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Article

The interaction of environmental factors and individual traits on investors' perception☆

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ABSTRACT

Our study extends prior research on the investment decision-making process focusing on investors' perception. On the basis of the Starbuck and Milliken (1988) model that divides perception into two stages, noticing and sense making, we investigate the driving factors of perception and provide empirical evidence on the interaction between environmental factors and individual traits. We test the empirical predictions of our model with an experiment on a takeover bid. Our results show that: (a) the distinction between noticing and sense making is significant to examine investors' information processing, since the driving factors and interactions of the two stages are different, (b) a high ambiguity context negatively influences the two phases of investors' perception; while the individual cognitive profile affects this negative influence on noticing, it does not affect it on sense making, (c) information clarity, without considering other contexts or personality factors, improves noticing but it does not produce significant effects on sense making, (d) the reliability of the source of information only has an effect on noticing and sense making when it interacts with other context variables and the cognitive profile affects this influence, and (e) the most relevant cognitive variable in noticing is ambiguity–tolerance, whereas in sense making it is intuition.

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1. Introduction

New information causes fluctuations in stock market prices (Mahmood et al., 2011). Warneryd (2001) suggests that investors make their decisions on the basis of their expectations regarding new information. The literature considers that the black box of the market is the investors' information processing, since it contains the key factors of the decisions they make. Behavioral finance emphasizes that opening that black box allows an explanation of the inefficiencies observed in financial markets not predicted by the Theory of Efficient Markets (EMH). Oberlechner and Hocking (2004) find that financial markets may be less about the actuality of economic facts than about how information is noticed and interpreted by market participants and emphasize the relevance of market participants' attitudes on information processing. This knowledge can facilitate defining strategies or behaviors for reducing the gap between actual markets and efficient markets. The study of the decision-making process is considered relevant not only to explain the dynamics of financial markets but also to help financial advisors develop their prescriptive activity of advising in a more effective way (Kahneman and Riepe, 1998).

Our study extends prior research on investment decision-making when new information enters to the market. The way investors perceive new information turns out to be pivotal for the decisions they make. We investigate the driving factors of investors' perception and provide empirical evidence on the interaction between environmental factors and individual traits on this process. To our knowledge, the interaction of the particular variables we consider has not been previously studied in the financial literature as a determinant of investors' decisions. Our environmental variables are ambiguity, clarity of the informative stimulus, and reliability of the source of information. The individual cognitive profile consists of the investor's cognitive style, ambiguity–tolerance, and proactivity.

Financial decisions are compelled and constrained by non-financial factors. These include context factors as well as personality characteristics of individuals which moderate the way in which the environment affects decisions (Holden, 2010). Among the environmental factors that influence investors' decisions, information plays an essential role. Investors make up their minds regarding the uncertainties involved in any investment based on the information they receive from different sources (Mahmood

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et al., 2011). Moreover, De Bondt and Thaler (1994) argue in their ground-breaking paper that it is indispensable to consider psychological variables and processes when approaching the market. In the same vein, Statman (1999) denies that behavioral finance introduced psychology into finance, since psychology was never out of finance. Finally, Oberlechner and Hocking (2004) state that psychologically informed empirical research may contribute to a better understanding of actual information processing in markets by considering attitudes of market participants and examining the role of the sources of information and their influence on investors.

Previous literature demonstrates the activation of differential information processing among individuals. This evidence reveals that it is difficult to identify the individual characteristics driving this process. Perhaps this is the reason that the individual characteristics have often been represented by demographic variables such as age, sex, qualifications, and experience.[1] Nevertheless, the impact of these demographic variables is usually explained by appealing to cognitive aspects and different attitudes. Therefore, we consider it more appropriate to introduce the cognitive variables and the individual attitudes into the model directly and not by means of demographic variables (Santos et al., 2011).

Our research uses the Starbuck and Milliken (1988) perception model that divides perception into noticing and sense making. We identify variables that explain how investors notice some news but ignore other news and how they interpret what they do notice. We then analyze how the characteristics of the information interact in each of the phases of investors' perception. To do so in a controlled way, we develop an experiment involving news of a takeover bid.

This paper is organized as follows: in the following section, we introduce the investor cognitive model; section three presents the interacting factors in the cognitive model and the hypotheses to test; section four describes the details of our experiment; section five summarizes our main empirical results; and section six discusses the main implications of our study.

2. Investor cognitive model

García-Ayuso and Jiménez (1996) argue that research on financial decision-making can be conducted by means of cognitive models. Lovric et al. (2008) show that processes such as perception and action are commonly included in cognitive models (e.g., Sloman, 2001; Warren, 2006).

Perception is the cognitive process by which individuals gather information and create an image of their surrounding reality. However this perception generates an imperfect awareness of reality; from the same informative stimulus, one can find that two individuals perceive different realities (Fahey and Narayanan, 1989). The literature has stressed the diversity of factors that influence and intervene in the perception process. The perception process can be divided into two stages (Starbuck and Milliken, 1988): the first one is "noticing" where the individual distinguishes signals (relevant information) from noises (irrelevant information); the second is "sense making" where the individual interprets those signals.

Our investor model integrates these proposals to define a cognitive model of investors' decision-making into three stages: noticing, sense making, and action. In this paper, we focus on the first two stages of this model; we study how the interaction of context variables and individual traits affects the investors' noticing and sense making.

Noticing is a key element in a decision-making model because, as Starbuck (1988) argues, those individuals unable to notice relevant changes will find it difficult to meet their goals. Such difficulties will arise either because the individual will not properly modify the way they use their knowledge or because they have not recognized the need to further enhance their knowledge. Karlsson et al. (2009) study investors' selective attention – the individuals' capacity to consider the stimuli as signals or noises.

Once the stimuli have been noticed and the investor has differentiated between noises and signals, the individual makes sense of the signals noticed. As was the case in noticing, not all investors interpret relevant information in the same way due to individual traits (Starbuck and Milliken, 1988; Braunstein and Welch, 2002; Santos and Barros, 2011).

Finally, action occurs as a consequence of the information-processing carried out by the investor.

3. Interacting factors: environmental variables and individual traits

There are many papers that focus on the main factors influencing the investment decision-making process. Some papers concentrate on the effect that environmental characteristics have on decision-making, whereas others add to the analysis by recognizing that the attitudes and cognitive profile of investors are moderating factors in the way environment affects decision-making. Our goal is to extend prior research by identifying the driving factors of investors' information-processing and providing empirical evidence on the interaction between environmental factors and individual traits on this process.

In this section we introduce the interacting factors: the investor's cognitive profile – cognitive style, ambiguity tolerance and proactivity (considered as moderating factors); and the environmental factors – ambiguity, information clarity, and source reliability. We then empirically test the interactions between environment and cognitive profile on the noticing and sense making stages. Thus, our first task is to divide the perception process into noticing and sense making to test whether there are different driving factors in each of these two stages.

The evidence shows that an individual's cognitive profile has a role in the different phases of the investor's perception. Thus, it has been argued that emotions, education, genetics (Barnea et al., 2010) and the social environment have an influence in shaping not just what, but how information is interpreted (Braunstein and Welch, 2002).

The first characteristic considered in the investor cognitive profile is cognitive style. Cognitive style is the way an individual processes and evaluates information. This affects the way individuals explore their environment to collect information, how they integrate their interpretations using mental models and subjective theories (Hayes and Allinson, 1998) and how they use such information to guide their behavior. We use the bipolar scale proposed by Allinson and Hayes (1996) which classifies individuals into two groups: analytic and intuitive. Analytic individuals study the problems in detail and make decisions based on mental reasoning, whereas intuitive individuals base their decisions on sentiments. To identify investors' behavior, Shiller and Pound (1989) consider whether the individuals analyze the financial information on stocks on their own before buying them. Analytic individuals are more prone to analyze information before making a decision than intuitive ones.

The second characteristic of our cognitive profile is ambiguity tolerance. This characteristic measures the way an individual perceives and processes information about ambiguous stimuli or situations, or the way an individual faces complex, incongruent or unfamiliar data. Ambiguity–tolerance is measured with an uni-dimensional scale. Those individuals with low ambiguity tolerance consider ambiguous situations as threats (Sully de Luque and Sommer, 2000; Ling et al., 2005). On the other hand, those

[1] See, among others, Powell and Ansic (1997), Robert and Cox (2001), Tutek et al. (2010) and Santos and Barros (2011).

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