

THE END OF RATIONALITY? EMBRACING BEHAVIORAL INSIGHTS IN FINANCIAL THEORY

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Abstract: Through a large state of the art on decision-making in trading, we find that the assumption of traders' rationality is difficult to sustain for individual investors. Even if this is not the mainstream of finance, a growing number of studies demonstrate the need to take emotions into account to understand the behavior of stock market investors. With this in mind, we emphasize the importance of a transdisciplinary approach to understanding stock markets, covering a broad spectrum of variables that influence decision-making process. Thus, the simultaneous use of measurement tools from psychology, sociology and neurophysiology would ensure access to high levels of scientific completeness. At the end of this article, we propose several qualitative tools designed to provide a closer look at the psychological contours of individuals and the emotional fields potentially involved in decision-making.

Keywords: Individual Investors, Qualitative Research, Emotions, Decision-Making, Behavioral Finance.

INTRODUCTION

Based on economic psychology, which seeks to understand unreasonable behavior, the choices of economic agents cannot be reduced to the rationality of homo economicus (Roland-Lévy & Kmiec, 2016). According to Chanut et al. (2011), the limits of perfect rationality are little discussed in economics and relatively ignored in management studies, and the perfect rationality model - even if questioned - has not really been replaced. Based on this observation, the aim of this article is to focus on decision making in the field of trading. In this context, we consider individual investors who are characterized by a chronic lack of reference points on the stock markets, and who rely on noises that they could mistakenly interpret as information (Black, 1986). The individual investor must therefore construct a personal schema that is supposed to lead him or her to adopt a particular investment technique. This schema will be contingent on various elements of the investor's personality: his knowledge, his expectations, his propensity versus aversion to taking risks, his moods and emotions... From this point of view, the inexperienced investor could be subject to the exacerbated negative influence of emotions, leading to the appearance of the behavioral biases classically identified in markets (Kaustia et al., 2008; Feng & Seasholes, 2005). By moving away from the dogma "as if" economic agents were rational, we believe that emotions allow us to apprehend behaviors that escape the fields of rationality (Bergeron et al., 2018). The article is organized as follows. In section 2, we introduce emotions, relying mainly on

definitions from the field of psychology. Section 3 is devoted to analyzing the particularities of individual investors, particularly in terms of psychological reality and felt emotions. Section 4 aims to provide a state-of-the-art analysis of the influence of emotions on the trading activities of individual investors. Section 5 stresses the need for a cross-disciplinary approach to understanding the behavior of stock market traders. Section 6 considers various measurement tools that can be used to approach the qualitative and psychological reality of individuals.

EMOTIONS: GENERAL DEFINITIONS AND CLASSIFICATIONS

Several authors have proposed definitions of emotions, some of which are highly focused, while others take a broader view. According to Petit (2015), emotions are intensely affective phenomena with a well-defined cause. They could be considered physiological reflexes, non-cognitive phenomena, involuntary and purely affective states, or biologically primitive and instinctive response patterns (Rosenberg, 1990). Emotions are said to be characterized by five main variables: a facial, vocal or postural expression, a motivation that translates into a tendency to act, a bodily reaction, a feeling and an evaluation of a cognitive nature (Sander, 2015). These different characteristics provide a clearer picture of the links between the emotions felt and the decision-making process. Lazarus (1993) identified three main classes of emotions: nine negative emotions (anger, fear, anxiety, guilt, shame, sadness, envy, jealousy and disgust), four positive emotions (joy, pride, relief and love) and three ambiguous emotions (hope, compassion and gratitude).

Beyond definitions and classifications, various studies demonstrate the influence of emotions in decision-making processes. Thus, Lerner and Keltner (2000) show that emotions such as fear and anger have different effects on judgment: under the influence of fear, the individual would tend to judge future events pessimistically and be less inclined to take risks (Schulreich et al., 2016), while under the influence of anger he or she would tend to judge them optimistically. Anger would therefore lead to riskier decision-making (Gambetti & Giusberti, 2012). Asamoah et al. (2021) and Sashikala and Chitramani (2017) also demonstrate that emotional intelligence has a direct and statistically significant positive effect on investor behavior; emotional intelligence thus stimulates investor behavior and plays a central role in the choice of financial products purchased (Tanvir et al., 2016).

The following section will be devoted to analyzing the emotional profiles of individual investors and the extent to which these profiles can influence their decision-making process.

3. INDIVIDUAL INVESTORS: SPECIFIC EMOTIONAL PROFILES

For small investors, the rapidity with which market exchanges take place (Szpiro, 1998) and their automation (Declerck & Lescourret, 2015) do not necessarily allow them to take advantage of informational fields and technical analysis for the deployment of an optimal investment strategy. The idea is not that small investors are lacking information, but rather that timely access to it and the way in which it can be assessed are the real issues (De Larminat, 2013). Small shareholders will only be able to take up a position at a late stage and will therefore not be able to take advantage of the informational content already decoded upstream by institutional investors (Ryu et al., 2017; Blankenspoor et al., 2019). In this logic, the emotional charge would be much more prevalent for small investors than for

institutional investors, who are strongly influenced by response protocols (reflecting the experience accumulated over the course of the institutional investor's history) to informational stimuli. Various studies have shown that institutional investors are less subject to the effects of behavioral biases than individual investors (Annaert et al., 2008).

As far as retail investors are concerned, emotions can be directly inherent to individuals, depending on their history (Kollareth et al., 2020; Valstar et al., 2011), personality, psychological constructs (Pozniak & Scoubeau, 2020) and past performance. They may also be induced by a social setting in which their personality is embedded in stereotypical beliefs and ways of functioning. This raises the question of emotional contagion, which can be likened to an automatic, unconscious tendency to imitate the emotional patterns of other participants (Hatfield et al., 1994).

4. THE EMOTIONAL INFLUENCE ON TRADING ACTIVITIES FOR INDIVIDUAL INVESTORS

The study of the links between emotions and retailer trading is a relatively unexplored area of research, except from a largely descriptive perspective. In our view, there are several explanations:

- Trading places are characterized by a chronic over-representation of the male gender, for whom considering emotional factors could be a confession of weakness (Finet et al., 2024).
- Neurophysiological measuring instruments can only provide a very superficial approach to the neural signals induced by financial decision-making because of synchronization problems.
- The analysis of emotions and their effects falls mainly within the domain of psychology, with no spillover effects on other scientific fields.
- The methodologies adopted in financial research are often far from those used in the field of psychology.

In any case, the literature survey we carried out below shows the importance of taking emotional fields into consideration in financial decision-making processes, particularly in trading.

4.1. State of Art

Conlin et al. (2015) demonstrate that exploratory excitability (in other words, the willingness to avoid periods of boredom), impulse (making decisions with partial information), extravagance (spending rather than saving) are systematically linked to participation in the stock market. They also show that fear of uncertainty is negatively related to stock market participation. In the same line, investment decisions are said to be triggered by emotions (such as excitement, anxiety and denial), demonstrating the key role of the inner world in understanding market dynamics (Taffler, 2014; Schunk & Betsch, 2006).

Baker and Wurgler (2007) show that it is possible to measure investor sentiment, and that waves of sentiment have clearly identifiable, significant and regular effects on companies individually and on the stock market. Stocks that are difficult to value are the most affected by sentiment. In their view, the investor sentiment approach faces several challenges: accurately characterizing and measuring investor sentiment, understanding the underlying causes and variations of investor sentiment over time, and identifying the stocks that attract speculators.

Anh and Kim (2023) highlight links between the emergence of “visceral emotions” (defined as emotions felt very deeply and difficult to control) and price dynamics in the cryptocurrency market, leading to sub-optimal behavior.

Gabbi and Zanotti's (2019) study finds that when a positive emotion develops simultaneously with a negative emotion, the positive emotion tends to dominate and generates optimistic expectations as well as risk-taking-oriented behavior.

Vamosy (2021) studies the impact of investors' emotions on earnings announcements. In particular, the author attempts to identify the extent to which the emotional content of company-specific messages published on social media just prior to a company's earnings announcement predicts the results and returns associated with the announcement. Investors would generally be enthusiastic about companies that end up exceeding expectations, but their enthusiasm translates into lower returns on the announcement. These results confirm that emotions and market dynamics are closely linked and underline the importance of taking investors' emotions into account when assessing a company's short-term value.

The study by Duxbury et al. (2020), based on an analysis of experimental finance, reveals an asymmetric pattern of fear in relation to price increases and decreases. For some participants in the experiment, fear and hope increase when the price rises, while fear increases, and hope decreases when the price falls. One explanation might be that price volatility influences the fear of losing more than the hope of winning.

Wang et al. (2014) prove, using a stock market simulation built on a university student population, that positive investor emotions are positively correlated with investment returns in a bull market, and negative investor emotions are negatively correlated with investment returns in a bear market.

Fenton et al. (2012), working on heart rate variability, argue that emotion regulation could be an important dimension of trader expertise, and that the learning effects demonstrated in financial markets may include greater consideration of emotions. Also working on heart rate, the hypothesis of a relationship between trader expertise and emotion regulation is supported by a positive relationship between trading experience and average heart movements during trading. A more qualitative examination of the trading day suggested a difference between inexperienced and experienced traders lies in the period during which peaks in cardiac activity are sustained. For experienced traders, significant peaks showed a slow decline and were maintained over relatively long periods. For inexperienced traders, on the other hand, the authors found a more rapid decline in peaks associated with news events (Fenton et al., 2011). The use of skin conductance analysis to understand the dynamics of individual portfolio value evolution has confirmed the importance of emotional involvement in determining gains and losses (Bossaerts et al., 2022).

Developing an approach oriented towards emotional contagion in markets, Chen et al. (2021) argue that when emotional calm decreases, investors' emotions begin to diffuse, increasing the likelihood of excessive buying in stock markets, with the final impact determined by the ratio between normal and

emotional investors. When emotional investors dominate the market, their emotions are diffused throughout the market.

For Pitters and Oberlechner (2014), at the individual level, while personality in general does not necessarily predict investment success, some traits can be advantageous. In addition, individual variables at the affective and cognitive levels (mood and empathy) can lead to irrational trading decisions. At the collective level, social norms and herd behavior influence market behavior. Finally, market rumors and investor moods are important psychological factors influencing investment orientations at the macro level.

In a study by Andersson and Tour (2005), based on trades conducted by five traders in Sweden, the authors demonstrated that participants evaluated the results of their morning trades more positively than those of trades made later in the day. The mood of the participating traders deteriorated as the trades progressed but improved at the close of trading. This fluctuation would seem to be linked to trading results, insofar as good (bad) trades are associated with a positive (negative) mood.

Lo et al. (2005) found that individuals with a more intense emotional reaction to monetary gains and losses had significantly poorer trading performance. Psychological traits derived from a standardized personality inventory do not reveal a traderspecific profile, raising the possibility that trading skills are not necessarily innate and that different personality types may be able to achieve high levels of performance.

The results of Hariharan and Joseph (2012), based on a population of 123 investors in India, demonstrate the significant role of emotional reasoning (i.e. the understanding and possible regulation of emotions) in decision-making. However, emotions themselves are not necessarily a decisive factor in understanding the direction of stock market investments.

According to Liu et al. (2016), based on 886,000 trades from 30 professional traders, those who expressed low or high levels of emotion made relatively unprofitable trades. Conversely, traders expressing moderate levels of emotional activation made more profitable trades.

Fenton et al. (2011), considering the trading operations of four City of London investment banks, argue that emotions and their regulation play a central role in traders' decision-making. They note differences between the most and least successful traders in the way they mobilize intuitive processing; different emotion regulation strategies also have consequences for traders' behavior and performance.

For Majewski et al. (2020), variations in trading volume would illustrate investors' emotions, and volatility could measure stock market investors' emotions.

Shiv et al. (2005) insist that emotional reactions to the results of orders placed in the past influence traders' decisions in the future, so that they become more conservative and less inclined to take risks.

Reflective and impulsive processing can interact during decision-making, affecting the evaluation of available options, as both processes are affected by feedback (Schiebener & Brand, 2015). Decision-making processes would also be modulated by individual attributes: older people with accumulated experience would be able to regulate their emotions would make better financial decisions than others (Sproten et al., 2010; Eberhardt et al., 2017; Dibb et al., 2021).

Going in the opposite direction, Seo and Barrett (2007) obtained, from a stock market simulation exercise, that people who experienced the more intense feelings performed better in terms of decision-making. In addition, those who were able to identify their feelings outperformed them, thanks to their greater ability to control any induced biases.

4.2. *Building Analysis Models: the Importance of an Emotional Approach*

Firstly, based on the idea that certain financial choices can be made spontaneously or, at the very least, within a very short timeframe, emotional patterns can become predominant. Market participants are subjected to continuous streams of information, which can lead to the development of emotional hypertension. Investors passively receive and observe information, which affects the sensitivity of the receiver, who will be emotionally affected: either the information meets his or her expectations, and so a so-called “positive” emotion will be observed, or the information is a source of disappointment, and so a so-called “negative” emotion will develop. Of course, the needs to be satisfied are contingent on the individual's personality, expectations, degree of maturity and, in the case of stock markets, financial commitments.

Secondly, even though reference models in finance are built on assumptions of rationality, these have been widely called into question, notably with the emergence of crisis phenomena and the denial of black swans. More fundamentally, the mobilization of emotional fields seems to us even more relevant given that stock market prices are built on expectations of changes in real performance. From the moment a risk is taken, there is necessarily, as a corollary, an expectation of gain associated with it (even if the gain cannot be calculated, the investor projects himself into the future and anticipates an increase in his personal wealth). In a way, the investor is making a bet on the future, and as the informational inputs following the decision flow in, disappointment or joy will predominate. When the investor places a buy order, the associated emotion is likely to be positive. Indeed, hope associated with the possible gain should arouse a feeling, if not of euphoria, at least of joy. Conversely, in the case of a sale, either the investor feels that his gain is significant, and so the emotion should be positive, or he feels that the result obtained is not in line with his initial expectations, in which case the emotion will have a negative connotation.

Thirdly, using emotional fields to understand trading operations systematically opens up a multitude of research directions. Indeed, taking emotions into account brings into parallel a very large number of paradigms derived from disciplinary fields most often handled separately: psychology, experimental psychology, neurology, sociology, neuroeconomics, finance, neurofinance... According to Tirole (2013), economists, psychologists and sociologists are interested in the same subjects of study (individuals, groups and societies). The convergence of ways of analyzing these fields of research therefore requires efforts to open to the techniques of other disciplines (Viviani, 1994). On the one hand, recourse to these different theories enables us to broaden our fields of reflection and lines of investigation, and to eliminate certain financial stereotypes. On the other hand, psychology researchers can be challenged by research environments that are often very far from their natural field of interest. This way of working seems even more relevant to us as the literature points to a total lack of coordination between research

in economics and psychology, particularly in the emotional field (Elster, 1998; De Winne & D'Hondt, 2017). According to these authors, it would be appropriate, firstly, to ensure the incorporation of neuroscience and psychology into the formal and rigorous approach to economic modeling and, secondly, the awareness within the economic community of the evidence for the existence of multiple variables involved in decision-making. One of today's challenges is to ensure that researchers communicate in a productive and coordinated way (Sanfey et al., 2006). Taking up Song's (2021) study, emotion identification could theoretically involve four analysis channels:

- Emotion recognition based on facial expressions (the aim is to identify the most important visual features for recognizing emotions represented by images containing facial expressions, Malik et al., 2021).
- Speech-based emotion recognition.
- Emotion recognition based on physiological signals (e.g. Xu et al., 2017).
- Movement-based emotion recognition.

In any case, this way of proceeding would aim to build a comprehensive theory of decision-making, unifying methods from economics, psychology and neuroscience (Gutnik et al., 2006).

5. A PRESENTATION OF QUALITATIVE TOOLS FOR MEASURING EMOTIONS IN TRADING

Based on the elements previously put forward, we propose several emotion-measurement instruments that are in line with a rationale of understanding both the qualitative and psychological realities of individuals. Clearly, the results obtained from the use of these various tools should be complemented by other, more quantitatively oriented measuring instruments.

Historically, the methodologies used to explore the influence of emotions on decision-making have come from the quantitative field (Widyarini, 2017; Stevenson & Hicks, 2016; Bubic & Erceg, 2018; Kumalasari et al., 2022). Although this approach enables causal relationships to be highlighted based on large samples, it tends to overlook the psychological subtleties of human behaviors. To overcome this limitation, literature shows a growing interest in experimental research and the use of qualitative methodologies. These two approaches, adopted simultaneously, offer a nuanced and rich perspective on the underlying dynamics of financial decisions (Severin et al., 2022). At the qualitative level, we present below the main instruments for measuring emotions.

5.1. Diaries

In existing literature, there are few studies that use diaries to analyze emotions during decision-making. However, research in the qualitative field (Waddington, 2013; Scott, 2022) insists on the use of notes taken in a notebook that could be understood for stock market participants as a trading diary. This tool seems even more relevant as some authors have widely insisted on the need to use this type of tool in trading. This written support can be associated with highlighting unfiltered emotional expression: it could provide access to intimate, spontaneous emotions and has the potential to capture a unique sense of authenticity, helping to reflect on thoughts and experiences that may be difficult to perceive through other measuring instruments. The use of this type of tool allows us to follow people in "real time"; this

can be understood as an intensive companionship with people to understand the way in which experiences and perceptions are created, negotiated, lived and felt.

In our view, simply taking notes on participants' spontaneous feelings is not enough. In fact, this approach fails to establish a link between the emotion felt and the decision taken. That's why we're proposing to make available notebooks that not only record the various investments (company name, number of shares sold or bought, price at which the transaction was carried out, total financial amount involved, and the minute at which the movements were made), but also the emotion experienced when placing the order. In this way, a more precise link can be established between the emotions felt and the different orders placed.

5.2. Emotional State Questionnaires

The emotions experienced can also be analyzed using self-report instruments, as people tend to forget certain emotional peaks within 24 hours (Can et al., 2019). Direct measures help to obtain more information about people's decision-making processes (Serra, 2012) and are usually presented in the form of a questionnaire in which the participant is asked to rate, on a Likert scale, the intensity with which he or she feels the emotion presented. Gil (2009) presents several such questionnaires: the Differential Emotions Scale (Izard, 1977), the Brief Mood Inventory Scale (Mayer & Gaschke, 1988) or the Self-Assessment Manikin scale (Bradley & Lang, 1994). The questionnaire developed by Harmon-Jones et al. (2016) also measures the primary emotions experienced by participants. Each item represents a primary emotion (anger, disgust, fear, anxiety, sadness, desire, relaxation and joy). By calculating the total score for each category, we can determine the dominant emotion associated with each movement performed.

5.3. Discursive Analysis of Emotions

To investigate the influence of emotions on decision-making, we adapt one of the steps in the development of the discrete emotion's questionnaire by Harmon-Jones et al. (2016) to the context of trading decision-making. For each proposed emotion, participants are asked to recall a specific moment when, for example, the market configuration did not correspond to their expectations and had a negative influence on the value of their portfolio. Once the memory has been memorized, participants are asked to come up with a word that best characterizes the emotion experienced and four additional words to name the emotion. Participants must, of course, be unaware of the emotion being studied, so as not to bias their responses.

This approach has several advantages. By linking emotions to real-life experiences, it guarantees greater authenticity of the data collected, compared with self-report instruments. Moreover, the words proposed can reveal specific biases such as loss aversion or overconfidence. In general, the data collected can be cross-referenced with other indirect measures, such as neurophysiological measures like heart rate. Such triangulation may help to validate the results and provide a more complete understanding of the interactions between emotions and decision-making.

5.4. *Semi-structured Interviews*

The meta-analysis carried out by Pérez-Sánchez and Delgado (2022) shows that in the great majority of qualitative studies, data were collected orally (21 of the 25 studies), from written documents (3 of the 25 studies) or from focus groups (only one study). Semi-structured interviews are therefore the most used method of data collection and thematic analysis.

Semi-structured interviews can thus be conducted with each participant, taken in isolation, to examine how emotions influenced their decisions. This method effectively captures more detail than self-report instruments. Semi-structured interviews offer sufficient structure to address key themes, while allowing participants the freedom to develop their responses, thus promoting the investigation of different emotional dynamics. This approach also offers the possibility of identifying interactions between the emotions experienced and the context of the stock markets that might not be highlighted with other measurement instruments.

This method requires designing an interview guide that serves as a guideline for the conduct of the interviews. On average, each interview lasts between 30 minutes and an hour. Each interview is recorded, then transcribed for in-depth analysis using computer tools (Nvivo software) or textual analysis by the researcher. Data from semi-structured interviews are generally examined through a coding process, essential for organizing and interpreting the information gathered.

5.5. *Focus Groups*

In the light of existing literature, and to complete the data collected or identify any differences, the various measurement instruments can be supplemented by the organization of focus groups. This discussion brings together between six and twelve people in a homogeneous group, and follows an orientation defined by the organizer. In this article, we refer to the methodology presented by Kitzinger et al. (2004). These authors propose to record themes on cards that participants rank according to their degree of agreement or disagreement, or according to the importance they attribute to each aspect. Applied to the context of decision-making in the stock market, this approach makes it possible to approach themes such as the management of uncertainty, the influence of emotions on the decision-making process, the search for information, the emotions experienced in the face of gains and losses, and so on. This process tends to encourage participants to get actively involved, share their points of view and explain their different opinions. The discussion should also be recorded and transcribed, so that the data can be coded and associated with potentially similar themes. The major strength of this method lies in its ability to observe how participants' opinions evolve within an interactive framework, shaped by exchanges within the group. This makes it possible to examine how people interpret and justify their choices as a group.

6. *CONCLUSIONS*

At the end of this analysis, we note that there is a relatively large body of literature on the lack of rationality in stock markets, as well as on emotions, but that these are not necessarily considered in understanding decision-making behavior. This is why, at the end of this research, we insist, firstly, on the need for an emotion-centered approach to understanding financial decision-making. Secondly, we

believe that a multi-disciplinary approach is needed to understand phenomena that are often multi-faceted, and that it is even more relevant given that the fragmentation of fields does not facilitate the emergence of a scientifically robust corpus. With this in mind, we are developing innovative methodological tools that will enable us to develop links between the field of finance, which until now has been rooted in quantitative approaches, and knowledge of human reality, which requires the use of more qualitative approaches to investigation. Our work is conceived as a first step in validating a process that should enable us to propose new theoretical models for understanding the development of market dynamics. Once fully tested and mastered, this process could provide a basis for analyzing decision-making behavior in other contexts.

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