Information, its acquisition and its dissemination in populations, are at the heart of financial economics, be it in understanding individuals' or firms' investment decisions or in the valuation of real and financial assets. Furthermore, the role of information and the extent to which it is disseminated is important in assessing the extent to which financial markets are well functioning and require regulatory intervention.

Existing theory has not ignored the mechanics of information transmission in real and financial markets. As an example of the former, a large literature on social and observational learning has explored how social interactions and information transmission co-evolve. As an example of the latter, there is a large literature on market microstructure, which has at its core the transmission (and concealment) of information.

Yet these literatures have made very specific assumptions about how such information travels between individuals. Specifically, the canonical model of social learning posits that there is a fixed sequence of individuals who choose between alternative actions (or trading strategies) in an exogenous and pre-specified order and that these actions are observed by all successors. In other words, the informational content of news is endogenous, but whether one hears any news is not.

In most real life settings, the mere fact of receiving information is in itself informative and can be used by individuals to make inferences about the likely origin, veracity and value of such information. Furthermore, departing from the sequence-of-agents approach is not only desirable on the grounds that it is more realistic, but also because it may radically alter the predictions offered by the models.

It is worth emphasizing some important consequences of assuming that information is transmitted from person to person, namely that (i) contact patterns (or social structure) will matter for the speed and direction of information propagation and (ii) the number of informed people will grow in an uneven manner over time, the rate of change depending at each time on the numbers that have already been informed. In turn, as individuals act or trade on the information they receive, aggregate variables such as economic activity or trading volumes will likewise depend on social structure and on the intricate details or how information is propagated in the population.

My plan is to model such person-to-person information transmission at the micro level and to characterize its aggregation and propagation at the macro level, by using techniques developed in the mathematical rumour literature, a branch of mathematical epidemiology. This literature has taken its cue from the similarities between how infections and news spread in populations. Authors such as Daley and Kendall (1964) and Pearce (2000) model the propagation of information (an "infection of the mind") using the classical tools of epidemiology. In such models, individuals are either ignorant (susceptible), spreaders (infected) or stiflers (immune). Depending on context, meetings between such individuals can induce different transitions between the groups (the ignorant become informed or the informed forget the information etc.), and the propagation of information can thus be analysed in both the temporal and geographical dimensions (see Daley and Gani, 2001 for a review of this literature).

Although mathematical rumour theory provides powerful tools to study the dynamics of information diffusion processes, it is often built on assumptions that are behaviourally simplistic. For example, in the most basic version of the rumour model, an informed agent who hears the rumour a second time decides that the rumour is already "known" and hence stops actively spreading the information. Alternatively, stiflers simply forget the information after a while. In more elaborate versions, an informed agent only becomes a stifler after having heard the rumour a number of times. This kind of behavioural assumption on individuals' rumour-spreading activity is not unlike the type of biases studied by DeMarzo et al. (2003), in which individuals count each piece of information as a new piece of evidence, without taking into account that such information could be simply a repetition or come from the same common source. In the stifler setting, an agent may think it is not worth mentioning news that are known by all, but then come to conclude based on insufficient evidence that the information is indeed already known.

A main task in the proposed research will be to enrich the mathematical rumour models with decision makers that behave sensibly and maximise well specified objectives (such as profits or utility). Furthermore, it will also be important to determine exactly how individuals' actions inform other individuals.

For completeness, it should be mentioned that some existing papers have already contributed to this literature. Duffie et al. (2009) look at information percolation in markets with search. Banerjee (1993) studies a model in which an economy is populated by informed and uninformed agents. He assumes that investment by informed agents alerts the uninformed of the investment opportunity. Burnside et al. (2013) analyse a model of the housing market in which optimistic, sceptical and vulnerable agents mix randomly. In a meeting between an optimistic and a pessimistic individual, the person who is most confident of his or her information will "infect" the other individual with his or her belief. Last, Hong et al. (2010) embed a model of price-volume dynamics into a standard epidemiological model in which information spreads through the population via friend-to-friend contacts.

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