



University of Tehran

## Do Behavioral Biases Affect Credit Risk Assessment Methods?

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### ARTICLE INFO

**Article type:**

Research Article

**Article History:**

Received 24 June 2021

Revised 11 August 2022

Accepted 15 August 2022

Published Online 28 February 2023

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### ABSTRACT

The purpose of this study was to investigate the effect of bankers' behavioral biases on credit risk management. We examined whether and how individual emotional biases (i.e., loss aversion, optimism, overconfidence, and cognitive dissonance) affect the banks' credit risk policy, including the risk assessment methods (i.e., quantitative vs. qualitative methods). Based on a sample of Tunisian banks, the results showed that the bankers' emotional biases affect their preferences regarding the choice of credit risk assessment methods. The findings revealed that optimist, loss-averse, and overconfident bankers are more likely to adopt quantitative methods such as scoring when they assess the credit risk. The bankers with high cognitive dissonance, however, were found to have a high preference for a qualitative approach.

**Keywords:**

*cognitive dissonance,*

*credit risk,*

*loss aversion,*

*optimism,*

*overconfidence.*

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**Cite this article:** Azouzi , M. A., Bacha , S. (2023). Do Behavioral Biases Affect Credit Risk Assessment Methods?. *Iranian Journal of Management Studies (IJMS)*, 16 (2), 501-514.

DOI: <http://doi.org/10.22059/ijms.2022.326105.674613>



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**Publisher:** University of Tehran Press.

DOI: <http://doi.org/10.22059/ijms.2022.326105.674613>

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## 1. Introduction

Nowadays, the main objective of financial institutions is to improve their performance and guarantee their stability through the stand of effective risk management policy, especially credit risk management. Credit risk is considered to be a major risk for financial institutions. It is defined as a loss resulting from non-repayment of credit or from the borrower's inability to pay its debt at maturity. Louzis et al. (2012) argue that credit risk is manifested in non-performing loans or bad debts. It is considered an indicator of financial stability used by the International Monetary Fund and the World Bank to assess the credit worthiness and the ineffectiveness of financial sectors (Bacha & Azouzi, 2019).

The credit risk assessment mainly relies on a risk identification phase, defined as "an operation or series of operations making it possible to recognize a risk, by describing it and stating its main characteristics" (Charbonnier, 2004). The identification phase should not be limited in time, because of the internal and external changes that affect the banking environment and can result in the appearance of other risks. According to Kajola et al. (2018), credit risk may have two main sources. The first one is linked to the bank management system, which fails at collecting in-depth information about customers. The second relates to banks' clients, who ignore how the banking system works in terms of requested credit. The combination of these two sources leads to the non-payment of credit at the appropriate term, called not performing loans.

Kolapo et al. (2012) add that credit risk constitutes a threat to the bank performance, and may increase due to the insufficient information collected on borrowers. In this line, Luqman (2014) has shown that profitability is influenced by non-performing loans, thus generating a very high liquidity risk. This, in turn, may negatively affect the banking system's functioning and reduce its efficiency. Moreover, Epure and Lafuente (2012) report that credit risk has a negative effect on the banks' efficiency and performance.

Most studies are unanimous that banks should control their credit risk and set up adequate risk management methods. Berger and Udell (2002) argue that credit risk management is based on two approaches. The quantitative approach is the standard method of risk assessment that uses statistical tools and historical data to predict credit default. The qualitative approach, however, relies on the banker's skills and his capacity to treat all available information and evaluate the possible risks. This approach highlights the manager's judgment.

The literature dealing with the managerial characteristics impact on corporate policies emphasize the importance of individual bias on the effectiveness scope of decision-making choices (Baker et al., 2004; Graham et al., 2015; Hackbarth, 2009; Malmendier et al., 2011 Wei & Zheng, 2019). The authors argue that managers are a fundamental part of firms and their characteristics influence the strategy and organizational outcomes. Individual managers' characteristics affect how they interpret the situations they face and the decisions they make, having thus an impact on organizational performance (Degeorge & Fayolle, 2009). In this line, Azouzi and Jarboui (2016) and Souissi et al. (2018) attest that emotions play a key role in the managers' decision-making process, and may explain the failure or the success of their actions. Ben-David et al. (2013) and Bodnar et al. (2018) also add that individuals' mental capacities are limited and are not always effective, which may generate negative and adverse effects.

In this paper, we investigate the effect of bankers' behavioral biases on credit risk management. We examine whether and how individual emotional biases (i.e., loss aversion, optimism, overconfidence, and cognitive dissonance) affect the banks' credit risk policy, including the risk assessment methods (i.e., quantitative vs. qualitative methods). To this end, a sample of Tunisian banks was examined.

The paper is structured as follows. Section 2 presents the theoretical framework and develops hypotheses. Section 3 describes the sample and data collection and specifies the models. Then, Section 4 presents and discusses the main findings. The last section concludes the paper.

## 2. Literature Review and Hypotheses

Recent research in psychology sheds light on emotions and behavioral biases and gives rise to new reflections. The advanced results drive researchers to review the mechanisms of decision through emotions and behaviors. Indeed, managers' emotional biases and behaviors have pervasive effects on corporate decision-making. Based on this argument, many recent empirical studies in corporate

finance have tried to investigate the effect of emotional bias on the choices of CEOs within the company (Aggarwal & Mazumdar, 2008; Backer et al., 2004; Bernardo & Welch, 2001; Gervais et al., 2011; Hackbarth, 2009; Heaton, 2002; Hess et al., 2015; Keiber, 2006; Malmendier & Tate, 2008, 2015; Robin & Yun, 2011). While emotions are a fundamental part of professional life, they present a real danger for firms and managers. In risky decisions, such as credit, managers should control their emotional experiences and mitigate their effects on decision-making choices, firm strategy, coordination activities, and allocation of resources. For instance, overconfidence leads to the overestimation of skills. Skala (2008) notes that overconfident bankers tend to believe they can influence and control events, leading them to overestimate their problem-solving capabilities and exaggerate their control abilities under over-optimism. Besides, over-optimism drives managers to overestimate their ability to manage difficulties when making decisions.

Investigating these biases reduces the likelihood of errors and improves the decision-making decisions. It also provides a better framework to gradually build criteria to better analyze and recognize risky situations. Thus, we concentrate on four components of emotion (loss aversion, optimism, over confidence and cognitive dissonance) and their effects on the choice of credit risk assessment method (quantitative or qualitative) by bankers (Azouzi & Jarboui, 2016; Bacha & Azouzi, 2019; Souissi et al., 2018).

## **2.1 CEO Loss Aversion Level and Risk Assessment Approach**

According to Kahneman and Tversky (1979), loss aversion is defined as the high sensitivity of decision-maker to negative changes from the baseline than to positive one at the same magnitude. Hence, they tend to employ appropriate methods and tools to avoid losses when deciding. Consistent with this view, loss-aversion bank managers may opt for a quantitative approach when assessing credit risk using statistics and scoring. They are encouraged to be more objective to avoid bad borrowers.

Stulz (1996) adds that managers would adopt an insurance logic: they would only seek to avoid the most pessimistic scenarios while leaving the opportunity to take advantage of certain risks for which the firm would have a comparative advantage. Managers' loss aversion then affects his strategic choices. It influences managers' preferences regarding credit risk management. Dionne (2013) argues that executive loss-aversion assesses the credit risk by forcing the rational analysis based on well-determined measures. The author documents a positive relationship between the loss-aversion level and the use of quantitative assessment of credit risk.

Furthermore, Bessi re (2007) states that both the characteristics of managerial decisions (complexity, low repetitiveness, lack of feedback, and difficult interpretation) and the decision-making environment (uncertainty, weak disciplinary controls) tend to exacerbate the role of behavioral biases within the manager. The author shows that managerial behavioral biases (including loss aversion) are strongly associated with decision-making (including choice of a credit risk assessment method). In the banking industry, loss-aversion bankers tend to choose a robust, reliable, and unbiased evaluation method (quantitative approach). This choice minimizes the probability of errors, reduces the risk of bankruptcy, and increases the bank's performance (Graham et al., 2015; Sawers et al., 2011). He then opts for a more objective quantitative evaluation in order to protect his position as the head of the management team.

Nosic and Weber (2010) analyzed the determinants of risk-taking and observed that the risk perceptions and expected returns affect the behavior of risk-taking. They showed that the uncertainty regarding the expected returns affects the individual's risk-taking behavior. Indeed, a bank executive doubting the borrower's creditworthiness may adopt a rational behavior when assessing the default risk. Uncertainty also may enhance the manager's loss-aversion level and drive him to maximize the shareholders' interest through the choice of a quantitative and more rational approach when assessing credit risk (Bacha & Azouzi, 2019).

In their study, L'Haridon and Paraschiv (2009) found a positive correlation between loss aversion bias and quantitative analyses. Loss-averse banker evaluates the credit risk by forcing the rational analysis based on well-determined measures since he is more sensitive to losses than to gains. Dominguez-Martinez et al. (2017) examined the relationship between the decision-makers' perception of risk, uncertainty, and personal preferences. The authors revealed that the CEO would often seek necessary secure safety margin to preserve his work. In the same line, Dobrajska et al. (2015) argue

that loss-averse managers do not prefer using risk management instruments to reduce the variability of the flow as well as to avoid the most pessimistic scenarios that may enhance the bankruptcy risk. They need evaluation methods and approaches based on objective criteria (i.e., data, analyses, and well-determined statistics) to minimize errors and make the right decisions. Hence, we assume that:

**H1:** Loss-averse bankers are likely to use a quantitative approach when assessing credit risk.

## **2.2 CEO Optimism and Credit Risk Assessment**

Optimism refers to the comparison between the estimation of the achievement of positive and negative results. Optimist managers think that positive results are more likely than negative ones, which influences their ability to evaluate the outcome of their decision-making (Azouzi & Jarboui, 2018).

Barabel and Meier (2002) argue that an optimistic decision-maker will tend to overestimate his ability to control results. He believes that the risk involved can be reduced by the proper use of his professional skills. He prefers qualitative approaches to analyze and assess risk. He then uses his judgment and personal experience to better assess credit risk.

Bolton and Heath (2004) also find that the concept of pioneer advantage is the most cited in strategic management because it refers to the mental patterns linked to success. As a result, investment decisions (including the credit appropriation) would result from the managers' overexposure to the concept of excellence in media rather than from a deliberate choice guided by procedural logic (Hawkins et al., 2001). Similarly, an optimistic bank manager neglects quantitative analyses to set up credit risk management and relies on his skills.

Moreover, Bortolotti and Antrobus (2015) argue that optimism is seen as a skill to help people make better decisions and avoid mistakes. As part of the credit risk assessment, optimistic executives focus on their visions and expectations. They prefer the qualitative approach, as they are considered more relevant, and neglect data analyses and statistics during evaluation.

Souissi et al. (2018) show that optimism is significantly associated with measures of cognitive strategies. They underline that the optimistic leader overestimates the capacity of others to assess the credit risk thanks to their professional skills. This implies a positive correlation between the level of manager's optimism and the qualitative approach to assess the credit risk.

Optimism is considered an important preacher of positive adjustment or subjective well-being, especially when making decisions. The literature indicates that the effectiveness of the decision is linked to the individual's behavior, as well as to his ability to generate process and change the information and knowledge necessary for effective decision-making (Bacha & Azouzi, 2019).

From the discussion above, we assume that:

**H2:** Optimistic bankers tend to assess credit risk using qualitative methods.

## **2.3 CEO Overconfidence and Risk Assessment**

Bessière (2007) define overconfidence as an overestimation of personal capacities and skills. It is qualified as one of the biases most treated as a brake on an individual's rational behavior, especially regarding the risk-taking. Individual confidence represents the subjective optimistic belief (based on personal perceptions and experiences) about the occurrence of a desirable event (Golembiewski et McConkie, 1975). Hence, the overconfident individual overestimates his abilities, his knowledge, or – more precisely – the accuracy of the information held (Alpert & Raiffa, 1982; Fischhoff et al., 1977).

Gervais et al. (2011) attest that the manager's excess of confidence involves aligning his choice with the interests of these shareholders. Thus, the overconfident bank executive overestimates his risk reduction skills. He builds on these skills and his share capital in the management of his bank's credit portfolio. This implies the positive relationship between overconfidence and the qualitative approach to credit risk management.

Susskind (2005) adds that overconfidence reflects a tendency in humans to overestimate their abilities, the chances of success, the probability of obtaining positive results, or even the accuracy of their knowledge. The presence of this bias among bank executives favors their choice of qualitative methods in the context of credit risk assessment.

Humphery-Jenner et al. (2016) report that overconfidence mainly refers to the tendency of individuals to overestimate their ability to control the events and maintain a certain influence on

others. This behavioral bias affects managerial decisions. It encourages the bank manager to be more subjective (based on his judgments) in analyzing the level of credit risk.

Park and Chung (2017) state that the overconfident leader relies on his experience and his skills to make good decisions. Hribar and Yang (2016) argue that the manager's excessive confidence is associated with an overestimation of his knowledge relevance. He believes only in the accuracy of his assessments while neglecting the consideration of others. Hence, the overconfident manager is not concerned with using statistical analyses in the assessment of credit risk. He chooses the qualitative methods that use available data and the manager's skills.

Bacha and Azouzi (2019) also show that overconfident loan officers tend to focus on their skills and intuitions so that they can form an opinion about the expected risks and losses.

Hence, we presume that:

**H3:** The confident banker assesses the credit risk based on qualitative methods.

## **2.4 CEO Cognitive Dissonance and Risk Assessment**

According to Greenfich (2005), cognitive dissonance is an individual cognitive bias that indicates the presence of contradictory elements in the individual's thinking and is present in several fields such as economics, politics, health, etc.

Cognitive dissonance is a bias that affects the individuals' attitudes rather than their behavior. It is defined as a mental structure that concerns the individual's evaluation of an object. Bellando and Tran Dieu (2008) show that the cognitive cost produced by the relationship of inconsistency between two mental states (cognitive dissonance) incites the decision-maker to rely on objective and exact methods, including the choice of quantitative criteria. The bank manager may then choose objective assessment methods based on analyses and measures to avoid situations of cognitive dissonance.

Beck (2009) indicates that the main source of cognitive dissonance is uncertainty about an event or decision (including managing credit risk). In an uncertain context, such as banking industry, reducing dissonance becomes a utility for all decision-makers (Hinterleitner & Sager, 2015; Hood, 2010). Bank managers tend to use rules and normative criteria when managing credit risk to reduce the dissonance level.

Moreover, Hobson et al. (2012) document a positive correlation between the level of cognitive dissonance in companies and the probability of fraud where fraudulent businesses have higher levels of cognitive dissonance. Managers tend to reduce the negative effects of cognitive dissonance through a preference for normative decision rules. Accordingly, a bank executive seeks to minimize his level of dissonance through the choice of quantitative approaches regarding the credit risk analysis.

Hahn and Kuhnen (2013) add that cognitive dissonance predicts that any decision should be asymmetrical regarding gains and losses. The authors note that decision-makers tend to use more objective selection criteria in order to reduce their level of dissonance.

Harmon-Jones et al. (2015) attest that all decision-makers are invited to reduce their level of cognitive dissonance in order to make the best decision. Reducing dissonance, therefore, involves reducing the cognitive workload and resolving internal conflicts. In this line, bank managers may reduce their cognitive dissonance level by using quantitative approaches to assess credit risk.

Ahrens and Rosa (2019) report that investors underestimate the risk of their investments due to their cognitive dissonance. Indeed, in a situation of moral hazard, potential investors' bias decreases the risk perception of their investments in order to justify any excessive risk-taking. The cognitive dissonance negatively affects the risk assessment capacity of the decision-maker (investor or banker, etc.). Hence, bank managers, who want to reduce the negative effect of their cognitive bias, opt for a quantitative credit risk assessment.

We then assume the following hypothesis:

**H4:** Managers are more likely to adopt quantitative evaluation methods to mitigate their cognitive dissonance.

### 3. Research Methods

#### 3.1. Sample Selection and Data Collection

We employed a quantitative research framework through the administration of a survey to the managers of 100 bank branches. All interviewed bankers assumed direct responsibilities in risk assessment and credit decision making. The survey focused on the level of emotional bias of these managers and tended to highlight their effects on credit risk assessment choice (quantitative approach vs. qualitative approach).

The questionnaire was distributed using the door-to-door method and delivered to the concerned person, while only a few were mailed.

We also collected other data from the annual reports of banks published on the Tunisian Central Bank website.

#### 3.2 Variables' Measurement

The objective of this section is to determine the measurement of the variables (See Appendix).

##### 3.2.1 Dependent Variable: Credit Risk Assessment

Prior research has shown that bankers may choose one of the two approaches when assessing the credit risk: the quantitative methods based on statistical models and financial analyses (Altman, 1968; Beaver, 1966) or the qualitative methods (Altman & Sabato, 2007; Maque & Godowski, 2009).

In this paper, we consider an endogenous variable (Y), which represents the credit risk assessment method used by managers. Therefore, the endogenous variable is a binary form that takes the value of 1 if the manager chooses the quantitative method of credit risk assessment, and 0 otherwise (i.e., qualitative method).

##### 3.2.2 Independent Variable: Bankers' Behavioral Bias

The questionnaire focused on evaluating and scoring the three emotional biases (risk aversion, optimism, and overconfidence). The questions were inspired by the questionnaires formulated by the Fern Hill and Industrial Alliance Companies (Azouzi & Jarboui, 2012, 2018).

Each emotional bias takes:

- 1 if the individual has a high level ;
- 0 if it doesn't have a high level.

#### A) Loss-Aversion

Loss aversion is a concept related to the theory of prospects. Loss aversion, as described by Kahneman and Tversky (1979) and Tversky and Kahneman (1991, 1992), is "losses loom more gains." Following Azouzi and Jarboui (2012, 2018), we used five items to measure the loss aversion bias. Every item (Table 5) was assessed based on a five-point Likert scale (from not agree = 1 to strongly agree = 5).

**Table 1.** Items Used in the Loss-Aversion Bias Scale (5 Items)

Items	Loss-aversion	
	Component 1: Risk perception: 31.347% of the total variance	Component 2: Risk preference: 23.986% of the total variance
1. When you think of the word "risk" in a financial context, which word in the following list comes to your mind first?	0.829	
2. When I face a challenge, I give up because I am afraid of failing.	0.766	
3. What is your proportion of financial risk taking compared to others?	0.525	
4. Insurance can protect us against a wide variety of risks, including theft, fire, accidents, illness, death, etc. How much insurance have you purchased?		0.716
5. Which one do you care about most when faced with a big financial decision: possible losses or possible gains?		0.645

### B) CEO Optimism

Optimism was introduced in the corporate domain by Heaton (2002, pp41) who states, “Managers are” optimistic “when they systematically overestimate the probability of good business performance and underestimate the probability of poor business performance.” In our case, optimism was measured using five short items (Table 2). Among the five items, items 1 and 2 identified the optimism level regarding the overestimation of good events, while the other items focused on the optimism level related to the overestimation of personal capacity.

**Table 2.** Items Used in the Optimism Bias Scale (5 Items).

Items	Optimism	
	Component 1: Overestimation of good events: 28.088% of the total variance	Component 2: Overestimation of personal capacity: 24.516% of the total variance
1. I am motivated by imagining the good results of the tasks undertaken.	0.835	
2. What level of optimism do you usually get when you make big decisions?	0.624	
3. Do you consider that the degree of uncertainty in the business environment.		0.675
4. I have a winning mood.		0.604
5. I often imagine that my business will perform well		0.523

### C) CEO Overconfidence

Malmendier and Tate (2005) use the concept of overconfidence to describe an individual's overestimation of his abilities and skills or future results linked to his situation. In our study, overconfidence was measured using five short items (Table 3). These items identified the managers' overconfidence level about their expertise and knowledge.

**Table 3.** Items Used in the Overconfidence Bias Scale (5 Items).

Items	Overconfidence	
	Component 1: Assessment of expertise: 31.505% of the total variance	Component 2: Assessment of knowledge of being: 24.653% of the total variance
1. I know how to control my emotions.	0.837	
2. How confident are you in your ability to make good financial decisions?	0.781	
3. How long do you plan to keep your position in your company?	0.463	
4. Do your abilities allow you to integrate all positions?		0.744
5. I am always ready to defend my ideas in public.		0.691

### D) CEO Cognitive Dissonance

Greenfich (2005) defines cognitive dissonance as an individual cognitive bias. This bias indicates the presence of contradictory elements in the thinking process of the individual. Table 4 summarizes the items that describe both the individual attitude and the effect of the confrontation between emotional and cognitive quotients at the time of decision-making.

**Table 4.** Items used in the Cognitive Dissonance Bias Scale (4 Items)

Items	Cognitive Dissonance	
	Component 1: Attitudes towards a decision: 33.723% of the total variance	Component 2: Cognitive and emotional quotient: 25.204% of the total variance
1. How do you feel about important financial decisions?	0.762	
2. Does the incompatibility of the information you received during a financial decision have an impact on your attitudes?	0.753	
3. In a situation of compromise, I rationalize my choices.	0.444	
4. Does the confrontation between cognitive and emotional quotient affect your decisions? Do your abilities allow you to integrate all positions?		0.959

### 3.2.3 Control Variables

We included two control variables that explained the choice of credit risk assessment. We controlled for bank size (SIZE) as it plays an important and significant role in determining credit risk assessment methods. Dionne and Triki (2005) have shown that small banks (branches) use qualitative methods of credit risk management. We then used the log of total assets as a measure of bank size. Moreover, we assessed the financial profitability (ROE) of a bank branch using a profitability ratio, as measured by the net profit divided by the total equity. Profitability may assess the performance of a credit institution and indicate its solvency.

### 3.3 Empirical Model

To explain the effect of individual behavioral biases on the choice of credit risk assessment, we used a logistic regression as follows:

$$\text{CRAA} = \alpha + \alpha_1\text{LA} + \alpha_2\text{OP} + \alpha_3\text{OV} + \alpha_4\text{CD} + \alpha_5\text{SIZE} + \alpha_6\text{ROE} + \xi,$$

where:

CRAA: credit risk assessment approach,

LA: loss aversion level of the bank manager,

OP: Optimism level of the bank manager,

OVC: Overconfidence level of the bank manager,

CD: Cognitive dissonance level of the bank manager,

SIZE: The bank size, and

ROE: The bank's financial profitability level.

## 4. Empirical Results

### 4.1 The Descriptive Statistics

**Table 5.** The Descriptive Statistics

	N	MIN	MAX	Standard deviation	Average		Variance	Asymmetry		Kurtosis	
					Statistical	Standard error		Statistical	Standard error	Statistical	Standard error
LA	100	0	1	0.46883	0.6800	0.0468	0.220	-0.784	0.241	-1.415	0.478
OP	100	0	1	0.50000	0.5500	0.0500	0.250	-0.204	0.241	-1.999	0.478
OVC	100	0	1	0.42923	0.7600	0.0429	0.184	-1.236	0.241	-0.482	0.478
CD	100	0	1	0.49021	0.6100	0.0490	0.240	-0.458	0.241	-1.827	0.478
CRAA	100	0	1	0.50000	0.5500	0.0500	0.250	-0.204	0.241	-1.999	0.478
BSIZE	100	13.68	20.33	1.18063	15.883	0.1180	1.394	1.615	0.241	6.326	0.478
BROE	100	0.01	0.26	0.07089	0.1296	0.0070	0.005	-0.287	0.241	-0.774	0.478

Table 5 reports the descriptive statistics. This table shows that the average loss aversion is equal to 0.6800, the standard error of the mean is 0.04688, the standard deviation is 0.46, and the variance is 0.220. Regarding the optimism level, it can be seen that the average is equal to 0.5500, the standard error of the mean is equal to 0.05000, the standard deviation is 0.50, and the variance is 0.250

To test the normality of the data, descriptive analyses show that skewness coefficients, which measure the degree of asymmetry of the distribution for most of the variables, are negative (<0). Hence, we can assume that the distribution is asymmetric or spread to the left, rejecting therefore the null hypothesis. Moreover, as the coefficient of flattening (Kurtosis), which measures the degree of flattening of the distribution for most of the variables, is different from 3 (<3), we contend that the distribution is more flattened than the normal distribution under certain circumstances (tails). The distribution is then considered as a platykurtic distribution, which may reject the null hypothesis of normality.



#### 4.2. The Logistic Regression Results

Table 6 presents the logistic regression results. The results show that behavioral biases have a significant effect on the credit risk assessment method ( $R^2 = 26.3\%$ ). The tests document a positive and significant relationship between the level of loss aversion and the credit risk assessment ( $\beta = 3.615$ ;  $P = 0.000$ ), suggesting that loss-averse banker often uses statistics and metrics to assess credit risk. Loss-averse managers always rely on certain quantitative information when deciding to maintain the performance of the bank at a high level. This result confirms the first hypothesis (H1) of our theoretical analysis and corroborates the findings of Dobrajska et al. (2015), who attest that loss aversion drives managers to use methods that provide them with a safety margin when making the decision.

The findings also show a negative and non-significant relationship between optimism and the credit risk assessment ( $\beta = -0.442$ ;  $P = 0.522$ ). This result suggests that the manager is optimistic about his environment and calls on his personal experience and own judgment, which is a necessary condition for the granting of credit. The optimistic manager uses qualitative methods of credit risk assessment (H2 confirmed). A positive feeling toward a decision improves personal judgment. An optimistic banker overestimates his capacity and uses his skills to assess the credit risk. Consistent with Anderssons (1996), our findings show that optimistic bankers rely on their skills to assess credit risk, leading to the increasing use of qualitative approaches.

Furthermore, the results demonstrate a positive but insignificant relationship between overconfidence and the assessment of credit risk ( $\beta = 0.500$ ;  $P = 0.383$ ), suggesting that overconfident bank managers are likely to use the standard credit risk assessment method. This result does not support our third hypothesis, which assumes that a confident manager assesses the credit risk based on a qualitative approach and, especially, based on his judgment.

Table 6 also documents a negative and significant relationship between cognitive dissonance and the credit risk assessment ( $\beta = -2.204$ ;  $P = 0.005$ ), suggesting that in a situation of dissonance, managers are encouraged to rely on their own judgment and personal capacities regarding the assessment of credit risk. This result does not confirm our fourth hypothesis (H4), presuming that the manager uses quantitative approaches to credit assessment in the presence of a cognitive dissonance. The results show that in a cognitive dissonance situation, managers refer to their judgment to assess the risk, which may negatively affect the bank's performance.

Concerning the controlling variables, the results show a positive and insignificant relationship between the size of the bank and the credit risk assessment ( $\beta = 0.080$ ;  $P = 0.693$ ), suggesting that the size strongly affects the choice of credit risk assessment methods. Hence, in a small bank, managers use qualitative approaches, while they use standard (quantitative) approaches in a large one. Besides, the negative and non-significant relationship between the bank's financial profitability and the credit risk assessment ( $\beta = -1.443$ ;  $P = 0.667$ ) show that the choice of credit risk assessment method may be influenced by the profitability and financial solvency of the bank.

**Table 6.** The Logistic Regression Results

Variables	Bêta	Significance	Expected relationship	Obtained relationship
Constant	-2.100	0.519		
LAV	3.615	0.000***	+	+
OP	-0.442	0.522	-	-
OVC	0.500	0.383	+	-
CD	-2.204	0.005***	+	+
BSIZE	0.080	0.693	+	+
BROE	-1.443	0.667	+	-
Cox and Snell's $R^2$			0.263	
$X^2$ for adjustment		30.394		P-value=0.000***
- 2 likelihood logs			107.047	
N			100	

\*\* , \*\*\* indicating significance at 5 % and 1 %, respectively.

## **5. Conclusion**

The purpose of this paper was to investigate whether and how the individual emotional biases (loss aversion, optimism, overconfidence, and cognitive dissonance) affect the choice of credit risk assessment methods (quantitative vs. qualitative approach). The literature dealing with the impact of managerial characteristics on corporate policies emphasize the importance of individual bias on the effectiveness scope of decision-making choices (Baker et al., 2004; Graham et al., 2015; Hackbarth, 2009; Malmendier et al., 2010, Wei & Zheng, 2019). The authors argue that managers are a fundamental part of firms and their characteristics influence the strategy and organizational outcomes. Individual managers' characteristics affect how they interpret the situations they face and their decisions they make, having thus an impact on organizational performance (DeGeorge & Fayolle, 2009). In this line, Azouzi and Jarboui (2016) and Souissi et al. (2018) attest that emotions play a key role in the managers' decision-making process, and may explain the failure or the success of their actions

Based on a survey addressed to 100 managers of Tunisian banks, the results of this study showed that the behavioral dimension has an effect on the manager's decision regarding the choice of credit risk assessment method. Managers choose quantitative methods when assessing credit risk. The overconfident bankers also prefer the use of a quantitative approach. Optimistic managers, however, were found to rely on their own judgment and personal capacity. The findings also revealed that in cognitive dissonance situations, managers refer to a qualitative approach regarding the assessment of credit risk.

This study may extend the literature on behavioral finance by highlighting the complementary relationship between organizational financial theory and behavioral biases. It also draws attention to the importance of the psychological dimension in the risk management field. An obvious future empirical extension of this study is to explore the effect of CEO perspective, CEO compensation, CEO race, and CEO attitude towards risk-taking on the bank performance. Understanding which related degree and education is most effective today remains an important avenue for future research.

## **6. Practical Implications**

The findings of this study may give policymakers insight into the effects of CEO psychology on bank risk management. We caution readers and investors that our measurement of CEO personal characteristics may have shortcomings. To overcome these, more direct measures could be considered in the future. Additionally, there may have been other incentives that we have not examined, though we have shown that the most obvious personal characteristics of CEOs (at least for us) can determine the bank's performance in terms of credit risk management methods.

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**Appendix: Operational Definitions of Variables**

Class	Phenomena	Measure	Variables	Predictions	
<b>Endogenous variables</b>					
Credit risk assessment	Choosing a credit risk assessment approach	The binary variable that takes (1) if the bank manager chooses the quantitative method and (0) if he uses the qualitative method		CRAA	
<b>Exogenous variables</b>					
Loss-aversion	Loss of earnings or reputation	The questionnaire obtained score	LA	Quantitative method +	Qualitative method -
Optimism	On the assessment of professional skills and leadership skills	The questionnaire obtained score	OP	Quantitative method -	Qualitative method +
overconfidence	On the assessment of personal skills by agency executive	The questionnaire obtained score	OC	Quantitative method -	Qualitative method +
Cognitive dissonance	Reactions to changes	The questionnaire obtained score	CD	Quantitative method +	Qualitative method -
<b>Controls variables</b>					
Firm size	Banks signaled performance	Ln (total assets)	SIZE	+	
Profitability	Reports on the company's ability to meet its commitments	$ROE = \frac{\text{Net Income}}{\text{Average Shareholders' Equity}}$	ROE	+	