Journal of Economic Behavior and Organization 203 (2022) 246–263

Contents lists available at ScienceDirect

Journal of Economic Behavior and Organization

journal homepage: www.elsevier.com/locate/jebo

Informative social interactions☆

Luc Arrondel[a], Hector Calvo-Pardo[b,c], Chryssi Giannitsarou[d,e,*], Michael Haliassos[f,g]

[a] CNRS and Paris School of Economics, Campus Jourdan, 48 Boulevard Jourdan, Paris 75014, France
[b] University of Southampton, Economics, SESPS, FSS, Bld. 58, R3113, Highfield campus, Southampton, SO17 1BJ, UK
[c] Center for Population Change, Southampton, UK and Institut Louis Bachelier, Paris, France
[d] University of Cambridge, Faculty of Economics, Austin Robinson Building, Sidgwick Avenue, Cambridge, CB3 9DD, UK
[e] CEPR, Clerkenwell EC1, London, United Kindgom
[f] Goethe University Frankfurt, Department of Money and Macroeconomics, House of Finance, Theodor-W.-Adorno-Platz 3, PF H32, Frankfurt am Main, D-60323, Germany
[g] CEPR, Science Po, Boulevard St Germain, Paris, France

ARTICLE INFO

Article history:
Received 23 May 2021
Revised 31 August 2022
Accepted 6 September 2022

JEL classification:
G5
G11
E21

Keywords:
Household finance
Subjective expectations
Peer effects
Information networks
Portfolio choice

ABSTRACT

Household finances are confidential and discussions are limited to a subset of peers. We collect novel representative survey data to examine separately whether interactions with inner and outer social circles influence return perceptions, expectations, and exposure to a widely known financial instrument in a developed economy with multiple information sources. We find that a respondent's connectedness, proxied by perceived prevalence of information or participation in the small financial circle, improves expectation accuracy indirectly, through boosting accuracy of perceived past returns; and influences stock participation and exposure not only by influencing expectations, but also directly.

☆ We thank the Editor, the Associate Editor, and two referees for very constructive comments. We are grateful to the *Keynes Fund, Authorité pour les Marchés Financiers*, the *Cambridge Endowment for Research in Finance*, the *Fondation Institut Europlace de Finance, project ANR 11-LABX-0019, CEPREMAP Foundation* and the *German Research Foundation* for funding different aspects of this challenging research project. Declarations of interest: none. For useful discussions we thank Klaus Adam, Debopam Bhattacharya, Olympia Bover, Antonio Cabrales, Chris Carroll, Vasco Carvalho, Jagjit Chadha, Giancarlo Corsetti, Arun Chandrasekhar, Pierre Dubois, Matt Elliott, George Evans, Thierry Foucault, Edo Gallo, Stephane Gallon, Pam Giustinelli, Sanjeev Goyal, Hamish Low, Charles Manski, Brendon McConnell, Stephen Morris, Kaivan Munshi, Matthew Olckers, Xisco Oliver, Stefan Pichler, Ricardo Reis, Johannes Stroebel, Jean-Marc Tallon, Giorgio Topa, Artur Van Soest, Nora Wegner, Basit Zafar and Yves Zenou. We also thank seminar and conference participants at Authorité pour les Marchés Financiers, University of Cambridge, UIB, Banque de France Research Foundation, NIESR, PSE behavioral Seminar, the joint ESRC NIESR Warwick and Bank of England workshop, Institut Louis Bachelier 10th Financial Risks International Forum, Judge Business School, ETH Zurich, Universita Catolica di Milano, CBID Workshop at Durham, ASSA-AEA session on 'Subjective expectations, belief formation and economic behavior', EEA, CEF, RES, ESEM, and SED meetings. Thanks aslo go to Joel Flynn, Sandeep Vijayakumar and Johannes Wohlfart for outstanding research assistance.

* Corresponding author.
E-mail address: cg349@cam.ac.uk (C. Giannitsarou).

https://doi.org/10.1016/j.jebo.2022.09.006

1. Introduction

Financially developed economies repeatedly experience episodes of fast-spreading behavior that exposes households to risks, such as the burst of the dot-com bubble or of the house price bubble. It is important to understand the role of social interactions and the main channels through which they can spread financial behaviors. While emphasis of existing research is on peers at large, household finances represent private and sensitive information, leading individuals to restrict the circle of peers with whom they discuss financial matters. A close look at how individuals perceive the members of this inner, *financial circle*, separately from their outer social circle is important for understanding the channels of peer influence on perceptions of the past, expectations about the future, and ultimately on behavior. This paper is the first systematic attempt to study these questions.

Two important channels are flow of information and knowledge, and imitation of peers, either mindful or mindless. Imitation is mindful when it concerns knowledgeable peers, and mindless when imitation simply yields social utility from the similarity of choice. Disentangling the two is important for understanding the spread of behavior and for devising policies to avert crises. In contrast to studies of setups where new financial products are introduced, peers are the only source of information, and alternative financial instruments are limited or non-existent, this paper investigates whether there is a significant role for *informative* social interactions even for a widely known financial instrument (stocks) in a financially developed economy (France) with a mature stock market and multiple information sources.

We collected novel survey data from a representative sample of French households by age, asset classes and wealth in December 2014 and May 2015. We elicited responses on how they perceive the stock market behavior and information of three circles around them: the inner, *financial circle*, the *overall social circle* of friends and acquaintances, and the *overall population*. Although the average reported size of the social circle is about 53, we document that only about half the sample report having a financial circle, and those who do talk about finances only with about five people. The size of the financial circle correlates positively with being younger, a saver, and with larger wealth.[1]

We elicit responses on the subjective probability distributions of future stock market cumulative returns (over a five-year horizon) and of *perceptions* of recent past cumulative returns (over a three-year horizon), from which we derive expected returns and mean perceptions. We link errors in both, as well as stock market participation and the risky portfolio share, to respondent perceptions of information and stock market participation in their financial and outer circles, controlling for a rich set of demographic, attitudinal, relative-standing and socio-economic covariates.[2]

Our econometric findings, in baseline and in robustness exercises, support a systematically positive role of social interactions in improving the accuracy of individuals' stock market expectations, which runs through their positive influence on the accuracy of perceptions of past returns. They also point to further relevance of informative social interactions for stock market participation and conditional portfolio shares, controlling for subjective stock market expectations.[3] Our analysis allows for possible presence of mindless imitation of perceived stockholding among the respondents' outer social circle, but it finds no, or at best mixed, evidence for such imitation. Such an estimated effect, if at all present, runs neither through perceptions nor expectations, but controlling for both. This is consistent with not engaging the outer social circle in purposeful discussions of financial matters.

We also show, in the Online Appendix A, that the empirically derived footprint of informative social interactions is consistent with a theoretical model of a large, anonymous, and efficient stock market, where individuals condition their expectations on equilibrium asset prices: informative social interactions survive in equilibrium by reducing the posterior variance of returns. We model direct communication and information dissemination within a large efficient financial market. Specifically, we extend the work of Ozsoylev and Walden (2011) to allow for individual heterogeneity in both risk preferences and signal precision, in line with empirical evidence. Individuals receive private signals about asset returns, as well as information from equilibrium asset prices, and locally available information from their peers, to whom they are connected through a well-defined information network. A key prediction is that individuals with higher risk-adjusted 'connectedness', i.e. those with more and/or more informative social interactions, invest more in risky assets, in response to good signals and for given risk tolerance. This is because well-connected individuals pool both more and more precise privately received signals from peers, increasing the precision of their conditional return expectations.

We employ various robustness checks that corroborate our findings. First, we allow for endogenous formation of an inner financial circle, and for potential correlation between unobserved factors influencing this decision and either the accuracy of return perceptions or expectations, or stock risk exposure. Our findings remain robust, and we cannot reject the hypothesis of independence of these unobserved factors. Second, we consider whether our findings merely reflect common preferences or shocks between respondents and their financial circles. To produce significant effects of the financial circle and insignifi-

[1] A small number of information-providing contacts can arise even among identical social network members in the context of the 'Law of the Few' (Galeotti and Goyal, 2010).

[2] Given the anonymity of stockholding and trading inherent in the stock market, our analysis is not limited by the fact that we do not trace the actual network structure (De Paula, 2010).

[3] Our set-up differs conceptually from the classical linear-in-means peer effects framework, where Manski's (1993) 'reflection problem' complicates identification: individual stock market return information, expectations and stockholding are a function of perceptions of the extent to which peers are informed or participating, conditioning on additional covariates commonly found in the household finance literature, and not of the actual peer information and/or behaviour, as in Manski's (1993) classical setup. See also Blume et al. (2011) and our Online Appendix.

cant or mixed effects of the outer circle, the outer circle should be sufficiently dissimilar and less subject to common shocks with the respondents. Placebo tests no longer find statistically significant effects of the financial circle, even for groups that share several characteristics.[4] Instrumental variable estimation yields substantially larger estimates of coefficients and also fails to reject the null of exogeneity of respondents' perceptions of financial circle participation or information. Third, since respondents do not discuss finances with the outer circle, it is plausible that they are much less certain about outer circle peers' participation and information. We find no evidence that our insignificant estimates on information in the outer circle are an artifact of attenuation bias.[5] Fourth, we consider reverse causality, namely that stockholding respondents may be more likely to persuade themselves that more of their peers also participate in, or are informed about stocks. It is hard to see why such 'feel-good' considerations are also associated with more accurate perceptions and expectations of stock returns, and why they don't extend to perceptions of the outer circle and the overall population. It is also not clear how the argument applies to respondent perceptions of *information* among their financial circle, as those who understand returns better and are more likely to hold stocks are also in a better position to assess the information possessed by their financial circle. Finally, differentiating between accuracy of return expectations or perceptions and persistent optimism is easier in panel data that we do not have. Nevertheless, we have no reason to expect that use of such data would attribute our return findings to persistent optimism instead of information transfer.[6]

Our work can be placed in the growing literature in household finance, and it relates to various strands: peer effects, subjective expectations, information flows and social comparisons, financial literacy, and social networks.[7] We link to the relevant peer effects literature on financial behavior, which builds upon the seminal papers of Duflo and Saez (2002, 2003) and Hong et al. (2004).[8] Our paper provides previously unavailable evidence that interactions on financial matters and their effects relate to a typically very small subset of peers, and they follow a particular thread, from perceptions to expectations and then to behavior.

Part of our work studies the nature and role of subjective expectations elicited through surveys, whose promise and link to individual or aggregate behavior has been studied in Carroll (2003), Hurd (2009), Greenwood and Schleifer (2014), Manski (2018), Giglio et al. (2021), and Ameriks et al. (2020). The aspects of our work that relate to accuracy of perceptions of the past and expectations, as well as financial knowledge, information, and their transmission, links to relevant literature on financial literacy (Lusardi and Mitchell, 2014; Lusardi et al., 2016). Our study also relates to the larger literature on social and information networks (see Jackson, 2008).

Methodologically, our analysis based on survey elicitation complements both administrative data and experimental research on social learning and social utility in important dimensions. Administrative data offer clear information on location and thus geographical proximity with potential peers, as well as detailed information on participation and holdings (see, for example, Kaustia and Knüpfer, 2012; Girshina et al., 2019; Haliassos et al., 2020). However, administrative data do not include information on subjective expectations, perceptions of past stock returns, or perceptions of peer information or behavior.

Experiments in the field or in the lab are able to control fully the information flow by focusing on a previously unknown product, knowing the precise network structure, and being able to control the exogenous flow of information to the agent. This allows a clean separation of social learning from social utility and an assessment of the relative importance of the two. Two important examples are Banerjee et al. (2013), who study a newly introduced micro-finance program in rural India, and Bursztyn et al. (2014), who conduct a field experiment in collaboration with a Brazilian brokerage firm for a brand new financial product. Both studies conclude that information on a new product provided through peers is important, but they differ on the importance of the social utility channel.

Our survey-based study complements administrative data studies by shedding light on subjective expectations and perceptions and the role peer interactions play in forming those and financial behavior. It also complements experimental approaches by asking whether social learning matters in the case of well-established products, such as stocks, in a decentralized and anonymous market, such as the French stock market, with multiple potential sources of information, including peers. This is highly relevant but not obvious. In the case of established financial products and developed environments, the incremental impact of information that individuals may or may not choose to obtain from peers can be limited, as a lot may be known already and peers may not be the most knowledgeable sources. Our findings consistently support the view that, even in such cases, the levels of information and exposure to the product among the respondent's financial circle contribute to the accuracy of return perceptions and expectations, and to the decisions to hold the premium asset and to adopt a higher risky portfolio share.

[4] Specifically, we reshuffle responses on the financial and the outer circle, the population, and non-response dummies among respondents in the same age, education and region of residence in one set of tests. In a second set, we also add to the list marital status, occupational status, and having children.

[5] Specifically, when we instrument responses regarding the outer circle with respondent perceptions regarding the overall population, which are actually quite consistent with population statistics, we find insignificant coefficients on both perceived information and participation in the outer circle. Importantly, the coefficients on the financial circle remain significant even in this case.

[6] We have found that inclusion of an available control for optimism in the regressions for accuracy of return expectations or perceptions yields insignificant estimates for being optimistic and does not alter the pattern of our other estimates. Furthermore, if optimism were the key to interpreting our findings on returns, we would expect it to extend to perceptions regarding the outer social circle and the population, both of which are consistently insignificant.

[7] A recent overview of research in household finance, including the placement of peer effects within its corpus, is provided in Gomes et al. (2020).

[8] This includes (Kaustia and Knüpfer, 2012; Banerjee et al., 2013; Bursztyn et al., 2014; Georgarakos et al., 2014; Li, 2014; Beshears et al., 2015; Girshina et al., 2019; Ouimet and Tate, 2020).

The paper is structured as follows. The next section discusses how the social circle is decomposed into a financial circle and an outer circle, and the links of each to informative social interactions and mindless imitation. Section 3 describes the survey design and the data. Section 4 presents the baseline empirical results, and Section 5 the results of robustness checks. Section 6 concludes.

2. The social and financial circles

Our theoretical model (Online Appendix A) assumes that an investor's expected return and demand for the asset are functions of (a) the pooled signal, x_i, about the return, constructed from the weighted signals, y_k, received by the respondent, either directly or via the peers; and (b) of the limiting sum of these weights in a large economy, k_i^*, which can be thought of as the overall connectedness of investors to peers. Averaging the signals is exogenous, since the information network is taken as given by the investors and does not enter their optimization problem. Respondents are assumed to give larger weights to signals received from peers who are objectively more accurate, in the sense of having lower variability around the true value. This formulation is a convenient way to separate the general social circle of a respondent from the financial circle, with whom the respondent interacts closely on financial matters. The empirical counterpart of assigning different weights to signals received from peers is the inclusion of some peers, whose signals are given considerable weight, in the financial circle, while others remain in the outer social circle.

Our survey is the first to elicit responses regarding the existence of a financial circle and perceptions regarding its members, separately from the overall social circle. In our data, the size of the social circle correlates positively with being younger, married, a higher-income earner and being wealthier, a college graduate, and a bigger saver. The size of the financial circle correlates positively with being younger, a saver, and with larger wealth, consistent with a greater incentive to interact with peers on financial matters (see Table O.A.12).

In the empirical specification, we study whether and how respondents' perceptions of past returns, expectations of future returns, and stockholding behavior depend on information potentially received from peers in both the financial and the outer circle. If we regressed such dependent variables on average expectations or average behavior of the peers, we could be subject to the well-known 'reflection problem' of Manski (1993). However, our theoretical model shows that respondent expected returns and stock demands react to the degree of connectedness in an equilibrium of a large economy, denoted by k_i^*. Thus, instead of asking respondents what return signals, y_k, they received from their peers, we ask two questions that relate to the weight these signals carry in the respondent's return expectation and demand for the asset.[9] The first question refers to the respondent's perception regarding how informed about stockholding the peers are, while the second refers to the respondent's perception of how experienced the peers are with stockholding. Intuitively, respondents who think that their peers are more informed or more experienced will assign more weight to these signals and respond more to them in adjusting their expectations and stockholding decisions.

Now, the theoretical model assumes rationality to show that, even under rational expectations and choice of behavior, there is information value to interaction with peers. The empirical implementation is more flexible, as it asks respondents to indicate the (subjective) weight that they give to information on stockholding coming from their peers, distinguishing between the financial and the outer circle. This allows us to test for differential weighting. Our empirical findings below are consistent with one form of rationality, namely that respondents react more to their peers if they believe them to be more informed or to have greater experience with stockholding. On the other hand, our survey records significant heterogeneity in perceptions of past stock returns and in expectations of future returns, consistent with our modeling choice of a departure from full-information rational expectations.[10]

Our approach is flexible enough to uncover the presence of such influences at different levels. Interaction with informed or participating peers can sharpen the accuracy of respondent perceptions of past returns, which enter the determination of expected future returns, but may also have a direct further effect on expectations, controlling for perceptions of the past. In turn, interaction with informed or participating peers may be related to greater stockholding participation or exposure only through its link to expectations, or also through a further, direct link.

3. Survey design

In this section, we provide information about key aspects of the special survey questions and sample, with more detailed information available in Online Appendix C.

[9] In model notation, we do not ask respondents to report the y_k signals they received, but factors that govern their connectedness, k_i^*, and thus the extent to which they react to the signals received by their peers. Because agents do not have a social utility component, their stockholding behavior depends on their expectations of returns, which in turn depend on how do they react to (or perceive) peers' signals.

[10] A subtler empirical issue of optimality is whether respondents in fact weigh more heavily the signals of peers who objectively know more and have lower variance around the true information. This is an interesting question for future empirical research, but not one that can be answered with our data, as we do not observe the peers and their objective attributes.

3.1. The sample

We added questions to an ongoing survey of the French population administered by Taylor-Nelson-Sofres (TNS), the world's second largest market research company and professional survey agency operating in different countries. We use two linked questionnaires, fielded in December 2014 and then in May 2015. The first provides detailed information on risk attitudes, preferences, expectations and perceptions of stock market returns, in addition to wealth, income and socioeconomic and demographic characteristics for a representative sample of French households.[11] The follow-up contains questions on how respondents perceive their social and financial circles and their own position within them in various dimensions.

The 2014 questionnaire was sent to the TNS panel of 4000 volunteers, one per household. The 3670 (92%) individuals who returned the completed questionnaire by post received 25 Euro in shopping vouchers (*bons-d'achat*). They received the follow-up questionnaire in May 2015, and 2587 (70.5%) completed it. Probit analysis of unit non-response among participants in the 2014 sample reveals that most factors are insignificant, with few exceptions.[12] Nevertheless, all reported tables in the main text, Appendix and Online Apprendix include a dummy for unit non-response to the TNS 2015 survey wave.

3.2. Eliciting perceptions and expectations of returns

We ask respondents to state their perceptions of the past and expectations of the future return on a buy-and-hold portfolio that tracks the evolution of the stock market index, CAC-40. Following Manski (2004), Dominitz and Manski (2007) and the recent expectations literature, we use probability questions on seven possible outcomes rather than eliciting point expectations.

We ask for the perception of the past cumulative 3-year return, *Perc. R* and for the expectation about the future cumulative 5-year return, *Expec. R*, and compute deviations from the respective actual return.[13] The use of five years as a forecasting horizon helps untie answers from current business cycle conditions and is consistent with observed portfolio inertia (e.g., Bilias et al., 2010). Probabilistic elicitation of the perceived past cumulative stock market return captures differences in information across households as well as the relationship between information and expectations.[14]

3.3. Perceptions of the financial and social circles

The size of the *social circle* and of the *financial circle* are obtained from the following survey questions, respectively:

C1: *Approximately how many people are there in your social circle of acquaintances?*
D1: *With how many people from your social circle (as identified in C1), do you interact with regarding your own financial/investment matters?*

To minimize item non-response related to lack of clarity, we conducted a pilot survey among university students, clerical, and administrative personnel. In our estimations, we control for any systematic factors that could lead to item non-response by using dummy variables for non-response, as well as separate dummy variables for 'I don't know' responses. Of the respondents to TNS2015, about 90% and 87% answered C1 and D1, respectively. On average, respondents interact with 52.5 people but include only about 5 in their financial circle, if they report having one, which implies considerable network sparsity. We denote by *SC, FC, OC* the social, financial, and outer circle, respectively (see Table O.A.1).

We elicit point perceptions about how many members of the overall social and financial circles are informed about the stock market, and how many participate in it. Perceptions about peers can be relevant for behavior but also help overcome Manski's (1993) reflection problem. The wording is:

C7i/D16i: *In your opinion, what is the proportion of people in your social/financial circle that invests in the stock market? (as a %)*
C7ii/D16ii: *In your opinion, what is the proportion of people in your social/financial circle that follows the stock market? (as a %)*

About 96% and 88% of TNS2015 respondents provided valid answers to C7 and D16, respectively.[15] Probit estimation for item non-response on each of the four questions separately finds that most characteristics are not systematically related to

[11] The TNS 2014 dataset is constructed from a panel of volunteers. TNS proposes a re-weighting so that the final sample is representative of the French population by age, wealth and asset classes. Such re-weighting to recover representativeness of the population does not strongly modify the descriptive statistics, suggesting that the selection bias is very low relative to the widely used INSEE survey, which does not include our key variables of interest. TNS survey waves are not necessarily representative in terms of other socio-economic or demographic characteristics, such as gender, marital status and number of children.

[12] We detect significant relations with higher risk aversion, being married, in the youngest group, and in the college educated group. Those with higher risk aversion and the youngest are typically less likely to participate in the stock market, so our survey questions may be less relevant for them. The literature has not found a stable relationship between stockholding and marital status, and we note that unit non-response is not related to child-related demands on respondents' time. The more limited tendency of the college-educated to participate probably has to do with opportunity costs of their time.

[13] We use responses to questions C39 and C42 from TNS2014, respectively.

[14] See Coibion et al. (2018); and Armantier et al. (2016) for substantial differences on the recent US inflation rate.

[15] Respondents could also answer '*I do not know*'. About 64% and 61% chose this option for C7i and D16i, respectively; and about 61% and 58% for C7ii and D16ii.

item non-response, but a few are, prompting us to include NR and DK dummies in the relevant estimations. In essence, those who are more concerned about finances or are alert to saving and financial investment opportunities are also more likely to be aware of the state of participation and information in their financial circle, consistent with our analysis.[16]

The cross-sectional average point estimates for the perceived shares of the social and financial circle that invest in stocks are 10.7% and 18.9%. Those for peers that follow the stock market are 12.6% and 20.5%. These questions define the variables *%SC Particip.*, *%FC Particip*, *%SC Inform.* and *%FC Inform.* and allow computation of the outer circle shares. Questions C6i and C6ii ask about the corresponding proportions in the French *population*.[17] Interestingly, the cross-sectional average of subjective responses regarding stock market participation in the French population is remarkably close to the cross-sectional mean participation rate in our representative sample: 19.4% versus 21.7%, respectively. We also ask how respondents see themselves in terms of wealth, education and professional standing relative to their peers (see Online Appendix C).

For the most part, the NR or DK dummies are not statistically significant, while the few exceptions seem plausible in view of our analysis. For reasons of brevity, we have opted not to include coefficient estimates on NR and DK dummy variables in the reported part of our tables, but we present an example of a full table in the O.A., for the regressions on back-cast and forecast errors in returns.[18]

3.4. Other variables

Respondents are asked to state their total financial wealth and its share invested in stocks (directly or indirectly). The latter defines the participation dummy variable $\Pr(S > 0)$, and the conditional risky share, *%FW*. We also collect information on demographic characteristics (age, gender, marital status, number of children), elicited risk preferences (coefficient of absolute risk aversion), proxies for resources and constraints (educational attainment, employment status, assets, income, perceived borrowing constraints, and achieved liquid saving over the past year), and region of residence.[19]

4. Baseline estimates

Consistent with our theoretical analysis, in which equilibrium depends on connectedness, we focus on whether and how expectations about future returns, perceptions of past returns and stockholding behavior are influenced by the share of the relevant peer circle that the respondent considers informed about, or participating in the stock market. We control for factors such as risk aversion that correlate with potential benefits from acquired information. We first present baseline estimates and we then conduct extensive robustness analysis to address potential concerns.

4.1. Errors in subjective return expectations and in perceptions

We begin by examining whether respondents who report higher shares of informed or participating peers tend to exhibit smaller absolute errors in their stock return forecast (over the next five years); and/or smaller absolute errors in their perception of the past (three-year) return. We also ask whether the perceived presence of informed or participating peers is systematically related to the size of forecast errors once we control for the error in perceived past returns.[20]

Figure 1 shows historical monthly data of the French stock market index CAC-40, from March 1990 to June 2016. The index dropped by nearly 25% at the time of the sovereign-debt crisis in the second half of 2011. By the time that the two parts of the survey were fielded, in late December 2014 and May 2015, the index was still below its dot-com and Lehman brothers peaks, but had already recovered relative to the sovereign-debt crisis. Given the substantial turmoil prior to data collection, respondents are likely to have been exposed to considerable news coverage of the stock market, and this makes the observed variation in perceptions and expectations all the more striking.

The cross-sectional average perception of respondents regarding returns over the previous 3-year period is +3.6%, which underestimates both the annualized and the cumulative actual returns in the second half of 2014 at 12.43% and 34.49%, respectively (Fig. 2). Although our emphasis in this study is on heterogeneity of perceptions, it is worth noting that the

[16] Specifically, we find that those who are more risk averse or are small savers are more likely to respond to all four questions regarding participation and information in the social and financial circles. Those in their most active years (35–50), the wealthiest, and those who manage to save a lot are more likely to respond on participation and information among their financial circle. Although the missing-indicator method we deploy here is widely used and has various attractive properties in terms of representativeness or efficiency over alternatives, such as the complete-case or stratification methods, it is not without limitations (see Jones, 1996).

[17] About 54% and 52% chose the option '*I do not know*,' (DK) for questions C6i and C6ii, respectively, while about 3.1% chose not to answer and are coded as 'non-responses', (NR).

[18] Non-response to the question on risk aversion or on past returns or on assets is typically associated with bigger forecast errors, consistent with limited ability of non-respondents to collect and process information. We see some tendency of those who do not respond on, or declare that they don't know the extent of, information or participation in the outer circle to have smaller forecast or back-cast errors. This is consistent with smaller errors reflecting greater sophistication and accuracy of respondents, and these respondents being less likely to report on features of the outer circle with whom they do not typically discuss financial matters.

[19] See Table O.A.2 for summary statistics and Online Appendix C for variable definitions.

[20] Early papers have documented the role of subjective expectations in stockholding behavior and their surprising heterogeneity, despite their reference to a single stock market (Dominitz and Manski, 2007; Kézdi and Willis, 2011; Hurd et al., 2011). Even more surprising is the heterogeneity in perceptions regarding recent stock market returns (Arrondel et al., 2014).

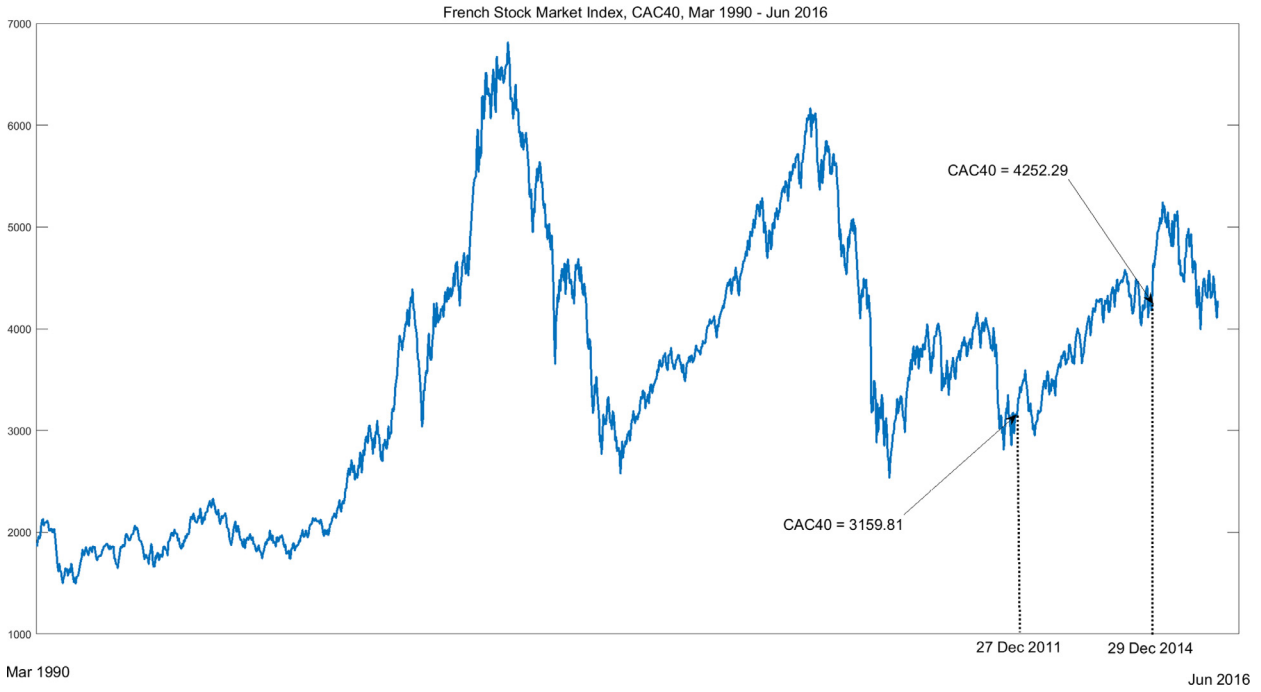

Fig. 1. French stock market index, CAC 40,weekly data, 3 March 1990 - 27 June 2016. *Source*: Yahoo Finance.

average size of the perception gap is consistent with reported empirical findings on the perception gap of households, and CEOs and CFOs of firms about inflation (see Jonung, 1981; Armantier et al., 2016, and Coibion et al., 2018 respectively). Also, it was obtained without any guidance to the 'correct' answer, in a period exhibiting return volatility. On average, respondents are analogously pessimistic about the future. The average subjective expectation of future five-year returns is equal to +1.6%. This is fairly close to the annual historical (arithmetic) mean excess return in France for 1870–2007, estimated by Le Bris and Hautcoeur (2010) at 2%, but significantly below the cumulative 5-year return this would imply (Fig. 2).[21]

In our theoretical model, we show that even within an efficient competitive asset market, under certain conditions, information sourced from peers influences agents' expectations of returns. Guided by a first order approximation of (O.A.Eq.8), we adopt the following empirical specifications (derived in Online Appendix B):

$$|R_{t+1} - Expec.\ R_i| = \kappa_0 + \kappa_1 k_i^* + \boldsymbol{\kappa}' \mathbf{v}_i + \varepsilon_{1i} \tag{1}$$

and

$$|R_{t+1} - Expec.\ R_i| = \kappa_0 + \kappa_1 D_i^e + \boldsymbol{\kappa}' \mathbf{v}_i + \varepsilon_{2i}, \tag{2}$$

where k_i^* is an indicator of information connectedness to the peer circle, D_i^e is perceived peer participation in the stock market, $\mathbf{v}_i$ is a vector of individual characteristics which includes respondents' perceptions about peer *and population* characteristics, ε_{1i} and ε_{2i} are individual zero-mean error terms distributed normally conditional on covariates.[22] The coefficients to be estimated are denoted by κ_0, κ_1 and $\boldsymbol{\kappa}'$. The same coefficient symbols are used for both equations for notational economy, but not to imply equality of coefficients.

We control for a wide range of characteristics and attitudes of the household head. These include individual perceptions about the respondent's standing relative to peers' professional status, education and total wealth, demographic characteristics (age, gender, marital status, number of children), elicited risk preferences (coefficient of absolute risk aversion), proxies for resources and constraints (educational attainment, employment status, assets, income, perceived borrowing constraints, and achieved liquid saving over the past year), and region of residence. Detailed variable definitions are in Online Appendix C. We also include dummies for item non-response and inconsistent responses, especially to the questions about

[21] The averages of the forecast/backcast absolute errors are 29.92/31.16. For those who reported 'DK=1' to questions D16i/ii re. the perceived proportion in their financial circles that invest/are informed about the stock market, the corresponding averages are 30.63/31.92, somewhat higher than the unconditional means. For those who reported 'DK=1' to questions D7i/ii re. the perceived proportion in their social circles that invest/are informed about the stock market, the corresponding averages are 30.37/31.70, also somewhat higher than the unconditional means.

[22] Although we do not strictly need the error terms to be normally distributed, this assumption better corresponds to the theoretical model's assumptions, built on the basis of a CARA-Gaussian framework. See also the econometric specification subsection at the end of Online Appendix B.

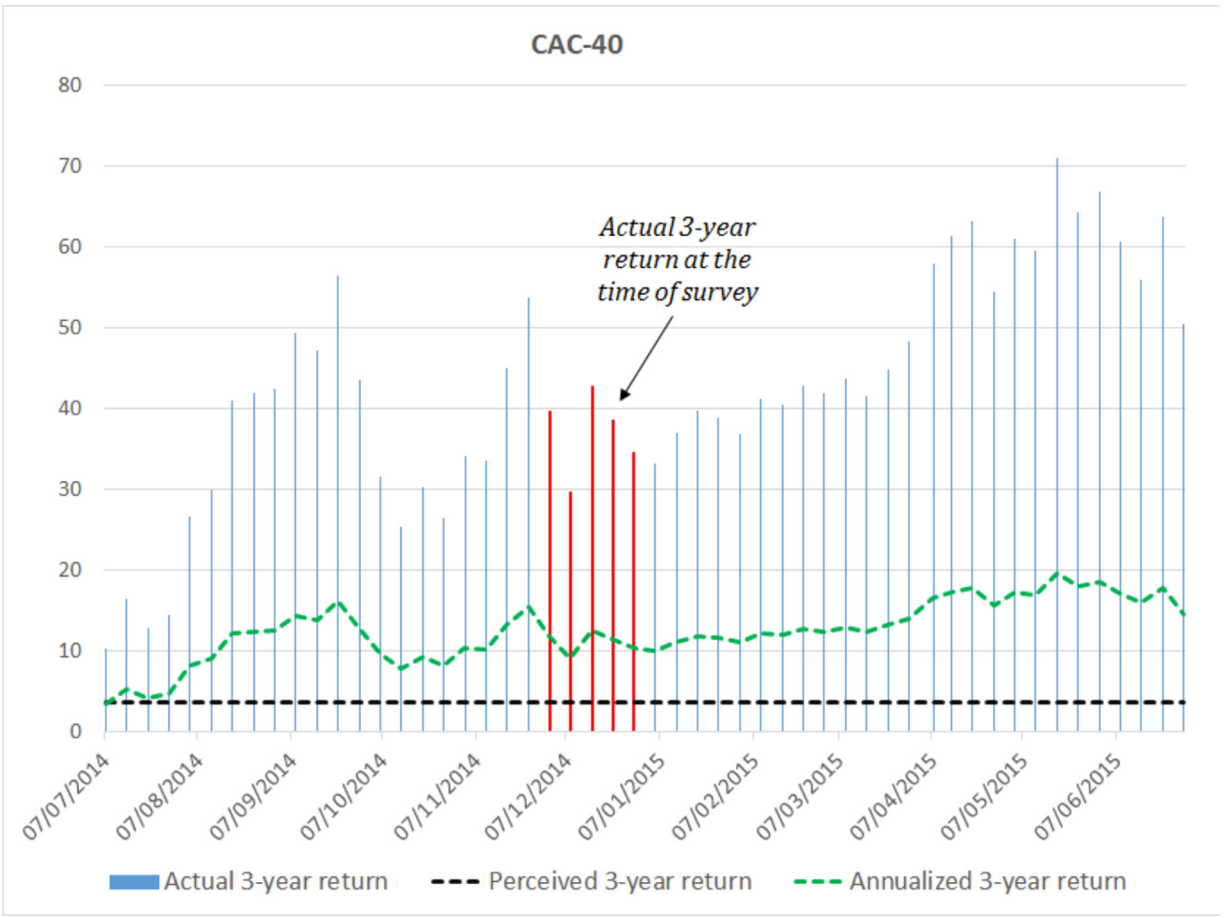

Fig. 2. French stock market CAC 40, three-year stock market returns, weekly data, July 2014 to June 2015. The blue bars show cumulative 3-year returns and in particular, the red segment shows the actual cumulative 3-year return at the time that the survey was fielded, Dec 2014. The green dashed line shows the actual annualized 3-year returns and the black dashed line indicates the perceived 3-year return at the time that the survey was fielded. *Source*: Yahoo Finance. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

perceived peer and population behavior.[23] Finally, we split respondents' social circle connectedness, k_i^* into a financial circle, $k_{i,FC}^*$, and an outer circle, $k_{i,OC}^*$, controlling also for respondents' perceptions about overall population-level counterparts $k_{i,Pop}^*$:

$$|R_{t+1} - Expec.\ R_i| = \kappa_0 + \kappa_{1,FC} k_{i,FC}^* + \kappa_{1,OC} k_{i,OC}^* + \kappa_{1,P} k_{i,Pop}^* + \boldsymbol{\kappa}' \mathbf{v}_i + \varepsilon_{3i}\,, \tag{3}$$

$$|R_{t+1} - Expec.\ R_i| = \kappa_0 + \kappa_{1,FC} D_{i,FC}^e + \kappa_{1,OC} D_{i,OC}^e + \kappa_{1,P} D_{i,Pop}^e + \boldsymbol{\kappa}' \mathbf{v}_i + \varepsilon_{4i}\,. \tag{4}$$

Table 1 (cols. 1 and 2) reports regression estimates for these two specifications. Controlling for the perceived shares of peers in the outer circle and in the population that are informed about (participating in) the stock market, a one standard deviation increase in the perceived informed (participating) share of financial circle peers (at a mean of 17.2 (16.6) percent) is associated with a reduction in the mean absolute forecast error by 0.45 (0.41) percentage points (or a 1.5% (4.7%) of the unconditional mean forecast error).

We want to investigate whether our results in this first pass at estimating the relevance of the financial circle for expectetional errors on stock returns reflect, partly or fully, a possible role in sharpening perceptions about recent past returns. To this end, we use question C42 in our survey, that allows probabilistic elicitation of respondents' perceptions about the most recent realized stock market return (see Online Appendix C), to introduce, as additional control in

[23] Controlling for item non-response to those questions hardly affects the sign, size, and significance of the main coefficients of interest, namely on perceptions regarding peers. A similar robustness exercise in the presence of missing data can be found in Dimmock et al. (2016).

Table 1
Forecast and Back/Nowcast Errors (short).

VARIABLES	(1) $\|FE\ R\|$	(2) $\|FE\ R\|$	(3) $\|FE\ R\|$	(4) $\|FE\ R\|$	(5) $\|FE\ R\|$	(6) $\|BE\ R\|$	(7) $\|BE\ R\|$
%FC. Inf.	-0.0263**			-0.0129		-0.0513***	
	(0.0131)			(0.0129)		(0.0193)	
%OC. Inf.	-0.0005			0.00218		-0.0148	
	(0.0259)			(0.0239)		(0.0370)	
%Pop. Inf.	0.0118		0.0123	0.0104		-0.00140	
	(0.0166)		(0.0184)	(0.0159)		(0.0224)	
%FC. Part.		-0.0247**			-0.0126		-0.0452**
		(0.0124)			(0.0120)		(0.0200)
%OC. Part.		0.0003			0.0089		-0.0455
		(0.0335)			(0.0323)		(0.0439)
%Pop. Part.		0.0068	-0.0049		0.0037		0.0026
		(0.0209)	(0.0237)		(0.0195)		(0.0255)
$\|BE\ R\|$			0.271***	0.271***	0.272***		
			(0.0230)	(0.0230)	(0.0230)		
Risk aversion	0.0686*	0.0699*	0.0405	0.0386	0.0387	0.145***	0.150***
	(0.0380)	(0.0380)	(0.0342)	(0.0341)	(0.0341)	(0.0525)	(0.0525)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2535	2535	2535	2535	2535	2328	2328
F	2.544	2.599	4.971	4.846	4.841	4.331	4.345
R^2	0.054	0.054	0.162	0.164	0.165	0.097	0.096

Notes: Results from OLS regressions of households' absolute forecast errors $|FE\ R| \equiv \left|R_{t+1} - F^i R_{t+1}\right|$ (cols 1–5) and back/nowcast errors $|BE\ R| \equiv \left|R_t - B^i R_t\right|$ (cols 6–7), for returns on the CAC-40 index over the next five or and last three years respectively on measures of informative social interactions. The corresponding unconditional means are 29.92 and 31.16 respectively. Columns 3–5 report results for households' absolute forecast errors conditional on back/nowcast errors. 'Controls' includes measures of relative social standing, socio-demographic and socio-economic characteristics, as well as NR, DK, IC indicators and reference categories, as fully specified in tables Tables O.A.1 and O.A.2 in the Online Appendix. Robust standard errors are reported in parentheses. ***, ** and * denote significance at 1%, 5% and 10%, respectively. Source: merged TNS2014 and TNS2015 waves in France.

(3) and (4), the absolute distance between recent stock price growth and a respondent's mean subjective perception of it, $\left|R_t - B^i R_t\right| \equiv |R_t - Perc.\ R_i|$.[24]

Table 1 (columns 3–5) shows that a respondent's mean perception error is a strongly significant predictor of their forecast error, regardless of whether peer variables are included in the regression (columns 4 and 5) or not (column 3). Strikingly, neither the share of informed peers nor the share of stockholders in respondents' financial circles retain their statistical significance in the presence of the respondent's mean perception error. This suggests that, if informative social interactions do influence subjective expectations of returns, they operate by affecting perceptions of realized returns.

To explore whether this is so, we regress the absolute size of perception errors regarding recent past returns on the social interaction variables, k_i^* or D_i^e, and the remaining controls:

$$|R_t - Perc.\ R_i| = \eta_0 + \eta_{1,FC} k^*_{i,FC} + \eta_{1,OC} k^*_{i,OC} + \eta_{1,P} k^*_{i,Pop} + \boldsymbol{\eta}' \mathbf{w}_i + \varrho_{1i}, \tag{5}$$

or

$$|R_t - Perc.\ R_i| = \eta_0 + \eta_{1,FC} D^e_{i,FC} + \eta_{1,OC} D^e_{i,OC} + \eta_{1,P} D^e_{i,Pop} + \boldsymbol{\eta}' \mathbf{w}_i + \varrho_{2i}, \tag{6}$$

where ϱ_{1i} and ϱ_{2i} are individual zero-mean error terms distributed normally conditional on covariates (see footnote [22]), $\mathbf{w}_i$ is a vector of individual characteristics. The coefficients to be estimated are denoted by η_0, $\eta_{1,FC}$, $\eta_{1,OC}$, $\eta_{1,P}$ and $\boldsymbol{\eta}'$, where again we use the same coefficients in both equations to economize on notation.

The last two columns of Table 1 report significant estimates of a negative relationship between the absolute size of the perception error and the perceived share of the financial circle either informed about stocks (column 6) or participating in stocks (column 7). We find that a one standard deviation increase in the mean informed (participating) share of financial circle peers of 17.8 (16.7) percent is associated with a reduction in the mean absolute perception error by -0.91 (-0.76) percentage points (or 2.9% (2.4%) of the unconditional mean backcast error).[25] Taken together, estimates in Table 1 suggest that, controlling for a wide range of household characteristics, informative interactions or mindful imitation of the financial

[24] Progress in incorporating information sets has been made by extending Manski's (2004) probabilistic elicitation techniques to facts, as opposed to events. See Arrondel et al. (2014), Afrouzi et al. (2016) and Coibion et al. (2018).

[25] The results reported are robust to adopting Coibion et al.'s (2018) econometric specification not in 'error form' (Table O.A.3), as well as to specifications with tuning parameter within normal ranges. The latter are available from the authors upon request.

circle tend to sharpen the accuracy of perceptions regarding the recent past return and, through that, increase the accuracy of return expectations.[26]

4.2. Stockholding behavior

Our preceding analysis has confirmed that connectedness to people more knowledgeable about the stock market tends to reduce absolute deviations of subjective expectations and perceptions from realized returns. In this section, we examine whether social interactions and connectedness increase the prevalence of, and exposure to stockholding risk, beyond their indirect effect through expectations.

Reorganizing the demand for stocks in (O.A.Eq.11) indicates that the risk-adjusted individual demands depend on a term that is common to all agents and a term that is individual-specific. Since we are exploiting cross-sectional variation, a linear approximation suggests the following econometric specification for agent i's share of financial wealth invested in stocks:

$$D_i = \%FW_i = \max\{0, \min\{\ \lambda_0 + \underset{(+)}{\lambda_1} k_i^* + \underset{(+)}{\lambda_2} Expec\ R_i + \underset{(-)}{\lambda_3}\rho_i + \boldsymbol{\lambda}'\mathbf{z}_i + u_i, 100\}\}, \tag{7}$$

where u_i is an individual-specific error term. The vector $\mathbf{z}_i$ contains respondent characteristics, such as age, gender, marital status, number of children, geographical region of residence, employment status, assets, income, borrowing or liquid savings. It also includes individual perceptions about the respondent's standing relative to the social circle (professional status) and financial circle (professional status, education, and total wealth), as well as individual perceptions about population behavior or information. The signs under the constant coefficients indicate the theoretically predicted signs. The zero term allows for stock market non-participation.

By analogy to our analysis of expectations and perceptions above, we also consider another specification involving stockholding behavior among peers. This takes the form:

$$D_i = \%FW = \max\{0, \min\{\ \zeta_0 + \underset{(+)}{\zeta_1} D_i^e + \underset{(+)}{\zeta_2} Expec\ R_i + \underset{(-)}{\zeta_3}\rho_i + \boldsymbol{\zeta}'\mathbf{z}_i + w_i, 100\}\}, \tag{8}$$

where D_i^e represents perceived peer participation in the stock market. In (), we focus on respondents' perceptions about how informed their financial and outer circles are; and in (), we use their perceptions of stock market participation in the two circles.

4.2.1. Stock market participation

Column (1) of Table 2 presents results for a standard participation probit, augmented with responses on how informed the financial, the outer circle, and the population are perceived to be. We confirm that subjective expected returns are positively related to the probability of participation, even after controlling for a range of household characteristics and for the respondent's elicited absolute risk aversion. We find that a one standard deviation increase in the mean share of a respondent's financial circle perceived to be informed about the stock market is associated with a higher probability of investing in stocks by 7.4 percentage points (a 34% increase in the unconditional probability). Column (2) repeats the exercise but now controls instead for respondent perceptions of the prevalence of stock market participation in the two circles and in the population. We find a statistically significant positive relationship with the perceived share of participating peers in the financial circle, consistent with information transfer or mindful imitation.

Our benchmark estimates also indicate that stock market participation among the outer circle, with whom the respondent does not purposefully discuss financial matters, has a positive and statistically significant relationship to the respondent's own decision to hold stocks, controlling for the respondent's perception of participation in the overall population, which turns out to be insignificant. This finding, together with the absence of a relationship between perceptions of the outer circle and expectations or perceptions of returns, suggests the possible presence of mindless imitation of peers that the respondent does not consider knowledgeable or trustworthy enough to include in the financial circle. This is all the more surprising, given the likely imprecision of such perceptions, presumably based on casual remarks. We will subject this finding to further scrutiny in the robustness analysis below.

4.2.2. Conditional portfolio shares

Columns (5) and (6) of Table 2 adopt a Tobit specification and report the size of portfolio exposure to stockholding risk, conditional on holding stocks. They examine the role of perceptions regarding how informed the financial and outer circles are and of the extent of their participation, controlling also for perceptions about the population. Higher shares of informed or participating members of the financial circle are related to greater exposure to stockholding risk, conditional on participation, providing support for the main theoretical prediction. The share of the outer circle investing in the stock market is also statistically significant for the conditional portfolio share, as it was for stock market participation.

All in all, our benchmark estimates provide consistent support for the view that informative interactions with the financial circle systematically influence the accuracy of return forecasts only through their influence on the accuracy of perceived

[26] The strong positive relationship to risk aversion is also consistent with a more limited relevance of information for those less likely to have use for it. In the more complete Table O.A.4, we have further support for informational consideration driving perception errors: controlling for retirement status, males, older and wealthier respondents tend to exhibit smaller backcast errors.

Table 2
Stockholding.

VARIABLES	(1) $Pr(S>0)$	(2) $Pr(S>0)$	(3) $Pr(S>0)$ Placebo	(4) $Pr(S>0)$ Placebo	(5) $E(\%FW\|FW>0)$	(6) $E(\%FW\|FW>0)$	(7) $E(\%FW\|FW>0)$ Placebo	(8) $E(\%FW\|FW>0)$ Placebo
%FC Inform.	0.0027***		-0.0003		0.0290		0.0259	
	(0.0005)		(0.0006)		(0.0198)		(0.0208)	
%OC Inform.	0.0001		0.0024		0.0415		-0.0643	
	(0.0013)		(0.0013)		(0.0416)		(0.0419)	
%Pop. Inform.	-0.0006		8.71e-0.5		-0.0392		0.0360	
	(0.0008)		(0.0008)		(0.0308)		(0.0261)	
%FC Particip.		0.0021***		-0.0002		0.0326*		0.0155
		(0.0006)		(0.0007)		(0.0190)		(0.0208)
%OC Particip.		0.0024*		0.0011		0.0799**		-0.0329
		(0.0012)		(0.0014)		(0.0397)		(0.0437)
%Pop. Particip.		-0.0002		0.0005		-0.0229		0.0170
		(0.0009)		(0.0009)		(0.0362)		(0.0293)
Expec. R	0.0021**	0.0021**	0.0020**	0.0020**	0.1070***	0.1100***	0.0820**	0.0800***
	(0.0009)	(0.0009)	(0.0010)	(0.0009)	(0.0351)	(0.0366)	(0.0325)	(0.0318)
Risk aversion	-0.0042**	-0.0040**	-0.0038**	-0.0038**	-0.1120*	-0.1120*	-0.0957*	-0.0973*
	(0.0018)	(0.0018)	(0.0017)	(0.0017)	(0.0607)	(0.0630)	(0.0536)	(0.0523)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2525	2525	2506	2506	2294	2294	2277	2277
Log-likelihood	-1190	-1192	-1145	-1146	-3618	-3615	-3395	-3396
LR χ^2	445.1	446.0	430.5	426.9	408.9	413.3	349.1	445.7
Pseudo R^2	0.1770	0.1750	0.1580	0.1570	0.0535	0.0541	0.0489	0.0484

Notes: Average marginal effects from probits of stock market participation (cols. 1–4) and tobits of share of financial wealth invested in the stock market (direct or indirect), conditional on investing (cols. 5–8), on share of FC and OC circles informed about or participating in the stock market. Controls as in Table 1. Robust standard errors are reported in parentheses. ***, ** and * denote significance at 1%, 5% and 10%, respectively. Source: merged TNS2014 and TNS2015 waves in France.

past returns; and they influence stock market participation, as well as conditional portfolio shares, even beyond their effect through expected returns. The benchmark estimates provide indications of additional relevance of mindless imitation, to be examined further below.

We now turn to examining the robustness of these links between social interactions and perceptions, expectations, and actions to address various alternative interpretations.

5. Robustness analysis

5.1. Endogenous formation of financial circle

Our baseline estimates do not allow explicitly for endogeneity of financial circle formation. A potential concern is that unobserved factors might induce a respondent both to form a financial circle and to collect information so as to sharpen her forecast (backcast) of stock returns, decide on stock market participation, or on the conditional risky portfolio share.[27]

To address this potential concern for perception and forecast accuracy, Table 3 reports estimates of Heckman regressions of absolute forecast or backcast errors, conditional on the respondent having chosen to form a financial circle. These Heckman regressions are based on those reported in Table 1, augmented to control for selection.[28] The selection equation for the probability of forming a financial circle is:

$$\Pr(FC_i > 0) = \Phi(\nu_0 + \nu_1' k^*_{iSC} + \nu_2' k^*_{iPop} + \nu_3' \rho_i + \boldsymbol{\nu}' \mathbf{o}_i) \tag{9}$$

The choice to form a financial circle is assumed to depend on the respondent's perception as to the shares of the social circle that are informed about, or participating in stocks, controlling for perceptions of the corresponding shares in the overall population; and on perceptions of the share of the social circle that has higher or lower professional standing than the respondent.

Columns (1) and (3) in Table 3 are reported for completeness, but they are not our preferred specifications, as they do not control for the back-cast error. Columns (2) and (4) refer to the forecast error, whereas (5) and (6) to the back-cast error. We find that formation of a financial circle tends to be positively associated with the likely usefulness of such a

[27] We take one's social environment as given, as studying the choice of location is beyond the scope of our project and data. We ask whether one's perceptions of that social environment, scaled by that person's perceptions of the overall population, lead the individual to form an inner circle for the purpose of interacting on financial matters.

[28] The reason why the number of observations in Table 3(or 4) is smaller than in Table 1(or 2) is the inclusion of variables in the selection equation (excluded from the outcome equation) for which there is a different non-response (NR)/does-not-know (DK) rate, such as %SC/Pop. Inf. and %SC/Pop. Part., together with the requirement to have valid responses both to the outcome variable (fore/backcast absolute errors and stockholdings) and to having a financial circle.

Table 3
Forecast and Back/Nowcast errors conditional on Financial Circle (FC).

VARIABLES	(1a) $Pr(FC>0)$	(1b) $\|FE\ R\|$	(2a) $Pr(FC>0)$	(2b) $\|FE\ R\|$	(3a) $Pr(FC>0)$	(3b) $\|FE\ R\|$	(4a) $Pr(FC>0)$	(4b) $\|FE\ R\|$	(5a) $Pr(FC>0)$	(5b) $\|BE\ R\|$	(6a) $Pr(FC>0)$	(6b) $\|BE\ R\|$
% SC Inf.	0.0104**		0.0087		0.0103*		0.0093*		0.0096*		0.0091	
	(0.0052)		(0.0056)		(0.0053)		(0.0055)		(0.0052)		(0.0817)	
%FC Inf.		-0.0227*		-0.0065						-0.0572***		
		(0.0127)		(0.0131)						(0.0175)		
%OC. Inf.		-0.0167		-0.0035						-0.0758**		
		(0.0251)		(0.0260)						(0.0386)		
% SC Part.	-0.0001		0.0005		-0.0002		-0.0002		-0.0006		-0.0003	
	(0.0052)		(0.0061)		(0.0053)		(0.0057)		(0.0052)		(0.0394)	
%FC. Part.						-0.0180		-0.0063				-0.0507**
						(0.0118)		(0.0128)				(0.0254)
%OC. Part.						-0.0183		0.0024				-0.0858
						(0.0323)		(0.0365)				(0.4040)
%Pop. Inf.	-0.0054	-0.0234	-0.0059	-0.0186	-0.0057		-0.0065*		-0.0049	0.0102	-0.0046	
	(0.0038)	(0.0215)	(0.0039)	(0.0224)	(0.0037)		(0.0038)		(0.0038)	(0.0311)	(0.0420)	
%Pop. Part.	-0.0004		-0.0006		-3.64e-06	-0.0288	0.0002	-0.0262	-0.0009		-0.0011	0.0017
	(0.0044)		(0.0045)		(0.0043)	(0.0275)	(0.0044)	(0.0273)	(0.0042)		(0.0408)	(0.334)
$\|BE\ R\|$				0.2870***				0.2890***				
				(0.0362)				(0.0368)				
Risk aversion	-0.0175**	0.0380	-0.0154*	0.0501	-0.0176**	0.0428	-0.0155*	0.0464	-0.0167**	0.0965	-0.0168	0.103
	(0.0081)	(0.0553)	(0.0084)	(0.0607)	(0.0082)	(0.0553)	(0.0084)	(0.0580)	(0.0079)	(0.0844)	(0.0114)	(1.230)
Controls	Yes		Yes		Yes		Yes		Yes		Yes	
Observations	2021		1920		2021		1920		1966		1966	
ϕ	-0.181		-0.322		-0.115		-0.219		-0.172		-0.118	
χ^2 (p-value)	0.22 (0.6390)		0.81 (0.3693)		0.16 (0.6868)		0.61 (0.4349)		0.40 (0.686)		0.00 (0.9944)	

Notes: Heckman regressions of absolute forecast $|FE\ R| \equiv \left|R_{t+1} - F^i R_{t+1}\right|$ (cols. 1–4), and back/nowcast errors $|BE\ R| \equiv \left|R_t - B^i R_t\right|$ (cols. 5–6), for returns on the CAC-40 over the next five and last three years respectively. The corresponding unconditional means are 29.92 and 31.16 respectively. Columns labeled (a) report results of the probit selection equation for having a financial circle; columns labeled (b) report results of regressions of forecast and back/nowcast errors conditional on having a financial circle. Equations are jointly estimated by ML. The third line from the end reports the estimated correlation between the errors of both equations. The penultimate line reports a Wald test of independent equations (and associated p-values) under the null of no correlation $\phi = 0$ between having a financial circle and the absolute forecast back/nowcast error for stock market returns. Controls as in Table 1. Robust standard errors reported in parentheses. ***, ** and * denote significance at 1%, 5% and 10%, respectively. Source: merged TNS2014 and TNS2015 waves.

Table 4
Bivariate Probits.

VARIABLES	(1a) $Pr(FC > 0)$)	(1b) $Pr(S > 0)$	(2a) $Pr(FC > 0)$)	(2b) $Pr(S > 0)$	(3a) $Pr(FC > 0)$	(3b) $Pr(S > 0)$	(4a) $Pr(FC > 0)$)	(4b) $Pr(S > 0)$
%FC Inform.		0.0026***				0.0025***		
		(0.0006)				(0.0005)		
%OC Inform.		0.0003						
		(0.0013)						
%SC Inform.	0.0034**		0.0033**		0.0034**		0.0033**	
	(0.0015)		(0.0014)		(0.0015)		(0.0014)	
%Pop. Inform.	-0.0014	-0.0004	- 0.0014		-0.0014	-0.0004	-0.0014	
	(0.0011)	(0.0008)	(0.0011)		(0.0011)	(0.0008)	(0.0011)	
%FC Particip.				0.0022***				0.0027***
				(0.0006)				(0.0006)
%OC Particip.				0.0026**				
				(0.0012)				
%SC Particip.	-0.0007		-0.0006		-0.0007		-0.0007	
	(0.0015)		(0.0014)		(0.0015)		(0.0015)	
%Pop. Particip.	-0.0001		-0.0001	- 0.0002	-0.0001		-0.0001	0.0001
	(0.0013)		(0.0012)	(0.0009)	(0.0013)		(0.0012)	(0.0009)
Expec.R	0.0003	0.0024**	0.0003	0.0023**	0.0003	0.0025**	0.0003	0.0024**
	(0.0011)	(0.0012)	(0.0010)	(0.0011)	(0.0011)	(0.0012)	(0.0011)	(0.0012)
Risk Aversion	-0.0042*	-0.0041*	-0.0042*	-0.0039*	-0.0042*	-0.0043*	-0.0042*	-0.0040*
	(0.0024)	(0.0023)	(0.0023)	(0.0022)	(0.0024)	(0.0023)	(0.0024)	(0.0023)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1684		1684		1684		1684	
Log-likelihood	-1789		-1790		-1791		-1793	
LR χ^2 (p-value)	637.6 (0)		640.6 (0)		629.2 (0)		622.8 (0)	
ϕ	0.0346		0.0415		0.0422		0.0440	
Wald χ^2(p-value)	0.420 (0.517)		0.612 (0.434)		0.633 (0.426)		0.694 (0.405)	

Notes: Average marginal effects from bivariate probits of (i) formation of financial circle (columns labeled a). and (ii) stock market participation (columns labeled b).The third line from the end reports the estimated correlation between the errors of both equations. The penultimate line reports a Wald test of independent equations (and associated p-values) under the null of no correlation $\phi = 0$ between having a financial circle and the absolute forecast back/nowcast error for stock market returns. Controls as in Table 1. Robust standard errors reported in parentheses. ***, ** and * denote significance at 1%, 5% and 10%, respectively. Source: merged TNS2014 and TNS2015 waves.

circle in discussing financial matters with the respondent. Higher risk aversion, and thus more limited desired exposure to stockholding risk, is typically associated with a smaller probability to form a financial circle. We also find some evidence of a positive relation between the tendency to form a financial circle and a larger perceived share of informed social circle peers, and thus candidates for inclusion; and smaller perceived opportunities to be picking up information incidentally from a well-informed overall population.

The second-stage (forecast or backcast) regressions appear in columns (b), for selected covariates.[29] The key finding on absolute forecast errors, namely that social interaction variables play no role once backcast errors are controlled for, is robust to endogenous formation of the financial circle. Further, our conclusion about information exchange or mindful imitation improving perceptions of the recent past return is robust to allowing for endogenous formation of the financial circle. Finally, the null hypothesis of no correlation of unobserved factors in the decision to form a financial circle and in the absolute size of the forecast or back-cast error cannot be rejected.[30]

In the next step, we consider a bivariate probit model for the choices to participate in the stock market and to form a financial circle, allowing for correlated unobserved factors influencing both. The first leg of the bivariate probit is Eq. (9) above, and the second is:

$$\Pr(S_i > 0) = \Phi(\lambda_0 + \lambda_1 k^*_{iFC} + \lambda_2 k^*_{iOC} + \lambda_3 k^*_{iPop} + \lambda_4 Expec\ R_i + \lambda_5 \rho_i + \boldsymbol{\lambda}' \mathbf{z}_i) \tag{10}$$

or the corresponding one for the perceived share of peers participating in stockholding, where we replace k^* with D^e.

Table 4 presents four bivariate probits. Even-numbered columns depict the choice on whether to form a financial circle, while odd-numbered columns depict stock market participation. Compared to Eq. (9) in Table 3, perceiving a higher share

[29] In specifications (2) and (5) where the perceived share of peers informed is the independent variable of interest, the perceived participation in the social circle (%SC Part.) and in the overall population (%Pop. Part.) are excluded from the second stage. In specifications (4) and (6) where the share of peers investing is the main independent variable of interest, the perceived peer and overall population information (%SC Inf. and %Pop. Inf.) are excluded from the outcome equations.

[30] In the second to last row of Table 3, we report the estimated correlation coefficient between the unobserved normally distributed errors in the two parts. The likelihood ratio test of independent equations and the associated p-value are reported in the first to last row of Table 3. Our findings are also robust to adopting a more general 'seemingly unrelated' statistical relationship between selection of financial circle and errors in respondents' perceptions and expectations. See Table O.A.11.

Table 5
Forecast and Back/Nowcast errors, placebo regressions.

VARIABLES	(1) $\|FE\ R\|$ Placebo	(2) $\|FE\ R\|$ Placebo	(3) $\|FE\ R\|$ Placebo	(4) $\|FE\ R\|$ Placebo	(5) $\|BE\ R\|$ Placebo	(6) $\|BE\ R\|$ Placebo
%FC. Inf.	0.0096		0.0123		-0.0042	
	(0.0142)		(0.0131)		(0.0207)	
%OC. Inf.	0.0046		-0.0039		0.0515	
	(0.0247)		(0.0251)		(0.0368)	
%Pop. Inf.	-0.0072		0.0190		0.0230	
	(0.0149)		(0.0162)		(0.0256)	
%FC. Part.		0.0167		0.0126		-0.0011
		(0.0155)		(0.0144)		(0.0206)
%OC. Part.		-0.0086		-0.0270		0.0236
		(0.0347)		(0.0343)		(0.0440)
%Pop. Part.		-0.0216		-0.0284		0.0068
		(0.0171)		(0.0185)		(0.0290)
$\|BE\ R\|$			0.274***	0.275***		
			(0.0228)	(0.0228)		
Risk aversion	0.0632	0.0639*	0.0551	0.0538	0.151***	0.155***
	(0.0387)	(0.0385)	(0.0392)	(0.0390)	(0.0531)	(0.0530)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2516	2516	2158	2158	2312	2312
F	2.521	2.544	5.325	5.122	4.158	4.101
R^2	0.054	0.055	0.188	0.190	0.092	0.092

Notes: Heckman regressions of absolute forecast $|FE\ R| \equiv \left|R_{t+1} - F^i R_{t+1}\right|$ (cols. 1–4), and back/nowcast errors $|BE\ R| \equiv \left|R_t - B^i R_t\right|$ (cols. 5–6), for returns on the CAC-40 over the next five and last three years respectively. The corresponding unconditional means are 29.92 and 31.16 respectively. Columns 3–5 report results for households' absolute forecast errors conditional on back/nowcast errors. Controls as in Table 1. Robust standard errors are reported in parentheses. ***, ** and * denote significance at 1%, 5% and 10%, respectively. Source: merged TNS2014 and TNS2015 waves in France.

of one's social circle as being informed about the stock market is now always correlated with the respondent's tendency to form a financial circle, consistent with the view that information exchange is an important motivation.

Columns (b) refer to the leg of stock market participation and show that allowing for correlation among unobserved factors leading somebody to participate in stocks and to form a financial circle further supports our benchmark findings in Table 2. The source of this robustness is highlighted in the last three rows of Table 4, showing that, in all cases, we do not reject the null of independence, $H_0 : \phi = 0$, between unobserved factors influencing the two choices.

5.2. Common preferences or shocks

An issue widely faced in the literature on peer effects is that of common preferences or common shocks. Applied to our case, individuals and their financial circles, with whom they discuss confidential financial matters, may be sharing common preferences in financial behavior or be affected similarly by exogenous shocks over time. These factors could be shifting both the proxy for peer effects and the outcome variable, thus inflating the estimated size of the peer effect. Specifically, they might induce a correlation between information collection or stock market participation in the financial circle and the accuracy of expectations and perceptions or the stockholding behavior of respondents. If outer social circles are sufficiently less subject to common preferences and common shocks, the coefficient estimate on the outer circle may turn out to be insignificant, while the one on the financial circle shows up as significant.

A useful approach to testing for the presence of powerful underlying factors bringing about such patterns is to conduct placebo tests. The key peer variables are reshuffled among demographic groups relevant for financial circle formation and possibly facing common preferences or common shocks. If the coefficient estimates for the peer variables are no longer significant, this supports the conclusion that the benchmark estimates do not originate in a tendency of such groups to have common preferences or be faced by common shocks.

We have reshuffled responses regarding the financial and the outer circle, the population, as well as non-response dummies among respondents in the same age, education, and location group. As can be seen in Table 5, we no longer find that the shares of the financial circle perceived to be informed about, or participating in the stock market are significantly related to either absolute forecast or backcast errors of stock market returns. Those of the outer circle and of the population continue to be insignificant. This supports the view that our findings on the accuracy of stock return expectations and of perceptions regarding past performance do not arise from common preferences or shocks among people sharing age, education, and location.

Although placebo tests are useful, they detect common shocks if these are common for the demographic groups considered in the reshuffling. Motivated by this consideration, we expand the range of characteristics that might be relevant for

the formation of social circles and the experience of common preferences or shocks. In the Online Appendix Tables O.A.6 and O.A.7, we reshuffle among respondents who share the same age, education, region of residence, marital status, occupational status, as well as having children. Even with these more granular peer groupings, we find again that the coefficients on reshuffled peer variables turn insignificant, making it less likely that our findings simply reflect common preferences or shocks.

Our supportive placebo results extend to our findings on stock market participation and on the conditional risky portfolio share, net of the peer effects on subjective expectations, for which we are controlling. Columns (3) and (4) of Table 2 report findings for reshuffling based on age, education, and region. The coefficients on reshuffled responses concerning the financial and the outer circle are not statistically significant for stock market participation, and the coefficients on the population perceptions remain insignificant. Columns (7) and (8) report our placebo findings for the intensive stockholding margin. Again, none of the reshuffled responses are significant. The findings reported in Table O.A.7 generalize these placebo results to allowing for the wider group of controlled characteristics described above.

An alternative approach to testing for common preferences or common shocks is to exploit an instrument that shifts the peer variable, but which itself has no direct effect on the outcome variable, except through its effect on the peer variable. One then examines if IV estimation renders the peer variable insignificant.[31] In our analysis, such an instrument should alter respondent perceptions about information or participation in their financial circle but should not directly influence the accuracy of stock return forecasts and backcasts, nor stockholding behavior. We have used as an instrument the respondent perception about the proportion of peers in the respondent's financial circle who are homeowners. Such perceptions about peer participation in another asset are relevant for perceptions about peer information and participation in the stock market, as confirmed by first-stage regressions. Although perceptions regarding homeownership and housing information of peers might affect stock return perceptions and stockholding indirectly, by affecting housing choices and wealth levels of respondents, we control not only for those but also for a wide range of other possible channels of influence, including, for example, social status and relative standing variables, borrowing and liquidity constraints, and variables governing willingness to take risks. IV estimation yields a broadly similar pattern of significance as in Tables 1 and 2, but with larger coefficients (Tables O.A.8 and (O.A.9).

Finally, we ask respondents in TNS2015 to report how they perceive themselves relative to those in their social and financial circles, in terms of professional standing, value of their financial assets and qualifications. For all these questions, respondents answer that less than half of their acquaintances are similar to them (Online Appendix C). In addition to this limited declared extent of homophily, our empirical results are conditional on these social utility covariates, which are never statistically significant.

All in all, placebo tests, IV estimation, and self reports suggest that our findings on the role of perceptions about peer stock market information or participation are not likely to be mere artifacts of common preferences or of responses to common shocks.

5.3. Attenuation bias

In our findings reported so far, perceptions about how informed the outer circle is were statistically insignificant, but those about its extent of participation were statistically significant. Given the lack of purposeful financial discussions with the outer circle, is the asymmetry in the estimates for perceived information and participation an indication of weak, if any, influence from the outer circle, or is it a mere manifestation of attenuation bias driving the coefficient on information in the outer circle towards zero? Intuitively, do we fail to find a significant effect of perceived information in the outer circle only because of the uncertainty surrounding this level of information or is it because respondents do not take into account the outer circle in their financial decisions? Although our emphasis is on informative social interactions with the financial circle, we briefly examine this question.

We take three steps to address this question. First, our sample already excludes respondents who give inconsistent answers regarding their financial and their overall social circle, suggesting confusion or limited knowledge of information and participation in the two circles. Second, we consider respondent perceptions of overall population behavior (Table 6, columns 1–4), which are quite consistent, on average, with existing population data.[32] We include them in our base regressions, alongside responses on the financial and outer circle, and find them to be insignificant. This insignificance is consistent with our narrative that individuals do not interact on confidential financial matters with people that are not in their social circle. Population controls could also be interpreted as scaling responses about the financial and the outer circles to how respondents think about others in general, and this scaling also does not appear to be a significant factor.

Third, we employ the respondents' perceptions of the population, that are given to them by the overall economic environment, as instruments for outer circle information and participation. The idea is to examine whether the part of outer-circle perceptions that emanates from the informed overall population perceptions of respondents does have an effect on behavior.

[31] A good recent example of this approach is Bailey et al. (2020), which uses Facebook data to assess peer effects in product adoption.

[32] For the average stock market participation rate in our sample of 21.7%, respondents have on average a perception of 19.39% (see Table O.A.2). Under odd-number columns in Table 6, we report average partial effects for the probability of stock market participation and share of financial wealth invested in the stock market conditional on participating, instrumented for potentially endogenous outer circle information or behavior stemming from measurement error.

Table 6
Attenuation Bias.

Variables	(1) $Pr(S>0)$	(2) %OC Inform. first stage	(3) $Pr(S>0)$	(4) %OC Partic. first stage	(5) $E(\%FW\|FW>0)$	(6) %OC Inform. first stage	(7) $E(\%FW\|FW>0)$	(8) %OC Partic. first stage
%FC Inform.	0.0112***	0.188***			0.0701*	0.192***		
	(0.0036)	(0.0099)			(0.0406)	(0.0099)		
%OC Inform.	-0.0103	-			-0.1720	-		
	(0.0150)				(0.1620)			
%FC Partic.			0.0084*	0.216***			0.0621	0.219***
			(0.0050)	(0.0093)			(0.0506)	(0.0097)
%OC Partic.			0.0038	-			-0.0564	-
			(0.0199)				(0.2070)	
SC Rel. St. Prof.+	n/s	0.055***	n/s	0.030***	n/s	0.051***	n/s	0.028**
SC Rel. St. Prof.-	n/s	-0.046***	n/s	-0.039***	n/s	-0.057***	n/s	-0.047***
FC Rel. Stand.	yes	yes	yes	yes	yes	yes	yes	yes
Expec.R	0.0072**	-0.0026	0.0073**	0.0019	0.106***	-0.0031	0.109***	0.0033
	(0.0031)	(0.0144)	(0.0031)	(0.0134)	(0.0357)	(0.0154)	(0.0364)	(0.0150)
Risk Aversion	-0.0142**	0.0076	-0.0138**	0.0146	-0.1140*	-0.0059	-0.1100*	0.0072
	(0.0063)	(0.0287)	(0.0062)	(0.0277)	(0.0607)	(0.0297)	(0.0626)	(0.0290)
%Pop. Inform.	-	0.187***		-	-	0.185***		-
		(0.0257)				(0.0254)		
%Pop. Particip.		-	-	0.164***		-	-	0.162***
				(0.0346)				(0.0339)
Controls	yes	yes	yes	yes	yes	yes	yes	yes
Observations	2525		2525		2294		2294	
Log-likelihood	-9402		-9317		-11097		-11036	
LR χ^2 (p-value)	459.3 (0)		440.3 (0)		572.6 (0)		587.6 (0)	
Fisher (p-value)	52.92 (0)		22.35 (0)		53.41 (0)		22.61 (0)	
Wald χ^2(p-value)	0.468 (0.494)		0.0512 (0.821)		1.599 (0.206)		0.388 (0.533)	
R^2	0.55		0.51		0.55		0.51	

Notes: Average partial effects for the probability of stock market participation and share of financial wealth invested in the stock market conditional on participating, instrumented for potentially endogenous outer circle information or behavior stemming from measurement error (cols 1, 3, 5 and 7) and corresponding results of first stage regressions of the outer circle information and behavior instrumented by population information and behavior respectively (cols 2, 4, 6 and 8). The last line reports Wald exogeneity tests and p-values under the null of no-endogeneity, when the models are estimated jointly by ML. The penultimate line reports the first stage Fisher statistics and p-values under the null of no relevance and the goodness of fit of the first stage regressions. Controls as in Table 1. Robust standard errors are reported in parentheses. ***, ** and * denote significance at 1%, 5% and 10%, respectively. Source: merged TNS2014 and TNS2015 waves in France.

We also control for a number of household characteristics, limiting the possibilities that perceptions regarding the population could be influencing stock market participation through omitted channels other than perceptions of the outer circle. Results are reported in Table 6. Although the instruments are relevant, in that they perform well in first-stage regressions, the coefficients on instrumented information and participation in the outer circle remain insignificant. Since the reported Wald tests in the prior to last bottom row fail to reject the null of exogeneity across columns, non-instrumented results are preferred.

All in all, these findings are consistent with the view that insignificance of outer-circle perceptions is not an artifact of imprecise knowledge of the outer circle, i.e. of measurement error generating an attenuation bias in the estimated coefficient, but a result of respondents not interacting with them on financial matters. Importantly, the significance pattern of our benchmark estimates regarding the *financial* circle shares, i.e. informative social interactions, remains robust.

5.4. Reverse causality

A further possible concern is that respondents who participate in stocks and those more exposed to stockholding risk may be more likely to convince themselves that their peers are also participating, possibly to justify their own choices. It is hard to see, a priori and in light of our findings, how such reverse causality could be present. First, by the same 'feel good' argument, stockholding respondents want to feel that they are not alone in the population. Yet, we find respondent perceptions about the population to be quite accurate and not significantly related to precision of return expectations or perceptions, to stockholding behavior, or to perceptions about the financial circle. Second, we have found a robust positive relationship between perceptions of the financial circle and accuracy of return perceptions and expectations. Under reverse causality, respondents who distort their perceptions of their financial circle tend to be more accurate in their assessments of returns. Third, if respondents who are more precise in their return expectations or perceptions, or hold stocks or are more exposed to stock risk tend to exaggerate participation in their financial circle, they would feel even better if they exaggerated information. Yet those with greater accuracy about returns, participation, and exposure to stockholding risk are in a better position to assess how informed their peers are. Finally, instrumental variable estimation, reported in the Online

Appendix (Tables O.A.8 and (O.A.9), tends to find larger estimates of coefficients on the financial circle but fails to reject the null of exogeneity, suggesting that the non-instrumented results are to be preferred.

All in all, we find no reason to suspect that respondents who have more accurate perceptions, information, and experience with the market are also more likely to have artificially inflated perceptions of the degrees of information and participation among peers with whom they continually discuss financial matters.

5.5. Optimism rather than information

Finally, could it be that unobserved respondent optimism causes higher return expectations and return perceptions, bringing them closer to return outcomes in our observation period, as well as more positive perceptions about information and participation among peers? Recent research has indeed shown that there is a significant 'fixed effect' in return expectations that could plausibly be linked, at least in part, to persistent optimism. We have no reason to doubt that persistent optimism could lead to persistently higher return perceptions. Yet we doubt that this could completely account for our estimated relationship between accuracy of perceptions and expectations or exposure to stockholding risk on the one hand and perceptions about the financial circle on the other. First, we have included a proxy for optimism in our regression, in the form of a binary response to the question "Are you one of those people who say to themselves that they are lucky in life?", and we have not found it to be significant or to eliminate the significance of our peer variables (Table O.A.13). Secondly, it is unclear why respondents whose optimism has led them to participate in stocks would only state higher shares of informed and participating peers in their financial circle but not in the overall population. In contrast, the transfer of financial information does single out the financial circle, consistent with our findings. While collecting panel data to shed light on how respondents adjust their return perceptions and expectations, as well as their stockholding, to variations in the perceived shares of informed and participating peers over time would be a useful extension for future research, we do not expect it to break the link between the financial circle and individual stockholding behavior we have found in the present study.

6. Conclusions

This paper employs novel survey data for a representative sample of the French population by age, wealth and asset classes and finds strong support for the presence of informative social interactions with only a small subset of the respondent's social circle, consistent with the confidential and sensitive nature of household finances. There is at best mixed evidence for the presence of imitation of perceived participation behavior in the outer social circle. Our findings are motivated by a theoretical model, where purely informative social interactions influence subjective expectations of future stock market returns as well as the demand for investing in stocks, within a large efficient asset market. The model shows that, conditional on investing, individuals collect more information from better informed peers, and due to the improved precision that this generates, demand more stock in response to positive pooled signals.

Our findings lend support to the notion that social interactions with the financial circle tend to be informative in relation to stockholding at various levels. The extent to which respondents perceive their financial circle to be informed about, or participating in the stock market, is related to the accuracy of expectations of future returns through its relationship to the accuracy of perceptions of recent returns. Stock market participation and the degree of exposure to stocks, conditional on participation, are positively related to stock market expectations. Even controlling for subjective expectations, stock market participation and the conditional portfolio share are additionally positively related to the extent to which the financial circle is informed or participating. We have found our results to be robust to a number of possible alternative interpretations, including endogenous formation of the financial circle, common preferences or shocks, attenuation bias, and reverse causality.

Our work draws attention to the importance of distinguishing different layers of possible social interactions on matters relating to household finances. Beyond defining or inferring a subject's social circle, it is important to recognize that discussions of personal financial matters tend to be confined to a small subset of this circle, and that information and experience in that trusted subset is crucial for the outcomes of this interaction for financial behavior.

The presence of informative social interactions with a small subset of the social circle permeating different levels imply a potentially powerful channel through which financial information, financial literacy and financial knowledge can spread through the economy, even if the original content reaches a relatively small segment of the population. We found evidence for this social multiplier even in a country with advanced financial development and in products that are mature and widely known, as is the case of stocks. They could provide at least a partial substitute for financial advice, when the latter is ill-conceived, poorly incentivized, or hardly trusted. Finally, they are likely to grow in importance, as use of social media and the potential to reach more people with new information spread rapidly. Yet, the inequities involved in having access to less informed or less financially experienced peers point to potential distributional consequences and suggest caution in relying exclusively on informative social interactions for the spread of useful information and best financial practices.

Data availability

Informative Social Interactions (Mendeley Data).

Supplementary material

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jebo.2022.09.006.

References

Afrouzi, H., Coibion, O., Gorodnichenko, Y., Kumar, S., 2016. Inflation targeting does not anchor inflation expectations: evidence from firms in New Zealand. Brookings Pap. Econ. Act. 2015, 151–225.

Ameriks, J., Kézdi, G., Lee, M., Shapiro, M.D., 2020. Heterogeneity in expectations, risk tolerance, and household stock shares: the attenuation puzzle. J. Bus. Econ. Stat. 38 (3), 633–646.

Armantier, O., Nelson, S., Topa, G., Van Der Klaauw, W., Zafar, B., 2016. The price is right: updating inflation expectations in a randomized price information experiment. Rev. Econ. Stat. 98 (3), 503–523.

Arrondel, L., Calvo-Pardo, H., Tas, D., 2014. Subjective return expectations. Southampton Discussion Paper Series in Economics and Econometrics. Information and Stock Market Participation: Evidence from France.

Bailey, M., Johnston, D., Kuchler, T., Stroebel, J., Wong, A., 2020. Peer Effects in Product Adoption. NBER WP 25843.

Banerjee, A., Chandrasekhar, A.G., Duflo, E., Jackson, M., 2013. The diffusion of microfinance. Science 341, 1236498.

Beshears, J., Choi, J.J., Laibson, D., Madrian, B.C., Milkman, K.L., 2015. The effect of providing peer information on retirement savings decisions. J. Finance 70, 1161–1201.

Bilias, Y., Georgarakos, D., Haliassos, M., 2010. Portfolio inertia and stock market fluctuations. J. Money Credit Bank. 42 (4), 715–742.

Blume, L.E., Brock, W.A., Durlauf, S.N., Ioannides, Y.M., 2011. Identification of social interactions. In: Benhabib, J., Jackson, M., Bisin, A. (Eds.), Handbook of Social Economics, vol. 1B. Ch. 18, North-Holland

Bursztyn, L., Ederer, F., Ferman, B., Yuchtman, N., 2014. Understanding mechanisms underlying peer effects: evidence from a field experiment on financial decisions. Econometrica 82 (4), 1273–1301.

Carroll, C.D., 2003. Macroeconomic expectations of households and professional forecasters. Q. J. Econ. 118 (1), 269–298.

Coibion, O., Gorodnichenko, Y., Kumar, S., 2018. How do firms form their expectations? new survey evidence. Am. Econ. Rev. 108 (9), 2671–2713.

De Paula, A., 2010. Econometrics of Network Models. Cemmap working paper. Centre for Microdata Methods and Practice, No. CWP06/16.

Dimmock, S.G., Kouwenberg, R., Mitchell, O.S., Peijnenburg, K., 2016. Ambiguity aversion and household portfolio choice puzzles: empirical evidence. J. Financ. Econ. 119 (3), 559–577.

Dominitz, J., Manski, C., 2007. Expected equity returns and portfolio choice: evidence from the health and retirement study. J. Eur. Econ. Assoc. 5, 369–379.

Duflo, E., Saez, E., 2002. Participation and investment decisions in a retirement plan: the influence of colleagues' choices. J. Public Econ. 85, 121–148.

Duflo, E., Saez, E., 2003. The role of information and social interactions in retirement plan decisions: evidence from a randomized experiment. Q. J. Econ. 118 (3), 815–842.

Galeotti, A., Goyal, S., 2010. The law of the few. Am. Econ. Rev. 100, 1468–1492.

Georgarakos, D., Haliassos, M., Pasini, G., 2014. Household debt and social interactions. Rev. Financ. Stud. 27 (5), 1404–1433.

Giglio, S., Maggiori, M., Stroebel, J., Utkus, S., 2021. Five facts about beliefs and portfolios. Am. Econ. Rev. 111 (5), 1481–1522.

Girshina, A., Mathae, T.Y., Ziegelmeyer, M., 2019. Peer Effects in Stock Market Participation: Evidence from Immigration. Mimeograph.

Gomes, F., Haliassos, M., Ramadorai, T., 2020. Household finance. J. Econ. Lit.. forthcoming

Greenwood, R., Schleifer, A., 2014. Expectations of returns and expected returns. Rev. Financ. Stud. 27 (3), 714–746.

Haliassos, M., Jansson, T., Karabulut, Y., 2020. Financial literacy externalities. Rev. Financ. Stud. 33 (2), 950–989.

Hong, H., Kubik, J.D., Stein, J.C., 2004. Social interaction and stock market participation. J. Finance 59, 137–163.

Hurd, M.D., 2009. Subjective probabilities in household surveys. Annu. Rev. Econom. 1, 543–562.

Hurd, M.D., Rooij, M.V., Winter, J., 2011. Stock market expectations of dutch households. J. Appl. Econom. 26 (3), 416–436.

Jackson, M., 2008. Social and Economic Networks. Princeton University Press.

Jones, M.P., 1996. Indicator and stratification methods for missing explanatory variables in multiple linear regression. J. Am. Stat. Assoc. 91 (433), 222–230.

Jonung, L., 1981. Perceived and expected rates of inflation in sweden. Am. Econ. Rev. 71 (5), 961–968.

Kaustia, M., Knüpfer, S., 2012. Peer performance and stock market entry. J. Financ. Econ. 104 (2), 227–420.

Kézdi, G., Willis, R.J., 2011. Household stock market beliefs and learning. NBER Working Paper No. 17614.

Le Bris, D., Hautcoeur, P.C., 2010. A challenge to triumphant optimists? A blue chips index for the paris stock exchange, 1854–2007. Financ. Hist. Rev. 17, 141–183.

Li, G., 2014. Information sharing and stock market participation: evidence from extended families. Rev. Econ. Stat. 96, 151–160.

Lusardi, A.M., Michaud, P.-C., Mitchell, O., 2016. Optimal financial knowledge and wealth inequality. J. Polit. Economy 125 (2), 431–477.

Lusardi, A.M., Mitchell, O.S., 2014. The economic importance of financial literacy: theory and evidence. J. Econ. Lit. 52 (1), 5–44.

Manski, C., 1993. Identification of endogenous social effects: the reflection problem. Rev. Econ. Stud. 60 (3), 531–542.

Manski, C., 2004. Measuring expectations. Econometrica 72, 1329–1376.

Manski, C., 2018. Survey measurement of probabilistic macroeconomic expectations: progress and promise. NBER Macroecon. Annu. 411–471.

Ouimet, P., Tate, G., 2020. Learning from coworkers: peer effects on individual investment decisions. J. Finance 75 (1), 133–172.

Ozsoylev, H.N., Walden, J., 2011. Asset pricing in large information networks. J. Econ. Theory 146, 2252–2280.