.5161
religious_activist	0.13871	0	1	0	0.345829	129	111.1065
access_network	9.246237	10	10	1	1.434096	8599	1910.612
hour_network	2.98172	3	6	1	1.623525	2773	2448.689
nr_used_network	3.203226	3	6	1	1.36644	2979	1734.59
index_asym	89.08491	94.62	99.97	0	18.30941	82848.96	311432.8
info_helpful	46.94452	50.5	100	1	25.7072	43658.4	613939.3
validated_reality	44.62706	50.5	100	1	22.10361	41503.17	453881.1
verify_read	67.38748	75.25	100	1	28.14065	62670.36	735671.7
verify_post	83.69481	95.05	100	1	24.9815	77836.17	579766.1
owners_restriction	49.32371	50.5	100	1	28.31805	45871.05	744976
owners_inappr	47.06268	50.5	100	1	28.17559	43768.29	737499.5
should_be_reg	42.24148	50.5	100	1	33.47619	39284.58	1041089
already_fully_reg	41.41648	40.6	100	1	28.56547	38517.33	758050.9
infl_politic_envir	74.1461	80.2	100	1	26.22974	68955.87	639151.3
red_freedom_speech	61.819	60.4	100	1	30.05306	57491.67	839060
past_restrict_innapr	62.87181	69.31	100	1	27.90917	58470.78	723618.1
past_restrict_pol	56.43361	60.4	100	1	29.38887	52483.26	802382.3
presence_pol_correc	48.02181	50.5	100	1	30.18203	44660.28	846277.1

**Appendix C – Table of Frequency for Demographic Profile and Background of Respondents (N=930)**

Variable	Specification	Valid	Frequency	Percent	Valid Percent	Cumulative Percent
gender	Female	.00	558	60.0	60.0	60.0
	Male	1.00	372	40.0	40.0	100.0
		Total	930	100.0	100.0	
age	1 – Under 16 years	1.00	1	.1	.1	.1
	2 – 16-25 years	2.00	407	43.8	43.8	43.9
	3 – 26-49 years	3.00	452	48.6	48.6	92.5
	4 – 50-65 years	4.00	58	6.2	6.2	98.7
	5 – Over 65 years	5.00	12	1.3	1.3	100.0
		Total	930	100.0	100.0	
origin_country	No	.00	144	15.5	15.5	15.5
	Yes	1.00	786	84.5	84.5	100.0
		Total	930	100.0	100.0	
continent	Others	.00	119	12.8	12.8	12.8
	Europe	1.00	811	87.2	87.2	100.0
		Total	930	100.0	100.0	
urban	No	.00	149	16.0	16.0	16.0
	Yes	1.00	781	84.0	84.0	100.0
		Total	930	100.0	100.0	
education	1 – Primary education	1	1	.1	.1	.1
	2 – Secondary education	2	25	2.7	2.7	2.8
	3 – Tertiary education	3	65	7.0	7.0	9.8
	4 – Bachelor or equivalent	4	287	30.9	30.9	40.6
	5 – Master or equivalent	5	321	34.5	34.5	75.2
	6 – Doctoral or equivalent	6	144	15.5	15.5	90.6
	7 – Postdoctoral/equivalent	7	87	9.4	9.4	100.0
		Total	930	100.0	100.0	
employed	No	.00	244	26.2	26.2	26.2
	Yes	1.00	686	73.8	73.8	100.0
		Total	930	100.0	100.0	
private_sector	No	.00	405	43.5	43.5	43.5
	Yes	1.00	525	56.5	56.5	100.0
		Total	930	100.0	100.0	
active	No	.00	36	3.9	3.9	3.9
	Yes	1.00	894	96.1	96.1	100.0

		Total	930	100.0	100.0	
income_net	1 – Below 1,000	1.00	315	33.9	33.9	33.9
	2 – Between 1,000-4,999	2.00	497	53.4	53.4	87.3
	3 – Between 5,000-9,999	3.00	64	6.9	6.9	94.2
	4 – Between 10,000-14,999	4.00	19	2.0	2.0	96.2
	5 – Between 15,000-19,999	5.00	3	.3	.3	96.6
	6 – Between 20,000-25,000	6.00	3	.3	.3	96.9
	7 – Over 25,000	7.00	29	3.1	3.1	100.0
		Total		930	100.0	100.0
languages	0	.00	18	1.9	1.9	1.9
	1	1.00	309	33.2	33.2	35.2
	2	2.00	395	42.5	42.5	77.6
	3	3.00	152	16.3	16.3	94.0
	4	4.00	33	3.5	3.5	97.5
	5	5.00	17	1.8	1.8	99.4
	6 (or more)	100.00	6	.6	.6	100.0
		Total		930	100.0	100.0
political_activist	No	.00	874	94.0	94.0	94.0
	Yes	1.00	56	6.0	6.0	100.0
		Total	930	100.0	100.0	
NGO_activist	No	.00	810	87.1	87.1	87.1
	Yes	1.00	120	12.9	12.9	100.0
		Total	930	100.0	100.0	
religious_activist	No	.00	801	86.1	86.1	86.1
	Yes	1.00	129	13.9	13.9	100.0
		Total	930	100.0	100.0	

**Appendix D - Pearson Correlations for Set A**

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. gender	1.000													
2. age	0.113	1.000												
3. origin_country	-0.057	-0.098	1.000											
4. continent	-0.141	-0.029	-0.013	1.000										
5. urban	0.045	0.177	0.024	-0.088	1.000									
6. education	0.058	0.591	-0.052	0.003	0.224	1.000								
7. employed	0.038	0.451	-0.086	0.035	0.219	0.427	1.000							
8. private_sector	0.097	-0.038	-0.088	-0.025	0.018	-0.217	0.265	1.000						
9. active	0.039	-0.065	-0.055	-0.060	0.034	0.031	0.096	0.105	1.000					
10. income_net	0.138	0.212	-0.216	-0.150	0.037	0.195	0.138	0.035	0.063	1.000				
11. languages	0.000	0.180	-0.201	0.034	0.011	0.173	0.117	0.095	-0.011	0.124	1.000			
12. political_activist	0.052	-0.050	0.058	-0.120	-0.037	-0.084	-0.085	0.067	0.051	-0.044	-0.004	1.000		
13. ngo_activist	-0.026	-0.048	-0.048	0.042	0.019	-0.025	0.004	0.015	-0.006	-0.074	0.077	0.145	1.000	
14. religious_activist	-0.055	-0.102	-0.060	-0.014	-0.062	-0.092	-0.022	-0.011	-0.065	-0.055	-0.012	0.016	0.105	1.000

Cronbach's Alpha test = 0.468

**Appendix E - Pearson Correlations for Set B**

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. access_network	1.000											
2. hour_network	-0.108	1.000										
3. nr_used_network	-0.039	0.452	1.000									
4. owners_restriction	0.018	0.104	0.109	1.000								
5. owners_inappr	-0.014	0.058	0.023	0.260	1.000							
6. should_be_reg	-0.048	0.075	0.055	0.137	0.015	1.000						
7. already_fully_reg	-0.091	0.103	0.058	0.183	0.232	0.020	1.000					
8. infl_politic_envir	0.080	0.011	0.047	0.143	0.059	0.128	0.159	1.000				
9. red_freedom_speech	-0.006	0.012	0.019	0.143	0.090	0.040	0.156	0.406	1.000			
10. past_restrict_innapr	0.010	0.089	0.090	0.226	0.308	0.007	0.239	0.244	0.343	1.000		
11. past_restrict_pol	0.022	0.033	0.044	0.212	0.181	0.046	0.251	0.278	0.379	0.612	1.000	
12. presence_pol_correc	-0.035	0.070	0.067	0.154	0.232	-0.024	0.190	0.110	0.201	0.238	0.308	1.000

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## Authors biographies

**Mihai Mutascu** is a Professor of Public Economics at Faculty of Economics and Business Administration, West University of Timisoara. He is currently Visiting Professor at Zeppelin University Friedrichshafen and an affiliated researcher at Laboratoire d'Économie d'Orléans (LEO), University of Orléans. Prof. Mutascu served as Professor of Economics at ESCE International Business School Paris, during the period 2017-2020. Between 2016-2017, he was Marie Skłodowska-Curie fellow, at the Loire Valley Institute for Advanced Studies, Orléans & Tours, under the aegis of the European Commission. Mihai received his PhD in Public Economics at West University of Timisoara (2004), being Habilitated in Economics at Laboratoire d'Économie d'Orléans (2014). His main research interest is focused on Public Economics, International Economics, Energy Economics, and Applied Economics. Prof. Mutascu is Editor of 'Economic Research Guardian' journal.



**Alexandre Sokic** is an Associate Professor of Finance and Economics at ESCE International Business School Paris. Professor Sokic received his PhD in Economics at the University of Strasbourg (1996). His research area is focused on Macroeconomics, Monetary economics, and Applied Economics. Alexandre published many papers in prestigious journals, such as *Revue Économique*, *Empirical Economics*, *Transport Policy*, *The Quarterly Review of Economics and Finance*, *Economic Systems*, *German Economic Review*, *Journal of Institutional and Theoretical Economics*, *Observatoire des Politiques Économiques en Europe* or *Revue Française d'Économie*.

