Prevailing behavioral biases and investor profiles: A survey to Professional Investors

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Abstract

This paper analyzes the relevance of Behavioral Finance in the functioning of financial markets. As a result of the empirical evidence through four surveys to professional investors with an average of 92 respondents, our main focus is to enhance the structure and systematization in the field. We first study the awareness and level of education in Behavioral Finance, determining a clear gap of learning experience for professional investors. We also analyze the main cognitive and emotional biases; identifying representativeness, loss aversion and herding as the most relevant ones in the decision making process. Moreover, we evaluate the prevalence of under- and overreaction through several financial scenarios and the lack of ability to anticipate the market. Finally, we classify professional investors through their investment profile applying the BB&K Five-Way Model. We identify overconfidence as being a predominant bias affecting investors and also find a clear disconnection between investors and their clients.

Key Words: *Behavioral Finance; behavioral biases; investor survey; investor profiles; BB&K five way model*

JEL Classification: *G02, G11, G14, G23*

1. Introduction

The efficient market hypothesis (EMH) developed by Fama (1965) for the financial market is still the most widespread theory that prevails among investors. Traditional finance theory concluded that stock prices reflect all known information and immediately change in response to new information (Fama, 1998). Likewise, arbitrage will correct any mispricing in the market, causing its return to equilibrium prices. However, the history of the stock market is full of events that challenge this theory, such as the Tulipmania in the 1630s (Mackay, 1841), the October 1929 Crash (Shiller, 2003) or the Black Monday crash of October 1987 (Shiller, 2000). Among the main anomalies found in the literature review are earnings and price momentum, excess volatility and size and book-to-market effects. The ample evidence of these disruptions along with the theories of irrational behavior (Kahneman and Tversky, 1974; Kahneman and Tversky, 1979) have led to the development of an alternative theoretical framework known as Behavioral Finance.

Although Behavioral Finance succeeds in understanding several financial phenomena as a result of irrational attitudes, the field is still today neither structured nor homogeneous (De Bondt et al. 2008). The aim of this paper, based on direct surveys conducted to professional investors exposed to the Iberian market, is to determine the relevance of Behavioral Finance for professional investors, and to contribute to structure the field by identifying the most significant biases that are present in the decision making process, in order to model investors' behavior.

We determine three key points to contribute to the systematization of Behavioral Finance: 1) the importance of behavioral finance in the decision-making process and the level of education of investors in the field; 2) the prevailing cognitive and emotional biases; and 3) the different investor profiles and their alignment with clients.

In order to set a framework for our research, we start by framing the main elements of Behavioral Finance. We refer to the most relevant anomalies detected in the market and documented in the literature, and the two main behavioral theories representativeness and prospect theory, identifying the prevailing psychological biases that influence decision-making processes. We then describe the different kinds of investor's profiles based on the BB&K model (Bailard Biehl and Kaiser, 1986). We include a reference to investor sentiment calculated in a similar way to the Confidence Index carried out by Yale's University (Dzielinski, 2010), using the answers of our professional investors.

Next, we explain the methodology of our analysis based on surveys to professional investors with an average of 92 respondents per question. Finally, we discuss the results obtained regarding the following points: 1) education in Behavioral Finance and its awareness by the investors' community, 2) relevance of cognitive and emotional behavioral biases and

3) investors profiles and alignment with their clients. Conclusions and References can be found at the end of the paper. An Appendix with the surveys' questions is included.

2. Literature Review

Two main premises, which entail the lack of arbitrage opportunities, characterize classical finance: investors are fully rational and financial markets are efficient in processing new information. Furthermore, the traditional financial model is also based on the positive correlation between risk and return (Black, Jensen and Scholes 1972). However these theories overlook investor sentiment, defined as the belief about future cash flows and investment risks relative to the true fundamental value of the underlying asset (Baker and Wurgler 2006).

According to these premises, investors behave rationally and consider all available information in the decision-making process. In addition, when new information appears, investors quickly react, eliminating any potential risk-adjusted return based on that information. Traditional theory assumed that both, irrational investors and risk-free profit opportunities would be quickly eliminated from the market. However, in real life, every investor has limited access to information and is surrounded by external constraints and its own personal behavior. In fact, individual investors make mental shortcuts when making any decision (Jain, Jain and Jain, 2015).

There is ample evidence that investors are not rational agents and that cognitive biases and erroneous beliefs lead to suboptimal investment decisions (Singh, 2012). Markets are likely to exhibit several irregularities due to investors' actions, known as financial anomalies, which are a consequence of the previously mentioned biases.

Behavioral Finance takes into consideration the deviations from perfect rationality and explores the different ways this may affect outcomes, asset prices and even the behavior of other investors (Zhang, 2008) developing investor behavior models that can explain the previously mentioned financial anomalies. However, despite the Nobel Prizes awarded in Behavioral finance since 2002 (Daniel Kahneman in 2002 and Robert J. Shiller in 2013), this alternative framework still does not have a homogeneous structure (Van der Sar, 2004).

Next we develop a brief literature review highlighting the main anomalies that affect the financial markets and identifying the dominant behavioral biases and investors' profiles according to the BB&K model.

2.1 Financial Anomalies, Over and Underreaction

Investors use different heuristics when forming expectations. For example, considering non-frequent events, people overestimate the probability of such an event occurring if they have recently observed it, resulting in overreaction to new information. Another common heuristic in the formation of expectations is anchoring. This refers to the use of previous

values of an item when making quantitative estimates. For this reason, anchoring can cause under-reaction to new information (Fuller 2000).

There are several financial anomalies that define this irrational behavior. According to Daniel, Hirshleifer and Subrahmanyam (1998) and Hong and Stein (1999) the two most relevant ones that occur in the security market are under- and overreaction.

Overreaction to past performance is a clear financial anomaly according to classical finance. De Bondt and Thaler (1985) find that investors tend to place too much emphasis on stocks past performance and too little to the fact that they tend to revert to their fundamental value. Barberis, Shleifer and Vishny (1998) exhibit empirical evidence revealing two types of anomalies in rational investor behavior: under-reaction to specific news, such as earnings announcements, and overreaction to a series of bad or good news. According to Daniel, Hirshleifer and Subrahmanyam (1998), investors overreact to private information because of overconfidence and on the other hand they tend to underreact to public information.

Jegadeesh and Titman (1993) find evidence that stock prices tend to underreact in the short term and in particular, the top performers will probably keep outperforming in the near future. However, in the long run, those stocks tend to be overvalued resulting in a reversal after this period. According to this price momentum effect, over one-year periods, past winners tend to remain winners and beyond that period, momentum is most likely followed by lower profitability.

In brief, market anomalies reflect the lack of correlation between risk and return as opposed to the theory developed by Black, Jensen and Scholes (1972). The two main phenomena identified are under- and overreaction which are interrelated since under-reaction to information becomes the seed for future overreaction (Hong and Stein 1999). Both anomalies result as a consequence of cognitive and emotional behavioral biases such as overconfidence or loss aversion.

2.2 Cognitive and Emotional Biases in Irrational Behavior

The theoretical framework of Behavioral Finance supports that, due to cognitive and emotional biases, investors cannot process available information rationally (Brav and Heaton, 2002). The two main psychological theories are the Representativeness Heuristic (Kahneman and Tversky, 1974) and the Prospect Theory (Kahneman and Tversky, 1979). However there are also other multiple factors that play a key role in this behavior such us herding (Chang, Cheng and Khorana, 2000) or social interaction and conservatism (Fama, 1998).

According to the Representativeness Heuristic (Kahneman and Tversky, 1974), investors are subject to biased beliefs; they tend to consider a certain event as typical or representative, ignoring the laws of probability, so that the Bayes rule of probability is not properly applied. This theory explains the overconfidence phenomenon, which results from the overestimation

of investors as for their knowledge and their forecasting skills and the underestimation of risk. Griffin and Tversky (1992) highlight that when people forecast, they tend to pay too much attention to the strength of the evidence and not enough attention to the statistical weight.

The other main pillar, the Prospect Theory (Kahneman and Tversky, 1979), establishes a decision model lead by loss aversion. This model considers the symmetry between gains and losses, explaining different existing violations to the utility function. The analysis of behavior in gambling shows that the individual is more sensitive to losses than to gains. This is also related to regret aversion bias, meaning that investors try to avoid losses that could have been predicted a priori (Barberis, Huang and Santos, 2001). Another bias related to Prospect Theory is mental accounting. Grinblatt and Han (2004) determined that investors categorize investments on different levels according to different investment objectives. In fact, they are subject to loss aversion and they ignore the interactions between their different investments, which in turn generates overreaction.

Contrary to the Representativeness Heuristic, Conservatism (Edwards, 1968) helps explain the phenomenon of under-reaction, referring to the slow pace of change in behavioral patterns when new evidence appears. It advocates that, as a consequence of investors' conservatism when processing new evidence, some of them are subject to anchoring bias and usually don't properly adjust their decisions in response to new information. De Bondt (1993) finds that investors expect the past price trend to continue, being bullish in rising markets and bearish in declining markets. Investors are subject to confirmation bias focusing only on positive information related to their investments and not considering any negative related aspects. Additionally, the status-quo bias affects the decision-making process of investors. According to this emotional bias, investors prefer to keep their current investments to stay the same by sticking with a decision made previously (Samuelson and Zeckhauser, 1988).

A factor that also has a strong impact on the investor's decision-making process is social interaction, which comprises the phenomenon of imitation (herding). Evidence of this behavior was found in 2001 when Pretcher analyzed the activity of large groups of financial professionals. This tendency to copy what others do is closely related with market anomalies such as bubbles (Shiller, 2000) or momentum. Nevertheless, this behavior does not have to be classified as fully irrational, since not every investor in the market has the same information or skills and therefore it is understandable to copy those who stand out (De Bondt et al, 2013) for the sake of personal comfort.

To sum up, in order to simplify their decision-making processes, investors tend to process information using shortcuts and emotional filters. The individuals, being unable to fully analyze the data, are conditioned by a number of cognitive and emotional biases, such as overconfidence (biased beliefs), loss aversion (unconventional preferences) or anchoring among others, which lead to potential non-rational and non-optimal decisions (Jain, Jain and

Jain, 2015). These various biases act as conflicting forces that keep investors away from the statistical evidence due to biased beliefs and divert them from their rational expected utility (biased preferences). Different investor profiles can be identified depending on the prevailing behavioral biases that affect the investors' decision making process.

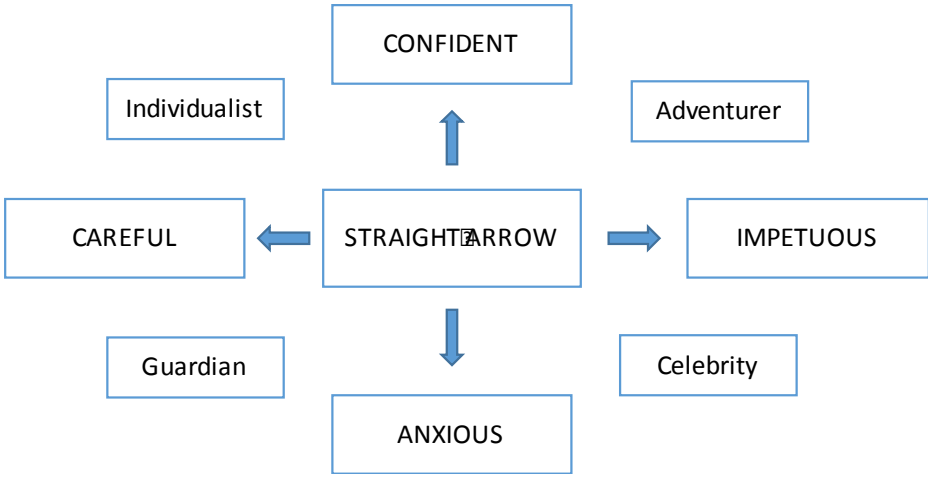
2.3 Investors' profiles

During the past several decades, researchers have analyzed the behavior of investors in order to determine the different ways in which investments are managed. According to the literature, the understanding of investors' behavior can be divided into two different frameworks. The first one, which has its fundamentals in sociodemographic features, is composed by researchers like Barber and Odean (2001) and Hariharan, Chapman and Domian (2000) among others. The second group, which focuses on psychological factors, includes researchers such as Kahneman and Riepe (1998), Thomas and Rajendran, (2012).

With the aim of contributing to a clearer determination of investor's profiles, first we shall examine investor types and personalities. According to the literature, there are two main approaches to this analysis. The first one is called the Behavioral Alpha Approach, and it is a multi-step diagnostic process that classifies clients into four behavioral investor types or BITs (Pompian, 2008). The four behavioral investor types concerning this approach are: the passive preserver, the friendly follower, the independent individualist and the active accumulator. Each one of these is characterized by a certain level of risk and a primary type of bias (cognitive or emotional).

The second approach to investors' profiles, and the one that we have used in our empirical analysis, is the BB&K Five-Way Model. The model developed by Thomas Bailard, David Biehl and Ronald Kaiser ("Personal Money Management", 1986) classifies investor personalities along two elements: level of confidence and method of action or risk aversion. The five investor personalities recognized by this approach are: the adventurer, the celebrity, the individualist, the guardian and the straight arrow. Each investor personality is located in a different quadrant made up by the two axes of individual psychology embodied by the elements mentioned above. One axis is named "confident-anxious" and reflect the emotional choices made, the other axis is called "careful-impetuous" and reflect how methodical and risk averse an investor is (Thomas and Rajendran, 2012).

Figure 1 BBK Model



Bailard, T. E., Biehl, D. L. and Kaiser, R. W., (1986)

Confident and risk-lovers constitute the Adventurer's profile, as it can be seen in the first quadrant. They have their own ideas about investing, which are so strong that are difficult to advice and they are biased emotionally. Whereas people who do not have their own ideas about investing and are afraid of being left out, establish the Celebrity's profile. This type of investor is mainly driven by cognitive biases. Considering the left-handed half of the diagram, people that have their own ideas about investing and that have a certain degree of self-confidence are included in the Individualist profile. The predominant bias in this type of profile is cognitive (Pompian 2008). The Guardian's profile is associated to careful people who worry about their money and are not interested in excitement. For this reason, they are dominated by the emotional bias. There is a last profile, the Straight Arrow, which is considered in this model as a very well-balanced person, which is exposed to medium amount of risk (Pompian, 2008; Thomas and Rajendran, 2012).

In summary, behavioral investor profiles are defined as a result of confidence and risk-exposure biases. In that sense, measuring the actual investor sentiment through the confidence index and comparing it with a reference is a key element in order to determine the real investors' profile and being able to compare with its own perception. Through the use of the Confidence Index we might try to confirm whether the investor's perception corresponds to its true nature.

2.4 Measuring Investor Sentiment

Investor sentiment has been ignored by classical finance due to its belief that aggressive arbitrageurs would quickly eliminate suboptimal trading behaviors. On the contrary, the alternative approach suggested by Behavioral Finance states that investor sentiment might significantly alter market outcomes and therefore affect asset prices in equilibrium (Uygur and Tas, 2012).

Since the seminal paper by DeLong et al (1990) included noise trader sentiment as the component of expectations about asset returns not warranted by fundamentals, many papers have been written on how to measure investor sentiment. There are no perfect and/or uncontroversial proxies for investor sentiment (Baker and Wurgler 2006, Beer and Zouaoui, 2013) and proxies can be classified as direct and indirect sentiment measures. Indirect measures have a tremendous advantage over direct ones since they are based on market data, can be observed in real time and reflect both the power of market participant and the strength of their bullishness or bearishness (Beer and Zouaoui 2005), however they are endogenous to the market and economic activity, and may not exclusively measure investor sentiment. Direct sentiment measures are derived from surveys directly asking individuals how they feel about current or future economic and stock market conditions while indirect ones represent economic and financial variables susceptible to capture investors' state of mind.

Investor sentiment is not a straightforward measure, but there is no fundamental reason why one cannot find imperfect proxies that remain useful over time. Economists always treat surveys with some degree of suspicion, because of the potential gap between how people respond to a survey and how they actually behave (Baker and Wurgler 2007). We acknowledge that this critic is especially relevant to our paper.

In our research we use an already existing approach to measure sentiment, which is a direct survey data, based on the Yale School of Management's Stock Market Confidence Index. Confidence in the stock market is hard to define due to the involved judgments required for those who invest. It is important to consider that many forces other than investor confidence are impacting the market. Stock prices are mainly determined by supply and demand. However, these two factors are conditioned by fundamental and psychological aspects (Zhang, 2008).

Despite these obstacles, the Yale School of Management under the direction of Robert Shiller ("Measuring bubble expectations and investor confidence", 1999) has been able to quantify investor confidence through a series of surveys concentrated on the outlook of the stock market since 1984. Initially, the surveys were conducted at six-month intervals, until 2001, when they were conducted monthly. With the results obtained from the surveys, they report four different investor confidence indices, each of them derived from the responses to questions asked persistently since 1989. These are the stock market confidence indices: i) One-Year Confidence Index, representing the percent of the population expecting an increase in the stock market in the coming year; ii) Buy-On-Dips Confidence Index, showing the percent of the population expecting a rebound the next day if the market dropped 3% in one day; iii) Crash Confidence Index, meaning the percent of population who attach little probability to a stock market crash in the next six months; and iv) Valuation Confidence

Index, representing the percent of the population who think that the market is not too high (Dzielinski, 2010).

In the spirit of this Stock Market Confidence Index, we measured the Investor Confidence including questions in the surveys to the professional investors in our database. With the results obtained from these surveys, we established five different indices that all together compose the IICI (Institutional Investor Confidence Index):

1. Perspectives' index: to determine whether investors think that the Spanish stock market will go up or down.
2. Valuation index: based on investor's valuation of current stock market assessment.
3. Index of capacity of short-term recovery: established in the confidence that investors have in punctual strong falls.
4. Index of capacity of long-term recovery: established in the confidence that investors have in that strong falls tend to revert.
5. Index of risk of crash: it indicates the risk investors assign to a stock market crash.

Once we have determined all these indices, we obtain the ICII averaging the results. The result can range between -100 and 100, meaning that a negative index implies a pessimist perspective of the market and positive implies an optimist perspective, with a result of 0 entailing neutrality.

3. Methodology

3.1 Research Questions

As indicated in introduction, the main objective of our research is to study the investors' views on Behavioral Finance and irrational biases in order to contribute to the systematization of the field. We have focused our analysis on the three following points: 1) education in Behavioral Finance and its awareness by the investors' community, 2) relevance of cognitive and emotional behavioral biases and 3) investors profiles and alignment with their clients.

3.2 Data

As indicated, this study is based on surveys conducted to professional investors from the Iberian market during 2015 and 2016. This data set is based on online surveys to fund managers associated to Funds People monthly publication.

The surveys were monthly conveyed by email with a link to the online survey and the structure remained the same during the period they were conducted. They were composed by seven initial questions that remained unchanged in every survey, regarding investor's sentiment in order to elaborate the index, followed by questions concerning Behavioral Finance, and six filter questions. Appendix includes all the questions included in the surveys to investors.

The surveys consist in four sets of questions on Behavioral Finance with an average of 92 respondents per question, considered representative from a statistical point of view. They were focused on the following aspects of Behavioral Finance:

- Acknowledgement and education and relevance of Behavioral Finance with a total of 101 participants
- Main biases affecting investors with a total of 89 and 100 participants
- Investor and Client profile with a total of 79 participants

3.3 Statistical Analysis

Our findings have been empirically contrasted through the following parametric and non-parametric statistic tests depending of the fulfillment of the required conditions (normality, equality of variances or large sample of data):

Binomial test (non-parametric):

- H0: homogenous binomial distribution (equal probability between the two possible variable values)
- H1: non homogenous distribution

Association between variables (non-parametric): $\chi 2$, γ

- H0: there is no association between the variables
- H1: there is association between the variables

The higher the result of the $\chi 2$ test, the higher the level of association. Unlike the $\chi 2$, the γ test ($-1 \leq \gamma \leq 1$) also indicates the type of association between the variables (positive if $\gamma > 0$ or negative $\gamma < 0$).

T-Student test for equality of means (parametric):

- H0: $\mu 1 = \mu 2$
- H1: $\mu 1 \neq \mu 2$

For all of the above-referred statistical tests, if pvalue ≤ 0.05 we can reject the null hypothesis (H0) with a confidence level of 95%, and if pvalue ≤ 0.1 we can reject H0 with a confidence level of 90%. All variables have been discretized and SPSS software has been used to perform the statistical analysis.

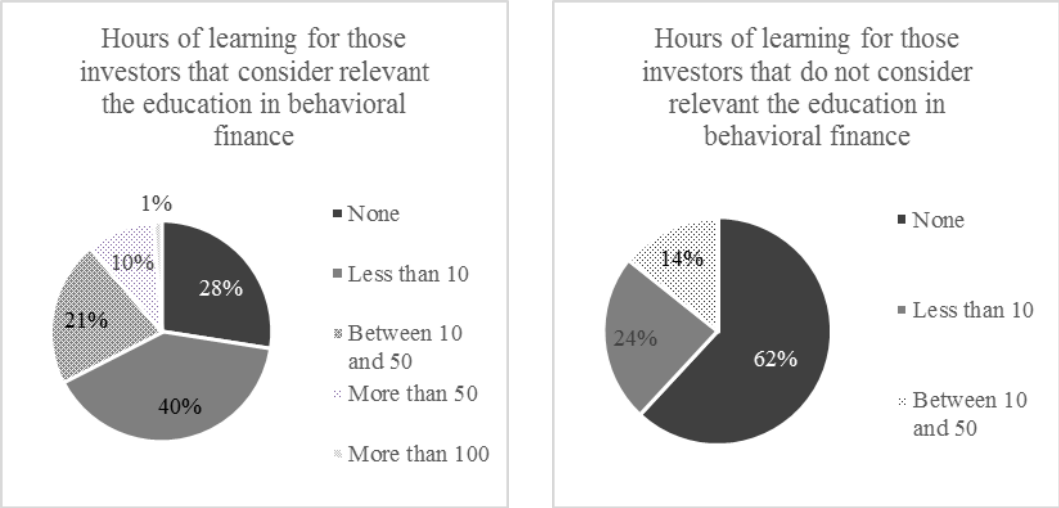
4. Results and Discussion

4.1 Acknowledgment and Education in Behavioral Finance

We first analyze the results obtained in relation to the study of Behavioral Finance (see questions 6, 7, 8, 17 and 18 related to Behavioral Finance in Appendix). Most participants (79% of a total of 101) considered that education in Behavioral Finance is relevant when making investment decisions. Applying the non-parametric binomial test shows that the relevance of Behavioral Finance for investors is statistically significant (pvalue=0.00).

However, despite the relevance of the field, 71% of investors have none or less than ten hours of learning and 35% of investors do not have any education in this area. Education in Behavioral Finance significantly increases the relevance assigned to the area ($\chi 2$= 8.1; γ=0.518 with pvalue=0.008): the percentage of investors viewing it as valuable for their job increases from 75% for those with less than ten hours of training to 90% for those with longer learning experience.

Figure 2 Education in Behavioral finance



Nevertheless, 62% of the investors that do not have any education in Behavioral Finance recognize the relevance of the field. The biggest group of investors without education in the field do not possess any official accreditation (47%), 23% do have the EFA, and none of investors without education in Behavioral Finance have completed the CFA program. If we discretize the variables accreditation (No accreditation=1; other accreditations=2; CFA Charterholder=3) and hours of learning in Behavioral Finance (0 hours=1; less than 10 hours=2; more than three hours=3) we find a significant relation between the accreditation and the education in Behavioral Finance ($\chi 2$= 10.0, pvalue=0.04). In particular, the CFA accreditation is associated with the highest level of learning in the field.

Regarding the adequacy of general financial training and academic education, 59% of the investors considered that it was not really appropriate (binomial test, pvalue=0.09), and 61% of the latter determined that the main reason for this is lack of education in the field of Behavioral Finance. According to the survey, this lack of knowledge in the field is mainly originated because the theory is not homogeneous nor clear (89%). The majority of those investors that considered that the fund managers' education is appropriate, also recognize that the field of Behavioral Finance needs to be further structured (83%), what substantiates one of our premises previously mentioned: the need of homogenization of the field. Overall, 81% of investors consider that Behavioral Finance is either too complex or not structured (binomial test, statistically significant pvalue=0.00).

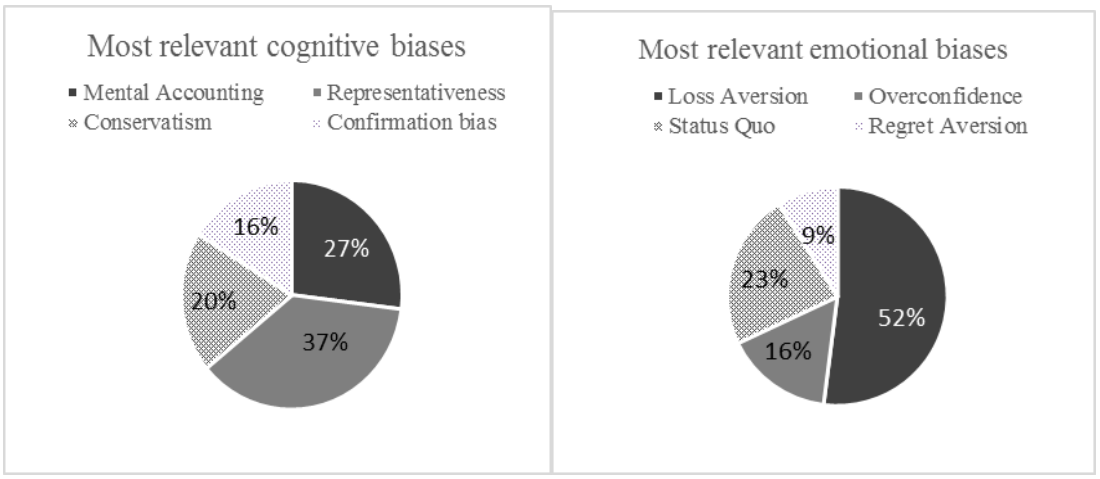
When investors were asked to determine which cognitive and emotional biases had the highest impact on the decision-making process, the results showed that a definite relationship does not exist between the study of Behavioral Finance and the knowledge of the biases. According to the literature we assume that the most relevant cognitive and emotional biases are Representativeness and Loss Aversion. We discretize the variable to questions 9 and 10 (2 for the right answer and 1 for the rest) and analyze the relation with the hours of training. We find no significant relation between the hours of learning and the knowledge of the cognitive and emotional biases ($\chi 2$= 1.4 and 1.1; pvalue=0.49 and 0.57). Hence, we can conclude again that the field of Behavioral Finance is diffuse and needs to be structured.

4.2 Analysis of Irrational Biases

Behavioral Finance suggests that agents in the financial market tend not to be rational in the sense of classic theory. Biased beliefs and unconventional preferences predominate in every investor, leading to inefficient investment decisions. As previously described, these irrational biases can be divided into two groups: cognitive and emotional.

The results obtained in the surveys (see questions 8 to 16 in Appendix) with an average of 95 respondents corroborate the main psychological theories in the field of Behavioral Finance: the Representativeness Heuristic and the Prospect Theory. In fact, the most relevant cognitive biases according to investors are representativeness (37%) and mental accounting (27%), and the most significant emotional bias is loss aversion (52%). Moreover, a relatively significant statistical relation exist among investors that identify Loss Aversion and Representativeness as the most relevant biases ($\chi 2$= 2.7; γ=0.33 with pvalue=0.097).

Figure 3 Main cognitive and emotional biases



These results do correspond with the predominant biases found in the related literature. Furthermore, when investors were directly asked about the effectiveness of Representativeness (question 15), the majority of them (67%) agreed with the theory, while

only a 6% disagreed. The results show that the agreement with the theory is strong: the average response is 3.9 (1=not valid … 5=very valid) and allows to reject the null hypothesis μ=<3 (t-student=9.6 and pvalue=0.000). When they were asked the same about loss aversion, the results even show a higher level of agreement with the theory: 76% of them agreed and only 7% disagreed, the average response is 4.04 and allows us to reject the hypothesis μ=<3 (t-student=11.1 and pvalue=0.000). Moreover there is a very strong positive association between the agreement of both theories ($\chi 2$= 26; ɣ=0.59 with pvalue=0.000).

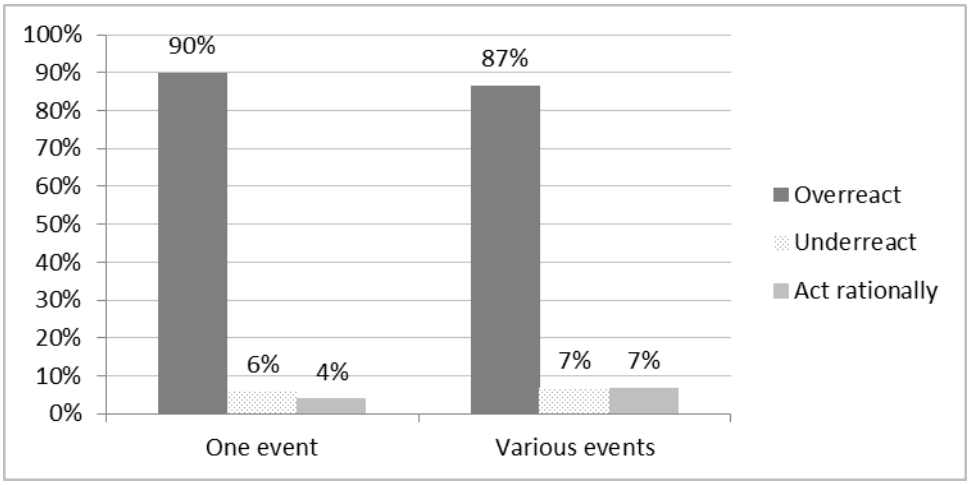
Another remarkable conclusion was found in relation to the relevance of herding behavior (question 19). While 61% of participants considered that the main motivation guiding the decision making process is related with irrational biases, such as loss aversion, representativeness and herding behavior, the remaining 39% considered that it was led by the rational market analysis. Moreover, the most highlighted irrational bias is considered to be herding behavior (49%), followed by emotional biases (36%) and cognitive biases (15%). These results are aligned with those obtained by a survey carried out by CFA Institute among 724 practitioners who answered that herding was the most influential bias in the investment decision-making process (CFA Institute, 2013). However, such conclusion could appear to be in contradiction with the prevalence of cognitive biases found in the literature. As a possible explanation, it seems logical to think that fund managers would not recognize cognitive biases (i.e. lack of knowledge) as their main driver for investment decisions. This would imply a lack of knowledge on the field, which is, without any doubt, hard to admit.

4.3 Prevalence of Overreaction versus Underreaction

Different scenarios were analyzed to identify the behavior that prevails in the decision-making process of investors (see questions 11 to 14 and 20 in Appendix) with an average of 89 respondents. In brief the different scenarios considered were: facing one single and various significant financial events, and facing or overcoming a crisis.

First, in the short term, when a public relevant event takes place, investors tend to over-react (90%) just 6% under-react and the remaining 4% determine that they react rationally. The same occurs when various public relevant events take place, all of them following the same direction: 87% of the participants consider that investors tend to overreact, and below 7% think that they under-react or react rationally. Considering a dichotomic variable (overreact / no overreact) and applying a non-parametric binomial test shows the prevalence of overreaction versus rational behavior and underreaction (pvalue=0.000). Moreover, we find a strong statistical association between over and underreaction to one and various events ($\chi 2$= 48 with pvalue=0.000; ɣ=0.69 with pvalue=0.035).

Figure 4 Investors' over- and under-reaction to single and various events



This prevalence of overreaction is consistent with the literature (De Bond and Thaler 1985, Grinblatt and Han 2004) and can be directly related to Representativeness and overconfidence. When investors are extremely confident about their thoughts and decisions they tend to follow the representativeness heuristic pattern and they ignore the laws of probability (Kahneman and Tversky, 1974), causing them to overreact.

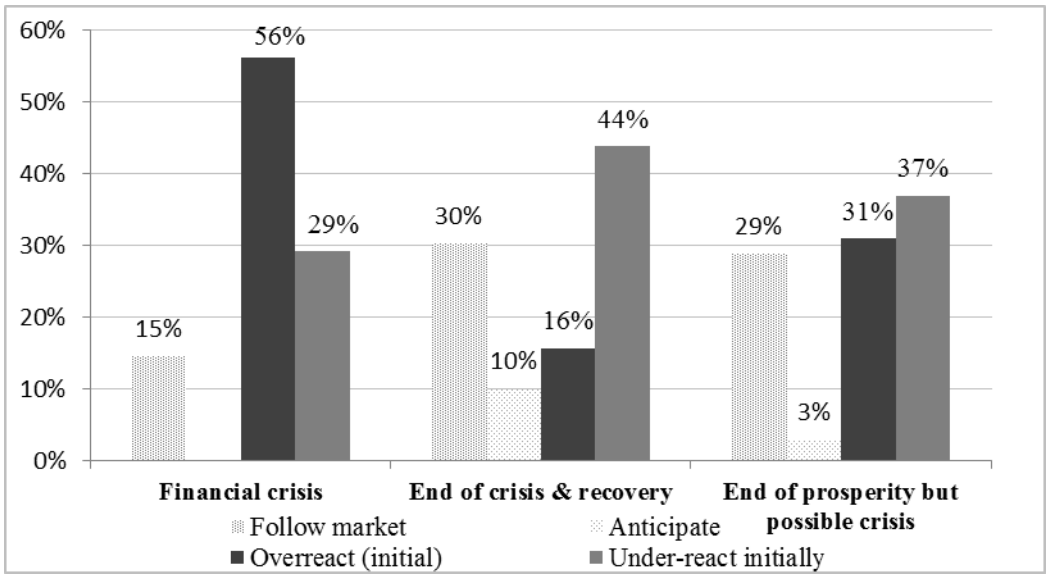
This pattern is also visible, although less clear, during a financial crisis. In this situation, the majority of the participants consider that investors tend to overreact initially (56%). This overreaction can be related to the loss aversion bias (Kahneman and Tversky, 1979) according to which investors tend to be more pessimistic during financial crises. However, some of them determine that they tend to underreact initially and overreact later (29%), or follow the market (15%), but nobody believes that they anticipate the market. In this case, no significant relation was found with the behavior as a result of a public relevant event ($\chi 2 = 4.9$ with pvalue=0.29). These findings are in line with the empirical evidence of momentum effect provided by Jegadeesh and Titman (1993) and described in our literature review. Moreover, the view of themselves as not being capable of beating the market again shows their pessimistic character. Likewise, a small percentage recognize their herding behavior. This shows lack of confidence on their own judgments, feeling safer following the market.

However, during the transition from the end of a crisis to an economic recovery, the results show the opposite: 44% of the individuals consider that investors tend to underreact initially and overreact later, versus 16% who would overreact and 30% who would follow the market. One more time, loss aversion takes place: investors are more sensible to negative situations than to positive ones. Under this scenario, the tendency to anticipate the market is supported by 10% of investors.

When investors face a situation of end of prosperity and possible entry of crisis, the results are less clear. The only strong conclusion that we obtain is that nearly all of them (97%) think

that investors do not anticipate the market (binomial test, pvalue=0.000). There is no clear evidence on what tendency is the most popular among investors: under-reaction (37%), overreaction (31%) or follow the market (29%).

Figure 5 Investors' over- and under-reaction under different scenarios



As a conclusion, overreaction is the prevalent behavioral bias as a result of relevant news and is also the dominant behavior in situations of financial crisis which in turn likely contributes to aggravate the crisis. By contrast under changing circumstances probably characterized by greater uncertainty, under-reaction appears to be the first response with a significant tendency to follow the market. During transition and crisis probably with higher level of uncertainty, the tendency of herding behavior increases, also as a consequence of loss aversion. In order to explain this kind of behavior we analyze next the predominant investors' profiles, comparing it with their own actual confidence index and their particular view of their clients.

4.4 Investor's Profile

Based on the BB&K Five-Way Model, we included two different personality questions in order to determine how the professional investor views himself and how he sees his clients. Intentionally, the straight arrow profile (associated with the absence of biases) was not included in our question in order to better identify the main biases recognized by investors.

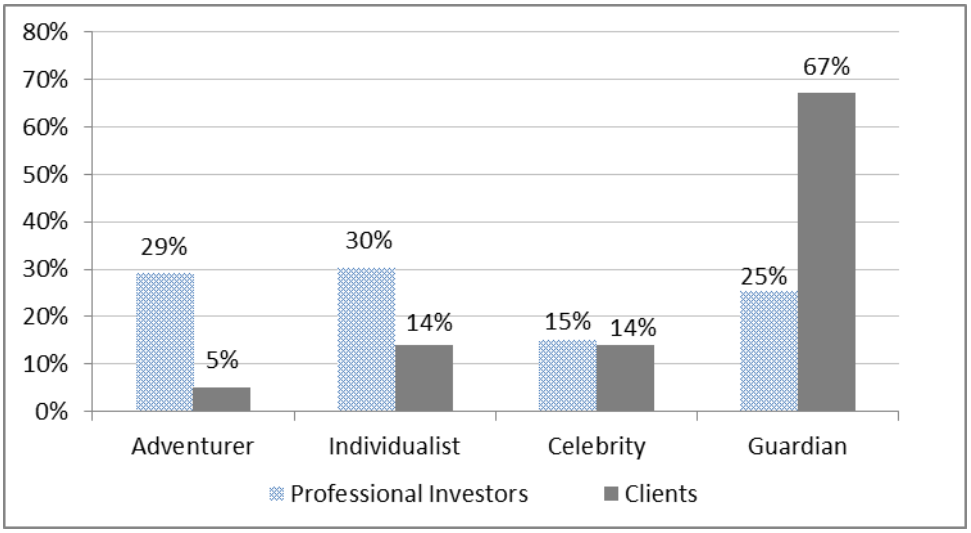
Interestingly enough, the results show a misalignment between the professional investor and his clients. In addition, we compare the results obtained from the personality questions with the measure of Investor Confidence obtained in the same surveys.

Based on 79 answers (see questions 2 and 3 related to Behavioral Finance in Appendix) we find that 60% of investors define themselves as highly confident (versus 40% low-confident) and 56% of investors view themselves as risk averse (versus 44% as risk lovers).

Moreover, the personality types that professional investors are most recognized with are the Individualist and the Adventurer with approximately 30% each, both being characterized by a high level of confidence. Hence, we can infer (binomial test, pvalue=0.115) again that overconfidence appears as one of the most relevant behavioral biases among investors, in line with literature (Barber and Odean, 2001).

It is important to note that when asked about the personality type of their clients, 81% of professionals determined that clients were characterized by risk-aversion. 67% of all the surveyed investors agreed on defining their clients as Guardians, meaning mainly driven by risk aversion and insecurity. In general, investors view themselves as more confident and risk-seeking than their clients. We can determine again the excess of confidence on the side of professional investors.

Figure 6 Investors and Client profiles

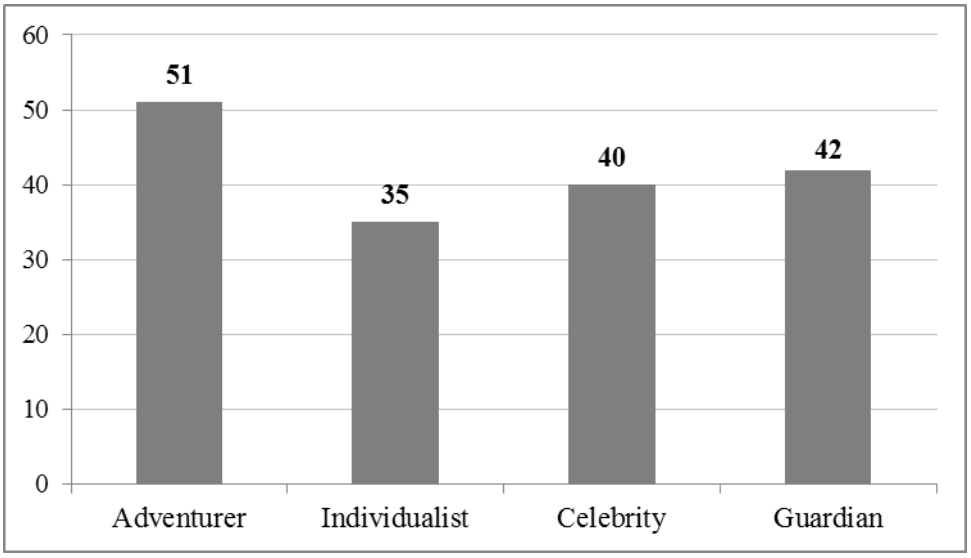


78% of all the adventurous investors do define their clients as Guardians. Only a 5% of all investors see their clients as Adventurers, which happens only for investors who consider themselves as risk-lovers. If we discretize the profiles (Guardian=1; Celebrity=2; Individualist=3; Adventurer=4) we find a significant negative association between the investor's and the client's profiles ($\chi 2$= 9.5; γ= -0.32 with pvalue=0.041). This means that investors who view themselves as Adventurers or Individualists tend to define their clients as Guardians. This misfit between the professional investor and his clients can be related, again, to an excess of confidence on the side of professionals.

Now we analyze the relation between the confidence index, (see questions 1 to 5, in Appendix) and the different types of personality. The average confidence index was calculated for each personality group. The results are partially aligned with the findings related to the direct answers related to Behavioral Finance:

- The personality type that had the highest level of confidence is the Adventurer (51), in line with what would be expected. However the difference versus the average confidence index for the rest of investors (39) does not appear to be very statistically significant (t-Student test for equality of means, pvalue=0.16).
- Moreover, the Guardian has the second highest confidence index (42) when it should intuitively be the group with the lowest level of confidence. Also, the Individualist has the lowest confidence index (35) when we would expect to have a high level of confidence. This may imply a lack of correspondence between investor perception of themselves and how they actually are.

Figure 7 Confidence index for different investor profiles



Analyzing these results, even if not statistically strong, we find that those investors with a low level of confidence (Celebrity and Guardian) do have a relatively high confidence index (both higher than the Individualist) and therefore seem to have a more distorted perception of themselves than those with higher levels of confidence. On the other hand, by definition the two predominant investor types based on the BB&K model (Adventurer and Individualist) are characterized by a high level of confidence, which can be related with the prevalence of overconfidence among behavioral biases.

Finally, a remarkable element in this section is the misalignment between the perceptions of the professional investor himself and reality and between the professional investor and his client. This disconnection introduces an additional factor of uncertainty which clearly deviates from traditional finance theory.

5. Conclusions and Recommendations

Even if the field of Behavioral Finance is diffuse and needs to be structured, it is considered very relevant by professional investors when making decisions in the financial

markets. However, despite its importance for professional investors, a clear lack of education and training in the field does exist. The participants in our empirical study determined that this gap is due to the absence of clarity and homogeneity of the theory.

Furthermore, supporting previous literature, when asked directly investors considered that the most relevant biases are representativeness (cognitive) and loss aversion (emotional). Also herding or social interaction plays a critical role in the investors' decision-making process.

In relation to the expected behavior in different financial scenarios, according to professional investors, there are two predominant phenomena that are closely interrelated: under- and over-reaction, being the latter prevalent. However, there is a pattern that does almost never take place, which is anticipating the market. This entails a lack of confidence on investors' own judgment, who feel safer following the market.

Considering now our goal of modelling investors' behavior, and applying the BB&K Five Way Model, we find that investors tend to define themselves as Individualists and Adventurers while they predominantly view their clients as Guardians. Two important points must be highlighted here. First, the disconnection between investor and their clients: the investor views himself as having a high level of confidence, while he sees his clients as risk averse and insecure. The second one is the misfit between how the investor sees himself and how he actually is. Considering the responses to our survey and applying the confidence index, we found that some of them tend to perceive themselves as more confident than they really are. These two points support the investors' overconfidence.

These misfits can constitute the scope for further research in the field of Behavioral Finance, as they introduce an element of uncertainty. In particular, the misalignment of perception between clients and professional investors clearly deserves further analysis regarding the implications for financial markets and the investment community.

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APPENDIX: Summary of Questions and Answers in the Surveys

Control Questions	
Age	
a. [less than 40]	35%
b. [40-50]	48%
c. [50-60]	12%
d. [60-65]	2%
e. [more than 65]	2%
Gender	
a. Man	82%
b. Woman	18%
Education	
a. CFA	12%
b. CEFA	5%
c. EFA	15%
d. EFPA	21%
e. FRM	0%
f. CAIA	3%
g. CIIA	2%
h. PRMIA	0%
i. CFP	0%
j. Incomplete CFA	9%
k. None of the previously mentioned	45%
Job/Firm type	
a. Independent	10%
b. Bank	50%
c. Insurance company	5%
d. Family office	5%
e. Other financial groups	17%
f. Retired	1%
g. Unemployed	0%
h. Other	11%
Assets under management	
a. Below 25 million euros	42%
b. Between 25 and 50 million euros	9%
c. Between 50 and 100 million euros	13%
d. Between 100 and 250 million euros	13%
e. Greater than 250 million euros	22%
Investment style	
a. Fixed income	25%
b. Mixed fixed income	35%
c. Mixed variable income	38%
d. Euro variable income	39%

e. International variable income		33%
f. Guaranteed fixed income		10%
g. Guaranteed variable income		9%
h. Global funds		26%
i. Funds of funds		16%
j. Hedge Funds, real estate funds or similar		9%
k. Other		13%
Behavioral Finance Questions		
Question #1 With which investment style do you feel more comfortable as professional investor?		
a. Value Investing		52%
b. Growth Investing		9%
c. Absolute Return		14%
d. Relative Return		3%
e. Momentum		5%
f. Capitalization		6%
g. Passive management		11%
Question #2 Which of the following profiles, as professional investor, better corresponds to yours?		
a. Adventurer: risk lover and with high level of confidence		29%
b. Celebrity: risk lover and insecure		15%
c. Guardian: risk averse and insecure		25%
d. Individualist: risk averse and with high level of confidence		30%
Question #3 How do you see your clients?		
a. Risk lover and with high level of confidence		5%
b. Risk lover and insecure		14%
c. Risk averse and insecure		67%
d. Risk averse and with high level of confidence		14%
Question #4 Value from 1 to 4 (being 4 the most relevant) the relevance when anticipating the evolution of a Value type security		
a. DCF		
	Most relevant	47%
	Relevant	43%
	Less relevant	6%
	Not relevant	4%
b. Macroeconomic		
	Most relevant	23%
	Relevant	35%
	Less relevant	23%
	Not relevant	19%
c. Multiples		
	Most relevant	30%
	Relevant	39%
	Less relevant	15%

	Not relevant	15%
d. Technic		
	Most relevant	5%
	Relevant	14%
	Less relevant	41%
	Not relevant	41%
Question #5 Value from 1 to 4 (being 4 the most relevant) the relevance when anticipating the evolution of a Growth type security		
a. DCF		
	Most relevant	24%
	Relevant	46%
	Less relevant	11%
	Not relevant	19%
b. Macroeconomic		
	Most relevant	41%
	Relevant	43%
	Less relevant	10%
	Not relevant	6%
c. Multiples		
	Most relevant	22%
	Relevant	44%
	Less relevant	14%
	Not relevant	20%
d. Technic		
	Most relevant	11%
	Relevant	32%
	Less relevant	28%
	Not relevant	29%
Question #6 Do you consider relevant the education/training in behavioral finance when investing?		
a. Yes		79%
b. No		21%
Question #7 How many hours of training in behavioral finance have you received?		
a. None		35%
b. Less than 10		37%
c. Between 10 and 50		20%
d. More than 50		8%
e. More than 100		1%
Question #8 Which of the following factors do you think has more impact on investment decisions?		
a. Mental accounting		27%
b. Representativeness		37%
c. Conservatism		20%
d. Confirmation bias		16%

Question #9 Which of the following cognitive biases do you consider that has more impact on investment decisions?

a. Loss aversion	51%
b. Overconfidence	16%
c. Status quo bias	23%
d. Regret aversion bias	9%

Question #10 Which of the following emotional biases do you consider that has more impact on investment decisions?

a. Rational analysis		
	Very relevant	38%
	Relevant	41%
	Normal	15%
	Little relevant	4%
	Irrelevant	2%
b. Irrational cognitive biases		
	Very relevant	4%
	Relevant	22%
	Normal	46%
	Little relevant	18%
	Irrelevant	10%
c. Irrational emotional biases		
	Very relevant	12%
	Relevant	31%
	Normal	34%
	Little relevant	13%
	Irrelevant	10%

Question #11 Looking at the market, in the short-run facing a significant public event, investors tend to:

a. Overreact	90%
b. Underreact	6%
c. React rationally	4%

Question #12 Looking at the market, in the short-run facing various public events that follow the same direction, investors tend to:

a. Overreact	87%
b. Underreact	7%
c. React rationally	7%

Question #13 1Looking at the market, facing an economic crisis, investors tend to:

a. Follow the market behavior	15%
b. Anticipate the market behavior	0%
c. Overreact initially	56%
d. Underreact initially and overreact later	29%

Question #14 Looking at the market, facing an end of crisis and economic recovery, investors tend to:

a. Follow the market behavior	30%

b. Anticipate the market behavior	10%
c. Overreact initially	16%
d. Underreact initially and overreact later	44%
Question #15 Do you consider valid the following sentence? "The individual evaluates the investment in terms of profit and loss and not on the basis of the final wealth, being more sensitive to losses than to gains":	
a. 1 (not valid)	0%
b. 2	6%
c. 3	27%
d. 4	39%
e. 5 (very valid)	28%
Question #16 Do you consider valid the following sentence? "Subjects tend to consider a given event as typical or representative, ignoring the laws of probability or the statistical evidence":	
a. 1 (not valid)	0%
b. 2	7%
c. 3	17%
d. 4	42%
e. 5 (very valid)	35%
Question #17 Do you consider adequate the education/training of fund managers and professional investors when investing?	
a. Yes	41%
b. No, more technical formation in business valuation is needed	19%
c. No, more formation in technical analysis is needed	1%
d. No, more formation in macroeconomic concepts is needed	3%
e. No, more formation in behavioral finance is needed	36%
Question #18 Which of the following reasons better explains the lack of relevant training in behavioral finance for fund managers/professional investors?	
a. It is not a relevant field when making investment decisions	11%
b. It is relevant but inaccessible	8%
c. It is relevant but it is a field of knowledge too complex	23%
d. It is relevant but the field is diffuse, not unified and hard to transmit	58%
Question #19 The decision-making process of fund managers is motivated by:	
a. Rational analysis of the markets	30%
b. Irrational cognitive biases	10%
c. Irrational emotional biases	16%
d. Herding behavior (social interaction)	44%
Question #20 Given a situation of end of prosperity and possible entry in crisis, investors tend to:	
a. Follow the market behavior	29%
b. Anticipate the market behavior	3%
c. Overreact initially	31%