Determinants of Individual Investors' Behaviors: Evidence from Tunisian Stock Market

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Abstract: *Recent studies on individual investors' have shown that they do not act in a rational manner. However, several behavioral factors influence their investment decisions in Stock Markets. The present study considers the theory of individual investors' irrationality and investigates into their behavior with regard to investment decisions. In this sphere, we attempt to find out whether some psychological as well as demographic factors affect Tunisian individual investors' behavior and then try to examine the factors that are more influencing than others. To achieve our aims, we used a survey approach and developed a questionnaire that included sixty three items dealing with six biases. Then, we conducted a descriptive and factorial analysis on the biases of the collected data. Therefore, results have indicated that the Tunisian investors' behaviors are subject to five behavioral biases: representativeness, herding attitude, loss aversion, mental accounting, and anchoring. Apart from these biases, when attempting to categorize Tunisian investors on the basis of demographic variables, we have also found that gender, age and experience have an interaction with behavioral financial factors in investment decisions.*
Key Words: *Behavioral finance, behavioral biases, demographic factors, factorial analysis.*

I.   Introduction

Behavioral Finance is an emerging discipline that represents a collection of alternative approaches to refine the definition of classical finance. The behavioral finance is, therefore, developing as an alternative to the standard theory (Kahneman and Tversky 1979), focusing on behavioral evidence and considering that investors are victims of several biases affecting their logical reasoning. In particular, this new approach draws heavily on the psychology and cognitive factors in the literature to examine why individual decision-making often deviates from rational choices in systematic ways. Previous research on behavioral finance issues have focused on investor heuristics, biases, and framing effects. For instance, the works of De Bondt and Thaler (1985), Daniel, Hirshleifer and Subramanyam (1998), Barberis, Shleifer and Vishny (1998), Coval and Shumway (2005) and Kumar (2006) show that the investor's irrational behavior as a concept has significant influences on prices formation in the Stock Market. In addition, many financial academic researchers (Odean, 1998-99; Glaser, 2003; Shu et al,. 2005; Kumar et al. 2010) were motivated to break with the full rationality hypothesis and, therefore, tend to recognize the natural effect of some psychological biases on the investors' decisions and reactions.

In the present study, we attempt to provide evidence for irrational financial behavior and to confirm the presence of the psychological biases determining Tunisian individual investor's trading behavior as well as the demographic factors interacting with those biases. Therefore, we include six behavioral biases suggested by academic sources. They are displayed as follows: Loss Aversion (Kahneman and Tversky, 1979; Lebaron, 1999; Filbesk 2005), Overconfidence (Tversky, 1990; Wood, 1996; Denial, Hirshleifer and Subrahmanyam, 1998; Allen and Evans, 2005; Deaves, 2006), Herding (Huberman and Regev, 2001; Clement and Tse, 2005), Mental Accounting (Shiller, 1998; Tversky, 1999; Shefrin and Statman, 2000; Broihane 2006); Representativeness (DeBondt, 1993; Shefrin, 2005; Ji and Zhang 2006; Wen He and Jianfeng Shen 2011) and Anchoring biases (Kahneman and Tversky, 1979; Shiller, 1998; Lebaron, 1999; Evans, 2002; Kaetner, 2005). Most of the already mentioned studies have dealt only with one bias apart, which reinforces the fact that the detection of the investors' irrationality bias is a difficult exercise. Thus, we simultaneously highlight the identification of important biases that may affect the Tunisian Stock Market as well as the investors' decision making process.
The remainder of this paper is organized as follows: the second section is devoted to a summary of the literature. In the third section, we explain the adopted methodology. The fourth section analyses the obtained empirical results. The last section provides concluding remarks and directions for future research.

II.   Literature Review On Financial Behavioral Factors

The main scope of our concern is the Stock Market as an autonomous entity composed of a heterogeneous group of investors of varying rationalities. That is, it is marked by a naive majority, known as bounded rationality, and a clear minority affecting the stock prices in a complex way as it is characterized by

it's being fully rational. Experimental evidence from research in psychology indicates that people are more likely to use heuristics and "rules of thumb" when they encounter more difficult problems such as a delete or noisy feedback. Such intuitive decisions are often associated with stronger behavioral biases (e.g., Kahneman and Tversky (1974), Kahneman (2003). As defined by Shefrin (2007), a bias is merely the "predisposition towards error". In other words, a bias is a prejudice or a propensity to make decisions while already being influenced by an underlying belief. In what follows is the presentation of the already mentioned six biases.

Overconfidence is known as the investor's tendency to perceive himself/herself as skilful. On this basis, Odean (1998) assumes that investors tend to overestimate their own capabilities. In the same sphere, Glaser and Weber (2003) argue that there are three aspects of overconfidence, namely miscalibration, the better-than-average effect (i.e., people tend to think that they have higher than average skills), and illusion-of-control (i.e., the tendency to believe that one's personal probability to success is higher than objective probability would warrant). According to Glaser and Weber (2003), miscalibration leads to higher trading activities. In a more recent study, Glaser and Weber (2007a), using a questionnaire, have studied the relationship between investors' overconfidence and the trading volume. They show that only the effect of "better than average" generates high trading volumes, but miscalibration is not related to trading volume. Blavatsky (2009), using an experimental study, has measured individuals' confidence in their own knowledge. Besides, their confidence does not depend on their attitudes towards risk or ambiguity. In addition to these studies, Gervais et al. (2003), Bernardo and Welch (2001) and Oskamp (1965) investigate not only the positive role of overconfidence and its evolution but also the effect of optimism in investment policy.

Herding often occurs when many people take the same action, perhaps because some imitate the actions of others in making investment (Graham 1999). Herding has been theoretically linked to many economic activities, such as investment recommendations (Scharfstein and Stein, 1990). According to Devenow and Welch (1996), the herding behavior can be subdivided into three categories: i) informational cascades, ii) reputational herding, and iii) investigative herding. An individual may choose to imitate the action of others rather than acting in accordance with his private information. This type of effect is often referred to as information cascade (Khanna and Slezak, 1998). Reputational herding takes place when an agent chooses to ignore his/her private information and imitates the action of another agent (Prendergast and Stole, 1996; Zwiebel, 1995). For Avery and Zemsky (1998), this mechanism works even better with mainly inexperienced investors. For Graham (1999), on the contrary, the incentive to mimicry is enhanced when the agent feels that he is ascribed to too much loss in terms of reputation. Clarke and Subramanian (2006) emphasize the role of past performances: agents who have committed few errors can afford certain fearlessness, while those who have made serious mistakes have little to lose and much to gain by being adventurous. Finally, investigative herding means that obtaining information is only worthwhile when others also procure this information (Spiwoks et. al, 2008). Using a questionnaire, Matoussi et al. (2009) tested the existence of the herding bias on the Tunisian Stock Exchange Market. The results of univariate analysis of the different variables through mimicry showed that 75% tend to follow the actions of others regardless of their reasons. This behavior is explained by the fact that some investors are less informed than others.

Loss aversion is another important psychological concept which has received increasing attention in economic analysis. Loss aversion or "prospect theory" is related to individual's stronger desire to avoid losses rather than longing for making gains (Tversky and Kahneman, 1979). It is important to note that loss aversion will be more acute when the issue is framed in negative terms, and the same individuals will make riskier decisions when faced with a "negatively-framed dilemma" (Rhoads, 1997). First positively demonstrated by Tversky and Kahneman, the theory of risk aversion stipulates that losses are emotionally felt twice as strongly by people compared to comparable gains. It is worth noting that the theory of loss aversion is present both in business and in everyday life. A study conducted by Carnevale (2008) looked at the concessions made in negotiations when the framing was alternatively displayed in positive and negative frames. In this context, Carnevale has concluded that "a loss frame produced fewer concessions than a gain frame" did. On this basis, individuals are less willing to negotiate when there is a potential of loss because they are not predisposed to encounter that loss.

Mental accounting describes the tendency of people to place particular events into different mental accounts based on superficial attributes (Shiller 1998). The main idea underlying mental accounting is that decision-makers tend to separate the different types of gambles they face into separate accounts, and they apply prospect theoretic decision rules to each account by ignoring possible interaction between the accounts. Therefore, mental accounts can be separated not only with respect to time but also according to their contents (Goldberg and von Nitsch, 2001). Similarly, Shiller (1997) suggests that investors place their investments into arbitrarily separate mental compartments, and react separately and in different ways to the investment depending on which compartment they are placed in. In the Indian context, for instance, people are often found to save for some specific purposes, such as for children's higher education, and then borrow money to some other purposes, such as buying a car, even though the interest on the borrowed fund is higher than the interest rate they get on

their savings for their children's education. Mental accounting, according to Thaler (1999), includes three main compartments. The first one captures how outcomes are perceived and experienced, and then how decisions are made and subsequently evaluated. The second one assigns the activities to specific accounts. It keeps track of inflow and outflow of funds from each specific activity. The third compartment of mental accounting is concerned with the frequency with which an account is evaluated. Accounts can be balanced on a daily, weekly, monthly, or yearly basis. In short, each mental accounting compartment violates the economic principle of fungibility.

The representativeness bias, seen as a mental shortcut, involves overreliance on stereotypes (Shefrin, 2005). It leads people to form probability judgments that systematically violate Bayes's rule (Grether, 1980; Kahneman and Tversky, 1973; Tversky and Kahneman, 1974). Investors may consider recent past returns to be representative of what they can expect in the future (DeBondt, 1993). Because of this extrapolation bias, investors might buy stocks that have recently increased in value. Using data from the UBS/Gallup survey of individual investors from 1998 to 2000, Vissing and Jorgensen (2003) find a strong positive association between investors' expected one-year-ahead market returns and current market price levels. Ji and Zhang (2006) examine the representativeness heuristic by contrasting the buy and sell behavior of Canadian and Chinese investors in three experiments. They have found that Chinese investors are less prone to exhibit the extrapolation bias than Canadian investors do. Indeed, Chinese participants were more likely to predict a price reversal than a trend continuation. Dhar and Kumar (2001), examining the extrapolation bias, investigate the price trends of stocks bought by more than 62,000 households at a discount brokerage during a 5-year period. They find that investors tend to buy stocks that have recently enjoyed some positive abnormal returns. This finding is consistent with the thinking that the past price trend is representative of the future price trend. Lee, O'Brien and Sivaramakrishnan (2008) maintain that the analyst long-term growth forecasts are optimistic during bull markets and pessimistic during bear markets. Investors also think that good companies are good investments, expecting good companies to continue their superior performance in the future. Wen He and Jianfeng Shen (2011) assume that there exists a significant and positive association between investors' expected returns and both past market returns and past stock returns. Thus, they find that real investors in the market extrapolate past returns and, hence, past earnings growth rates have strong implications for future research on asset pricing.

Anchoring is another psychological bias to which some investors are subject. It refers to individuals' tendency to base their estimates and decisions on familiar positions, known as 'anchors', with an adjustment relative to the starting point, known as reference points. This fixation is called anchoring. Benartzi and Thaler (1995) argue that a reference point is the stock price that investors compare to the current stock price. The brain's choice of a reference point is important because it determines whether the investor feels the pleasure of obtaining a profit of the pain when experiencing loss. One important reference point is the purchase price of the security. In case an investor bought an asset long ago, he could tend to use a more recently determined reference point. The highest price the investor has perceived also becomes a reference point and an anchor. Investors typically wait for the stock price to reach a reference point before making a trade. Mangot (2008) states that there exists an anchoring bias which reflects the tendency to focus on a value and adopted it as a reference point when planning to make estimation. Conducting a study on U.S firms during 1983 and 1999, Kaestner (2005) shows that financial analysts and investors are victims of a bias anchor. He also states that these investors fail to correct their errors of prediction, but rely heavily on even more conservative expectations.

In addition to the six biases – seen as psychological factors - affecting investment decision making process, it is worth discussing the impact of demographic factors influencing individual investors' behavior.

Exploring the effect of gender and optimism of the riskiness of investment decision of sixty-six students, Felton et al. (2003) have concluded that males make more risky investment choices than females. According to them, this difference was primarily due to the riskier choices of optimistic males. Besides, Barber Odean (2001) demonstrates that men are more overconfident than women in areas such as finance. Therefore, men are expected to trade more excessively than women investors. Dhar and Zhu (2006), when considering demographic and socioeconomic variables, report that wealthier individuals and those working in professional occupations exhibit a lower disposition effect. Then, Korniotis and kumar (2011) have examined the old-aged investors regarding their investment decisions. Their evidence indicates that older and more experienced investors hold less risky portfolios, exhibit stronger preference for diversification, trade less frequently, exhibit greater propensity for year-end tax-loss selling, and exhibit weaker behavioral biases such as the disposition effect and the familiarity bias. Thus, their choices reflect greater knowledge about investing. However, consistent with the cognitive aging hypothesis, older investors appear to have worse investment skills as their performance deteriorates sharply at the age of 70 – of course with regard to the weakness of their skills. Engin Demirel et al. (2011) have studied the interaction between demographic and financial behavioral factors in investment decisions. They find that gender interacts with five financial behavioral factors (Overreaction, herding, cognitive bias, irrational thinking, and overconfidence). They also find that the level of individual savings interacts with four of the financial behavioral factors (overreaction, herding, cognitive bias, and

irrational thinking). On the other hand, they find that there is no interaction between age and the six behavioral financial factors.

III.   Methodology Of The Study

The current paper has involved the completion of a questionnaire in an attempt to find out the incentives underlying the investors' behaviors in the Tunisian Stock Market. Indeed, psychology, defined as "the science of behavior", must be taken into account to investigate the investors' behavior and their effect on their decision making. On this basis, the questionnaire is taken as a useful tool for understanding well how the decisions of many investors affect the prices formation in Stock Markets. The questionnaire was administered into two methods of data collection, either face to face (60%) or by email (40%). We have addressed our questionnaire to 300 Tunisian investors, from February to Mai 2011. Besides, we have chosen the Likert' constant sum scale which seems appropriate for the subject. On the light of the obtained answers, we have attempted to reduce the frequency of each behavior among the Tunisian Stock Market investors. Therefore, to analyze the survey data, we have applied multivariate techniques which consist of combining all the psychological attitudes considered in the survey questionnaire in order to reduce them into few main behavioral axes that should describe the Tunisian investor's behavior. Each axe would regroup all the correlated behavioral biases. For instance, the main adopted axes are taken independent and sufficient enough to explain the biggest portion of data variance. To achieve the multivariate analysis, we have adopted the Principle Component Analysis (*PCA*) method (Capon et al. (1994), Zoghalami and Matoussi (2009) and Kumar and Chandra (2009)). In a second step, we made a cluster analysis which consists of classifying statistical units and variables. Then, a discriminate analysis is considered as an important tool not only to better discriminate but also to identify the characteristics of investors being victims of cognitive biases. Finally, the Chi square test is proved to be vital to assess the influence of demographic variables on investors' behavioral biases. Shortly, the choice of these methods was based on their most suitability for several studies in the sphere of behavioral finance.

IV.   Findings

Aiming at determining the suitability of data for factor analysis, we have attempted to perform the test of Kaiser, Meyer and Olkin (KMO) and the sphericity test of Bartlett. Indeed, Kaiser (1974) proposed an unacceptable value of KMO if it is less than 0.5, poor if it reaches 0.6, acceptable if it is of 0.7, good if it is between 0.8 and 0.9, and wonderful if it reaches 0.9. The results of these tests are given in Table 1.

TABLE 1
KMO AND BARTLETT'S TESTS

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		,856
Bartlett's Test of Sphericity	Approx. Chi-Square	74,229
	df	15
	sig	,000

According to the KMO index, having a high value of 0.856, the items are correlated enough to build common dimensions. Similarly, the significant value for Bartlett's test of sphericity is 0.000, which indicates that there exist significant relationships among variables. Thus, from the obtained statistics, we can conclude that the factor analysis is relevant for our study.

Adopting the above mentioned criteria for solving the problem of components' number, the multivariate analysis extracts five components to be retained for rotation and interpretation. Therefore, these five components were judged as sufficient enough to explain the significant data variance. Also, these five components allowed qualifying the above mentioned criteria for solving the problem of components' number. The total variance accounted for by all the five factors with Eigen Value greater than 5 is 73.521% which is sufficiently significant. The remaining variance is explained by the other variables as indicated in Table 2.

TABLE 2
COMPONENTS AND VARIANCE EXPLAINED

Factors	Eigen Value	% of Variance Explained	Cumulative Variance
1	13.839	21.868	21.868
2	11.969	17.220	39.089
3	9.154	15.163	54.252
4	9.036	12.727	66.979
5	5.997	6.543	73.521

According to the extracted coefficients, we name these five pertinent behavioral factors as follows: The Herding attitude, the Loss Aversion factor, the Mental Accounting factor, the Anchoring attitude and the Representativeness heuristics factor.

- The "herding" attitude, seen as the most important factor influencing investment behavior, accounts for more than 21% of data variance. Therefore, our findings are consistent with the notion that individual investors are more prone to trading mistakes than obtaining information from others. This factor extracted by the multivariate analysis is positively correlated with (Mi_{91} to $Mi_{123)}$. These variables underline the investors' behavioral tendency to change easily their decisions and to revise quickly their positions. Also, the set of these variables describes the investors' attitude to be easily influenced by the others' decisions and reactions. In short, this behavioral factor affects the investors' behavior in the Tunisian Stock Market. In this sphere, the Tunisian investor tends to follow the others' interventions without worrying about the reason of the others' sale or purchase orders.

- As for the Prospect Theory, losses are twice more painful as compared to the pleasure experienced by a gain of a similar attitude. The explained variance of this factor is 17.22%; it provides evidence for the sensitivity of the investor's loss aversion. The results of our analysis show that there is a category of Tunisian investors who are considered as risk-taking individuals mainly when faced with an obvious loss. That is to say, these investors were reluctant to part from their assets worth less than the market price where owners had already bought even if that impairment merely reflects a deteriorating outlook for this asset. Thus, it is worth signaling that the above results are approximately consistent with the results found in Tversky and Kahneman's (1992) experiments. Besides, other studies conducted by Barberis and Odean (2002), Odean (1999) and Toshino et al. (2004) empirically demonstrated that investors tend to feel much more pain from losses than they feel joy from gains.

- The third factor, extracted from the multivariate analysis, is the "Mental accounting bias". The data variance explained by 15.6% provides evidence for mental accounting effect on Tunisian investors. In fact, this axe is positively correlated with (CM_{131} to CM_{153}), which reflects the tendency of individuals not only to treat each element in their investment portfolio separately but also to simplify the economic decision making.

- The next important component derived from the multivariate analysis is known as the "Anchoring bias". This component explains the tendency of individuals to base estimates and decisions known as "anchors" with an adjustment relative to a reference point. This behavioral component accounts for about 12.72% of data variance. Thus, it is observed that a large portion of surveyed Tunisian investors was subject to the anchoring bias since they tend to use their purchase price as a reference kept in their minds for their trading decisions. This result is in line with Welch's (2000) findings which maintain that the majority of economists place a high weight on their knowledge of historical returns when assessing future returns. Besides, this finding is also fine-tuned with that of Kaestner (2005) who states that the mental anchor reflects the fact that people reason with reference to past benchmarks. The weight assigned to past information is excessively high and leads to an insufficient adjustment when receiving new information.

- The fifth factor shows the extent to which there is a group of investors who are subject to the bias of representativeness. Indeed, the results show that the sample of investors extrapolates future performance of the Stock Market in the recent past events. Rather than tending to consider recent events, investors may be led to overestimate the probability of the occurrence of a future event. So, the Tunisian investor's behavior seems to be largely influenced by the representativeness bias. This result is consistent with Shefrin (2000), Gong-Meng Chen et al. (2004) and Wen He and Jianfeng Shen (2011) who find that the representativeness bias affects investors' decisions.

Therefore, it is worth noting that we need to apply a "Cluster Analysis", considered as the most suitable tool, in order to define a typology of Tunisian investors according to their behavior in the financial market.

TABLE 3
THE CLUSTER ANALYSIS RESULTS IN FIVE GROUPS

Analysed variables	Fisher	Group 1 (68)	Group 2 (50)	Groupe 3 (27)	Group 4 (22)	Group 5 (13)
F_1	*8,07*	**0,71**	0,31	0,11	-0,21	-0,15
F_2	*9,21*	-0,24	**0,69**	0,17	0,13	0,09
F_3	*7,83*	0,14	0,30	**0,81**	-0,06	-0,18
F_4	*8,15*	-0,13	0,30	-0,16	**0,73**	0,48
F_5	*9,05*	-0,18	-0,11	0,14	0,36	**0,65**

On the basis of Table 3, we took a total of 180 investors with limited rationality on the Tunisian Stock Market among a total of 300 investors. The Table illustrates the averages of each group and the results of a

variance analysis (Fisher coefficient), which indicates that the five groups are separable and made up of individuals subject to various cognitive biases.

The first group, which constitutes investors subject to the mimicry bias, verifies the majority of abnormal behavior (68 investors), which implies that mimicry is the most widespread bias on the Tunisian Stock Exchange. Therefore, the Tunisian investors are irrational and try to align themselves with the behavior of other groups.

The bias of "loss aversion" is the second cluster which is displayed on the Tunisian Stock Exchange in an intense way, which indicates that Tunisian investors are sensitive to loss. Therefore, most of them tend to choose the probable losses rather than evident ones. This bias reflects the idea that the loss of a given amount has a more important negative effect on the investor's well-being than the positive effect of saving the same amount.

In the third group, the investor illustrates a behavior of a "mental accounting" in a relatively less important way. This means that individual investors operating on the Tunisian Market decide separately for each event instead of considering the whole situation as supported by the theory of utility. They buy stocks in special occasions and sell them due to exceptional conditions. Such a practice leads investors to give different values depending on their origin and their use.

The fourth group consists of investors who start with an arbitrary initial value as a point of reference in forming their estimates. Indeed, investors who are victims of such anchoring bias take their investment decisions with insufficient consideration of new information. These subjects remain anchored to an initial value and then correct their ways of unbelief in an insufficient manner due to their lack of rationality that can cause reactions to the new information.

Finally, the materialized anomalies in the behavior of the investor of the previous "cluster" are small and even insignificant. This group of investors is representative though Tunisian investors are not frequently subject to the bias of representativeness.

This result has stimulated us to examine whether the factors characterizing individual investors influence their behavior in decision making. Therefore, it is necessary to identify the characteristics of investors who are victims of behavioral biases through a discriminator analysis, made on the basis of the collected data.

We have developed a discriminate analysis by means of databases to discriminate and to better identify the characteristics of five groups of investors according to their biases and characteristics. We have estimated the validity of discriminate analysis based on two indicators: The Wilks' Lambda and the overall correlation. The Global correlation is indicated in Table 4 of "Eigen Values".

TABLE 4
EIGEN VALUES

Function	Eigen Values	Variance%	Cumulated%	Canonical correlation
1	2,163[a]	67,7	67,7	,827
2	,726[a]	22,7	90,4	,649
3	,307[a]	9,6	100,0	,484

a. The first 3 canonical discriminate functions were used for the analysis

The more the "Canonical Correlation" approaches 1, the better is the model. From Table 4, we observe in particular that the column of "Canonical Correlation" is close to 1, which reinforces the fact that the model is validated.

TABLE 5
LAMBDA OF WILKS

Test of functions	Lambda Wilks	Khi-deux	df	Sig.
1	,140	282,909	66	,000
2	,443	117,089	42	,000
3	,765	38,508	20	,008

The lower is the value of Lambda Wilks, the better is the model. It is noted here that the more this value tends to 0, the more the model is validated.

TABLE 6
TESTS OF EQUALITY OF GROUP MEANS

	Wilks' Lambda	F	df1	df2	Sig.
Gender	,915	4,077	4	154	**,003**
A1	,957	2,321	3	154	,077
A2	,975	1,319	3	154	,270
A3	,952	2,592	3	154	,055
A4	**,808**	**12,220**	3	154	**,000**
A5	**,460**	**60,206**	3	154	**,000**
A6	**,893**	**6,162**	3	154	**,001**
N1	,958	2,275	3	154	,082
N2	,955	2,396	3	154	,070
N3	,954	2,467	3	154	,064
N4	,909	5,165	3	154	**,002**
N5	,925	4,147	3	154	**,007**
N6	,991	,491	3	154	,689
CSP1	,969	1,646	3	154	,181
CSP2	**,892**	**6,218**	3	154	**,001**
CSP3	,935	3,563	3	154	,016
CSP4	,972	1,462	3	154	,227
CSP5	.a				
CSP6	,972	1,466	3	154	,217
E1	**,854**	**8,756**	3	154	**,000**
E2	,938	3,388	3	154	,020
E3	**,791**	**13,600**	3	154	**,000**
E4	,989	,580	3	154	,629
RAM1	,951	2,667	3	154	,050
RAM2	,985	,755	3	154	,521
RAM3	,979	1,113	3	154	,346
RAM4	.a				

As indicated in Table 6, with reliance on Fisher's value test, the results show that different classes of investors are distinguished primarily by gender, age, level of experience, and occupational category. Besides, when applying the test of "Wilks' Lambda", the variables gender, age, socio-professional category, and experience all seem to have an influence on the behavior of investors operating on the Tunisian Market. Therefore, these moderators can determine the path taken by behavioral biases to influence the investor's decision.

The discriminate analysis shows that the tendency of some investors to make mistakes when making an investment decision depends on some demographic variables.

A Chi-square test is used to test the relationship between psychological biases and demographic variables. This test, therefore, checks the assumption of independence of these variables. We refer to this analysis to make first a Cross-tabulated results sorting between mimetic-age and mimetic-experience of investors.

TABLE 7
CROSS-TABULATED MIMICRY-AGE

		Age		Total
		,00	1,00	
Mimicry	,00	92	20	112
	1,00	15	53	68
Total		107	73	180

TABLE 8
THE CHI-SQUARE TEST

	Value	ddl	Asymptotic signification	Exact signification (bilateral))	Exact signification (unilateral)
Chi-squareof pearson	64,211(b)	1	,000		
Correctionfor continuity[b]	61,717	1	,000		
likelihood ratio	67,225	1	,000		
Fisher exact test				,000	,000
Linearcombination linear	63,850	1	,000		
Numberofvalid observations	180				

a Computed only for a 2x2 table   b 0 cells (.0%) have theoretical number less than 5. The minimum theoretical number is 27.51.

TABLE 9
CROSS-TABULATED MIMICRY-EXPERIENCE

		Experience		Total
		,00	1,00	
Mimicry	,00	99	13	112
	1,00	11	57	68
Total		110	70	180

TABLE 10
THE CHI-SQUARE TEST

	Value	ddl	Asymptotic signification	Exact signification (bilateral))	Exact signification (unilateral)
Chi-squareof pearson	92,850(b)	1	,000		
Correctionfor continuityb	89,836	1	,000		
likelihood ratio	99,957	1	,000		
Fisher exact test				,000	,000
Linearcombination linear	92,334	1	,000		
Numberofvalid observations	180				

a Computed only for a 2x2 table
b 0 cells (.0%) have theoretical number less than 5. The minimum theoretical number is 26.44.

Clearly Tables 7, 8, 9, and 10, indicate that the value of Chi-square is high (V = 64.211, V = 92.850, respectively a cross-tabulated sorting between mimicry-age and between mimicry-experience) and the significance level is low (=, 000). It is at this level that some investors said that less experienced young people are the ones who are most prone to the mimetic bias. This result confirms the work of Kumar et al (2011), which assumes that people, at a certain age, are less subject to psychological biases as they become more experienced. According to these authors, elder investors who are relatively less knowledgeable and have lower incomes are subject to behavioral biases.

TABLE 11
CROSS-TABULATED LOSS AVERSION-AGE

		Age		Total
		,00	1,00	
Loss Aversion		67	63	130
	1,00	23	27	50
Total		90	90	180

TABLE 12
THE CHI-SQUARE TEST

	Value	ddl	Asymptotic signification	Exact signification (bilateral)	Exact signification (unilateral)
Chi-square of pearson	,443(b)	1	,506		
Correction for continuity[b]	,249	1	,618		
likelihood ratio	,443	1	,505		
Fisher exact test				,618	,309
Linear combination linear	,441	1	,507		
Number of valid observations	180				

a Computed only for a 2x2 table
b 0 cells (.0%) have theoretical number less than 5. The minimum theoretical number is 25.00.

TABLE 13
CROSS-TABULATED LOSS AVERSION-EXPERIENCE

		Experience		Total
		,00	1,00	
Loss aversion	,00	117	13	130
	1,00	10	40	50
Total		127	53	180

TABLE 14
THE CHI-SQUARE TEST

	Value	ddl	Asymptotic signification	Exact signification (bilateral)	Exact signification (unilateral)
Chi-square of pearson	85,173(b)	1	,000		
Correction for continuity[b]	81,837	1	,000		
likelihood ratio	83,628	1	,000		
Fisher exact test				,000	,000
Linear combination linear	84,700	1	,000		
Number of valid observations	180				

a Computed only for a 2x2 table
b 0 cells (.0%) have theoretical number less than 5. The minimum theoretical number is 14.72.

With reference to this result, we conclude that age has no effect on the behavior of investors and that loss aversion appears to be greater among participants with an experience less than 5 years. As for the gender criterion, we note that women are slightly more affected than men. This result confirms those of Felton et al (2003), Philips and Grossman (2008).

TABLE 15
CROSS-TABULATED ANCORING-GENDER

		Gender		Total
		,00	1,00	
Ancoring	,00	136	16	152
	1,00	7	21	28
Total		143	37	180

TABLE 16
THE CHI-SQUARE TEST

	Value	ddl	Asymptotic signification	Exact signification (bilateral)	Exact signification (unilateral)
Chi-square of pearson	60,187(b)	1	,000		
Correction for continuity[b]	56,303	1	,000		
likelihood ratio	49,097	1	,000		
Fisher exact test				,000	,000
Linear combination linear	59,852	1	,000		
Number of valid observations	180				

a Computed only for a 2x2 table
b 0 cells (.0%) have theoretical number less than 5. The minimum theoretical number is 5.76.

As shown in Table 16, using the Chi-square test to find out the influence of gender on the anchoring behavior, we note that women are more prone to mental anchoring bias than men (V= 60.187 and p = 0.000). This result confirms those of Schubert et al (1999), and Philip Grossman (2008) and Massachi Tachino (2005). The main results of this cross-tabulated analysis show that the mental anchor bias is mostly found in women, while mimicry is more found in men than in women. As for the factor of age, the older investors are, the less they are

affected by psychological errors as they over time become more experienced. We also remark that experience also influences the behavior of Tunisian investors when making investment decisions.

V.   Conclusion

Unlike what the classical finance theory has suggested, the present study reveals that Tunisian investors do not always act rationally while making investment decisions. To explore the investors' behavior, the most appropriate manner is to interact directly with the investors in an attempt to extract their opinions and analyze them. Therefore, we adopted the questionnaire survey technique and we made questions based on these psychological biases. Since investors are found to be subject to several psychological and cognitive biases which play a key role in their decision-making processes, we have attempted to check the extent to which six psychological biases, among some others, have an effect on investors' behavior. We have also examined the interaction between demographic as well as financial behavioral factors in terms of investment decision making.

In short, the first main finding shows that herding attitude, representativeness, anchoring, loss aversion, and mental accounting all influence the Tunisian investors' perception of their decision making processes. On the other hand, we have mentioned the absence of overconfidence bias in the Tunisian Stock Market. In fact, Tunisian investors seem to be under-confident, hesitant and very sensitive to others' reactions and opinions. The second finding explains the fact that there is an interaction between demographic variables and financial behavioral factors. These results have particularly provided us with the first profile of Tunisian investors' behavior. Therefore, in future studies, it is of paramount importance to investigate the influence of these behaviors on prices dynamics in the Stock Market.

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