

**ED DESPEG**

Doctoral School in Law, Political Science, Economics and Management

**Proposition de Sujet de Thèse 2021**

2021 PhD Subject Proposition

**Title of the PhD research project:** The economics of fake news: a theoretical extension to the economics of digital platforms, and an application to rationalize the COVID-19 crisis polarization of social beliefs.

**Supervision:** The PhD thesis will be jointly supervised by [Dominique Torre](#) (GREDEG), and [Serena Villata](#) (I3S) for the parts related to computer science and, more precisely, Natural Language Processing tools.

**Host laboratory :** GREDEG, Université Côte d'Azur

**Keywords:** Disinformation, misinformation, economic analysis of social networks, social network data governance

**Research fields:** economics of information, economics of platforms, economics of attention, natural language processing

Research conducted in 2018 on the spread of false information on Twitter indicates that this type of content spreads six times faster than correct information (Vosoughi, Roy, & Aral, 2018). Since then, concerns about this issue have continued to grow, particularly in 2020, where the COVID-19 pandemic and then the American presidential election were real catalysts for false news. As example, the Forum on Information & Democracy underlines that in April 2020, while the pandemic was in full swing, the content of the 10 sites spreading the most "fake news" in the health field reached 420 million views (Forum on Information & Democracy, 2020). This is four times more than the views recorded on official sites such as the WHO (World Health Organization) for example. All national and international institutions are now considering the extent of this problem. Recently, the WHO spoke of an "infodemic" that was affecting the whole world, and its director general spoke about false information that "spreads faster and more easily than this virus and is just as dangerous."

All over the world, state and inter-state institutions are multiplying initiatives to fight against this new problem. At the same time, social networks, which are accused of being the main vectors of this type of content, are facing major criticism regarding their management of the "fake news" issue. Their diffusion indeed has many deleterious consequences such as the erosion of trust in the media, an increased polarization of society (Azzimonti & Fernandes, 2018) and contributes to incurring health risks to all (Nguyễn Hoàng, El-Mhamdi, & Faucon, 2021).

The issue of false information has been the subject of research in many disciplines such as computer science, communication science, sociology, and cognitive science. Nevertheless, for the moment, economics has shown very little interest in this topic. However, the notion of information is essential in the framework of economics and many authors have paid particular attention to it from a long time (Stigler, 1961; Akerlof, 1970). A significant part of microeconomics is labeled "Economics of Information" but is however mainly devoted to the study of the imprecision of information on products and agents in bilateral or multilateral interactions than to the explicit diffusion and propagation of fake news. However, this subject could not be ignored or underestimated by analysis. Nevertheless, different economic tools could be useful in order to understand how and why fake news proliferates so much within social networks. Sendhil Mullainathan and Andrei Shleifer (2005) have proposed a model of the information market in the presence of homogeneous and heterogeneous demand, integrating this kind of deliberate diffusion of false news, but without any substantial improvement of the approach. Different other attempts were made in the same direction but with other methodologies. Biases in newspapers have been justified by the demand of readers, when those last prefer information that confirms their already existing beliefs (Gentzkow, Shapiro, & Stone, 2014). Puglisi, Snyder, and Larcinese (2011) found a correlation between the zip code in which certain newspapers circulated and news coverage in the United States. In more Democratic areas, news tends to cover more scandals related to the Republican party and vice versa. Therefore, in the presence of agents with heterogeneous preferences and competition in the market, information will be biased in order to reach a part of the readers.

Lindstädt, (2009) suggests the use a two-sided market notion, to derive the motivation of a company which would like to increase demand from advertisers, but without any real theoretical model nor conclusive results. The advent of digital technology has however profoundly changed the way media outlets operate. They have had to adapt to a decrease in the costs of producing and distributing information. This exogenous shock has had important consequences for the media market. On the one hand, there has been a sharp decline in advertising revenues for newspapers, resulting in a decline in the production of journalistic content that is expensive to produce (Angelucci, Cagé, & Sinkinson, 2021). On the other hand, more and more journalistic content results from simply copying or translating English-language content (Cagé, Hervé, & Viaud, 2019). For Hunt Alcott and Matthew Gentzkow (2017), who conducted one of the few research studies that address "fake news" in economics

has its origins precisely in recent changes in the media market. The barriers to entry in the information production market have become extremely low, social networks allow to reach people quickly and the algorithms that distribute information on these platforms encourage virality.

Finally, the media industry is the subject of a significant literature in economics, without devoting sufficiently advanced research to the issue of fake news, and overall, without referring to sufficiently advanced methodologies. The proposed thesis would contribute to improve the way fake news could become a considered part of strategic interactions, either in their origin, or in their diffusion and propagation. To do so, we propose to use microeconomic standard or advanced concepts of digital microeconomics, economics of information, political economy, but also to introduce sociological assumptions at the beginning of theoretical settings, or sociologic stylized facts as objects of studies.

The objectives of the thesis are namely to understand better

- how the platformization of information and the way information is consumed are factors that have contributed to the emergence of the problem of misinformation within social networks,
- how the economic model of platforms based on advertising, on attention of users and on virality of information have greatly contributed to promote misinformation,
- what are the benefits and costs of social networks when they amplify the dissemination of fake news
- what role does the governance of platforms play in the problem of fake news, what are the challenges that these platforms face, and the costs associated with effective moderation.

**Chapter 1** will choose as benchmark formulation the Mullainathan-Shleifer reference setting on Market for News. This was a paper published in the American Economic Review<sup>1</sup> in 2005. It studies the influence of competition and heterogeneity of agents on the diffusion of accuracy of information. The model has several advantages: behavioral assumptions are quite general and provide robustness to the result, mathematics is simple, make the model tractable and admitting extensions, and the model has also been discussed in the literature. It also presents limits: it was written at a moment where news, reliable and fake, did not diffuse yet by digital channels, propagate less rapidly and, for this reason, were not completely integrated in economic or political strategies. Methodologically, notions as cross-externalities, multi-sided partnerships, attention, network transmissions, and more generally the economic mechanisms and notions motivated by the generalization of digitalization were not yet available to the analysis. It then needs to be updated, to test its adaptability to this new context. The objective of the first chapter will then be to propose a “Mullainathan-Shleifer season 2 model”, i.e. to test if the results of the model on the influence of competition and

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<sup>1</sup> The *American Economic Review* is one of the “Top Five” Economic Reviews in Economics, and usually considered as the “Top One” generalist review, as the four other ones are more specialized in Finance, Econometrics, Macroeconomics and Management.

heterogeneity of agents are as important in a digital world than in the traditional media environment, when fake news could make information noisy and imperfectly reliable. For the most, the methodology will be to propose extensions of the original model.

**Chapter 2** will be an empirical contribution of the thesis. It should contribute to analyze the origin, motivations, and ways of development of fake news in COVID 19 crisis. This subject has already motivated some studies, but for the moment mainly related to communication and journalism concerns (Montesi, 2020; Al-Zaman, 2021). The role of social media and digital platforms has been pointed out in this case. Fake news on this matter comes with big health, social and economic costs because it increases risky behavior and vaccine distrust delaying economic recovery. Spread of fake news on COVID-19 can also be an important factor of polarization, something with significant implication for democracy and that has been studied in economics (Gentzkow, 2016; Gentzkow & Shapiro, 2015). At the same time, fake news during this pandemic has been weaponized by some governments to help them serve their political agenda. Some of this repeated false information is part of a bigger wave of populism across different countries, a subject well documented on political economy (Rodrik, 2018). The methodology we propose is as follows: scraping fake news stories that spread on social media platform such as Twitter and using natural language processing tools to see the reactions they spark on users (i.e., comments on the fake news story posted on the platform, retweets, likes). We also suggest using various tools used in others similar research (Allcott, Gentzkow, & Yu, 2019) such as Buzzsumo or Crowdtangle to see how widespread some fake news stories have been.

**Chapter 3** will present the more original and developed contribution of the thesis. The microeconomic model that we have in project will have the following objectives:

- contributing to understand why, at a reasonable level, fake news is the result of rational actions of two-sided platforms
- analyzing the reasons why beyond this level, they are counterproductive for the same platforms
- investigating the influence of the third partner on this “optimal amount of fake news”
- studying the role of heterogeneity of users, of their preconceptions/ideological views
- considering the influence of competition among platforms, or among different communication channels

Methodologically, the setting will integrate three types of agents:

- end-users of the platform, who receive, and can also diffuse messages. Their utility increase with the quantity and the diversity of received messages. They could be “ideologically” neutral or oriented (i.e. more receptive to false news in sympathy with their ideology, more severe with fake news not compatible with their ideology, and react negatively to bad reputation of the platform).

- third part are advertisers interested in buying big data to the platform to advertise selectively (or not). They are neutral to news but motivated by the popularity of the platform
- The platform is motivated by the number of messages and their price.

Platforms can be in a monopoly or in a duopoly state. Government considers the welfare of the population or alternatively have a bias toward reliability of platforms.

Methodologically, the chapter will use industrial economic style theoretical tools (staggered games, economics of platforms, economics of information, economics of attention) and will open to behavioral, sociological, and public economic assumptions and concerns. It will use Wolfram Mathematica software as a help to test the robustness of assumptions, and the form of solutions when they are dependent on different specifications of the model.

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**Dominique Torre** is (full) Professor of Economics (PRCE2) at Université Côte d’Azur. He is member of GREDEG (UCA-CNRS), and member of CNRS National Committee of Economics from 2013. He is also former Director of International Economics and Finance master (UCA), Vice Director of DESPEG Doctoral School, President of UCA CPRH in Economics (during 2 terms), Director of the department of Economics of UNS. He is also a founding member and Treasury of AFREN (Association Francophone d’Economie Numérique), of FLOSS European network, a member of many scientific committees of associations in Finance, Microeconomics and Digital Economics and of boards of Scientific Reviews. He wrote more than 60 articles published in Scientific Reviews or Collective Writings, edited collective books or special issues of scientific reviews, was invited for research stays or seminars in more than 20 universities in France and abroad, participated to more than 100 scientific conferences, supervised 19 PhD students (1 still in process), 3 HDR, and participated as referee or chairman to more than 40 PhD and HDR defenses. He is expert of HCERES and ANR and works as referee for many scientific reviews. His main concerns are Digital Economics, Payment and Finance, Economics of Tourism, History of Monetary analysis, and Monetary History. He teaches microeconomics, network economics, digital economics, and market finance.

**Serena Villata** is a tenured Research Fellow (CR1) in Computer Science at CNRS and she pursues her research at the I3S laboratory where she is a member of the Wimmics team. Her research area is Artificial Intelligence, and her current work focuses on information extraction and argumentation in natural language, particularly in legal and medical texts, political debates and social networks. Since July 2019, she has been awarded with a Chair in Artificial Intelligence at the Interdisciplinary Institute for Artificial Intelligence 3IA Cote d’Azur on “Artificial Argumentation for Humans”. Since December 2019, she is a member of the National Pilot Committee for Digital Ethics (CNPEN). Since 2021, she is the scientific deputy director of the 3IA Côte d’Azur Institute in Sophia Antipolis.

**Candidate profile**

The candidate must hold a master in Economics. Some basic skills in Computer Science are required. The candidate must have good English skills in writing and communication.