

# BEHAVIORAL BIASES AFFECTING DECISION-MAKING IN THE FINANCIAL MARKET

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**Abstract.** For decades, the advent of behavioural finance has challenged market finance theories. The latter has been the subject of many criticisms from advocates of behavioral finance especially with regard to the rationality of investors. Indeed, recent studies have shown that investors are subject to bias arising from their own daily behaviour, which can distort their investment decisions. This article is intended to be a study of the different behavioural factors affecting decision-making among retail investors. The analysis of the data was carried out on a sample of 100 Moroccan individual investors. The results enabled a number of factors to be obtained which significantly influenced both the investment intention and the equity market participation. Thus, the financial expectations variable, overconfidence and financial literacy represented significant relationships with the intention to invest, while the financial situation, financial self-efficacy and investment intent significantly affect the equity market participation variable. Moreover, the study rejected the hypothesis that there was a mediating effect of the intention to invest between all the variables taken separately and the variable participation in the stock market.

**Keywords:** Behavioural finance; Investment decision; financial market; Individual Investors; Theory of planned behaviour (TPB)

## Introduction

Although behavioral finance has been explored for a long time, it is a promising field that takes into account human behavior in finance. Behavioral finance is defined as "a growing field that deals with the influence of psychology on the behavior of financial practitioners" [1].

In investing, it is found that most people make their decisions based on emotions, feelings, fantasies, moods, and impressions that ultimately affect their investment decisions [2].

Financial theorists have argued that investors do not always act rationally, but rely on psychological biases [3]. Therefore, it is obvious that other studies should be conducted on the behavior of investors because of the contribution they make to the economic growth of

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the country as well as to the development of financial markets. This article then attempts to study whether the factors identified in previous studies conducted in different economies are reflected in Moroccan individual investors. In addition, this study seeks to examine the factors influencing the investment decision among Moroccan individual investors in the stock market.

According to the theory of planned behavior, individuals make reasoned decisions and that behavior is the result of the intention to engage in it [4]. Therefore, this study attempts to examine the relationships between financial expectations, risk and uncertainty, overconfidence bias, herd behavior, financial literacy, financial status, self-efficacy, financial situation, investment intention and stock market participation in the Moroccan context.

Our problem is part of this perspective: **To what extent do Moroccan individual investors make rational decisions in the presence of behavioral biases?**

This article is presented in two parts. The first part consists of a literature review explaining the different theories and concepts related to our study, and the second develops the justifications for the type of data processing used and the analysis of the different results obtained and the exploration of their perspectives.

## **1. Literature review**

To identify the studies that are interested in the analysis of the factors influencing the investment decision on the stock market, we proceeded by a relevant synthesis of literature. The literature review covers a variety of sources, methodologies, theoretical bases and geographical areas.

### **1.1 Financial Expectations**

Each investor has their own return expectations, and investors invest based on their income expectations. They therefore look for appropriate stocks that have generated high incomes in the past to meet their future financial expectations [5]. [6] found that an investment's income or expected return to investors has a significant relationship with investment behavior. This is due to the expected return, as the expected return helps investors filter and select instruments that match their needs. Investors will seriously consider past returns or options that match their expected return when making an investment decision. Also, investors are attracted to investments that offer them high returns.

We therefore formulate the following hypothesis:

**H1: Investment intention is significantly influenced by financial expectations.**

### **1.2 Investor risk and uncertainty**

Making investments imposes a risk-taking attitude, this behavior is also used by investors to select their stocks [7]. According to [8], the investment instrument carries a different level of risk for investors, investing in a common stock that generates higher risk leads to higher returns and gains. Admittedly, a mutual fund carries a lower risk, which implies a return considered to be low.

Based on prospect theory, the investor generally follows investment norms to avoid risk and adverse consequences, especially in a situation of uncertainty [9]. [10] find that higher loss aversion is associated with a lower probability of participating directly or indirectly in stock markets. Based on this empirical evidence, we can propose that :

## **H2: Risk-uncertainty significantly influences investment intention.**

### **1.3 Overconfidence**

Overconfidence is essentially a heuristic bias, in which investors rely on appearance to reduce the risk of losses in unpredictable situations. Overconfidence leads stock market investors to underestimate investment risks, overestimate their financial knowledge and over-trade, which ultimately affects their investment behaviors [11]. When individual investors use heuristics, their technical knowledge and reasoning skills are impaired, leading to errors in investment judgment [12]. [13] state that there is a significant positive effect of overconfidence bias on investors' decision making. Investors with an overconfidence bias tend to focus more on profitability, reliance on debt financing, and preference for short-term external investment in the cost of a long-term project [14].

We therefore formulate the following hypothesis:

### **H3: Investment intention is significantly influenced by overconfidence.**

### **1.4 Herd Behavior**

We speak of herd behavior when individuals conform to the majority of individuals present in the decision-making environment, by reproducing their decisions. Individuals are more than often subjected to the pressure of their environment and are obliged to conform to it.

Individuals with herd behavior base their investment decisions on the buying and selling actions of the crowd, which creates speculative bubbles and makes the stock market inefficient [13]. [14] investigated whether German mutual fund managers engage in herd behavior. Additionally, the study sought to establish the impact of herd behavior on stock prices. A sample of 60 management companies specializing in German equities over the period from December 31, 1997 to December 31, 2007 was used for the study. The results provided evidence of the herd behavior of German fund managers. A significant part of the herd effect detected in the German market was associated with a spurious herd effect resulting from changes in the composition of the benchmark.

We therefore formulate the following hypothesis:

### **H4: Herd behavior has a significant impact on investment intention.**

### **1.5 The financial situation of investors**

The financial situation of an individual is the most important aspect to influence his investment behavior. It is important to understand that an individual's financial situation indicates the amounts of savings they have, as well as their fixed income, such as the salaries they receive each month, and that these financial resources are most fundamental when it is about sustaining its investments [15]. Additionally, [16] stated that financial status has an influence on investors' behaviors and viewing investments as a form of financial planning to get rich. Therefore, the financial situation of the individual influences the desire to invest his money, and it also affects the amounts he invests in stocks and shares.

We therefore formulate the following two hypotheses:

### **H5: There is a significant relationship between the financial situation of investors and investment intention.**

### **H6: Participation in the stock market is significantly influenced by the financial situation of investors.**

## **1.6 Financial literacy.**

Financial literacy has become a phenomenon of interest in financial decisions [17]. Financial literacy is seen as a way to accelerate financial well-being. It enables informed judgments and effective investment decisions to be made. Financial literacy not only helps investors form a stable way of thinking for their investment decisions, but it also gives them the confidence to make rational and well-calculated judgments [18]. Additionally, financial literacy can help individuals perform day-to-day financial tasks and deal with financial emergencies [19]. Empirical evidence suggests that subjective and objective financial literacy positively influences stock market participation [20]

We therefore formulate the following two hypotheses:

**H7: Investment intention is significantly influenced by financial literacy.**

**H8: There is a significant relationship between financial literacy and stock market participation.**

## **1.7 Financial self-efficacy.**

[21] described financial self-efficacy as a set of psychological traits including budget information overload or procrastination, regrets and risk aversion. Self-efficacy is an individual's belief in their ability to perform a certain task. A Research by [22] was conducted among American people with the aim of analyzing the investment psychology of men and women and to assess the reason why women make rather conservative investments. Research has found that, compared to men, women make less risky investments and that financial self-efficacy is positively related to the level of risk taken in investment portfolios. In addition, gender differences influence investment and retirement saving techniques, wealth accumulation and portfolio choices [23].

We therefore formulate the following two hypotheses:

**H9: Financial self-efficacy significantly impacts investment intention.**

**H10: There is a significant relationship between financial self-efficacy and stock market participation.**

## **1.8 Investment intention**

According to the theory of planned behavior [4], intentions precede behavior (represented by stock market participation in our study). Investment intention can be predicted by several predictors, such as risk tolerance, herd behavior and financial knowledge, in order to gain participation in the stock market [24]. A person's financial behavior is referred to as investment intention - both short-term and long-term investment intentions are believed to reflect behavioral intentions [25]. Therefore, an investor's behavior, investment experience and social interaction significantly influence stock market investment intention and subsequently stock market participation [26]. According to [4], a person's intention can predict future behavior because intention is a preliminary step to the subsequent behavior pattern. Intention is an attitudinal construct based on intrinsic values and plays an important role in predicting a person's future behavior. Therefore, intention indicates the possible behavior of a person in the future [27].

Based on the above discussion, the following two hypotheses have been proposed:

**H11: Intention to invest significantly influences stock market participation.**

## **H12: Investment intention mediates the relationship between investment influencing factors and stock market participation.**

### **1.9 Theory of planned behavior**

The main components of the theory of planned behavior are a person's own attitude, subjective norms, perceived behavioral control, intentions and usage behavior [4]. Attitude towards behavior is defined as the individual's positive or negative feelings about their behavior. Behavioral intention is a sign of the will to adopt certain behaviors [4]. According to the theory of planned behavior, the adoption of a certain behavior by an Internet user is determined by his intention to adopt this behavior. Subjective norms are meant to assess the social pressures exerted on individuals to adopt or not adopt a particular behavior. In theory, perceived behavioral control is influenced by the adopter's beliefs about possessing the opportunities and resources needed to perform the behavior [4].

For this study, the three fundamental antecedents of planned behavior theory, namely Attitude, Subjective Norm, and Perceived Behavior Control, were reformulated in the context of financial market investing. This approach allows us to maintain the effect of factors influencing investor behavior while maintaining the theoretical basis of the study.

## **2. Research methodology**

In order to analyze the problem, we have adopted a hypothetico-deductive approach and a positivist positioning. This epistemological choice justified by the objectivity of the reality studied. Our main objective is to determine the extent to which individual investors make investment decisions in the financial market in the presence of influencing factors.

To achieve such an objective, we will try to test the hypotheses, resulting from previous studies, on a sample of 100 Moroccan individual investors. Data will be collected using a questionnaire. The questionnaire will be disseminated in forums, social networks and groups of Moroccan investor communities.

For the measurement scales of the variables of the conceptual model, we will opt for the scale most used in management sciences: the LIKERT-Roussel scale. The scale is as follows: (1) Totally disagree; (2) Disagree; (3) No opinion; (4) Agree; (5) Completely agree. For all questions, a mean positive response greater than (3) statistically suggests agreement with the statement/question, a mean positive response less than (3) implies disagreement.

Structural equation modeling is considered the most appropriate for data analysis, as the model produced should be both substantively significant and statistically fit. The interest of structural equation modeling lies essentially in its ability to simultaneously test the existence of causal relationships between several latent variables.

The variables from this study were grouped into each category of the antecedents of the theory of planned behavior (see Table 1). In addition, several factors can influence an individual's intention to invest in the stock market, namely an individual's behavioral biases, his financial situation, his knowledge and skills in investing in the financial markets, his financial expectations etc.

All of the factors in the subsections above have been grouped into each category that corresponds to the antecedents of the theory of planned behavior:

**Table 1.** Grouping of the factors of our study in each category of the antecedents of the theory of planned behavior

Variables	Antecedents	Definition/explanation of antecedent
Financial Expectations, Risk and Uncertainty, Overconfidence	Attitude towards behavior	Attitude towards behavior is defined as the individual's positive or negative feelings about their behavior [4].
Herd Behavior	Subjective Norm	Subjective norms are meant to assess the social pressures exerted on individuals to adopt or not adopt a particular behavior [1].
Financial situation, financial literacy, financial self-efficacy..	Perceived behavioral control	Perceived behavioral control is influenced by the adopter's beliefs about possessing the opportunities and resources needed to perform the behavior [4].

Source. Developed by us

### 3. Results of the empirical analysis

After emphasizing the methodology adopted in the context of our research. In this section we will test our hypotheses, derived from previous work.

#### 3.1 Analysis of the measurement model

##### 3.1.1 Convergent validity assessment:

To test item reliability, a confirmatory factor analysis was examined as shown in the table. Item factor loads must be equal to or greater than 0.7 [28]. The reliability of the measuring instrument used in this research was verified using the composite reliability test (CR: composite reliability) and the AVE. The tests were performed using the PLS algorithm with 500-resamples.

**Table 2.** Item Reliability Test

Variables	Items	Factor loads	Composite reliability	Average Variance Extracted (AVE)
<b>FSE</b> <b>(Financial self-efficacy)</b>	FSE1	0.864	0.926	0.757
	FSE2	0.904		
	FSE3	0.863		
	FSE4	0.847		
<b>HB</b> <b>(Herd Behavior)</b>	HB1	0.745	0.850	0.587
	HB2	0.828		
	HB3	0.718		
	HB4	0.768		
<b>OV</b> <b>(Overconfidence)</b>	OV1	0.781	0.899	0.691
	OV2	0.780		

	OV3	0.882		
	OV4	0.876		
<b>FL</b> <b>(Financial literacy)</b>	FL1	<b>0.684</b>	0.893	0.736
	FL2	0.752		
	FL3	0.860		
	FL4	0.862		
<b>INT</b> <b>(Investment intention)</b>	INT1	0.713	0.876	0.641
	INT2	0.856		
	INT3	0.887		
	INT4	0.733		
<b>FE</b> <b>(Financial Expectations)</b>	FE1	<b>0.568</b>	0.836	0.719
	FE2	0.768		
	FE3	0.787		
	FE4	<b>0.621</b>		
	FE5	<b>0.548</b>		
<b>SMP</b> <b>(Stock market participation)</b>	SMP1	0.859	0.911	0.773
	SMP2	0.816		
	SMP3	<b>0.689</b>		
	SMP4	0.894		
<b>RU</b> <b>(Risk &amp; uncertain)</b>	RU1	<b>0.485</b>	0.851	0.657
	RU2	0.742		
	RU3	0.717		
	RU4	0.856		
<b>FS</b> <b>(Financial situation)</b>	FS1	0.782	0.864	0.680
	FS2	<b>0.630</b>		
	FS3	0.773		
	FS4	0.821		

**Source.** Developed by us

As the table shows, almost all the items exceed the 0.7 threshold, except for FL1, FE1, FE4, FE5, SMP3, RU1, FS2 which are below 0.7. However, items with a score lower than 0.7 should be deleted. The results obtained for the reliability of the constructs clearly show that the constructs are reliable. All the variables have a composite reliability greater than 0.7 and AVE greater than 0.5.

### 3.1.2 Discriminant validity assessment:

After analyzing the convergent validity of our model, in this subsection we will test the discriminant validity. The table below shows the results of the evaluation of the Fornell-Larcker criterion with the square root of the AVE of the constructs on the diagonal and the correlations between the constructs in the off-diagonal position.

**Table 3.** Results of the evaluation of the Fornell-Larcker criterion with the square root of the AVE of the constructs

	<b>FSE</b>	<b>HB</b>	<b>OV</b>	<b>FL</b>	<b>INT</b>	<b>FE</b>	<b>SMP</b>	<b>RU</b>	<b>FS</b>
<b>FSE</b>	<b>0.870</b>								
<b>HB</b>	0.374	<b>0.766</b>							
<b>OV</b>	0.639	0.424	<b>0.831</b>						
<b>FL</b>	0.516	0.374	0.330	<b>0.858</b>					
<b>INT</b>	0.524	0.404	0.509	0.530	<b>0.801</b>				
<b>FE</b>	0.412	0.545	0.286	0.375	0.458	<b>0.848</b>			
<b>SMP</b>	0.615	0.500	0.372	0.584	0.681	0.518	<b>0.879</b>		
<b>RU</b>	0.148	0.194	0.221	0.213	0.111	0.306	0.141	<b>0.811</b>	
<b>FS</b>	0.068	0.187	-0.061	0.267	0.212	0.185	0.303	0.153	<b>0.824</b>

**Source.** Developed by us

Overall, we notice that the square roots of the AVEs for all the constructs are higher than the correlations of these constructs with other latent variables in the conceptual model, indicating that all the constructs are unique.

### 3.2 Hypotheses significance test

#### 3.2.1 Direct effects test

Most researchers use p-values to assess significance levels. The p-value is the probability of mistakenly rejecting a true null hypothesis, that is, of assuming a significant path coefficient when in fact it is not significant. The bootstrapping method was used to test the hypothetical relationships of our conceptual model.

The table below presents the tests of the hypotheses.

**Table 4.** Validity test of research hypotheses

Hypotheses		Beta	Sample mean	Standard deviation	T-value	P-value	Results
<b>H1</b>	<b>FE -&gt; INT</b>	0.242	0.228	0.110	2.202	<b>0.028</b>	<b>Accepted</b>
<b>H2</b>	<b>RU -&gt; INT</b>	-0.127	-0.092	0.105	1.219	0.223	Not accepted
<b>H3</b>	<b>OV -&gt; INT</b>	0.336	0.320	0.151	2.229	<b>0.026</b>	<b>Accepted</b>
<b>H4</b>	<b>HB -&gt; INT</b>	-0.004	0.005	0.110	0.034	0.973	Not accepted
<b>H5</b>	<b>FS-&gt; INT</b>	0.127	0.129	0.091	1.393	0.164	Not accepted
<b>H6</b>	<b>FS-&gt; SMP</b>	0.151	0.154	0.073	2.087	<b>0.037</b>	<b>Accepted</b>
<b>H7</b>	<b>FL -&gt; INT</b>	0.285	0.282	0.130	2.182	<b>0.030</b>	<b>Accepted</b>
<b>H8</b>	<b>FL-&gt; SMP</b>	0.177	0.169	0.110	1.603	0.110	Not accepted
<b>H9</b>	<b>FSE -&gt; INT</b>	0.074	0.086	0.142	0.521	0.603	Not accepted
<b>H10</b>	<b>FSE-&gt; SMP</b>	0.307	0.310	0.103	2.976	<b>0.003</b>	<b>Accepted</b>
<b>H11</b>	<b>INT -&gt; SMP</b>	0.394	0.397	0.117	3.380	<b>0.001</b>	<b>Accepted</b>

**Source.** Developed by us

We note that the results of the hypotheses tests of H1 (FE -> INT), H3 (OV -> INT), and H7 (FL -> INT) are significant, with a p-value of 0.028 for hypothesis H1, 0.026 for H3 and 0.030 for H7. Indicating that these variables have a significant and positive impact on



the investment intention because all the betas have a positive sign and the p-values are less than 0.05.

The results of the hypothesis tests on the variables having a direct impact on the participation in the stock market show that, the impact of the financial situation (FS -> SMP), the financial self-efficacy (FSE -> SMP) and the the effect of investment intention (INT -> SMP) are significant, with a p-value of 0.037 for hypothesis H6, 0.003 for H10 and 0.001 for H11. Indicating that these variables have a significant and positive impact on stock market participation because all betas have a positive sign and p-values are less than 0.05.

### 3.2.2 Test of mediating effects

In this study, investment intention showed a partial mediating effect on the relationship between investment decision influencing factors and stock market participation. The significance test of the effect of overconfidence with respect to stock market participation recorded a p-value of 0.014, indicating the mediating effect of investment intention on the relationship between overconfidence biases and stock market participation. On the other hand, investment intention did not have a mediating effect on the rest of the independent variables of our conceptual model because the set of p values is greater than 0.05. The table below presents the results of the mediating effect of investment intention on the proposed relationships.

**Table 5.** Results of the mediating effect of investment intention (H12)

Hypotheses		Beta	Sample mean	Standard deviation	T-value	P-value	Results
<b>H12.1</b>	FE -> INT -> SMP	0.095	0.096	0.062	1.550	0.122	Not accepted
<b>H12.2</b>	RU -> INT -> SMP	-0.050	-0.034	0.039	1.300	0.194	Not accepted
<b>H12.3</b>	<b>OV -&gt; INT -&gt; SMP</b>	0.132	0.118	0.054	2.455	<b>0.014</b>	<b>Accepted</b>
<b>H12.4</b>	HB -> INT -> SMP	-0.001	0.005	0.044	0.033	0.973	Not accepted
<b>H12.5</b>	FS -> INT -> SMP	0.050	0.052	0.041	1.228	0.220	Not accepted
<b>H12.6</b>	FL -> INT -> SMP	0.112	0.113	0.063	1.770	0.077	Not accepted
<b>H12.7</b>	FSE -> INT -> SMP	0.029	0.040	0.064	0.459	0.646	Not accepted

Source. Developed by us

### 3.3 Assessing the goodness of fit of the conceptual model:

In this study we evaluated the quality of our model by 3 indicators namely: the coefficient of determination R<sup>2</sup>, the predictive relevance Q<sup>2</sup> and the criterion of goodness-of-fit (gof).

**Table 6.** Assessment of the goodness of fit of the conceptual model

	R <sup>2</sup>	R <sup>2</sup> Adjusted	Q <sup>2</sup>	GoF
<b>INT</b>	0.483	0.444	0,281	0,556
<b>SMP</b>	0.606	0.590	0,446	0,684

Source. Developed by us

In academic research focused on management science,  $R^2$  values of 0.75, 0.50, or 0.25 for endogenous latent variables can, as a general rule, be described as substantial, moderate, or low, respectively [28, 29].

We note that  $R^2$  of investment intention and participation in the stock market is respectively equal to 0.483 and 0.606, which means that the model has an acceptable predictive power. Also, the value of  $R^2$  adjusted for investment intention and stock market participation is respectively equal to 0.444 and 0.590, which means the degree of robustness of the model is qualified as moderate if we take a different sample from the same population.

In addition to evaluating the magnitude of  $R^2$  values as a criterion of predictive accuracy, it is also necessary to examine the Stone-Geisser  $Q^2$  value [30]. In the structural model,  $Q^2$  values greater than zero for an endogenous latent variable indicate the predictive relevance of the pathway model for a particular dependent construct. The table above shows us that both values of  $Q^2$  are greater than zero, which supports the claim that this study model has adequate predictive ability.

Finally, the GoF criteria for determining whether GoF values are unsuitable (below 0.1), small (between 0.1 and 0.25), medium (between 0.25 and 0.36), or large (greater than 0.36) to be considered a PLS model global validity were given by [31]. It can be concluded that the GoF model of our study is largely important for the validity of the conceptual model to be considered sufficient because the values recorded for the intention of investment and participation in the stock market and greater than 0.36.

## Conclusion

Behavioral biases lead to a flagrant influence on decision-making. The aim of this research is to determine the role of behavioral biases in investment decision making. According to traditional financial theories, investors make rational decisions by obtaining all the information available in the market. However, the theory of financial behavior is opposed to the concept of individual rationality, given the presence of psychological factors and their influence on decision-making in an investment project.

Our study focused on a sample of 100 responses from a questionnaire assigned to various Moroccan investors. The results showed that several behavioral factors contribute to decision-making among investors, biasing them accordingly. Among the factors considered significant by our research model, we note on the one hand the overconfidence, financial expectations and forecasts and financial literacy which directly affects the investment intention. On the other hand, the financial self-efficacy, financial status and investment intention explain directly the participation in the stock market.

This research allowed us to shed some light on the various influencing factors of the decision among investors by establishing the relationships that bind them. That said, all work is not without limitations, so in our case, there was a data collection constraint because of the reluctance of Moroccan investors in addition to the probable subjective nature of the data collected which could be a source of possible error.

To conclude, we can say that this study has certainly highlighted various influential behavioral factors, however it has not identified everything. Thus, several other explanatory variables have been studied by researchers in this subject, such as social responsibility and socially responsible investment. It should also be noted that the analysis focused specifically on individual investors, thereby providing a research perspective on other types of investors. Finally, a fundamental question needs to be asked: will there be another discipline that will challenge the theory of behavioral finance?

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