The Behavioral Approach and the Rationality of Economic Decisions: Application to Banks Managers

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Abstract
This paper advances an empirical contribution to the behavioral economics’ literature. In traditional economic theory, perfectly rational agents make logical and justified decisions on perfect markets. Nevertheless, everyday life of investors, executives, managers and general economic agents is not the one of a “homoeconomicus” rational and cannot pretend to behave like a mathematical model. This paper is an essay to explore and validate the theoretical predictions of the behavioral economics’ theory in decision making process. Among 124 banks’ managers in the Tunisian context, our results highlights that their psychological biases and emotions can serve as a determinant of their bounded rationality and so they can explain managerial decisions’ distortions. Financial institutions should be aware that managers’ psychology and emotions can persist and causes decision making’s distortions. Tunisian bank’s managers are normal and they are affected by their psychology and emotions. A thing that may explains managerial decisions’ distortions. It is the time to discuss how financial institutions arrive to delimit the effect of the influence of the managers’ personal characteristics (emotions, psychological biases) on decision making efficiency.

Keywords: Behavioral economics, economic decision, rationality, psychological bias, emotional bias
Paper type: Research paper

Introduction
In traditional economic theory, perfectly rational agents make logical and justified decisions on perfect markets. Nevertheless, everyday life of investors, executives, managers and general economic agents is not the one of a “homoeconomicus” rational and cannot pretend to behave like a mathematical model. The emerging field of behavioral economics seeks to develop more precise theory on the behavior of economic agents. The recent success of this new approach shows how the gap between economic theory and reality can take time to fill.

Indeed, everyone understands that a pure economic theory cannot but approach the real-world conditions. Standard economic models exclude emotions because they are too complex, unruly and ephemeral. But today, the behavioral economists add a psychological dimension to the traditional economic model to take account of emotions and human irrationality. According to them, by observing interactions between rational decision making and intuitive, thus obtaining a more sophisticated and realistic about how the economy really works. This new approach may have a fundamental influence on economic theory of the future. This is why central bankers, policymakers and economists of the dominant school, are now showing a growing interest in the ideas of behavioral economics.
In this context, this research intends to establish and develop the field of behavioral economics by adopting a nature of Human more realistic than commonly-used in economics, by using behavioral approaches inspired by psychology. It is therefore a descriptive study being carried out primarily through a literature review. This development is similar to complementarity, on some points, with a revolution of paradigms. Indeed, we find that some authors, such as Hermalin and Isen (2000), study the behavioral approach in the context of rationality (primarily substantive) and others such as Shiller (2000) and Camerer (2003) analyze behavior outside of this context.

Indeed, our research aims to explain and determine the significance of the explanatory power of behavioral approaches in the research developments in economic decision behavior. In the context of rationality, the development of the behavioral approach introduced and developed individual characteristics, a posteriori theory.

Emotions in this context are mainly obstacles to reflection or a factor incorporated in the utility (Hermalin and Isen, 2000). The resources approach, bounded rationality and the inclusion of skills, different ways of taking into account implicitly the behavior of agents in the context of rationality. Instead, the alternative view (behavioral approach) attempts to establish new behavioral assumptions by introducing behavioral biases that are inconsistent with rationality. Indeed, under the assumption of rationality, some behavior is considered irrational.

The behavioral approach
Behavioral economics is a branch of economics that studies the behavior of agents in economic situations. One of the principal objectives of behavioral economics is particularly to describe and explain why in some situations, the agents have non-rational or irrational behavior. “Behavioral economics” is a designation given by U.S. researchers, behaviorism, consider that this area is mainly based on behaviorist psychology. Behavioral economics is not confined to a single study of symptoms (economic effects in this case) and pair stimulus (reaction), even if the phenomena of under-reaction and over-reaction studied by Thaler (1987), that are part of this discipline of economic analysis; She appealed also to many other concepts, so that individual psychology of social psychology, especially anything that relates to emotional and cognitive biases, whatever the result of individual or group effects "collective".

It must be noted a large part of the research of behavioral economics and the phenomena observed is common with those of behavioral finance: in point where the two disciplines are often synthesized. The findings relate in particular to the fact that the economic decision making is affected by psychological factors, cognitive and emotional, which differ from the rationality attributed to homoeconomicus. Economic theory is of course expanded and changed, and the result of this review is "behavioral economics".

Perfect rationality to bounded rationality
The classical economic theory provides that individuals make rational decisions that are not dependent, as the final object: to maximize its utility in an environment marked by risk and uncertainty. Thus, because it a question of economic issues and not sentimental, emotions are absent from this theoretical framework. The common vision is also a disturbing element of the decision process. Yet these two visions, very theoretical or very simplistic, ignore a fundamental point: very often, the emotions can make good decisions quickly, and away from the danger of getting lost in details.

The field of behavioral economics is quite old, and goes back to the publications of Allais (1953) and Elsberg (1961) concerning the paradox of the rational choices on the notion of ambiguity in decision theory. Yet it is only relatively recently that behavioral economics has really established itself as an alternative theory to the standard theory (Kahneman and Teversky, 1982, and Sunstein, 2000).
The starting point of the behavioral theory is to consider the individual bounded rationality (Deffains and Ferey, 2007). In other words, it does not always have all the information needed for decision-making or any capacity to optimally treat this information. Therefore, the challenge is to define the bounded rationality. Indeed, we could say that, as long as there is only one way to be rational, there is a variety of ways of being «irrational». In other words, when one considers that rationality is limited, there may be multiple forms of limitations of rationality: the importance of the norms of behavior in the actions of individuals, distortion of probabilities, and use of heuristics in decision cognitive biases. Specifically, behavioral economics questions the standard theory of the decision on four main grounds: the question of maximization of expected utility, the stability of preferences, the process of computing information and rational expectations (Sunstein, 2000).

Behavioral theory is not to build a decision theory that is prescriptive and that would indicate how agents should behave rationally, but rather to describe how agents effectively behave (Sunstein, 2000). To avoid pure description, which would have limited utility, behavioral economics seeks to identify recurring effects, ideal types of decision making in bounded rationality. Thus, the emphasis is on general heuristics or biases typical particularly, identified especially at experimentation, which can then be applied on other contexts that these experiments.

The refutation of rationality in economics

Economic psychology or behavioral economics has launched two lines of research, trial and choice (preference), which are essential for decision making (Camerer and Loewenstein, 2004 and Rabin, 2002). Studies of the judgment treat evaluation and treatment of information, while the choice treats the option pricing and stock selection. According to Camerer and Loewenstein (2004), the standard principles used to measure the probability of events in economics are the concepts of statistical sampling and Bayes rule. Since the Bayes rule is cognitively not very realistic, it is unlikely to be correct in a descriptive manner.

Cognitive psychology provides that the mechanisms heuristics such as heuristics of availability of people, consider the probabilities of future events. This heuristic is a shortcut to require minimal cognitive effort to provide reasonable judgments. Another line of research focuses on the behavior categories of choice (preferably), like the effect of mental framing. How to regulate the problem? Does this phenomenon affect the decision making? The study by Kahneman and Tversky on the context of framing effects is well known. For example, agents make choices between certain Results and probabilistic results, if the prospect is a gain or loss. For earnings, the agents tend to be averse to risk, while for the losses they have takers or players to risk (Teversky and Kahneman, 1974, 1981). In this context, Kahneman and Tversky proposed the theory of perspective.

The rationality of economic decision

The prospect theory of Kahneman and Teversky (1979 and 1992) teaches us that decision-making (including economic decision) involves two major steps before the final choice. "The editing" phase and "the value" phase. In the first phase, the agent will fragment his principal problem in several sub-problems. This is to simplify the final choice. In the second stage the agent will evaluate each prospect, to finally choose the one to maximize their final wealth. This theory is based on the introduction of the effect of psychology on the agent decision. The contribution of this theory is the introduction of a new form of utility function that takes the form "S ". At the opposite, the rational approach in the utility function of an agent is always assumed concave reflecting his aversion to risk.

According to prescriptive models of decision making (prospect theory, Khaneman and Teversky, (1979) and (1992), the agents make decisions by considering all possible alternatives without
time constraint, and maximizing the benefits to the Final. Classically, agents are considered as organisms tending to maximize profits and reduce costs: they are viewed as "maximizer". However, we know that in a "natural" environment, people tend to make quick decisions under time pressure, and from a small amount of information. In order to make quick decisions, individuals use heuristics (mental shortcuts). These cognitive processes are automatic and parsimonious in terms of time and mental resources.

March and Simon (1958) and Simon (1960) are the first to have questioned the assumption of absolute rationality by introducing the concept of bounded rationality. They indicate that the rationality of an agent is limited by three factors: (i) the information is incomplete, (ii) the individual motivations and (iii) the capacities are limited. Consequently, they substitute the goal of maximizing (described by the theory of expected utility) by that of satisfaction: the individual does not take an optimal decision but rather a satisfactory decision. Since the work of Simon (1960), we know that agents are more like "satisfiers" rather than "Maximizers": we tend to choose the most "rational" in light of our physiological and psychological limits, and environmental complexity.

Among the psychological biases, we will study in this research particularly emotional biases. So, this research studies the correlations between decision making and emotional biases. More clearly, we will explore the emotional impact of bias on the economic decision. So, our contribution in this research is to study the rationality and/or the irrationality of economic decisions of agents, and verify the factors affecting this rationality. More precisely, we study the relationship between decision making and emotional biases. Consequently, we test the general assumption that the emotions and/or emotional biases are a source of bounded rationality or irrationality.

**General Hypothesis:** The economic decisions of agents are not perfectly rational and psychological biases (particularly bias emotional) are possible sources of bounded rationality or irrationality of economic agents.

In literature, we find four types of bias: risk aversion, optimism, overconfidence and lack of cognitive flexibility. So, this general hypothesis is divided into several sub-hypotheses, each hypothesis corresponding to a specific bias.

**The attitude towards the risk**

Risk is a probability proposed from the uncertainty. So, economic agents can have 3 types of attitudes towards risk: neutral, aversion to risk or risk player. Nevertheless, the prevailing attitude is risk aversion (Shefrin, 2000; Camerer, 2003; Camerer et al., 2004). The uncertainty is due to the unknown or the lack of information. This is true of any unforeseeable event influencing the decision. Similarly, the economic agent is generally rain to uncertainty when it comes to winning and vice versa if this relates to losses (Camerer, 2003, Camerer et al., 2004). Moreover, fear of uncertainty, economic agents adopt a conservative attitude and therefore exclude any decision that can change their current status (Anderson, 1983). Kahneman and Tversky (1979), have proposed a utility function in the form $S$, which shows that the utility function of an agent is concave in the domain of gains (reflecting an aversion to risk in case of possible gains). At the opposite, this function is convex for losses (reflecting that the agent is a risk taker when it comes to losses).

Therefore, the assumption of convexity of the utility function in the region of losses, and concavity in the region of gains is interesting in this context. Indeed, the shape of the utility function reflects an aversion to risky choices in the area of gains and a search of those choices in the areas of loss. Similarly, according to Benartzi and Thaler (2001), agents are too sensitive to losses than profits (asymmetric risk preference). Thaler and Johnson (1990) observed a decrease in risk aversion of economic agents subsequent to an initial gain and vice versa.
Gollier, Hilton and Raufaste (2003), noted that the observed behavior is largely determined by processing modes that deviate significantly from the classical norms of rationality. Moreover, Gollier et al. (2003) propose several possible justifications for such behavior: the social position of the maker or the sum of positive and negative judgments of the agent relative to a situation of risk (e.g. the role of affect or the interaction between the emotional system and the representation of the problem).

Consequently, since in the classical norms of rationality, the economic agent is always averse to risk, we find that the economic agent deviates in most situations, if not all, of this rationality, and may be a risk taker. In this framework develops the first sub-hypothesis:

**Hypothesis 1:** The further we get from the concave form of the utility function (it is close to the S form of the utility function) the closer we get to the behavioral approach.

**Optimism**

Comments of psychologists indicate that humans tend to have overly optimistic as regards their situation. Show optimism is often refusing to believe that probability theory applies to his personal case. This explains why so many people continue to play the lottery when the expected gain for each player is obviously less than the ticket price. Any such optimism is not always detrimental; it helps for example to deal calmly with the uncertainty of life. Consequently, optimism can have a perverse effect on economic decisions, it feeds unrealistic expectations or if it was unaware of the risks of loss.

Optimism refers to the conversation of an attitude and a positive perspective, while happiness refers to the ability to maintain a sense of satisfaction with life, and expresses positive emotion. Based on the synthesis of Parisi and Smith (2005), optimism increases the chance of success of the event. Generally, optimism can be treated as the present Baker et al. (2004). Indeed, this element encourages economic agents to monitor its capabilities. Even when excluding conflicts of interest, these attitudes will push economic agents to select cost-effective decisions that yet he will not consider as profitable. Since then, the study of affective in finance has focused primarily about investor optimism (Glaser et al. 2003) and managers (Baker et al. 2004 and Heaton, 2002) or on the strategies interactions between individual (Hermalin and Isen, 2000).

However, this dimension seems to permit a development of explicative theory of behavior in decision making. According to Bazerman (2006), the optimism bias will lead economic agents to believe that their future will be better compared to others. So, the rationality of these decisions is limited. Moreover, we find that the economic agent is more optimistic or over-optimistic, the rationality of his economic decisions are rationally limited, or irrational.

**Hypothesis 2:** The behavior for economic agent’s optimism can affect the rationality of their economic decisions.

**Overconfidence**

Overconfidence is only overestimate personal abilities. This behavioral bias is probably the one that was most valid by empirical studies. For Thaler (1995) is the element most robust of the psychology of decision. It is widely reported among people who think, typically, almost better drivers than average. It is also found among professionals, of all kinds, psychologists, engineers, lawyers, negotiators, managers, bankers ... are all prone to overconfidence.

In the calibration study of subjective probabilities or the overconfidence bias stems. The results of many experiments generally show that individuals are overconfident (Griffin and Teversky, 2002). Specifically, events consider certain occur in 80% of cases and events considered impossible take place in 20% of cases. Individuals overestimate their own abilities, are particularly optimistic on the future events that are personally in favor. In addition, this overconfidence is directly reflected in the opinion that people have for themselves: they consider
themselves, for example, as better drivers, or better managers than average people, and tend to overestimate their role in the achievement of favorable events. Kent, Hishleifer and Subrahmanyam (1998) develop a model showing that investor overconfidence generates an overreaction to their private signals, which generates a negative autocorrelation of profitability in a long term. Overconfidence stems from the fact that investors seek their private information and give it too much importance. Overconfidence bias leads people to overestimate their own skills and knowledge (Camerer and Lovallo, 1999).

According to Baker et al. (2004) overconfidence, opposed to optimism, reduces levels of perceived risk or increase the gain since it overestimates the capacity of the individual. So overconfidence can make efficient decisions with minimal time and energy. Also, overconfidence can lead to a systematic overestimation of high probabilities associated with current events, and a systematic underestimation of the low probabilities associated with rare and severe events. This means that the decision maker (forecaster) is overconfident in their ability to predict a phenomenon will be realized or not. This bias allows the decision maker (forecaster) to overestimate his abilities to provide an accurate forecast. Therefore, we find that overconfidence is not a rational behavior, and most economic agents are overconfident, over the economic rationality of his decision either limited or irrational.

Hypothesis 3: The greater the economic agent is overconfident; the more economic rationality of his decision is either limited or irrational.

The lack of cognitive flexibility
Cognitive flexibility is the human ability to adapt strategies that cognitive behavioral events unexpected environmental conditions (Cañas, Quesada, Antolí and Fajardo, 2003). This definition implies three important concepts. First, cognitive flexibility is the ability which could explain the study process, i.e. it could be acquired with experience. Second, cognitive flexibility involves the adaptation of cognitive processing strategies. In the context of this definition, a strategy is a sequence of operations that are looking into a problem space (Payne, Bettman and Johnson, 1993). Cognitive flexibility refers to changes in complex behaviors, not discrete responses. In conclusion, the adaptation will produce new and unexpected environmental changes after a person has completed a task for a while. Although flexibility may be an adaptive capacity of individuals (Payne, Bettman and Johnson, 1993, 1988), this adaptation does not always take place. In situations where a person should be flexible than it treats the changing environment, then we are talking about the cognitive inflexibility or lack of cognitive flexibility. An example of this inflexibility occurs when the actions that are efficient in previous situations, they are inefficient in new situations. Cognitive flexibility refers to the ability to adjust strategies and cognitive processes based on new environmental conditions or unforeseen (Canas, Quesada, Antoli, and Fajardo, 2003). In our case, it is rather the lack of cognitive flexibility that is the bias. When a person is not flexible, cognitively, she behaves in a non-functional in dealing with situational demands, so often he would execute incorrectly. Psychological resources of the individual play an important role in individual creativity. Sternberg and Lubart (1999) state that the development of individual creativity depends on the combination of six resources: knowledge, intellectual skills, ways of thinking, motivation, personality and environment. For Amabile (1997), skills of reactivity can still be improved by learning and practicing techniques designed to increase cognitive flexibility and the intellectual independence of the individual.

Hypothesis 4: The lack of cognitive flexibility affects the rationality of economic decision.

Conceptual model of the study
In the next figure, we advance our conceptual model. As it described here, we tests the effect of some behavioral biases as potential determinants of the rationality of economic decisions.

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Especially, we test the effect of banks’ managers’ attitude towards risks, optimism, overconfidence and the lack of cognitive flexibility.

The explanation given to the formulation of anomalies in the economic field in behavioral economics is based on taking into account different contributions of cognitive psychology to our decision making process. The introduction of a psychological bias generally disrupts the rationality of agents inducing the formation of an anomaly on highly theoretical. The alternative view (behavioral approach) attempts to establish new behavioral assumptions by introducing behavioral biases that are inconsistent with rationality. Indeed, under the assumption of rationality, some behavior is considered irrational.

If we introduce the development of behavioral approaches in the auxiliary hypotheses theory, it is possible to create a behavioral paradigm as an alternative to rationality because some behaviors may both appear completely irrational in the context of rationality and follow a logic corresponding to a different framework. In our research, to investigate the validity of our assumptions we used only the emotional bias, so in the empirical part, we will study how these emotional biases affect the rationality of economic decision.

Methodology and data descriptions
Sample Description
We used in this study a questionnaire addressed to 124 managers or officers of the banks in Tunisia, forming our sample, who have the power to make individual decisions in their direction (eg, agency heads, the responsible for client advisers, second agency heads ...). We used the information obtained from qualitative research to develop this questionnaire. Quantitative data were collected using a survey of four parts including closed questions more personal information (age, work experience) and distributed over the four studied psychological biases. For the questionnaire development, we adopted an approach based on the available literature and also included a list of items that are relevant and important to assess and study the rationality of economic decision.

The general characteristics
From table 1, concerning the age of people shown in the sample, we see that most respondents are aged over 30 years. From this table, we find that 85% of respondents have a professional experience of more than 5 years, and 56% of the populations have professional experience of more than 10 years. Consequently, we find that most individuals in the sample have a good and broad professional experience, which can affect the quality of results.
Table 1: Descriptive statistics of the population

<table>
<thead>
<tr>
<th>Age</th>
<th>Percentage</th>
<th>Experience</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between 25 and 29</td>
<td>20</td>
<td>1 to 5 years</td>
<td>15.30</td>
</tr>
<tr>
<td>Between 30 and 34</td>
<td>30.9</td>
<td>6 to 10 years</td>
<td>28.18</td>
</tr>
<tr>
<td>Between 35 and 39</td>
<td>30.9</td>
<td>10 to 15 years</td>
<td>36.37</td>
</tr>
<tr>
<td>More than 40 years</td>
<td>18.2</td>
<td>More than 15 years</td>
<td>20.15</td>
</tr>
</tbody>
</table>

7.3. Model Overview

The objective of this study is to explain and show the bounded rationality of economic decisions of agents by a group of qualitative variables expressing the real behavior or the true behavior of economic agent, psychological variables are considered. The bounded rationality of economic decisions of agents is the one foundation of the behavioral economics, as our independent variable. Following a literature review, we identified four dimensions of this variable. Thus, the model studied in this research:

\[ RED = \alpha_0 + \alpha_1 Attrisk + \alpha_2 Optim + \alpha_3 Overconf + \alpha_4 Flexcog + \varepsilon_t \]

Where,
- \( RED \): the Rationality of Economic Decision
- \( Attrisk \): Attitude toward the risk
- \( Optim \): Optimism
- \( Overconf \): overconfidence
- \( Flexcog \): cognitive flexibility.
- \( \alpha_i (i=1,...,4) \) are the parameters to estimate.
- \( \varepsilon_t \): residual standard term.

Measures

The dependent variable

Following the absence of direct measurement and/or reliability of our dependent variable, the rationality of economic decision, is represented by the combination of two items: (i) If you invest in a project: you are overweight in states most favorable, less favorable, or you use scientific criteria to estimate its profitability; (ii) Suppose that you have to choose between three types of projects: I will choose a project among them without much thought because I have confidence in myself. From my experience, I will choose a project without taking into account the selection criteria standards (e.g. NPV, IRR, ...) or I will choose a project with reference to my experience, confidence and other traditional selection criteria.

We used the Cronbach’s alpha coefficient to verify the reliability of measurement, which is based on the variance of responses, formulated, which provides indications on the dispersion of results, and the covariance is an indication of the relationship between variables, to measure the reliability of the items. Thus, Cronbach’s alpha in our case is 0606>0.5, where the reliability of our items are checked.

Independent variables:

The attitude toward the risk: this variable represents the first part of the questionnaire, which is represented by five items to study the utility function of the population: (i) choices in the domain of gains, (ii) choice in the domain of losses. From to the responses, we find that in the field of gains, 85.5% of respondents chose the prospect A, and in domain of losses, 81.8% of people chose the prospect D. This reflects that agents are risk averse in gains domain and risk-taker in
the domain of losses, verifying the theory of Kahneman and Teversky perspective. (iii) The awareness of agent in two items, we find that 83.6% of respondents chose the loss, which verified that they are sensitive to losses. (v) The degree of risk taking, most individuals in the sample are risk takers, since 78.2% chose to place a significant portion of their economy in risky investments. These items are based on the literature to study the risk aversion of economic agents and the value of Cronbach's alpha is equal to 0604 where the reliability of our items is checked.

Optimism: This variable is represented by four items, (i) in the preoccupation of the economic agent to losses or gains we see that 72.7% of individuals are concerned about gains face a big decision, and this reflects the optimism agents face these decisions. (ii) The sentiments inspired by the big decisions, we note that 69.1% of individuals in the sample, behave optimism toward the decisions taken. (iii) Concerning the reactions to the uncertainty of profitability, we find that 65.5% of individuals have over weighted the most favorable states to estimate the profitability under uncertainty. That has a degree of optimism in their behavior. (iv) In solving their financial problems, we find that the agents have a behavior of optimism in solving their financial problems, as 60% of them anticipate that they are able to get out easily of this situation. These four items represent a value of Cronbach's alpha equals to 0.745 which explains their reliability to explain the optimism of economic agents.

Overconfidence: we have fixed four more reliable items to study this behavior. The value of Cronbach's alpha of these items is equal to 0.635. (i) Overconfidence aptitude to make the right economic decisions, well, 56.4% were very confident to make good decisions and 16% are completely confident. (ii) Overconfidence estimates, we note that 94.6% of the populations are overconfident in their estimates. (iii) The overconfidence of choice shows that 32.7% of individuals make their choices by referring to their experience and traditional selection criteria (NPV, IRR ...), 23.6% make their choice by referring to their experience, but without taking into account the selection criteria. At the contrary, we see that 43.6% of managers make their choices without much reflect, that reflects their overconfidence in their choices. (iv) Overconfidence capacity, we find that most agents are agreed with this item, since they believe in most things they undertake. Thus, we see that overconfident.

The lack of cognitive flexibility: This variable is measured by four items that have a value of Cronbach's alpha equal to 0.558 which reflects the reliability of the items selected. (i) business sought, which gives us an idea of the personality and responsibility of the agent, we find that 41.8% of the population seeking work that allows them time, 25.5% of officers seeking adventure, risk, novelty, and 21.8% of officers seeking a job with great responsibility. (ii) The reactions toward economic crises: we see that almost half of the sample has an average response toward economic crises and almost 40% of the population have a low reaction toward the economic crisis. This is reflected in the lack of cognitive flexibility. (iii) How to think of the agent and the flexibility of their ideas, as 83.6% of the population changes their usual idea only rarely, which reflects well the lack of cognitive flexibility.

In this empirical study, the value of Cronbach's alpha of the questionnaire is equal to 0.823 and the value of Cronbach's alpha of 17 items is equal to 0.852, which implies the reliability of all our items and questionnaire.

Analysis method
In the context of our search for the model analysis, the method that best fits our case is logistic regression. Thus, the choice of the binary logistic regression is justified by the impossibility of implementation of the linear regression for two reasons:
- The linear regression can be extended to infinity when the value of the independent variable increases to infinity, while a probability, by definition must be between 0 and 1.
Regression with a binary variable would not respect the principle of normal distribution, because all values are 0 or 1.

To use this technique of regression, we checked the conditions of its use, i.e., the linearity of the model (the variable to be explained is linearly related to each of the explanatory variables), the normality of residuals through the Kolmogorov-Smirnov homoscedasticity of residuals (to do this, we used a regression of squared residuals over all variables of the models, the absence of multicollinearity between explanatory variables (this was verified through Pearson coefficients) and, finally, lack of auto-correlation of residuals across the Durbin-Waston test.

Analysis and results
The objective of this section is to present and interpret the results of our research. Table 2 contains the means and standard deviations of variables used in this study and the correlations between them. It becomes clear that the age, experience, attitude toward risk, optimism, overconfidence and lack of cognitive flexibility are positively correlated between them and correlated negatively with the rationality of economic decisions. So we find correlations we expect.

Table 2: Pearson correlations between the various variables

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Age</th>
<th>Experience</th>
<th>Attrisk</th>
<th>Optim</th>
<th>Overconf</th>
<th>Flexcog</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>34.90</td>
<td>5.565</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expprof</td>
<td>9.58</td>
<td>5.596</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attrisk</td>
<td>15.93</td>
<td>5.55</td>
<td>0.927</td>
<td>,691**</td>
<td>,612**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optim</td>
<td>13.49</td>
<td>4.08</td>
<td>0.681</td>
<td>,613**</td>
<td>,836**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>overconf</td>
<td>14.20</td>
<td>3.628</td>
<td>0.640</td>
<td>,525**</td>
<td>,812**</td>
<td>,890**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexcog</td>
<td>13.73</td>
<td>3.445</td>
<td>0.650</td>
<td>,563**</td>
<td>,853**</td>
<td>,884**</td>
<td>,902**</td>
<td></td>
</tr>
<tr>
<td>RED</td>
<td>254</td>
<td>440</td>
<td>-0.581</td>
<td>-0.498**</td>
<td>-0.903**</td>
<td>-0.907**</td>
<td>-0.915**</td>
<td>-0.931**</td>
</tr>
</tbody>
</table>

**, Correlation is significant at the one percent level.

Rationality and overconfidence, for example, the correlation is negative, which means that more agents are overconfident, over the rationality of decisions is limited, similarly, for all other variables. We found a significant relationship between all variables used in this study.

Table 3 presents estimation results of regressions relating the probability of rational economic reports the coefficients obtained and the value “p” in brackets, which tells us about the statistical significance or insignificance of the assumption about each independent variable.

Table 3: Results of logistic regression of the model

<table>
<thead>
<tr>
<th></th>
<th>attrisk</th>
<th>optim</th>
<th>overconf</th>
<th>flexcog</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regress.Coeff[α]</td>
<td>-0.636</td>
<td>-0.590</td>
<td>-1.582</td>
<td>-1.109</td>
</tr>
<tr>
<td>Sig. [p]</td>
<td>0.012**</td>
<td>0.043**</td>
<td>0.077*</td>
<td>0.042**</td>
</tr>
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</table>

Cox & Snell R Square = 0.872

**, p<0.05; *, p<0.1

According to our results, we find that R2 equals 0.872, implying that these variables, the attitude towards risk, optimism, overconfidence and cognitive flexibility, explain a large part of
rationality of economic decisions of our sample with a percentage of 87.2%. We can conclude that this percentage is sufficient as a percentage of explanation of a qualitative or behavior variable.

The review of our results notes a negative and significant relation at 5% between the attitude towards the risk and the rationality of economic decisions of agents. This shows that the attitude of the agent towards the risk, because the economic agent is risk averse in the event of gains and risk-taker in the event of loss, verified and the form of the function utility proposed by Kahneman and Teversky (1979), the “$S$” form. This theory is based on the introduction of the psychological effect of the agent’s decision. According to Kahneman and Teversky, the agents’ behavior is affected by psychology or cognitive biases, such as emotional bias. Thus, the prospect theory of Kahneman and Teversky proposes that the utility of agents function is concave in the field of Gains (reflecting the risk aversion when possible gains). At the opposite, this function is convex for losses (reflecting a taste for risk in the case of losses).

As part of our sample consisting of officers Tunisian banks (bankers), and especially agents who have authority to make decisions, their behavior is affected by cognitive biases, indicating that their utility function conforms with $S$ form, proposed by the prospect theory of Kahneman and Teversky. The negative sign of the coefficient indicates that this variable affects the rationality of economic decisions of these agents; the results validate the first hypothesis. Thus, our results confirm the results of Kahneman and Teversky (1979, 1992).

The results reveal that the coefficient of the variable "Optim" relating to optimism is statistically significant at 5%, and has a negative impact on the rationality of economic decisions. This result is completely identical to the theoretical framework in our research. The study in behavioral finance has focused primarily on investor optimism (Glaser and al. 2003) and leaders (Baker, 2004) or on strategies for interaction between individuals (Hermalin and Isen, 2000). However, this dimension seems to enable a development of explanatory theory of behavior in decision making. Indeed, the validity of this assumption can be explained by the negative effect of this behavior on rational economic decisions.

This means that the decision maker (forecaster) is optimistic in their decisions to snuff better judge their situation. From the results obtained, we find the optimistic behavior of an agent affects the rationality of their economic decisions and act on their choices. Indeed, this element encourages economic agents to monitor its capabilities. Even when excluding conflicts of interest, these attitudes will push economic agents to select cost-effective decisions that yet he will not consider as profitable. Consequently, the results validate the hypothesis that optimism affects the rationality of agents' decisions.

For the third variable “overconf” relating to the presence of overconfidence bias in the behavior of economic agents, it has a negative and significant influence at 10% on the rationality of economic decisions of agents. This result is consistent with our theoretical prediction. The negative sign of this relationship comes from the following logic: This overconfidence is directly reflected in the opinions of the individuals themselves: they consider themselves, for example, as the best driver or better manager than average, and tend to overestimate their role in achieving the favorable events.

The overconfidence can lead to a systematic overestimation of probabilities associated with high current events, and a systematic underestimation of the low probabilities associated with rare and severe events. This means that the decision maker (forecaster) is overconfident in their ability to predict whether a phenomenon will happen or not. This bias is for the decision maker (forecaster) to overestimate its ability to provide an accurate prediction. This affects the rationality of agents and influences their choices and/or their economic decisions.

Overconfidence as cognitive impairment shows that trials of individuals are characterized by certain systematic defects and other irrationalities. The results validate the hypothesis that overconfidence affects the rationality of agents' decisions. This behavior is well verified in our
sample, because the bank executives are highly overconfident. Thus, our results confirm our theoretical predictions. Finally, hypothesis four, that the lack of cognitive flexibility affects the rationality of economic decision is validated. Indeed, our results show that the coefficients associated with variable “flexcog” are statistically significant at 5% and a negative sign, which reflects the negative relationship of cognitive flexibility to rationality. We note that the lack of cognitive flexibility affects the rationality of economic decisions of agents, which validates the theoretical framework of our research. Thus, the cognitive flexibility refers to the ability to adapt strategies and cognitive processes according to new environmental conditions or unforeseen (Canas, Quesada, Antoli, and Fajardo, 2003).

In our context, it is rather the lack of cognitive flexibility that is the bias. Psychological resources of the individual play an important role in individual creativity. Sternberg and Lubart (1999) stipulate that the development of individual creativity depends on the combination of six resources: knowledge, intellectual skills, and ways of thinking, motivation, personality and environment, which is presented in the questionnaire items. For Amabile (1997), skills of creativity can still be improved by learning and practicing techniques designed to increase cognitive flexibility and the intellectual independence of the individual. Thus, referring to our sample shows that the study population is characterized by a great professional experience, most individuals in the sample were older (over 50% of the population has more than 35 years), this reflects the more development of individual creativity. According to our results, we find a positive correlation between these variables (flexcog) and optimism and overconfidence. So we can conclude that the agent is more optimistic and/or overconfidence, he has a lack of cognitive flexibility. Thus, optimism and overconfidence affect cognitive flexibility. An agent or optimistic overconfidence is stiff in its economic decisions and choices, and then the lack of cognitive flexibility negatively affects the rationality of choice. Therefore, our results validate the hypothesis that the four lack of cognitive flexibility affects the rationality of economic decisions, so that for an agent or not cognitively flexible stiff or flexible, economic decisions and choices are rational limited.

Empirical Implications
Our paper highlights that banks’ managers behave far from the rational expectation of the traditional economic literature. It has long been assumed that economic agents are fully rational and they essay always to maximize their own utility function. In term of managerial decision, they are assumed to be methodic and use scientific criteria among the decision making process, while we demonstrate here that they are affected by their psychological biases and so they aren’t fully rational.

Tunisian bank’s managers are normal and they are affected by their psychology and emotions. A thing that may explains managerial decisions’ distortions. It is the time to discuss how financial institutions arrive to delimit the effect of the influence of the managers’ personal characteristics (emotions, psychological biases) on decision making efficiency.

Limitations of the Study
Generally, the main problems for research in the emergent markets’ context, is the lack of precise information to construct proxies for behavioral variables. For example, we don’t have any information about the usage of stock options to construct exact measure for the overconfidence bias. One common solution in this context is the use of questionnaire to construct proxies for our behavioral variables. So, our research faces problems of sample size and other difficulties related to the usage of questionnaire. Banks managers generally refuse to participate in the survey. Even if they agree to do it, they will not give all information in accurate manner.
Conclusion
The objective of this paper is to explore the impact of psychological biases, and notably emotional biases on the rationality of economic decisions. The attitude of the agent towards the risk shows that the economic agent is risk averse in case of gains and risk-taker in the event of loss, thus confirming the S form of the utility function proposed by Kahneman and Teversky (1979). This theory is based on the introduction of the effect of psychology on the agent decisions. According to Kahneman and Teversky, the agents' behavior is affected by psychology or cognitive biases, such as emotional bias. Thus, the prospect theory of Kahneman and Teversky proposes that the utility function is concave agents in the field of earnings (reflecting an aversion to risk in case of earnings). At the contrary, this function is convex for losses (reflecting a taste for the risk when it comes to losses).

However, the effect of the presence of optimism as a behavior that affects the rationality of economic decision is significant. Considering, optimism bias leads economic agents to feel that their future will be better compared to others. Thus, the rationality of these decisions is limited (bounded rationality). Moreover, we find that the economic agent is more optimistic, more rationality of economic decision is limited or irrational. From the results obtained, we find the optimistic behavior of an agent affects the rationality of their economic decisions and act on their choices. This hypothesis is empirically validated.

Overconfidence as cognitive impairment shows that the judgment of individuals is characterized by certain irrationalities. This overconfidence is directly reflected in the opinion that individuals have of themselves: they consider themselves better drivers or better managers than average, and tend to overestimate their role in the realization of favorable events. This means that the decision maker is overconfident in their ability to predict whether something will happen or not. This bias is for the decision maker to overestimate its ability to provide an accurate prediction. This affects the rationality of agents and influences their choices and their economic decisions.

Finally, the fourth hypotheses according to which a lack of cognitive flexibility affects the rationality of economic decision are validated. We see a negative correlation exists between lack of cognitive flexibility and rationality. We note that the lack of cognitive flexibility affects the rationality of economic decisions of agents, which validates the theoretical framework of our research. Thus, cognitive flexibility refers to the ability to adapt strategies and cognitive processes according to new environmental conditions or unforeseen. In our case, it is rather the lack of cognitive flexibility that is the bias. These results validate the hypothesis, that the low for cognitive flexibility affects the rationality of economic decisions, such as an agent or not cognitively rigid or flexible hose, their economic decisions and choices are rationally limited.

References
Thaler, R., H. and Johnson, E., (1990), Gambling with the House Money and Trying to Break Even: The Effects of Prior Outcomes in Risky Choice, Management Science, 36 (6), 643-660.

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