



The Impact of Behavioral Biases on Investment Performance: Does Financial Literacy Matter?

Hind Lebdaoui,* Youssef Chetioui, Elias Ghechi

School of Business Administration, Al Akhawayn University in Ifrane, Morocco. *Email: h.lebdaoui@au.ma

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ABSTRACT

This paper aims to investigate the impact of behavioral biases and financial literacy on investment performance in an emerging stock market context. Based on data collected from a sample of 196 Moroccan investors operating in Casablanca stock exchange, we test the research hypotheses using structural equation modeling. Out of the four heuristics examined in our proposed conceptual framework (i.e., overconfidence, representativeness, anchoring and herding), only overconfidence and representativeness had a significant positive impact on financial performance. Our results also suggest a significant positive impact of financial literacy on representativeness, while it was found negatively associated with overconfidence. This research paper is the first of its kind to investigate the existence of heuristics in an African, Arab and emerging market. As well, the current study is among the earliest attempts to examine how behavioral biases relate to investors performance.

Keywords: Heuristics, Financial Literacy, Investment Performance, Stock Market, Structured Equation Model

JEL Classification: G02

1. INTRODUCTION

In simple terms, the field of Finance can be understood as the study of how scarce resources are first allocated, then managed, then acquired, and then invested over a certain period of time. Within the traditional theory of finance, there are two key pillars that govern: investors are perfectly rational beings (rational behavior implies that investors always correctly interpret any available information while updating their beliefs at the same time), and that markets are fully efficient, which means that the price of any asset instantly reflects any relevant information at the time being, as stated by the Efficient Market Hypothesis. When the hypothesis holds to be true, an investor can in no way earn more than the risk-adjusted average return on a certain investment strategy. Despite the many revolutionary asset-pricing models that have been created over the years, such as the Capital Asset Pricing Model and other risk-based pricing models, traditional finance doesn't really do a good job in explaining the behavior of investors (Rabin and

Thaler, 2001). The major presumption is that since investors value wealth, then they will be rational when making financial decisions. However, this presumption doesn't explain many problems that are commonly found within the market. For example, why stock returns vary across securities for reasons besides risk? Or more importantly, why did the Global Financial Crisis occur, and how can another potential financial crisis be averted?

While the financial world was being revolutionized with more and more accurate and complex asset-pricing models, the field of psychology was also making remarkable progress. Behavioral psychologists were continuously discovering that people tend to act in an irregular manner while making decisions related to money. Several scholars have presented accurate and empirical evidence that many traditional finance theories such as the CAPM or the Efficient Market Hypothesis are able to explain and even predict many events. However, these theories have failed to explain many other events, such as the January Effect. The January Effect

is an irregularity in the market where prices of various securities increase in the 1st month of the year for no logical reason (Rozeff and Kinney, 1976). Therefore, academics have begun to understand that they may need to look into cognitive psychology in order to explain illogical and irrational investor behavior. This realization has thus brought forth a heavy interest into the rather new field known as behavioral finance.

According to Sewell, scholar of behavioral finance at Cambridge University, "Behavioral finance is the study of the influence of psychology on the behavior of financial practitioners and the subsequent effect on markets" (2007). It is basically the field of finance that examines how the behavior of agents in the market is influenced by various psychological factors which affects the decision-making process that said agents undertake which in turn affects asset prices. Specifically, this science aspires to explain why markets are actually able to be inefficient. A more interesting definition is offered by Barber and Odean, who said that "Behavioral finance relaxes the traditional assumptions of financial economics by incorporating these observable, systematic, and very human departures from rationality into standard models of financial markets" (2001). All in all, the purpose of behavioral finance is to explain market anomalies using identifiable and commonly relatable psychological biases.

Schindler (2007) summarized the three pillars in which further research could benefit behavioral finance. First, there is the limits to arbitrage. Financial market dislocations are situations where markets operate under stressful conditions and as a result, price assets incorrectly. Due to these dislocations, rational traders are unable to undo the effect that irrational traders have made with their decision-making (Barberis, 2003). And therefore, arbitrage opportunities will never cease to exist and can have a long, substantial and mathematically incorrect impact on asset prices. Second, there is the field of Psychology. Research in this field has proven that people tend to exhibit certain systematic psychological biases when formulating their preferences and beliefs in the context of decision making (Barberis, 2003). Therefore, several theories upon which behavioral finance is founded are based on the experimental evidence and the biases that result from making investment decisions. The third and final field is the one of Sociology, which suggests that a remarkable number of financial decisions arise from social interaction (conversations, tips, rumors, etc.) instead of factual data, which directly challenges the idea that investors make decisions without the influence of others (Schindler, 2007).

It is commonly believed that the fathers of behavioral finance are Daniel Kahneman and Amos Tversky (Heukelom, 2007). In the mid 1960s, Tversky and Kahneman were focused on different issues in research but they then came together in 1970 to combine their works and create what are now considered to be benchmarks in behavioral finance. They decided to implement psychological tests in decision theory to scenarios in the real world. In 1971, they published a paper which came to the conclusion that people tend to take a random sample from a population and perceive it as highly representative (Heukelom, 2007). Three years later, they then published another paper where they outlined three major biases

involved in decision-making: Representativeness, Availability and Anchoring. They claimed that a solid understand and awareness of these biases can actually improve decision-making in uncertain situations.

Meanwhile, in the 1980s, the efficient markets model was starting to be challenged due to its lack of efficiency. The major issue that troubled scholars was excess volatility. The idea that a stock's price was based on the present value of future dividends, as commonly accepted by the finance community, was starting to be questioned (Hammond, 2015). Some stocks were simply too volatile, and this led to the belief that the field of finance was wrong about how to price a stock, or that investors were simply irrational. It was then suggested that on the micro level, markets were surely efficient, but on the macro level they most definitely were not (Shiller, 2003).

Tversky and Kahneman (1981) came up with the concept known as heuristics. "Heuristics are simple efficient rules of the thumb which have been proposed to explain how people make decisions, come to judgments and solve problems, typically when facing complex problems or incomplete information. These rules work well under most circumstances, but in certain cases lead to systematic cognitive biases" (Tversky and Kahneman, 1981). The Casablanca Stock Exchange, more commonly referred to as the CSE, is the second oldest exchange in the African continent (second to the Johannesburg stock market), and the first in the North-African region. It was officially established in 1929 and has a total market capitalization of US\$ 71.1 bn. The CSE experienced various sorts of major reforms in 1993, in which investors were guaranteed increased protection, transparency was promoted and electronic trading was introduced (Wild and Lebdaoui, 2014). As of today, the CSE boasts one of the leading performances in the MENA region and is also the third largest exchange in Africa, coming in after the Johannesburg Stock Market and the Nigerian Stock Market.

The traditional theories of finance which support the alleged fact that human beings act rationally are outdated. There have been numerous models which have been used as pillars in the financial world, such as the Capital Asset Pricing Model, but they do not fully capture the behavior of investors, as they do not take irrationality into consideration. Behavioral biases are shortcuts that investors (and all human beings) use to avoid the effortful process of accurately estimating data, and they are inevitable and consequently, faulty decisions that follow biased decisions are imminent. Due to these various biases, investors can take risks that they are completely unaware of. Therefore, it is crucial to take into consideration the possibility of behavioral biases having a role to a certain extent within the decision-making process of investors. Being aware of the science of behavioral finance is significant because it can help investors better manage risky decisions (Rizzi, 2008).

Morocco has been receiving more and more global attention due to its decent economic growth over the years and has been considered as an emerging market since the 90s (Mohammed, 1996). However, literature has shown that emerging markets are more susceptible to irrational decision-making than developed markets (Farooq and Chetioui, 2012). Behavioral biases are omnipresent across all

markets, naturally, but evidence has proven that emerging markets are more prone to behavioral biases than other markets (Chen et al., 2007). Also, behavioral biases are in fact underapplied in comprehending financial behavior in emerging markets (Lucey and Dowling, 2014). Thus, the purpose of this paper is threefold. First, it attempts to identify a relationship between financial literacy (which can be understood as the combination of financial experience and financial studies) and four behavioral biases (overconfidence, representativeness, anchoring and herding) and between financial literacy and investment performance. Second, it also attempts to identify a relationship between the four biases and investment performance. In addition, the study also attempts to determine a relationship between the overconfidence bias and representativeness bias. More specifically, this study's purpose is to answer the following questions:

- R1. Are Moroccan investors susceptible to the behavioral biases of overconfidence, anchoring, representatives and herding, and to what extent?
- R2. How does exposure to the aforementioned behavioral biases affect an investor's returns?
- R3. Does a relationship exist between financial literacy and the biases under investigation?
- R4. How does financial literacy affect the perceived returns?

This research paper is structured as follows: Section 2 presents the theoretical background and hypotheses, Sections 3 and 4 cover the methods used in the research and data analysis respectively. Then Section 5 contains a discussion and a conclusion. Finally, Section 6 includes research limitations.

2. THEORETICAL BACKGROUND AND HYPOTHESES

Heuristics initially dealt with cognitive biases in the decision-making process, but they now include emotional factors, and they are used to explain the behavioral biases that can influence investors' decisions. Investors can be affected by all kinds of behavioral biases, which makes their decisions not only non-optimal, but also predictable, in a situation that involves uncertainty. Over the years, scholars have managed to identify over fifty behavioral biases, but the ones that will be discussed and used in the experiment contained within this thesis are: Overconfidence, herding, anchoring, and representativeness. The reason why the biases were selected as so is due to the fact that they are the most statistically significant biases worldwide (Baker et al., 2019).

2.1. Overconfidence Bias

According to Pompian, a Chief Investment Officer of a successful private investment company, the overconfidence bias occurs when an investor experiences an unjustified faith in their cognitive abilities, intuitive reasoning, and judgments (2006). This concept arose from a large amount of surveys psychological experiments where subjects ended up overestimating not only their predictive abilities but also the accuracy of the information they were provided with. This behavioral bias is common among investors, as the more experienced ones tend to amplify their ability in terms of picking stocks and interpreting information surrounding

said stocks. Despite the fact that stock picking is an effortful and sometimes highly complicate task, it is the one where investors experience the largest amount of overconfidence (Nofsinger, 2001). To sum up, overconfidence is a behavioral bias that exists because investors tend to think that they are very good at predicting events based on limited information, and that they are more intelligent than they really are (Pompian, 2006).

2.2. Herding Bias

Herding is the behavioral bias that occurs when a group of people imitate a certain action which leads to the convergence of said action (Hirshleifer and Teoh, 2003). In the financial market context, investors can sometimes follow the decisions made by the majority, despite their personal opinion on the aforementioned decision. A good example is the one of Bitcoin Bubble. When the cryptocurrency began to gain popularity, an increasing number of people started investing in it without any information or expertise in the domain, and they were doing so because everyone else was investing in it. Investors tend to be influenced by the recommendations of analysts, which in turn, are also influenced by other analysts. A study in 2000 found that when an analyst reviewed their recommendation, there was a positive correlation with the following two analyst's recommendations (Welch, 2000).

2.3. Anchoring Bias

Fathers of behavioral finance Tversky and Kahneman first identified Anchoring in 1974. They found that people tend to create estimations by starting with an initial value and then adjusting that value to arrive to a final answer. This initial value is usually based on the structure of the problem or on a partial computation. In both scenarios, these starting points are not based on any exact science and therefore lead to biased final answers (Tversky and Kahneman, 1974). This initial value is statistically random in its nature and is also assigned an unnecessary amount of significance. Market agents typically exhibit this bias when they find themselves questioning when the right time to sell a stock is, or whether a stock is fairly priced. In order to avoid the complex process of analyzing large amounts of data, investors will base their decision on an illogical reference point and make an irrational investment decision (Pompian, 2006).

2.4. Representativeness Bias

Representativeness is a very common (due to how relatable it is) heuristic. It revolves around the idea that people tend to judge the probability that a certain object A belongs to a class of objects B by looking at the resemblance of object A to B (Tversky and Kahneman, 1974). For example, say Elias is an opera fan who enjoys attending opera events, plays the piano and the violin and can speak with his friends for hours on the history of opera music. Is Elias musician for a major orchestra, or is Elias a farmer? Most people would select the option that Elias is a musician for a major orchestra, even though, statistically speaking, the probability that Elias would be a farmer is highly more likely. Furthermore, representativeness is involved with determining conditional probabilities.

To sum up, the market agents, scholars, and academics have been relying on traditional finance theories such as the CAPM and the

efficient market hypothesis for far too long. These two theories, among many others, rely on the assumption that human beings are rational. In reality, they are not, and there is much evidence that supports this statement. Human beings create shortcuts in order to process complex and large amounts of information, and these shortcuts are known as heuristics and behavioral biases. There are many behavioral biases, but some noticeable ones that are very common among investors are overconfidence, herding, anchoring, representativeness. Overconfidence is a bias that occurs when investors believe that they can predict events without enough information, even when that information isn't accurate enough. Herding results when investors feel a psychological need to make the same investment decision that many others are, without performing any prior research. Anchoring is when investors attempt to calculate certain numbers (such as the fair price for a stock) by adjusting a certain initial value—but the initial value isn't based on any rational data. Representativeness revolves around the idea that investors have a tendency to assign significance to a sample retrieved from a population without taking into consideration any probabilistic data. All of these behavioral biases are ones that occur on a daily basis because human beings are occasionally irrational by definition (Thaler, 1999). Being aware of these behavioral biases, and integrating them in asset-pricing models, may lead to more accurate and realistic results, which in turn may revolutionize the world of finance.

2.5. Research Hypotheses

All of the following hypotheses are going to be tested within the framework of the Moroccan market. They are devised to be tested on Moroccan investors which are actively participating in the Moroccan stock market.

Gervais and Odean's model (2001) is considered as the foundation of studies that connect characteristics of overconfidence and investing experience (Menkhoff et al., 2013). They developed a multiperiod model where initially, investors weren't fully aware of their investment skills. After several investment periods passed by, the unsuccessful investors are usually excluded from the markets. Contrarily, successful investors become overconfident as they entirely attribute their success to their superior investing skills instead of taking the factor of luck into consideration (Menkhoff et al., 2013). More studies have also established a clear positive relationship between overconfidence and investment experience (Coşkun et al., 2016; Glaser et al., 2004). Furthermore, a higher level of finance-related education has also been associated to overconfidence in the market (Bhandari and Deaves, 2006), as investors with more knowledge in academic finance believe to know more than actually do, and are also more respected by their peers, which also impacts their confidence (Deaves et al., 2010). Thus:

H₁. Financial literacy is positively related to overconfidence.

Coşkun et al. surveyed 596 individual stock investors in order to measure their financial literacy and to examine their relationship between financial literacy and various behavioral biases. According to their findings, high levels of representativeness was negatively correlated to high levels of financial literacy—in fact, they found

that investors that did not obtain an undergraduate degree in Finance exhibited significantly higher levels of representativeness (Coşkun et al., 2016). Thus:

H₂. Financial literacy is negatively related to representativeness.

The role of herding behavior is one that is noticed in all aspects of behavioral psychology, and even nature. Within the financial markets, however, literature has repeatedly shown that herding is not correlated with financial literacy (Sabir et al., 2019). This is so because the more experience and financial studies that an investor has, the more said investor is aware of herding behavior and thus, they attempt to avoid it. Nevertheless, despite their awareness of this behavioral biases, investors do not always avoid herding behavior due to regret aversion (Rabin and Thaler, 2001). Instead, literature has shown that financial literacy has a negative moderating role upon the herding bias, wherein the third variable is usually the overconfidence bias (Hayat, 2016). On the other hand, fewer literature has suggested that financial literacy has a direct negative correlation with the herding bias (Agrawal et al., 2016). Thus:

H₃. Financial literacy is negatively related with herding.

Years of learning leads to condition, and conditioning is related to certain stimuli that can become attached to reaction and anchoring is a stimulus that is associated with learning experience. In fact, research has shown that an essential aspect of the anchoring bias is that people are sensitive to information that they have experienced personally (Welsh et al., 2014). Therefore, despite the fact that anchoring is sometimes considered as a "rookie mistake" (Baker et al., 2019), previous studies have established a positive relationship between financial literacy and anchoring (Coşkun et al., 2016; Mouna and Anis, 2015). Thus:

H₄. Financial literacy is positively related to anchoring.

Financial literacy has long been tied to increased investment performance for obvious reasons; the best way to become a professional at something is to practice it, and to study it (Baker et al., 2019). A more financially literate investor would not only limit their portfolio to the basic financial instruments such as stocks or bonds, but instead will compose their portfolio of various complex assets, such as interest rate derivatives, options, and so on (Lusardi, 2019). Additionally, studies have shown that financially literate investors restructure their portfolio more actively than others, and they do so in a manner that keeps their risk exposure relatively constant over time (Bianchi, 2018). As a result, an increase in financial literacy is associated with higher investment performance (Baker et al., 2019; Bianchi, 2018; Lusardi, 2019). Thus:

H₅. Financial literacy is positively related with investment performance.

Behavioral biases, by definition, are disproportionate weights against or in favor of ideas, habits or concepts, and are therefore irrational by nature. In the financial market, calculations are what is supposed to determine the true and fairest price of an asset. But, behavioral biases push investors to skip the tedious and iterative process of calculation (Rabin and Thaler, 2001) and to improperly assess the risks they are undertaking (Rizzi, 2008). As a result,

behavioral biases are erroneous of nature, and should, either in the short or in the long-term, lead to incorrect decisions (Baker et al., 2019). Incorrect decisions lead to weak investment returns. Therefore, investors that exhibit the biases of overconfidence, representativeness, anchoring and herding, should have a weaker investment performance than those who don't (Agrawal et al., 2016; Barber and Odean, 2000; Kaustia and Knüpfer, 2008; Kumar and Goyal, 2016). Thus:

H₆. Overconfidence is negatively related with investment performance.

H₇. Representativeness is negatively related with investment performance.

H₈. Herding is negatively related with investment performance.

H₉. Anchoring is negatively related with investment performance.

Among with a few others, overconfidence and representativeness are the behavioral biases that have received the most focus within literature. That being said, entirely attributing financial success to superior investing skills (Menkhoff et al., 2013) and the belief that past returns can reveal future returns (Chen et al., 2007) are two of the most common characteristics among investors (Baker et al., 2019). Consequently, many studies have attempted to identify a relationship between these two biases, and they have succeeded to do so (Kumar and Goyal, 2016). Thus:

H₁₀. Overconfidence is positively related with representativeness.

3. METHODOLOGY, DATA AND RESULTS

3.1. Model Specification

The conceptual model (Figure 1) is designed in a manner to establish a relationship between financial literacy and investment performance, overconfidence, representativeness, herding and anchoring. Financial literacy is measured using two constructs: investment experience and prior financial studies, both measured in years. It also is designed to determine a correlation between the four biases and investment performance. Demographic factors such as gender, age, income and educational level were used as control variables. In order to estimate the model and analyze the causal relationships, a structured equation model was used (SEM). SEM has been the leading statistical technique for estimating and testing causal relationship as it uses a combination and statistical data and is able to measure latent variables based on observable

indicators (Baker et al., 2019). Partial least squares (PLS) was the appropriate method to use.

3.2. Methodology

All of the constructs within the study were based on literature with trivial modifications. These constructs were measured using a 5-point liker scale in each item. They ranged from strongly disagree (1) to strongly agree (5). The constructs were presented in the form of a questionnaire. Back translation was used, as French is currently the established working language within the financial markets of Morocco (Chetioui et al. 2020a). In addition, for demographic questions were added in order to determine the age, gender, education level, and income level. The questionnaire was uploaded using Google forms.

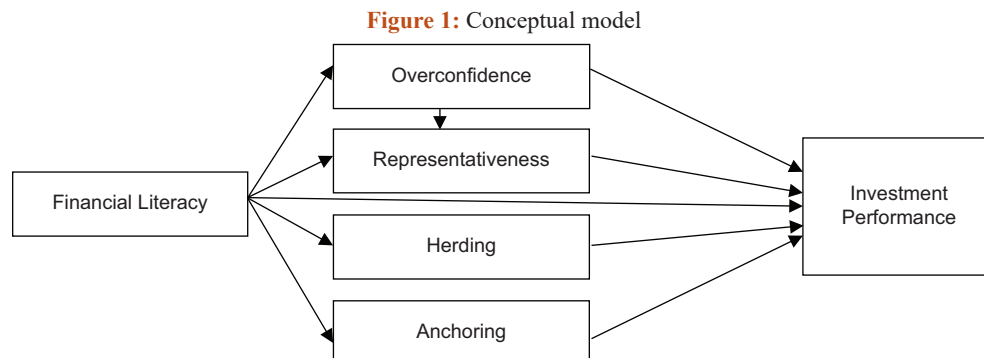
3.3. Data Collection

In alignment with the research objectives of this study, the questionnaire was sent out to Moroccan investors that participate in the Moroccan stock market. Before it was sent out, it was reviewed and reworked in order to avoid confusing questions and unpopular biases. Initially, biases such as the gambler's fallacy, mental accounting, emotional bias, hindsight bias and the disposition effect were all part of the questionnaire. However, in order to reduce the possibility of a response bias, only the four most popular (from the perspective of literature coverage) were selected. Also, the survey was shortened in order to avoid being too long to answer. These Moroccan investors were found using platforms such as LinkedIn and also via various managers and directors who not only filled in the survey themselves, but also passed along the survey to their investor subordinates. In the end, a total of 196 investors responded to the questionnaire. Out of those 196 investors, 134 consisted of males (68.4%) and 62 consisted of females (31.6%). The age of the investors averaged around 42 years old. Table 1 contains more details pertaining to the descriptive statistics. The measurement tools used for Financial literacy are also observable in the descriptive statistics.

4. RESULTS ANALYSIS

4.1. Measurement Model

In order to assess the indicators' reliability, all loadings should normally be >0.7 (Chin, 1998a; Henseler et al., 2014). Accordingly, all of the items have loadings >0.7 (Table 2). This confirms that the indicators are indeed reliable. For the construct's reliability, two criteria were used; composite reliability (CR) and Cronbach's



alpha (CA). As noticeable in Table 2, all of the items also have CR and CA >0.7, which validates the constructs reliability (Lebdaoui and Chetioui, 2020, 2021). Finally, to examine the convergent validity, average variance extracted (AVE) should be greater or equal to 0.5 in order to be considered as sufficient (Hair et al., 2010). As seen in Table 2, the AVE for all the constructs is >0.5, which confirms convergent validity.

The discriminant validity is composed of three criteria (Chetioui et al. 2020b). The first is the Fornell-Lacker criterion, which states that the root square of average variance extracted of each latent

variable should be larger than the correlation with the other latent variables (Fornell and Larcker, 1981). As seen in Table 3, the Fornell-Lacker criterion holds. The second criterion suggests that the loading of each indicator is to be greater than all of its cross-loadings (Chetioui et al., 2021; Chin, 1998b). The third criterion consists of the Heterotrait-Monotrait ratio, in which all of the values must be below a threshold of 0.9 (Hair et al., 2010). Both of these criterion hold, and both tables are available upon request.

In addition, given that the sample structure is uneven according to the demographic variables, four control variables are checked:

Table 1: Survey respondent profile

Measure	Item	n	Percentage	Measure	Item	n	Percentage
Gender	Male	134	68.40%	Income	Below 8000 MAD	2	1.02%
	Female	62	31.60%		8000-16000 MAD	15	7.65%
Age	18-30	27	13.78%		16000-240000 MAD	20	10.20%
	31-45	101	51.53%		24000-36000 MAD	72	36.73%
	46-60	58	29.59%		Above 36000 MAD	87	44.39%
	>60	10	5.10%	Experience	<2 years	19	9.69%
Marital Status	Married	151	77.00%		2-5 years	38	19.39%
	Single	45	23.00%		5-8 years	63	32.14%
Education	Highschool Degree	3	1.53%		8-12 years	28	14.29%
	Bachelor's Degree	61	31.12%		More than 12 years	48	24.49%
	Master's Degree	130	66.33%				
	P.h.D.	2	1.02%				
Work sector	Private Sector	151	77.04%				
	Public Sector	9	4.59%				
	Independent	35	17.86%				
	Other	1	0.51%				

Table 2: Factor loading, composite reliabilities, and average variance extracted (n=196)

Constructs	Items	Loading	Cronbach's Alpha	Average variance extracted	Composite reliability
Financial literacy	Experience	0.907	0.870	0.793	0.920
	Fin-studies	0.880			
Overconfidence	OCV1	0.755	0.808	0.634	0.874
	OCV2	0.789			
	OCV3	0.757			
Representativeness	REP1	0.828	0.870	0.720	0.911
	REP2	0.879			
	REP3	0.872			
Herding	HER1	0.772	0.852	0.630	0.895
	HER2	0.821			
	HER3	0.783			
Anchoring	ANC1	0.772	0.752	0.530	0.795
	ANC2	0.821			
	ANC3	0.783			
Investment performance	PER1	0.755	0.808	0.634	0.874
	PER2	0.789			
	PER3	0.757			

Table 3: AVE and correlations

	Age	ANC	EDU	FIN	Gen	HRD	Income	PER	OVER	REP
Age	1.000									
Anchoring	-0.136	0.616								
Education	-0.083	-0.003	1.000							
Financial literacy	0.403	-0.176	-0.158	0.770						
Gender	-0.195	0.153	0.180	-0.218	1.000					
Herding	-0.114	0.296	0.064	-0.276	0.112	0.626				
Income	0.663	-0.111	0.022	0.330	-0.194	-0.067	1.000			
Investment performance	-0.023	-0.012	0.032	0.730	-0.067	0.027	-0.014	0.937		
Overconfidence	-0.144	0.229	0.132	-0.478	0.128	0.288	-0.095	0.298	0.728	
Representativeness	-0.273	0.336	0.087	0.450	0.148	0.166	-0.225	0.543	0.287	0.634

gender, age, education and average monthly respondent's income (as illustrated in Table 4). Our results reveal that none of the control variables has a statistically significant influence on investment performance, so the evaluation of the measurement and structural model continued without control variables.

Since the measures suffice the discriminant validity of the constructs, and the examination of construct reliability, indicator reliability and convergent validity hold, then the constructs can be used in order to test the conceptual model.

4.2. Structural Model

Chin (1998a) suggested that the values of R² that above 0.67 considered high, while values ranging from 0.33 to 0.67 are moderate, whereas values between 0.19 and 0.33 are weak and any R² < 0.19 are unacceptable. As seen in Table 5, the research is unable to explain the variation of anchoring and herding in the conceptual model but is able to moderately explain the variation of investment performance, overconfidence and representativeness.

As per the path coefficients, Table 6 summarizes the hypotheses that were tested.

H₃, H₄, H₈ and H₉ were immediately rejected due to their P-value being >0.05. And therefore, in summary, we fail to reject H₅ and H₁₀, yet we reject H₁, H₂, H₆ and H₇.

Table 4: Control variables

Control variables	Std. Beta	Std. Error	T-Value	P-Value
Age ->Investment performance	-0.072	0.105	0.693	0.488
Gender ->Investment performance	-0.080	0.072	1.112	0.266
Education ->Investment performance	0.030	0.066	0.449	0.653
Income ->Investment performance	-0.047	0.095	0.496	0.620

Table 5: R-square of endogenous latent variables

Constructs	R ²	Result
Anchoring	0.031	Unacceptable
Herding	0.076	Unacceptable
Investment performance	0.341	Moderate
Overconfidence	0.445	Moderate
Representativeness	0.373	Moderate

Table 6: Path coefficients of the research hypotheses

	Independent variables	->Dependent variable	Std. Beta	Std. Error	T-Value	P-Value
H ₁	Financial literacy	Overconfidence	-0.478	0.171	2.802	0.005
H ₂	Financial literacy	Representativeness	0.524	0.073	7.125	0.000
H ₃	Financial literacy	Herding	-0.276	0.277	0.996	0.319
H ₄	Financial literacy	Anchoring	-0.176	0.117	1.501	0.133
H ₅	Financial literacy	Investment performance	0.407	0.097	4.185	0.000
H ₆	Overconfidence	Investment performance	0.439	0.223	1.970	0.049
H ₇	Representativeness	Investment performance	0.239	0.117	2.049	0.041
H ₈	Herding	Investment performance	-0.021	0.094	0.224	0.823
H ₉	Anchoring	Investment performance	-0.002	0.102	0.016	0.987
H ₁₀	Overconfidence	Representativeness	0.257	0.118	2.168	0.030

4.3. Implications and Conclusion

This study has several implications. The first hypothesis and second hypotheses state that financial literacy is positively related with and negatively related with overconfidence and representativeness, respectively. It was found, however, that financial literacy was negatively related with overconfidence yet positively related with representativeness. This suggests that the more experience and financial knowledge a Moroccan investor has, the less likely they are to be overconfidence, but the more likely they are to believe that future returns can be determined using past returns. When it comes to the herding and anchoring biases, the results suggest that they are not present within our sample group, as the P-values for H₃, H₄, H₈ and H₉ are all >0.05. Perhaps this suggests that the biases were not well phrased within the questionnaire, or that these two behavioral biases are simply not exhibited by Moroccan investors. From the perspective of superior investment performance, financial literacy seems to play an important role. The results indicate that an experienced investor with previous financial studies is more likely to have a satisfactory return within the Moroccan stock market. We failed to reject H10, which implies that indeed, as numerous other related studies have concluded, overconfidence and representativeness are two behavioral biases that tend to come along. This theory applies to the sample group of Moroccan investors as well. Moreover, the two statistically significant biases impacting investment performance were overconfidence and representatives. Interestingly enough, however, H₆ and H₇ were rejected, which suggests that Moroccan investors who are overconfident and who exhibit representatives in their investment-related decision-making are the ones with strongest investment performance. This may be because Morocco's stock market is already heavily inefficient, and thus irrational decisions are what the stock market is entirely based on. Of course, this doesn't mean that stock prices in Morocco are entirely random. Instead, it suggests that they the majority of a stock's value is based on irrational decisions than on accurate information. For example, if the majority of Moroccan investors exhibit representativeness, than they will all assign an irrational amount of significance to a stock's past returns in order to calculate the stock's future returns, which will ultimately push the stock's price to a number that is mainly based on a behavioral bias instead of on available information. As per the overconfidence bias, it seems that the investors who are the most confident have the highest returns. Not many hypotheses can be extracted from this suggestion, other than that these investors deserve the confidence that they possess. After all, literature has already indicated that emerging markets are more susceptible to behavioral biases than others

(Chen et al., 2007) and that behavioral finance is underapplied in the understanding of financial behavior within emerging markets (Lucey and Dowling, 2014).

5. CONCLUSION

Asset-pricing models such as the CAPM which assume that human beings are rational have not always been able to explain stock price anomalies. As much research has suggested, this is so because human beings are in fact irrational and exhibit behavioral biases. These biases can be thought of as shortcuts that investors use to avoid accurately predicting the true value of a certain asset. Although more common in emerging markets such as Morocco (Lucey and Dowling, 2014), behavioral biases are exhibited by investors all around the world. Therefore, evidence has suggested that investors that exhibit behavioral biases will ultimately have weaker returns (Agrawal et al., 2016). Within much literature, financial literacy, which can be understood as a combination of investment experience and finance-related studies, has also been connected to behavioral biases (Baker et al., 2019). The results vary from one market to another, but overall, financial literacy is either positively or negatively correlated with behavioral biases; nevertheless, the correlation exists. In the case of Moroccan investors that participate within the Moroccan stock market, overconfidence and representativeness are the most statistically significant behavioral biases. Surprisingly, evidence from the sample population indicated that these two biases actually help investors have stronger returns than others. This data may have resulted for various reasons. It may be because the Moroccan stock market is heavily inefficient. Further research which can prove just how imperfect the Moroccan stock market is may be of very great value and confirm the results of the experiment.

5.1. Limitations of Study

The field of behavioral finance has definitely revolutionized the way academics perceive the markets. Investors' decision-making processes play a major role in the determination of asset prices since after all, it is these very decisions that influence the law of demand and supply (Chetioui et al, 2017). Nevertheless, this study and many others similar to it come along with several limitations. First of all, it is time-consuming and difficult to gather enough of a sample population that will truly be representative. Most experiments within the field of psychology will always have this issue. Even if a large enough sample is gathered, nothing guarantees that the responses will be accurate and honest, and therefore, response bias always remains as an issue (Curtis, 2009). This is the major limitation with this study, as 196 responses may not have been enough to confirm the hypotheses made, and response bias may have had a part in the answers. Moreover, other common limitations revolve around the fact that behavioral biases are very difficult to integrate into asset-pricing models, they seldom have contradictory implications (some investors are deemed as risk-averse yet overconfident at the same time, for example), and, finally, behavioral finance fails to provide practical alternatives to the many theories that it challenges (Curtis, 2009).

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