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Impact of Psychological Biases on the Performance of UCITS before and after the Tunisian Revolution

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Through a questionnaire, the results indicate that 35% of the managers of UCITS in Tunisia are not rational. Their decision-making is often influenced by the following biases: herding, fear, heuristics and anchoring. The results also indicate that this irrational behavior did not significantly change after the Tunisian revolution. Accordingly, in order to measure the effect of these biases on performance, we developed a composite model that groups together the studied psychological biases. We found that despite the moderate presence of these psychological biases, they tend to explain the performance of Tunisian UCITS, only before the revolution. Some of these biases, like regret aversion, positively affect performance. Other biases, like herding, anchoring, disposition effect and loss aversion, negatively affect UCITS performance.

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Zouaoui Marwa [α] & Bellouma Meryem [σ]

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I. Introduction

Behavioral finance is the study of how psychology affects the behavior of financial agents and markets. It assumes that investors are often irrational and that their demand for risky financial assets is affected by their feelings, beliefs or emotions. Such a behavior is subject to error of judgment, known as heuristics (anchoring, overconfidence), herding behavior and loss and regret aversion. These latter tend to compromise their decision-making.

In recent years, we have documented a significant shift to this new form of finance and an enthusiasm for the inefficient markets hypothesis. This latter is a response to two main factors; the increasing observance of anomalies in financial markets and the birth of perspective theory, developed by Kahneman and Tversky (1979).

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Indeed, since the 1980s, anomalies have been observed in markets, undermining thus the efficient markets hypothesis. With the 2000s crisis and more recently the Subprime crisis, research in finance began to look deeper into this issue. The psychology of market agents in particular has become an exciting topic in the literature because these crises have intensified volatility, destabilized financial markets and increased the fragility of the financial system.

Research in behavioral finance has therefore questioned the assumption of investor rationality and that of market informational efficiency. These latter are considered to be the fundamentals of behavioral finance. Psychological bias may explain these market anomalies.

Accordingly, in this paper we focus first on determining the psychological biases of institutional investors, like herding, overconfidence, anchoring, loss and regret aversion and in particular their effect on UCITS in Tunisia. The purpose of this paper is to determine whether or not managers of UCITS act rationally.

Previously, several studies focused on psychological biases to examine different market scenarios like financial or political crises (Bilson et al., 2002, Dimic et al., 2015). In Tunisia, most studies focused on the effect of socio-political crises on stock market behavior (such as volatility: Mnif, 2017), and on investors' psychological biases (Ben Mrad and Chaouachi, 2013). Then, our second aim is to study persistence of different behavioral biases in time, i.e. before and after the Tunisian revolution. In other words, we try to determine whether political instability has had an effect on the psychological behavior of UCITS' managers. We believe that this study adds to the relevant literature. First, it aims at concluding to market management efficiency in Tunisia, as these biases are considered by some authors to be one of the causes of financial markets inefficiency (Kremer and Nautz, 2013). Second, it aims to shed more light on the relationship between political instability and behavior of stock market agents.

This paper is then structured as follows. Section 2 reviews the theoretical and empirical foundations of psychological biases of UCITS, as well as the sources and reasons behind these psychological biases. Section

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3 describes the data and methodology. Section 4 presents the results. Finally, section 5 concludes about psychological behavior of UCITS in the Tunis financial market before and after the 2011Tunisian revolution.

II. Previous Studies on Psychological Biases

Professional fund managers base their investment decisions on information to select higher stocks, yet sometimes they may be psychologically biased. Such a bias leads them to make cognitive errors. Investors may make predictable and suboptimal choices when faced with difficult and uncertain decisions due to heuristic simplification.

Behavioral finance bears on psychology, which suggests that human decision processes are subject to several cognitive biases. These biases are divided into two groups: biases caused by a heuristic decision process and biases rooted in mental states proposed by perspective theory. In this study, we will only focus on biases of herding, overconfidence, anchoring, and perspective-related biases such as regret and loss aversion.

a) Herding Behavior

In its simplest version, herding is the attitude of a particular individual to imitate the behavior of another individual. According to the literature, we distinguish two currents of research that defined herding behavior. Under the first current: herding is rational (Bikhchandani et al., 1992; Mensah and Yang, 2008). Under the second current, herding is irrational (Kahneman and Tversky and (1979), Delong et al., 1991, and Shleifer and Vishny, 1997).

According to Mensah and Yang (2008), herding is the most rational behavior. The authors believe that, regardless of the perceived private information, it is more interesting to follow the choice of predecessors since this behavior is less risky than making an uncertain new decision. If the decision proves to be defective, it will be considered as a bad signal received by all operators. However, Kahneman and Tversky and (1979) show that individuals adopt reasoning shortcuts, leading them to imitate others and trick them into a biased decision-making process that generates assets valuation errors. Accordingly, their choices are not consistent with the perfect rationality hypothesis.

The main factor behind herding behavior is often lack of accurate information and uncertainty of the obtained information. These reasons lead investors to imitate the market trend in order to improve the information at their disposal.

Previous studies, including those of Jiang et al. (2005), assumed that informational uncertainty affects investor behavior. When uncertainty prevails, investors are led to copy the behavior of other agents whom they consider better informed. Such an attitude allows them to improve their previsions and increase their performance. For Devenow and Welch (1996), the desire to be certain and secure may explain herding behavior.

More recently, other psychological dimensions explaining this behavior have been examined. Regret aversion and a moderate self-confidence may trigger herding behavior (Shiller, 2002). Two other endogenous factors that play an important role in triggering herding can be signaled: investor reputation and remuneration. According to Scharfstein and Stein (1990), investment funds managers seek compliance with established conventions, because compliance encourages them to imitate others for two reasons: first, to protect their reputation, and second, because their remuneration depends on other agents' performances. Because of these, investors seek to minimize the risk of being isolated, sanctioned and the fear of losing money. Then, they should keep an eye on others'.

Indeed, several studies have focused on the link between investor behavior and market characteristics. Wermers (1999) found that herding mutual funds tends to stabilize prices. Indeed, since stock prices correlate with herding investment funds, then herding behavior significantly affects price effectiveness.

Chen et al. (2012) studied the impact of herding on stock market returns during financial crises. These authors found that herding behavior has a positive effect on future returns during times of market stress. On the other hand, Scharfstein and Stein (1990) and Hwang and Salmon (2004) believe that intentional herding can destabilize stock prices and thus hinder the smooth functioning of financial markets. However, Walter and Weber (2006) found that herding behavior in the German market has no effect on equities returns.

b) Loss aversion, regret aversion and disposition effect

According to perspective theory, the likelihood that an investor will incur losses by placing their savings in stocks encourages them to invest in bonds that yield less but are more secure. In other words, losses seem more offensive for investors than equivalent gains. According to Shiller (2002), investors are very sensitive to losses, which leads them to take more risks to prevent them. This bias is eschewed by the field of psychology. This latter assumes that a decrease in utility, mainly because of deficits, leads investors to retain losing stocks than winning stocks. This assumption has been developed by perspective theory and has been empirically tested by several authors, like Shefrin and Statman (1985) and De Bondt and Thaler (1985). According to these researchers, this behavior is none other than the disposition effect.

Mangot (2004) confirms these findings and in addition shows that risk-aversive investors generally hold securities in their portfolio, that no longer follow the news and market trends, no longer yield returns, and in

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particular lose much of their value. This author explains that loss aversion has two main consequences. First, the investor prefers to retain losing stocks, yet he does not believe in the quick turnaround potential. Second, if there is a small chance of losing then the investor avoids investing in these securities, although the future outlook of returns is clearly positive. Both of these consequences support the close relationship between loss aversion and disposition effect.

Brown et al. (2006) explain in a different way disposition effect. According to these researchers, investment fund managers who keep losing stocks for too long and sell winning stocks too early, follow a rational decision rather than a biased decision. These findings are drawn from behavioral theory which stresses that investors who perceive today's winners to be losers tomorrow then sell these winning stocks and buy shares that have depreciated thinking that these shares will see in the future a surplus value. It should be noted that the reasons behind disposition effect and loss aversion biases are more or less the same. First, with an unfounded belief in average price returns, investors will then sell a winning stock because they anticipate that its price will decrease while they keep a losing stock because they expects its price to go up again. Then, their preferences are consistent with perspective theory, which suggests that an investor is risk-aversive when it comes to returns and risk-taker when it comes to losses. For this reason, investors will sell a winning stock to secure its added value, while they are ready to keep a losing stock hoping for future positive returns despite uncertainty.

Finally, the last reason that motivates this bias is commitment intensity. Indeed investors find difficulty closing a trade at a loss given the time and money invested in the initial stock purchase and prefer to hope for future positive returns. This means that they do not disengage themselves from a project in which loss is certain. They continue to pour more resources, buying losers. This is known as commitment intensification (Lin and Huang, 2015).

Goetzmann and Massa (2008) found that the disposition effect negatively correlates with stock returns, volume and volatility. In addition, Svedsater et al. (2009) state that the relationship between disposition effect and returns depends on the investment horizon. In the short-term, past returns positively correlate with the disposition effect, while in the long-run, past returns negatively correlate with this bias. Leal et al. (2010) suggest that the relationship between returns and this bias depends on market conditions. In a bull market, investors are more likely to be influenced by this effect than in a bear market.

Bodnaruk and Simonov (2016) develop the causal relationship between loss aversion of mutual funds and their performance. They found direct evidence on the effect of this bias on investment decisions and returns.

Aziz and Abdullah Khan (2016) studied the behavioral factors of individual investors and their role in investment decision and performance in the Pakistani market. Their results indicate that there is a significant relationship between behavioral factors and investment performance. Indeed, representativeness, confidence, anchoring and availability biases positively correlate with investment returns. Whereas mental accounting, loss aversion and regret aversion negatively correlate with investment performance.

Garvey and Murphy (2004) found that regret aversion negatively correlates with professional performance. Moreover, Kahneman and Tversky (1979) define regret as a frustration feeling that prevails because of a wrong decision. Investors tend to value capital gains because they make them feel proud while they tend to avoid losses because they would make them feel uncomfortable, hence a feeling of regret emerges which investors try to avoid.

Chandra (2008) examines the relationship between regret aversion and portfolio structure. The author lists the reasons behind regret and they all relate to performance. Hence, investors will feel regretful when selling a stock too early and the price of the stock increases after the sale. The same feeling of regret persists when they buy a stock too late and the value of the stock remains stable after the purchase. Finally, the same is true when the value of previously held stocks increases. The author argues that it is the volatility of stock returns which affects investors' aversion to regret.

c) Behavioral Heuristics

Kahneman and Tversky (1979) are the first to study heuristics biases, notably representativeness, availability and anchoring. Then, Waweru et al. (2008) list other factors known as Gambler's error and overconfidence. In our study, we will focus on the following heuristics: anchoring and overconfidence, which we present in what follows. Indeed, anchoring is when individuals refer to past reference values (Kahneman and Tversky, 1974). The authors show that when making judgments and setting expectations, agents memorize reference points and adjust their reasoning and forecasts accordingly. This tends to limit their attention to assess the consequence of new events.

These assumptions have been confirmed by Chandra (2008) who show that investors are not doing enough research on stocks because there is just too much data. As a result, they make decisions based on a single factor that should have little or no impact on their decisions, while they ignore more relevant information.

As for the overconfidence bias, it takes place when investors tend to overestimate the probabilities of occurrence of events and the information received.

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Moreover, they tend to overestimate their ability to understand and the accuracy of their knowledge. Investors trust information, regardless of its source and regardless of its reliability. According to Hirshleifer (2001), the origin of this bias stems from the fact that investors believe that the chances of success result from their own talents. Investors are victims of great illusions about their own power and their ability to overcome chance.

Investors' overconfidence feeds on a biased account of their successes and failures. Investors tend to remember their earnings and willingly forget their losses. Similarly, according to Mangot (2004), investors equate their success to their abilities and reject their failures on the ground of market conditions or bad luck.

Overconfidence has its origins in the study of subjective adjustment probabilities, the feeling of being better than others, excessive optimism and the illusion of control (Hilton, et al., 2011). Adjustment bias reflects a person's tendency to overestimate the accuracy of the information at their disposal. Another source of overconfidence is the better-than-average effect. Indeed, individuals overestimate the accuracy of their own information. They overestimate their skills and investment abilities and feel that their choice is better than the average, which increases their self-confidence.

Finally, the last source of overconfidence is the illusion of control and excessive optimism. Indeed, illusion of control is defined as the feeling of being able to control events or results on which, in reality, there is no influence. This bias pushes investors to risky behaviors and overestimation of capacities in relation to reality, hence the birth of the overconfidence bias. According to Odean (1998), over-confident investors exchange more securities than others, they have lower expected utility and make less profits than if they were completely rational. They then spend too much money on information, hold riskier portfolios, increase market volatility, and do not perform better.

Some authors, like Barber and Odean (2001), explain the relationship between overconfidence and performance from another perspective. In fact, confident investors are more likely to make investment mistakes, resulting in less conservative investment decisions and lower returns. According to these researchers, individuals who have recorded past earnings tend strongly to give credits for themselves personally. As a result, self-confidence is overfed. This pushes them to take more risks, forget the long-term investment objectives and the diversification principle. In the end, after such an irrational behavior, overconfident investors record unsatisfactory and below-average returns.

For the impact of anchoring bias on performance, this topic has not been thoroughly investigated in the previous literature. Some researchers studying anchoring have confirmed its influence on returns. For example, Kaustia et al. (2008) focused on the impact of historical facts on the stock market, to see investors' anchoring degree and its influence on the market. They found that anchoring has important effects on estimating mid and long-term returns.

According to Cen et al. (2013), market participants are affected by anchoring when they estimate firm profitability. As a result, this behavior affects market performance in an indirect way.

Although the above reviewed literature anchors the effect of biases like herding, overconfidence and disposition effect on stock returns as significant, the empirical results found in several markets show mixed results as to the existence or absence of these biases, as well as to their impact on performance.

Such state of affairs led us to examine first the psychological behavior of Tunisian investment funds managers, before and after the social-political crisis of 2011. Then to determine the impact of these biases on the performance of these funds. For this reason, we propose to study the behavior of Tunisian UCITS between 2006 and 2015.

III. Sample and Methodology

a) Sample

The sample that we propose to study consists of mixed and bond UCITS operating in the Tunisian financial market.

Taking into account the survival bias, the sample we wish to study will consist of 22 mixed UCITS and 18 bond UCITS that have been operating from February 2005 until December 2015. We thus examine a total of 40 UCITS.

b) Methodology

This study uses mixed methods, but focuses more on the quantitative type of research by using a questionnaire. Indeed, quantification is generally associated with the study of behavior rather than meanings, which is the focus of behavioral finance.

The main objective of this study is to examine and diagnose the possible impact of the psychological biases of Tunisian UCITS managers on investment funds performance. This aim can only be reached effectively by opting for a quantitative type of research, since quantitative research is designed to identify and describe variables in order to establish relationships between them.

Subsequently, in order to measure the effect of biases on investment decisions, we use a qualitative method through a simple regression.

i. *Questionnaire Design*

Of the 40 UCITS surveyed, only 34 UCITS agreed to answer the questionnaire. Data collection lasted eight weeks: from March 14 to May 16, 2016. The percentage of acceptable answers is 85%. This percentage is considered acceptable to process our data and test our research hypotheses. Indeed, the

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questionnaire probed UCITS managers on the Tunisian market through so-called "closed" questions.

The questionnaire is divided into three sections. The first part of the questionnaire collects bio data (personal information like gender, age and educational level).

The second section targets biases and psychological behavior of UCITS managers. Indeed, each bias is represented by a set of items. For each question, we propose a number of answers. The third section determines the impact of the revolution on these psychological biases. In this section, our aim to find out if the biases existed or not before the revolution. After having collected 34 questionnaires from the respondents, we used the SPSS software (Statistical Package for Social Science) 13.0 to process our data. In order to test reliability and internal consistency of our measurement scale (1 for ever, 2 for rarely and 3 for yes), we used Cronbach's alpha.

ii. *The Variables of the Study*

To answer our research questions, we used a single return from each fund. The approximate return we used is the amount of monthly returns for the last month of each studied period. We took December 2010 for the pre-revolution period and December 2015 for the post-revolution period as references for each UCITS.

UCITS returns will be our dependent variable in our model. Behavioral biases represented by scores will be the independent variables in our model. Each of these scores is represented by a few items as shown in Table 2. The items are measured by a Likert-type scale.

One of the contributions of this section is to operationalize the psychological profiles of UCITS managers in terms of the six studied biases. Operationalizing our variables will follow two steps: firstly, we will detect the degree of significance of these biases in the Tunisian market, and then we will determine the impact of each bias on the performance of UCITS. The independent variables of our study are composite scores which group a multitude of questions for each variable. These independent variables are as follows:

The variable (SC_MIM) represents herding behavior of UCITS managers. We believe that this behavior negatively influences UCITS performance (Scharfstein and Stein (1990).

The overconfidence bias is represented by the variable (SC_EXCF). We assume that overconfident managers have a positive impact on UCITS performance (Belanes and Hachana (2010)).

Loss aversion is represented by the variable (SC_AVPE). We expect this variable to negatively affect UCITS performance (Garvey and Murphy (2004) and Aziz and Abdullah khan (2016)). Subsequently, (SC_ANC) represents anchoring bias. We assume that managers subject to anchor bias have a negative impact on UCITS performance (Cen et al (2013)).

The variable (SC_REG) represents regret aversion. We believe that regret-depleted managers have a negative effect on UCITS performance (Garvey and Murphy (2004)).

Finally, disposition effect is represented by the variable (SC_DISP). We assume that this bias negatively influences stock returns (Goetzmann and Massa (2008)).

To ensure the reliability of our results, and avoid measurement bias, we included a control variable in our model. This control variable is binary and represents the category of each fund (Cat). It takes 1 if the funds are investment companies with a variable capital, or 0 if the funds are mutual funds.

iii. *Model Retained: Principal Component Analysis*

To process our data, we will use a principal component analysis (PCA). Our choice is motivated by the nature of the objective we have set, which consists mainly in building scores for previously supported behavioral biases. This method mainly consists in grouping items of a variable into smaller sets called factors, which would reduce the number of variables in order to eliminate the multi-collinearity problems between them.

To judge the quality of our factor analysis, it is necessary to assess its sampling adequacy through the Kaiser-Meyer-Olkin's coefficient (KMO) and Bartlett's Sphericity test. Subsequently, in order to test the validity and reliability of the factor solution, it is necessary to examine the correlation matrix and the univariate statistics. For this reason, we used the ANOVA test and Cronbach's Alpha coefficient.

To determine the impact of behavioral variables on UCITS performance, we use the following regression:

$$Ri = \alpha + \beta_1 SC_MIM + \beta_2 SC_EXCF + \beta_3 SC_ANC + \beta_4 SC_DISP + \beta_5 SC_REG + \beta_6 SC_AVRP + \beta_7 Cat + \varepsilon i$$

SC_MIM, SC_EXCF, SC_ANC, SC_DISP, SC_REG and SC_AVRP are binary variables that take 1 if the score associated with the bias in question is greater than the median.

Cat is a control variable that represents the category of funds. This binary variable is represented as follows:

Cat = 1 If the funds are investment companies with a variable capital.

Cat = 0 If funds are ordinary investment funds.

β1 is a constant; βi is the coefficient respectively representing the impact of psychological biases: herding, overconfidence, anchoring, disposition effect, regret aversion, loss aversion and fund category.

ε_{it} is a random term.

i represents the number of UCITS which ranges from 1 to 34 funds.

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IV. Results

a) Content Analysis

As mentioned above, psychological biases are represented by items, each is represented by three answers (Yes, rarely and never). One answer is symptomatic of the bias object of the study.

Table 1 presents the profiles of the 34 UCITS managers. First, it presents the frequency of symptomatic responses as a percentage of biases: mimicry, overconfidence, anchoring, disposition effect, regret aversion and loss aversion after the Tunisian revolution. In this table, managers of Tunisian UCITS have all the biases included in our research model, but with different degrees not exceeding 40%.

We found out that the major bias that affects UCITS managers is the anchoring bias with an average of 36.75%. We also note that the least represented biases are regret and loss aversion with averages of 17.6% and 20.6% respectively. Decision-making of Tunisian UCITS managers is not affected by loss and regret aversion. This shows that Tunisian managers prefer to invest and take risks, rather than not investing in order to preserve gained profits.

The same results indicate that 30% of UCITS managers in the Tunisian market are subject to the overconfidence bias. Indeed, these managers trust their intuition. They consider themselves lucky and tend to overestimate the quality of the information they have.

Table 1: Profiles of Respondents

Biases	Items	Frequency	Percent %
Herding	MIM1	23,5	29,425
	MIM2	29,4	
	MIM3	32,4	
	MIM4	32,4	
Overconfidence	EXCF1	26,5	29,4
	EXCF2	23,5	
	EXCF3	38,2	
Anchoring	ANC1	29,4	36,75
	ANC2	44,1	
Disposition Effect	DISP1	26,5	26,5
Regret Aversion	REG	17,6	17,6
Loss Aversion	AVRP1	29,4	20,6
	AVRP2	11,8	

In order to determine the biases before and after the revolution, we asked a question for each category of bias. For each question, UCITS managers should say whether the relevant bias is:

(a) Greater before the revolution; (b) The same before and after the revolution; (c) Greater after the revolution.

The results of these questions are shown in Table 2.

As 71% of managers believe that the effect of other competitors on their investment decisions is the same before and after the revolution, we conclude that herding did not change significantly after the revolution.

Table 2: Variability of psychological biases before and after the revolution

Bias	Item	a	b	C
Herding	Q14	0,21	0,71	0,09
Heuristics	Q15	0,24	0,47	0,29
Perspectives	Q16	0,44	0,5	0,06

Responding to question (Q15), most managers (47%) testify that heuristics in their behavior remain stable after the revolution. Finally, Table 2 shows that 50% of Tunisian managers maintain the same level of loss and regret aversion after the Tunisian revolution.

The results on the herding bias contradict those of Boubaker and Bouattour (2008) on the Tunisian stock market. The authors found a complete absence of herding behavior among Tunisian investors. We also note that the herding bias is one of the biases that was not affected by the revolution. It should be mentioned that our results contradict those of Dimic et al. (2015) as well, which indicate that herding behavior of investors and investment fund managers tends to increase during high volatility and uncertainty periods.

b) Score Construction

In order to build the six scores, we adopted the same approach. We run a factor analysis on the items of each variable. In order to validate the questionnaire and

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assess its reliability, we run the Keyser-Meyer-Olkin (KMO) and Bartlett's sphericity tests, reported in Table 3. These two coefficients provide information about item factorization and the fit degree between the theoretical and the statistical models.

Table 3: Score Construction

Herding			Overconfidence			Anchoring			Loss aversion		
Items	VP	Coefficient	Items	VP	Coefficient	Items	VP	Coefficient	Items	VP	Coefficient
MIM1	1	0,673	EXCF1	1	0,427	ANC1	1	0,56	AVPE1	1	0,721
MIM2	1	0,561	EXCF2	1	0,374	ANC2	1	0,56	AVPE2	1	0,721
MIM3	1	0,695	EXCF3	1	0,655	Variance explained		100%	Variance explained		100%
MIM4	1	0,127				KMO		0,5	KMO		0,515
Variance explained		100%	Variance explained		100%	Bartlett's test		0,108	Bartlett's test		0,115
KMO		0,65	KMO		0,552	Cronbach's Alpha		0,18	Cronbach's Alpha		0,579
Bartlett's test		0	Bartlett's test		0,166	ANOVA		0	ANOVA		0
Cronbach's Alpha		0,66	Cronbach's Alpha		0,461						
ANOVA		0	ANOVA		0						

In Table 3, all KMO coefficients are greater than 0.5. We therefore accept these coefficients as all the variables had a KMO greater than or equal to 0.5 before the revolution. We also note that all of our variables have a Bartlett's sphericity coefficient equal to 10%, and in most cases these variables are less than 10%, which leads us to accept these estimates. Then, to test score reliability, we used ANOVA test which is found to be significant. Finally, in order to measure internal consistency of our questionnaire, we calculate Cronbach's Alpha coefficient. We found that Cronbach's alpha of all variables varies between 0 and 1, which reflects reliability and internal coherence of our measurement scale. After checking consistency and scores significance, we study the impact of behavioral variables on performance using a linear regression.

c) *Impact of psychological biases before and after the revolution*

In order to determine the impact of psychological biases on performance, we run a linear regression that includes all the psychological biases and the control variable. The regression results are reported in Table 4 below.

Table 4: Impact of psychological biases on performance

	Pre-Revolution		Post-Revolution	
Model	t	Sig	T	Sig
Constant	0.568	0.575	1.133	0.267
Herding	-2.612**	0.015	-0.249	0.805
Overconfidence	0.126	0.901	-0.220	0.827
Anchoring	-1.846*	0.076	-1.160	0.257
Disposition effect	-1.881*	0.071	0.600	0.554
Loss aversion	1.923*	0.065	-0.141	0.889
Regret aversion	-1.831*	0.079	0.084	0.933
Cat	-1.966*	0.060	-1.149	0.261

*This table reports the results of the following linear regression: $Ri=\alpha+\beta1\ SC_MIM+\beta2\ SC_EXCF+\beta3\ SC_ANC+\beta4\ SC_DISP+\beta5\ SC_REG+\beta6\ SC_AVRP+\beta7\ Cat+\varepsilon i$. This regression estimates the impact of psychological biases on the performance of 40 mixed and bonded Tunisian UCITS between February 2005 and December 2015. The model is significant at the * 10% ** and 5% thresholds.*

In this table 4, we found different results before and after the revolution. We note that before the revolution all the tested variables have a significant effect on return variability, except for overconfidence. Therefore, overconfidence does not affect performance of Tunisian UCITSs.

Since the results for the post-revolution period are insignificant, we conclude that all the psychological biases have no effect on UCITS performance during this period. Accordingly, all our hypotheses are significant only for pre-revolution period.

With these findings, we can conclude that the absence of the impact of psychological biases on Tunisian UCITS performance after the revolution may have resulted from managers' disorientation and destabilization, who might have reacted randomly and

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on a case-by-case basis. Therefore, these biases were found to be no longer significant.

Before the revolution, herding has a negative impact on performance. In other words, if managers' herding behavior increases, their returns decrease significantly. This relationship implies that herding may destabilize stock prices before the revolution and thus hinder the smooth operation of UCITS.

In Table 3, the results indicate that herding is stable over the entire period, whereas in Table 4, the results of a more in-depth statistical analysis show that this bias has an impact on performance only before the revolution, and becomes insignificant after the revolution.

In our opinion, this may have resulted from either the unexpected variation of returns, or, the change in herding behavior after the revolution as managers do not follow each other like they used to. In this case, managers lost faith in each other and in UCITS because many have been taken over by the State, while others closed or in the process of privatization.

The post-revolution results confirm those of Walter and Weber (2006) who found that herding behavior has no effect on stock performance. In table 4, the only variable that has an insignificant impact before and after the revolution is overconfidence. These results are consistent with those of Odean (1998) and contradict those of Belanes and Hachana (2010), who indicate that investment decisions and investor performance are affected by overconfidence.

Then, it should be pointed out that another heuristics-related bias like overconfidence, but which negatively affects performance, is anchoring. In our opinion, this impact can be interpreted by the fact that managers of Tunisian UCITS do not do enough research on stocks. These managers make decisions based on a single factor or use benchmarks, without seeing their relevance. As a result, they ignore the most important information, which necessarily affects their returns. For the pre-revolution period, our results are similar to those of Chandran (2008).

Similarly, for the disposition effect bias and loss aversion, they negatively affected performance before the revolution. It seems that managers of Tunisian UCITS keep stocks too long, because they are afraid of losses, and continue to buy new stocks in the hope of gaining profits. However, these new stocks may introduce a new risk which negatively affects portfolio performance. These results confirm those of Goetzmann and Massa (2008), who found that the disposition effect negatively correlates with performance. Similarly, they confirm those of Bodnaruk and Simonov (2016) and Aziz and Abdullah Khan (2016) who claim that loss aversion negatively affects performance.

Finally, we found that the effect of regret aversion of Tunisian managers on performance is positively significant. In our opinion, when Tunisian investors fear regret, they tend to review their choices and change their preferences so as not to regret later a wrong decision. This then positively affects performance. Our results are at odds with those of Garvey and Murphy (2004).

A last variable that also has an impact on UCITS performance is the control variable, i.e. fund category. This variable negatively affects performance.

V. Conclusion

Behavioral Finance Theory is a new approach to finance that examines how the behavior of agents in the financial market is affected by psychological factors which in turn influence decision-making and stock performance.

This behavioral theory takes into account many cognitive and emotional biases that influence economic agents when facing risky choices. In fact, agents facing complex choices often resort to reasoning shortcuts.

In this paper, our first objective was to determine the psychological biases that affect the returns of Tunisian investment funds, before and after the revolution in view of understanding the psychology of fund managers.

Our second objective was to determine the impact of these psychological biases on the performance of Tunisian UCITS, in order to identify the variables that may explain variability of performances. To achieve our objectives, we used, on the one hand, a questionnaire on the presence of psychological biases, and on the other hand a linear regression that measures the effect of these psychological biases on the returns of Tunisian UCITS.

The results of the questionnaire show that of the Tunisian UCITS managers, only a small portion of them adopt a herding behavior. They are overconfident in their knowledge and have a low regret, risk and loss aversion. By studying the effect of the revolution on these biases, we conclude that these biases remain the same after 2011 revolution. Subsequently, using a qualitative measure, we studied the effect of these psychological biases on the returns of Tunisian UCITS. We conclude that these endogenous factors fail to explain the variability of mutual funds returns over the period. In fact, the psychological biases we measured are significant only before the revolution. Some of these biases, such as regret aversion, have a positive effect on performance and others, like herding, anchoring, disposition effect and loss aversion, negatively affect performance.

This study is not without limitations. First, the bias measurement estimation, which is a simple regression in the form of a composite index, is above all subjective and cannot be exhaustive. Second, it would be interesting to shed more light on the relationship between fund characteristics and behavioral biases. In particular, this study can be broadened by measuring

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the effect of other variables that may affect the long-term performance of UCITS, such as macroeconomic news.

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