ECONOMIC RESEARCH FORUM
منتدى البحوث الاقتصادية
2007

working paper series

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Working Paper No. 0717

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**Working Paper 0717**

**December 2007**

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## ABSTRACT

The purpose of this paper is to check if investors in emerging markets, especially in the Tunisian stock market, have the same psychological biases as those documented in developed markets. To achieve this purpose we adopt a survey approach that uses the investigation technique through the development and distribution of a questionnaire describing some scenarios related to behavioral biases - either suggested by theory or extracted from reality- that are suspected to generate the momentum phenomenon. Our major findings are: the Tunisian investor seems to be prudent, non confident, over opportunistic, sensitive to rumors and conservative. These psychological biases were confirmed either by examining the correlation between variables or by the aggregation of all these variables in factorial axes.



## ملخص

يُعد غرض تلك الدراسة هو التحقق مما إذا ما كان المستثمرون في الأسواق الناشئة، خاصة في سوق البورصة ولكي يتم التونسي، لديهم نفس التحيز النفسي شأنهم شأن ذويهم من المستثمرين المسجلين بالأسواق المتقدمة. تحقيق هذا الغرض، نقوم باستخدام منهج الاستقصاء المستخدم فيه تقنية التحقق من خلال وضع وتوزيع استبيان يتناول وصف بعض السيناريوهات المتعلقة بالانحياز السلوكي، إما أن تكون التي تقترحها النظرية أو تلك يبدو أن المستثمر المستخلصة من الواقع، ويظن أن تنشأ عنها ظاهرة القوة الدافعة. أهم النتائج التي توصلنا إليها: وقد تأكدت التونسي هو مستثمر حريص، غير واثق من نفسه، انتهازي للغاية، يستجيب للإشاعات ويقاوم التغيير. هذه الانحيازات النفسية عن طريق دراسة العلاقة ما بين المتغيرات أو تجميع كافة هذه المتغيرات في محاور تقوم على عوامل متعددة.

## 1. Introduction

Momentum is an anomaly that has been documented by recent research. Debondt and Thaler (1985) studied the crucial role played by the length of the prior ranking period. They identified a market phenomenon in which prior winners continue to win and prior losers perform poorly. Taking a step further, Jegadeesh and Titman (1993) examined individual stocks over the 1965-1989 period and showed that stock returns exhibit a momentum at medium term horizons ranging from 3 to 12 months, or a continuation in their directions. They found that a strategy to buy stocks in the top performance deciles and sell stocks in the bottom deciles earns approximately one percent per month over the subsequent months. To check if such a pattern is not the result of data mining, Jegadeesh and Titman (2001) repeated the same work over the 1989-1997 period and obtained the same results. This pattern in stock returns was first acknowledged by using a US sample of NYSE/AMEX stocks. Beside this evidence, Rouwenhorst (1998) found the same order of profitability of momentum-based trading strategies on a sample of 12 European countries over the 1980-1995 period. Chui, Titman and Wei (2000) confirmed the presence of momentum in 5 Asian financial markets. Rouwenhorst (1997) found that momentum strategies earn significant gains in 20 emerging markets.

Because of its robustness and its interesting and intriguing implications on the predictability of future stock returns and on the efficient market hypothesis, academic research took many directions - either to test the accuracy and robustness of proposed models in measuring abnormal returns or to understand and identify factors that drive momentum.

Some suggested a risk-based interpretation of momentum. For example, Conrad and Kaul (1998) argued that it simply reflected cross-sectional differences in long-run returns, but recognized that little evidence cuts clearly in favor of risk story. Lewellen and Nagel (2003) showed that the conditional CAPM performs nearly as poorly as the unconditional CAPM to explain asset-pricing anomalies like book-to-market and momentum. Fama and French (1996) noted that the momentum effect is not subsumed by their three factor model. Furthermore, the literature did not identify the nature of risk that the abnormal profitability of momentum strategies remunerates, as it should be according to the hypothesis of rationality paradigm.

Non risk-based explanation comes from behavioral finance. Several theories tried to provide a justification to positive medium-term returns autocorrelations. These theories focus on abnormal behaviors such as overreaction or under reaction to news about fundamentals. This idea attracted many academic financial researchers, for two main reasons: (1) the limits of arbitrage, which let rational agents undo the frictions caused by irrational agents (2) the psychological results which assert that the behavior of any person is determined and influenced by a set of behavioral biases.

The extrapolation of the psychological results on financial markets, asserts that under the effect of one or a set of natural and human cognitive biases, agents in financial markets could not be of full rationality, especially to understand and react to news immediately and appropriately. That’s why the agents appear to over or under react to news, driving by this way, a continuation in the direction of stock returns.

In this new behavioral framework paradigm, formulated especially to explain the puzzling pattern of momentum in stock returns, we find three main and popular models and theories:

those of Barberis, Shleifer and Vishny (1998) (BSV henceforth), Daniel, Hirshleifer and Subrahmanyam (1998, 2001) (DHS henceforth), and Hong and Stein (1999)[1].

DHS (1998) use the two biases of overconfidence and self-attribution to generate the momentum phenomenon in stock returns. DHS assume that the investor is overconfident about his private information. If the private information is positive, overconfidence means that investors will push prices too far up relative to fundamentals, generating during this period some continuation in the directions of stocks prices. Indeed, DHS assume that the public information alters the investor's confidence in his private information in an asymmetric way, under the effect of the self-attribution bias: when public news confirms the investor's belief, this strongly increases the confidence he has in his private information, which incite him to push up the prices. However, less attention is given to disconfirming public news and the investor's confidence in his private information remains unchanged. This asymmetric response means that initial overconfidence is on average followed by even greater overconfidence, thus generating momentum.

BSV (1998) stress biases in the interpretation of public, rather than private information. They build a model that incorporates a conservatism bias (the tendency to underweight new information relative to prior), and a representativeness bias (whereby people expect small samples to reflect the properties of the parent population). Following good public information (in particular, earnings announcements), conservatism means that investors react insufficiently, which consequently results in only a small rise in stock prices. Nevertheless, after a succession of good public information, the representativeness bias causes investors to overreact and push the prices up too high. The main reason being that the investor expects a similar tendency of earnings in the future, driving, as a result, the momentum phenomenon.

Hong and Stein (1999) assume, in their model, an interaction of two delimited rational groups of investors, where delimited rationality means that investors are only able to process a subset of available information. "News watchers" make forecasts based on private information, but do not rely on past prices. "Momentum traders" rely only on the most recent price change. With this hypothesis, Hong and Stein assume a gradual diffusion of the private information among the population of news watchers, who are unable to extract any other private information from prices. This slow diffusion of information generates momentum. Indeed, the momentum traders, whose reactions are based on the last price changes, will push the prices so far, enforcing in this way, the momentum phenomenon both in magnitude and persistence.

Although behavioral theories and models seem to offer some plausible explanations, they remain without direct empirical validation. Instead of seeking to establish the existence of these psychological biases among investors, they assumed their existence and tried to model and test their effect on stock returns. Among these researches, we mention Cooper, Gutierrez, and Hameed (2004). Following Gervais and Odean (2001) who assert that the aggregate overconfidence should be greater following market gains, they envisage market conditions to test the responsibility of overconfidence bias in generating momentum in stock returns. If the overconfidence bias drives momentum, then the momentum effect should be higher following positive rather than negative market returns. The mean monthly momentum profit following positive market returns is 0,93%, compared to -0,37% following negative market returns. Nevertheless, Muga and Santamaria (2006), using Spanish data, found that momentum appears following both up-market and down-market trends and does not depend on the state

[1] Another approach uses Kahneman and Tversky's (1979) "prospect theory" together with Thaler's (1980) "mental accounting" framework to explain the disposition effect, which is responsible for many asset pricing anomalies (see Shefrin and Statman 1985, Weber and Camerer 1998, Weber and Zuchel 2001 and Grinblatt and Han 2005).

of the market. Another example of indirect validation is the framework of Hong, Lim and Stein (2000) and of Doukas and McKnight (2003). The first tested the hypothesis of gradual diffusion of information among investors. They showed that momentum strategies worked better for stocks with low analyst coverage, since the diffusion of information is bound to be particularly slow. Doukas and McKnight did the same test for 13 European financial markets.

In this paper, and in order to test the implications of behavioral finance, we adopt another methodology based on a psychological and cognitive approach. Instead of using secondary data (market returns) to validate the implications of some of behavioral biases, we conduct a survey research to gather primary data from a sample of Tunisian financial intermediaries. We distribute a questionnaire describing some scenarios related to behavioral biases, either suggested by theory or extracted from reality, that are suspected to generate the momentum phenomenon.

The remainder of this paper is organized as follow. In section 2 we summarize the different psychological biases suggested by financial economists as driving a momentum effect. This section provides the theoretical background supporting our questionnaire. In section 3 we describe data and methodology. In Section 4 we present our results and their interpretations. Finally, Section 5 concludes the paper and presents some limits.

## 2. Momentum Effect: Theoretical Issues and Behavioral Implications

Two schools of thought tried to understand and explain momentum: The first school "**rational finance**" continues to believe in rationality, and attributes this anomaly to new dimensions of risk. These are explained below:

High price variation (Jhonson 2002), downside risk (Ang, Chen and Xing 2001) and business cycle variation (Chan, Jegadeesh and Lakonishock 1996, Young 2001 and Chordia and Shivakumar 2002) increase in fiscal expenses (Grinblatt and Moskovitz 2004), natural persistence of cross sectional returns (Konrad and Kall 1998 and Berk, Green and Naik 1999) and industrial component of return (Moskovitz and Grinblatt 1999).

Unfortunately all these explanations were refuted by subsequent evidence[2].

The second school "**behavioral finance**" argues that some financial phenomena cannot plausibly be understood using rational models. This new field has two building blocks: limits to arbitrage and psychology.

**Limits to Arbitrage:** Barberis and Thaler (2002) stated that although many financial economists argued that Efficient Markets Hypothesis had to be true two decades ago because of the forces of arbitrage, we know now that this is a naïve view: the limits of arbitrage can permit substantial mispricing.

**Bounded Rationality and Prospect Theory:** The bounded rationality hypothesis and empirical findings of cognitive psychologists (such as Tversky and Kahneman 1973, Kahneman and Tversky 1974 and 1979) help in writing down formal models that are more accurate for describing human behavior than purely rational models.

As we said earlier, in this particular issue of research which tries to explain the momentum effect, three eminent papers address the most popular psychological biases. The first one (DHS 1998) uses biases of overconfidence and the self attribution to allow the momentum in stock returns. The second (BSV 1998) drives momentum through the psychological biases of

[2] We quote from Hong, Lim and Stein (2000, 1): "Some suggested a risk-based interpretation of momentum. This is certainly a logical possibility, although there is little evidence that cuts clearly in favor of a risk story".

conservatism and representativeness. Finally, the third one (Hong and Stein 1999) takes interest in the limited capacity of computation of agents.

In this section, we emphasize each of these psychological biases, how they were documented by psychologists, and how financial economists gave them credence in driving the momentum effect in stocks returns.

### *2.1. The Overconfidence Bias*

The overconfidence bias affects the people's beliefs and judgments. This psychological bias was documented in several experimental studies where individuals appeared to underestimate their error variance in making predictions and overestimate their own forecasts relative to those of others. Alpert and Raiffa (1982), and Fischhoff, Slovic and Lichtenstein (1977) ran the two most popular experiences proving the overconfidence of people in their judgments. In the first experimental study, Alpert and Raiffa asked individuals to assign the confidence intervals to their estimates of quantity "the level of the Dow in a year", the average confidence intervals assigned was 98%. This means that people think their estimates of quantity are true 98% of the time. Yet experience showed that the estimations assigned were true only 60% of the time. Through this experience, people appeared to clearly overestimate their judgments.

The second experience led by Fischhoff, Slovic and Lichtenstein (1977) asked individuals to assign probabilities to the occurence of some events. People seemed certain about the occurrence of some events, and the impossibility of others. Yet experience showed that their occurrence was distributed between 80% for the "sure events" and 20% for the "impossible ones". Evidence of overconfidence has been found in several contexts[3].

DHS (1998) built on these findings of overconfidence bias to construct a theoretical 3- period model. Their model allows a momentum effect in stock returns, especially a positive short-lag autocorrelation in stock returns. They assume that people are overconfident about the precision of their private signals. People get their private information during period 1. The public signal starts to arrive during period 2, but with noise. It becomes clear progressively until the full achievement of the public signal during period 3. Overconfidence in the private signal causes the period 1 stock price to overreact. During period 2, when noisy public information signal arrives, the inefficient deviation of price is partially corrected, on average. The correction will be achieved in the subsequent period 3. This overreaction and the subsequent correction imply that the covariance between period 1 and period 2 price variations is negative ($cov(p_1-p_0,\ p_2-p_1) < 0$). But, as the public signal starts to arrive, the prices movement corrections take place until full correction by the end of period 3. The correction process taking place drives a positive correlation ($cov(p_2-p_1,\ p_3-p_2) > 0$). As a result, a momentum effect is observed through this correction progressive phase.

### *2.2. The Self-Attribution Bias*

The self attribution bias refers to a tendency to attribute their success to their own talents while blaming failure on bad luck. Doing this repeatedly, will lead people to the pleasing but erroneous conclusion that they are very talented. This was documented in several experimental studies, ran especially by Fischhoff (1982), Langer and Roth (1975), which

[3] Examples include physicians and nurses (Christensen, Szalanski and Bushyhead 1981 and Baumann, Deber and Thompson 1991), engineers (Kidd 1970, Attorneys, Wagenaar and Keren 1986), negotiators (Neale and Bazerman 1990), entrepreneurs (Cooper, Woo, and Dunkelberg 1988), managers (Russo and Schoemaker 1992), investment bankers and market professionals such as security analysts and economic forecasters (Vonholstein 1972, Ahlers and Lakonishok 1988, Froot and Frankel 1989)….

gave evidence that people tend to give themselves credit for past success, and blame external factors for failure.

DHS (1998) integrate this psychological bias into their model together with the overconfidence bias. The mixture of these two psychological biases allows their model a better driving for momentum effect in stocks returns.

According to DHS (1998), and under the effect of the self attribution bias, the confidence of the investor rises when public information is in accord with his private information, but does not fall when it isn't. DHS (1998) consider an informed investor one who buys or sells a security based on his private information. This investor becomes more confident as the later public signal confirms his trade. However, his confidence decreases by little or remains constant when the public information does not confirm his intuition. This implies that, on average, public information increases confidence, thus accentuating overreaction. An ongoing overreaction in subsequent periods leads to positive autocorrelation in stock price changes, during the initial overreaction phase. Hence, introducing the self attribution bias to the model, we should observe a momentum effect, both during the overreaction and the correction phase.

### *2.3. The Conservatism Bias*

The psychological bias of conservatism was first documented in the experiment run by Edwards (1962). His experiment showed that people tend to accumulate and overweight past evidence and underweight recent evidence. This bias causes a progressive assimilation and incorporation of new evidence. As a consequence, people seem to adjust and actualize their beliefs and judgments slowly and gradually.

Building on this conclusion, BSV (1998) argued that the momentum effect documented in the stock returns is the result of systematic errors that investors make when using public information to form expectations about future cash flows. Thus, under the effect of conservatism bias, investors tend to underweight new information relative to prior information and under react to news, which causes a progressive incorporation of news in stock prices. This gradual reaction creates a momentum effect in stock returns.

To build their model, BSV assumed only one investor and only one stock in the financial market. Furthermore, when the evolution of the earnings is random, the expectation lies between two regimes: a continuation in earnings trend, or a reverting regime. Thus, the prediction of next earnings announcement depends on two factors. The investor has to anticipate the nature of the regime and the sign of previous earnings. If it is a trending regime, the investor anticipates the same sign (as the previous one) for next earnings. If it is a reverting regime, the investor anticipates an opposite sign.

In BSV model, the conservatism bias let the investor bet on the persistence of the regime, ignoring that this regime may change at any time. Thus and under the conservatism bias, the investor seemed to forget the random character of stock returns and tended to overweight his prior impression and belief about the stock. This attitude resulted in an under reaction to recent evidences and news and a continuity in the evolution of stock prices until the full incorporation of the news. During this period of under reaction, it appeared very plausible to observe a momentum effect in stock returns.

The effect of conservatism behavior on the profitability of momentum strategies was tested by Doukas and McKnight (2003) on a sample of 13 European stock markets through the 1998-2001 period. The dispersion of analyst forecasts was used as a proxy for the weight of information. The results showed that the forecast dispersion is inversely related to the profitability of momentum strategies.

### *2.4. The Representativeness Bias*

Kahneman and Tversky (1974) showed that when people try to determine the probability that a data set A is generated by a model B or that an object A belongs to a class B, they often use the representativeness bias. This means that they evaluate the probability by the degree to which A reflects the essential characteristics of B.

In other words, the representativeness bias leads people to reduce or shorten spontaneous evidence and information in making decision and judgment. People tend to overweight some particular evidence, which they think sufficient and descriptive of the situation , and underweight or take no notice of evidence they think unimportant and trivial.

BSV (1998) were also interested in this particular bias, which they added to their model. In BSV's model, the effect of the representativeness bias appeared when the investor had to choose the regime of earnings announcement evolution. The nature of the regime "reverting or trending" was assumed depending on the latest evolution of announced earnings. Hence, the recent evolution of earnings announcements was sufficient and representative enough of the future evolution of future earnings[4].

So, the beliefs and anticipations of the investor are spontaneously affected by the representativeness bias. Furthermore, the investor is likely to rely more and more on his belief about the regime considered, and to underweight new evidences. When the new announcements have the same sign as anticipations, there will be an overreaction to news. Conversely, when earnings announcements are of opposite sign to anticipations, the investor tends to disregard it and under react to news, which causes a continuation in stock prices, and a momentum effect in stock returns.

### *2.5. The Slow Diffusion Information or Limited Capacity of Computation Bias*

The psychological biases evoked earlier, underline the bias of dismissing the interpretation and the process of making judgment. The present bias of limited capacity of computation does not underline the way of mind thinking and processing, but the natural incapacity of the human mind to process all available and potential information and evidence when making a decision or judgment. This bias presents a break with the condition of exclusivity and exhaustivity of the human mind, which is requested by Bayesian rationality.

Hong and Stein (1999) built a model, which allowed a momentum effect through the limited capacity of the computation of agents. The emphasis was on heterogeneity across investors, who observe different pieces of private information at different points in time. They assumed that each agent considered a particular set of information in making his decision. Nevertheless, they considered two types of agents "new watchers" and "momentum agents". The first group observed new private evidence, and made decisions only according to this private information, ignoring past and previous changes in stock prices. The second group could not observe or receive private signals, but tried to extract them from previous changes in stock prices, supposed to reflect the private signal initially acquired by informed agents. These agents were called momentum agents, because they usually reacted in the same sense to the observed change in stock prices.

[4] To better illustrate their philosophy of thinking, consider the following example: H refers to a positive variation of earnings and L to a negative variation. Now, suppose these two schemes of previous stock earnings evolutions: LHLLHLHLH, and LHLLLLLL. Although, the two regimes are random, the investor will conclude a reverting regime after the observation of the first evolution, and a trending regime after the observation of the second one.

More formally, Hong and Stein (1999) assumed the arrival of new positive information at instant t. The new watchers received the signal and reacted to news but not sufficiently. This under reaction stemmed from the lack of some other piece of pertinent information by new watchers. Nevertheless, as soon as the momentum agents noticed the positive move of stock prices, they deduced the arrival of new information and reacted in the same sense, driving prices up and thus causing a momentum effect.

Hong, Lim and Stein (2000) and Doukas and McKnight (2003) tested the Hong-Stein (1999) version of under reaction hypothesis. To test the assumption that firm-specific information diffuses gradually across the investing public, they used the residual analyst coverage as a proxy for the rate of information diffusion. They found that momentum strategies worked better on stocks with low analyst coverage.

## 3. Empirical Research Design

As we mentioned earlier, our goal is not to test how psychological biases drive a momentum effect in stock return, but to find evidence for the existence of these psychological biases in an emerging market. We are especially interested in those psychological biases that may drive a momentum effect in Tunisian stock returns[5]. Precisely, we would like to know if the theory, as suggested and tested in developing markets, works as well in emerging markets, and especially in the Tunisian one. In order to meet this objective, we could have used the same approaches as DHS (1998), BSV (1998), Hong and Stein (1999), Hong et al (2000), etc… However, we would have had a problem of data availability and been faced with the problems of small samples. These approaches need big samples to split in sub-samples in order to test the consequences of the proposed biases on stock returns[6]. Even the use of analyst coverage could not be used because this kind of information does not exist.

To overcome this difficulty, we chose the cognitive approach which deals with attitudes[7]. Our approach lies between exploration and confirmation. It can be seen as exploratory if we look at the identification of psychological biases among Tunisian stock market investors. It may be considered as confirmatory if we test to what extent the psychological biases suggested by the theory really exist in emerging markets[8].

To achieve our purpose we adopt a survey approach that uses the investigation technique through the development and distribution of a questionnaire.

### *3.1. Questionnaire Conception*

In the development of the questionnaire, we split our questions into two categories: the first one is derived from the available literature presented in the previous section. The second part was suggested by financial analysts during the interviewing phase, which led to the design of

[5] In an earlier work that has not been published yet, we investigated the existence of momentum in the Tunisian Stock Exchange during 1998-2004 period. It was shown that stock returns exhibited a momentum at medium term horizons ranging from 3 to 9 months. The best strategy (a classification period of 9 months and a holding period of 3 months) earned approximately three percent per month.

[6] There are only about 50 listed firms in the BVMT. This number is too small to carry studies based on stock returns. This behavioural empirical literature uses discriminatory procedure, through the distinction of three or more groups of stocks that are supposed to have different returns movement, and tries then to validate some implications which supposedly result from the psychological biases.

[7] As examples of cognitive approaches, we can cite Langer and Roth (1975) and Fischhoff and Lichtenstein (1977).

[8] This particularity will influence the interpretation of our results.

the questionnaire. The questionnaire contains 13 questions dealing with the psychological biases either suggested by theory or professionals.

*3.1.1. Questions coming from the theory*

Questions one to four deal with the overconfidence bias (DHS 1998). Question seven deals with the slow diffusion of information or the limited capacity of computation bias (Hong and Stein 1999). Questions eleven and twelve deal with the conservatism bias (BSV 1998). Finally, Question 13 deals with the representiveness bias (BSV 1998).

*3.1.2. Questions suggested by professionals*

In our primary investigation and while conducting our preliminary interviews, professionals (financial intermediaries) suggested three other biases: mimetism, over opportunism and sensitivity to rumors.

**Mimetism bias:** The existence of this bias can be justified in emerging markets where most investors don't have enough knowledge of financial rules and security analysis. That's why they build their decision on the decision of others who are supposed to better know the market and firms[9]. Question ten is intended to test for the existence of this bias.

**Over opportunism:** Being over opportunistic means that the investor tries to realize the maximum gain from each opportunity. When the investor identifies an opportunity in buying some stocks, his tendency is to buy the maximum quantity and at any price. If this attitude is quickly transmitted to other investors, we should observe a trending move in stock prices, which drives momentum[10]. This issue is addressed by questions five and six.

**Sensitivity to rumors**: According to the professionals of the BVMT, people are highly sensitive to rumors, particularly those concerning a liquid stock. In fact, being very sensitive to rumors creates a trending and continuous move in stock prices, which causes a momentum effect in stock returns. Questions eight and nine are designed to test for the existence of this bias.

### *3.2. The Questions Design*

The general design of the questions adopted in our investigation is as follows:

**The question construction:** for each question, we imagine a particular situation or scenario that may occur in the financial market that identifies the influence of a particular psychological bias. Then, we propose the different potential behaviors that investors may show regarding their position. Usually, there are five possible behaviors an investor might have in a financial market given a certain situation or information about a particular stock: (1) sell aggressively to liquidate his position, (2) weaken his position, (3) abstain and maintain the same position, (4) buy moderately to reinforce his position or (5) buy aggressively to strengthen his position. However, the choice between five options is not adopted for all our questions. The number of choices depends on the nature of the question asked.

[9] Although this bias was not suggested to explain momentum, many researchers suggested mimetism as an anomaly to explain abnormal returns.

[10] This behavior can take place as follow: to take advantage of an opportunity the seller may offer high prices, exceeding the maximum allowed by the market authority (open price + 3%). By this way, any effective transaction wouldn't be achieved, and the stock will be reserved on the rise during some subsequent period. During this period, we should observe a trending move in stock price and a momentum effect in the stock returns.

A scenario describes a situation about the stock (the firm performance or the market price). For example to underline the over confidence bias, we asked about the behavior of the Tunisian investor in the situation of his anticipation not being realized about the evolution of the stock price. To underline the conservatism bias, we asked about his reaction after a change in the past reality of the stock. To underline the mimetism bias, we asked about his behavior once he identifies a trend movement in the stock price that is unsupported by any information. To underline the over opportunism bias, we asked about his behavior when he identifies some opportunity in a particular stock.

**The attitude rating scale:** since we are in a multi-choice case, we had to choose between a category scale, a numerical scale or a constant sum scale. We adopted the last one for two reasons: the first is the nature of the questions asked and the second is the nature of the respondents.

The options given to the respondents are not independent. The sum of all these options should describe the whole situation. Hence, each option is a component of the situation and represents a frequency. By the way the respondents gave the percentage of investors who might choose a particular option, the sum of all these options would describe the whole situation and must equal 100%[11].

**The pretest phase:** In our pretest phase, we started with questions inspired by theory. These questions were revised and enriched by contextual ones. The rating scale adopted during the first wave of the distribution of our questionnaires was a numerical scale (Likert scale from 1 to 5). But, some bias was detected when examining the responses. Then we realized that the adopted rating scale was not appropriate and decided to replace it with a constant sum scale[12]. Following that, we redistributed the questionnaire and collected all responses.

### *3.3. Sample and Data*

It is useful to note that the data of interest to us is the attitude of investors that may drive momentum. This data cannot come from the prices of stocks, but should come from investors. However, investors don't have direct access to the stock market. Their orders are executed by a financial intermediary (the only agent who has the authority to execute orders). That's why we address our questionnaires to financial intermediaries operating in the Tunisian stock market. Hence, the stock market intermediaries are the ideal target for our questionnaire, particularly the commercial agents working at the front office. These professionals are in daily contact with Tunisian investors, receiving and executing their orders.

So our target population is commercial agents of stock market intermediary houses. In the Tunisian financial markets, there are 31 stock market intermediary houses. Each house employs 1 to 6 commercial agents. The whole population amounts to 110 commercial agents. From this population we arbitrarily draw a sample of 78 commercial agents, giving us a representativeness rate of 71%. However, we get only 55 responses. Furthermore, and after verification, 6 questionnaires were rejected because they were not correctly filled. Consequently, we get a final sample of 49 units with a representativeness rate of 45% of the target population.

[11] Adding to that, the constant sum scale works best with respondents with high educational levels (Zikmund 2003, 312). Our respondents are commercial agents working in a market intermediaries society (Société d'Intermédiaires en Bourse). Those persons are executive and have at least a bachelor degree.

[12] See previous paragraph for the justification of a constant rating scale.

The data collected from our survey consists of the different responses to the asked questions. Since for every question there are many options, each option can be represented by a variable, the total number of variables is 51[13]. Our input data is 49 units by 51 variables, which give a total number of 2499 observations. The survey was conducted during the period May - June 2006.

## 4. Empirical Results

Before presenting the results of the statistical analysis, let's recall that the purpose of this survey is to identify the kind of psychological and cognitive biases that may drive momentum in emerging markets, and especially in the Tunisian stock market. To fulfill this goal we conduct three types of statistical analysis: a univariate, a bivariate and a multivariate analysis. We present the results of these analyses.

### *4.1. Searching typical behaviors: the results of the univariate analysis*

Table 2 presents the descriptive statistics of our data.

We can see from table 2 that overall, the responses are not concentrated, but rather a bit dispersed since the variables range varies form a minimum of 20% to a maximum of 95%. When we look at the variables mean, we can deduce some behaviors related to those suggested by the theory or by the professionals.

For example, the evidence weakly supports the overconfidence bias. From questions 1 to 4, all the variables related to overconfidence have low scores (only 27% for V2, 33% for V4, 35% for V7 and 24% for V10). Since the total score of question 1 (V1+V2+V3) should equal 100%, the score of question 1 approximates the overconfidence and the total score of V2 and V3 should approximate the lack of confidence. Hence, the score of overconfidence (27%) is too low compared to that of lack of confidence (73%)[14]. To corroborate these findings, we tried to look at the frequency table (see table 3). We can see from the table that a high frequency is associated with low score for overconfidence variables (i.e. 61.2% of the respondents gave a score less than 20% for V2, 51% gave a score less than 25% for V4 and 61% gave a score less than 30% for V7). However, high scores were given to lack of confidence variables (i.e. 50% gave a score higher than 40% for V1, 51% gave a score higher than 40% for V6 and 59% gave a score higher than 30% for V8).

The disposition effect bias doesn't seem to exist at the BVMT, since V9 and V10 have a low score (31% and 24% respectively).

However, there is evidence for conservatism (the percentage mean is approximately 55% from question eleven and 53% from question twelve). This high percentage shows that investors are rather conservative in their action and believe in their stocks. There is also evidence for representativeness bias. From question thirteen, we can see that only 15% (V43) of investors use full and exhaustive information. Around 85% of investors make inference about a particular indicator (see V44 to V51). Mimetism seems present in the Tunisian stock market since 76% of investors imitate others (V31 and V32 from question ten).

The results confirm the biases suggested by professionals. Overopportunism is very pronounced with a mean of 81% from question five and 72% from question six. Sensitivity to rumors is very present among investors and is more pronounced for liquid stocks with a mean

[13] Table 1 gives the code and the definition of the variables extracted from the questionnaire.

[14] We can reach the same conclusion when comparing the score 33% of V4 (overconfidence) and the score 67% of V5 and V6 (lack of confidence), or the score of V7 (35%) compared to V8 and V9 (65%) or the score of V10 (24%) compared to V11 to V13 (76%).

of 75% (V23 and V24 from question eight) than for non liquid stocks with a mean of 60% (V27 and V28 from question nine).

### *4.2. Looking at coherence in attitudes: the result of the bivariate analysis*

The aim of the bivariate analysis is to check the coherence of the responses and confirm (by examining the sign and significance of correlations between some variables) the behavioral biases detected by the univariate analysis[15].

#### *4.2.1. The Overconfidence bias:*

Overconfidence is the psychological attitude of a person who reacts instantly and immediately to news, and is especially not concerned or influenced by the beliefs and the reactions of others. The overconfidence bias can be confirmed by exploring the correlations between V2 (V4) and V7 (V10). Variables V2 and V4 show respectively two features of the psychological attitude: sure either in order transmission or in expectation. Hence, a positive correlation between V2 and V4 on one hand and V7 and V10 on the other hand indicates an attitude of overconfidence among investors. Panel 1 of table 5 reports no significant correlations between these variables. Furthermore, we can draw attention to the negative correlation between V2 (sure in order transmission) on one hand and V11 (abstain after price fall although a high expectation), V20 (buy small and slowly waiting for market reaction) and V22 (abstain wait market reaction) on the other hand. These results confirm the Tunisian investor's lack of confidence. Being sure and certain of his opinion and anticipation should be the attitude of a person who continues and perseveres in his decision and action. Nevertheless, the results show an opposite behavior.

#### *4.2.2. The Self attribution bias:*

We can see in Panel 2 of table 5 that this behavioral concept is approached simultaneously by V7 and V9, which respectively capture the attitude of the investor, when his anticipations are realized, and when his anticipations are not. This attitude of relating success to own competence and intelligence, and failure to bad luck should be translated by a significant positive correlation between V7 and V10 and between V9 and V13. However, no significant correlation was detected, which implies the inexistence of this psychological bias at the BVMT.

#### *4.2.3. The Disposition Effect:*

Panel 3 of table 5 shows that the behavioral attitude of retaining the losers stocks and quickly getting rid of the winners stocks (captured in the questionnaire simultaneously by V9 and V10) does not seem to exist at the BVMT. The results don't show any positive significant correlations between these two variables as expected.

#### *4.2.4. The Mimetism bias:*

Panel 4 of table 5 illustrates this bias, which makes people very sensitive to the actions of others. In the questionnaire, this behavioral concept is captured by V31. This attitude may be the attitude of investors who overweight the market reaction in their decision set, or limit

[15] Before conducting the correlation analysis, we test if the variables are normally distributed. Table 4 presents the results of the Kolmogorov-Smirnov test. If the two variables are normally distributed, we choose the Pearson coefficient. Spearman coefficient is calculated if at least one variable is not normally distributed.

their information base to market reaction, thinking that this variable represents a sufficient enough perspective of the stock. The results support this behavior. As expected we find a significant positive correlation between V31 and V49 which captures the representativeness of the market reaction.

Furthermore we find a positive correlation between V31 (buy aggressively when prices rise without any prior information) and V48 (use private information) which captures the representativeness of the private information.

This attitude may characterize emerging markets, where people lack public information and have a weak expertise in security analysis. That's why they rely on others (who are supposed to have private information) and follow market movement suspecting the presence of private information they don't own.

We can complete the analysis of this bias by examining the coherence of responses through the study of some correlations relating to the opposite attitude of a person who is not concerned or influenced by the reaction of others and prefers to understand and interpret information before taking action. This attitude is directly appreciated by V33 (abstain when prices rise although no prior information). Effectively, we find a significant positive correlation between V33 on one hand and V21, V25 and V29 on the other hand. This illustrates an attitude of a person who tries to understand and assimilate news and information before reacting. Furthermore, this translates the attitude of a person who prefers waiting for rumors to actually happen, before participating in any movement.

*4.2.5. The Over opportunism bias:*

Panel 5 of table 5 shows that this concept is captured by V14. It translates the attitude of a person who is constantly seeking opportunities, and who intervenes aggressively once he identifies one. We find a significant positive correlation between this variable and V51 (give credit to broker of the stock), which captures the representativeness of the notoriety of the financial intermediary (initial sponsor of the stock). The opportunist attitude seems to characterize people who evaluate the stock not from its earnings perspectives, but from its financial sponsor (thinking that a stock that has a good and powerful financial intermediary does not risk price falls)[16].

Furthermore, significant negative correlation between V14 and V43 (use full information) provides more evidence to this opportunistic behavior. The opportunistic people don't consider available and potential information in making decision.

*4.2.6. The Conservatism bias:*

Conservatism is the psychological attitude of persons who are influenced by the past. This behavioral attitude is captured in the questionnaire by V34, V36, V39, and V40. The first couple of variables capture the conservatism regarding past performance (book or market data). The second couple of variables capture the conservatism relating to enthusiasm following some major past events, like mergers, acquisitions, alliances, partnerships, etc …

The significant positive correlation between V34 and V40 and the negative one between V34 and V13 indicate that people rely heavily on the past and that bad news doesn't imply selling aggressively. These two results support the existence of conservatism bias at the BVMT. From this result, the conservative investor seems to be indifferent to the nature of past records (book data, market data or a particular event). Furthermore, the negative correlation means

[16] At the BVMT, professionals think that holding a stock sponsored by MAC (Investment Company of UAE) is safe, because they don't incur any risk. The sponsor can overcome any risky situation.

that a conservative investor does not process a quick withdraw, when his anticipations are not met (he persists influenced by the past performance).

Our results also show a significant positive correlation between V36 and V2 and V36 and V4. This means that investors are likely to maintain or strengthen their position in a stock even after bad news.

Finally, the significant positive correlation found between V40 and V46 corroborate the conservative attitude. In fact, a person who is too influenced by the past major events (V40) should be a person who assigns great importance to these major past events in evaluating stocks (V46).

Hence, the results of the bivariate analysis are very useful. First, we are ensure the coherence of the interviewee's responses since the correlations among variables describing the same psychological attitudes are convergent. Second, we succeed to underline some particular psychological attitudes presented by Tunisian investors, such as: distrust, fear of bad surprises, excessive loss aversion, fear of regret sentiment, etc…

### *4.3. Looking at global attitudes: the results of the factor analysis*

After looking at most behavioral biases through a univariate and bivariate analyses, let's see now if the Tunisian investor's behavior can be aggregated in global attitudes. The factor analysis is well suited for this kind of analysis.

When conducting our principal component analysis, we started by letting the number factors not fixed. Sixteen factors were extracted. But after controlling for the correlation between the extracted factors and the original variables, we noticed that only five factors have a high correlation (more than 0.4) with the original variables. Then we fixed the number of factors to five and applied a rotation technique to get a good fit and interpretable results. Table 6 shows the final results. A careful examination of the output allows us to retrieve roughly the findings of the univariate and bivariate analyses. We now try to interpret the extracted factors according to our conceptual analysis. The five factors correspond to five axes, each approaching a behavioral bias of Tunisian investors.

Axis 1: Prudence or cautiousness axis

This axis is positively related to V21, V24, V26, V29, V30 and V33. It is negatively related to V19, V23, V27, V37, V45 and V48. All these variables indicate a prudent attitude either in actions or in approach. Usually subject to this psychological attitude, investors prefer to await the reaction of the market, to analyze and understand information and wait for public information. In fact, they have fear of post regret sentiment, which is very painful and unpleasant.

Axis 2: Overopportunism axis

This axis is positively related to V4, V17, V31, V36, and V49, which indicate an opportunistic behavior. It is negatively related to V18, V28, V32, V43 and V44, which indicate a prudent attitude either in actions or in approach. This corroborates our earlier findings. This axis translates the opportunistic attitude of investors who are persistently seeking opportunities instead of looking for the appropriate evaluation of a stock.

Axis 3: Lack of confidence axis

This axis is positively related to variables linked to hesitation (V11, V16, V22, V38 and V50) and negatively related to those showing confidence (V2, V7, V12 and V45). From these

findings we deduce a lack of confidence in the attitude of the Tunisian investor. These findings confirm those of the univariate and bivariate analysis.

Axis 4: Conservatism axis

This axis is positively related to V34 (indifferent to bad news for well established company), V39 (indifferent to low return after good strategic action), V40 (demand the stock even low return after good strategic action), V46 (use historical strategic information) and V47 (use industry information). It is negatively related to V42 (sell slowly even slow return after good strategic action), and V51 (give credit to broker of the stock). All these results show the conservative attitude of Tunisian investors.

Axis 5: Mimetism axis

This axis is positively related to V3, V15 and V25. It is negatively related to V1, V5 and V14. All these variables are related to mimetic behavior. This psychological attitude is underlined by the tendency to follow others, maybe because they suspect some private information.

## 5. Conclusion

In this research we focused on factors which may drive momentum in emerging markets. We started from the established theory of behavioral finance to understand what makes stock returns exhibit momentum. Then, we designed a questionnaire and distributed it to financial intermediaries. The purpose of this investigation was to identify the existence of some psychological biases suggested by the behavioral finance theory or proposed by Tunisian professionals.

We subjected the collected data to some analysis in order to understand Tunisian market investors and explain the observed momentum. The results of our univariate, bivariate and multivariate analysis converge.

The Tunisian investor seems to be prudent, non confident, overopportunistic, sensitive to rumors and conservative. These psychological biases were confirmed either by examining the correlation between variables or by the aggregation of all these variables in factorial axes. Our study could be helpful for investors, analysts, portfolio managers or financial market authorities.

For investors, it may help them understand the subjective part of their behavior and control their emotions. It may also help financial analysts and portfolio managers to give their recommendations more accurately. Finally, it may help market authorities to supply traders and investors with information that could elucidate the market.

The most important recommendation we can give market authorities is to work on the diffusion of public information to investors. Market transparency would reduce asymmetric information and let people rely more on public rather than private information and become less sensitive to rumors.

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**Table 1: Variables Definition**

| Questions | Variable code | Variable definition |
|---|---|---|
| 1 | V1 | hesitant order transmission |
| | V2 | sure order transmission |
| | V3 | follow broker advice |
| 2 | V4 | sure in expectation |
| | V5 | not sure in expectation |
| | V6 | no opinion in expectation |
| 3 | V7 | buy after realization of expectation |
| | V8 | abstain after realization of expectation |
| | V9 | sell after realization of expectation |
| 4 | V10 | buy after price fall although a high expectation (price rise) |
| | V11 | abstain after price fall although a high expectation (price rise) |
| | V12 | reduce position after price fall although a high expectation (price rise) |
| | V13 | sell after price fall although a high expectation (price rise) |
| 5 | V14 | buy big quantity when good opportunity |
| | V15 | buy medium quantity when good opportunity |
| | V16 | buy low quantity when good opportunity |
| 6 | V17 | buy open when good opportunity |
| | V18 | buy close when good opportunity |
| 7 | V19 | buy full immediately when positive information |
| | V20 | buy small and slowly waiting for market reaction |
| | V21 | buy small and slowly waiting for other news |
| | V22 | abstain wait market reaction |
| 8 | V23 | buy liquid stock aggressively when positive rumor or sell when negative |
| | V24 | buy liquid stock slowly when positive rumor or sell when negative |
| | V25 | abstain liquid stock wait confirmation when rumor |
| | V26 | abstain liquid stock wait market reaction |
| 9 | V27 | buy non liquid stock aggressively when positive rumor sell when negative |
| | V28 | buy non liquid stock slowly when positive rumor sell when negative |
| | V29 | abstain non liquid stock wait confirmation when rumor |
| | V30 | abstain non liquid stock wait market reaction |
| 10 | V31 | buy aggressively when price rise, without any prior information |
| | V32 | buy slowly when price rise without any prior information |
| | V33 | abstain when price rise without any prior information |
| 11 | V34 | indifferent to bad news for well established company |
| | V35 | hesitant to bad news for established company |
| | V36 | maintain position when bad news if well established company |
| | V37 | sell immediately when bad news even if established company |
| | V38 | sell slowly when bad news if established company |
| 12 | V39 | indifferent to low return after good strategic action |
| | V40 | demand the stock even low return after good strategic action |
| | V41 | liquidate position when low return even after strategic action |
| | V42 | sell slowly even slow return after good strategic action |
| 13 | V43 | use full information |
| | V44 | use historical accounting information |
| | V45 | use market history |
| | V46 | use historical strategic information |
| | V47 | use industry information |
| | V48 | use private information |
| | V49 | use market perception |
| | V50 | give credit to wide held company |
| | V51 | give credit to broker of the stock |

## Table 2: Descriptive Statistics

| | N | | Mean | Median | Std. Dev | Range | Min | Max | Percentiles | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Valid | Missing | | | | | | | 25 | 50 | 75 |
| V1 | 49 | 0 | ,4224 | ,4000 | ,23140 | ,75 | ,05 | ,80 | ,2000 | ,4000 | ,6250 |
| V2 | 49 | 0 | ,2698 | ,2000 | ,21163 | ,87 | ,05 | ,92 | ,1000 | ,2000 | ,3500 |
| V3 | 49 | 0 | ,3078 | ,2500 | ,18971 | ,77 | ,03 | ,80 | ,2000 | ,2500 | ,4000 |
| V4 | 49 | 0 | ,3286 | ,2500 | ,21578 | ,75 | ,05 | ,80 | ,2000 | ,2500 | ,4250 |
| V5 | 49 | 0 | ,2633 | ,2500 | ,15968 | ,65 | ,05 | ,70 | ,1250 | ,2500 | ,3000 |
| V6 | 49 | 0 | ,4173 | ,5000 | ,21030 | ,65 | ,05 | ,70 | ,2500 | ,5000 | ,6000 |
| V7 | 49 | 0 | ,3484 | ,3000 | ,23608 | ,85 | ,05 | ,90 | ,1750 | ,3000 | ,5000 |
| V8 | 49 | 0 | ,3418 | ,3000 | ,21122 | ,78 | ,02 | ,80 | ,1750 | ,3000 | ,5000 |
| V9 | 49 | 0 | ,3098 | ,2500 | ,20634 | ,75 | ,05 | ,80 | ,1500 | ,2500 | ,4000 |
| V10 | 49 | 0 | ,2398 | ,2000 | ,15612 | ,70 | ,00 | ,70 | ,1000 | ,2000 | ,3250 |
| V11 | 49 | 0 | ,2612 | ,2000 | ,16306 | ,70 | ,00 | ,70 | ,1500 | ,2000 | ,3000 |
| V12 | 49 | 0 | ,3151 | ,3000 | ,15735 | ,65 | ,05 | ,70 | ,2000 | ,3000 | ,4000 |
| V13 | 49 | 0 | ,1839 | ,1000 | ,17250 | ,75 | ,00 | ,75 | ,0500 | ,1000 | ,2750 |
| V14 | 49 | 0 | ,3418 | ,2500 | ,24310 | ,75 | ,05 | ,80 | ,1000 | ,2500 | ,6000 |
| V15 | 49 | 0 | ,4663 | ,4500 | ,19105 | ,60 | ,20 | ,80 | ,3000 | ,4500 | ,6250 |
| V16 | 49 | 0 | ,1898 | ,1500 | ,14105 | ,50 | ,00 | ,50 | ,1000 | ,1500 | ,3000 |
| V17 | 49 | 0 | ,7173 | ,7000 | ,14236 | ,60 | ,30 | ,90 | ,6500 | ,7000 | ,8000 |
| V18 | 49 | 0 | ,2827 | ,3000 | ,14236 | ,60 | ,10 | ,70 | ,2000 | ,3000 | ,3500 |
| V19 | 49 | 0 | ,3902 | ,4000 | ,22980 | ,83 | ,02 | ,85 | ,2000 | ,4000 | ,6000 |
| V20 | 49 | 0 | ,2998 | ,3000 | ,13958 | ,65 | ,05 | ,70 | ,2000 | ,3000 | ,3750 |
| V21 | 49 | 0 | ,1957 | ,2000 | ,11293 | ,40 | ,00 | ,40 | ,1000 | ,2000 | ,3000 |
| V22 | 49 | 0 | ,1188 | ,1000 | ,09001 | ,40 | ,00 | ,40 | ,0500 | ,1000 | ,2000 |
| V23 | 49 | 0 | ,5000 | ,5000 | ,23363 | ,85 | ,05 | ,90 | ,3250 | ,5000 | ,7000 |
| V24 | 49 | 0 | ,2510 | ,2500 | ,12353 | ,55 | ,05 | ,60 | ,1500 | ,2500 | ,3000 |
| V25 | 49 | 0 | ,1300 | ,1000 | ,14245 | ,70 | ,00 | ,70 | ,0500 | ,1000 | ,1500 |
| V26 | 49 | 0 | ,1190 | ,1000 | ,10373 | ,50 | ,00 | ,50 | ,0500 | ,1000 | ,1500 |
| V27 | 49 | 0 | ,3347 | ,3000 | ,24005 | ,85 | ,00 | ,85 | ,1000 | ,3000 | ,5000 |
| V28 | 49 | 0 | ,2735 | ,3000 | ,16805 | ,90 | ,00 | ,90 | ,1500 | ,3000 | ,3500 |
| V29 | 49 | 0 | ,1959 | ,2000 | ,16609 | ,70 | ,00 | ,70 | ,0500 | ,2000 | ,2750 |
| V30 | 49 | 0 | ,2000 | ,1500 | ,20052 | ,80 | ,00 | ,80 | ,0500 | ,1500 | ,3000 |
| V31 | 49 | 0 | ,3829 | ,4000 | ,23893 | ,80 | ,00 | ,80 | ,2000 | ,4000 | ,6000 |
| V32 | 49 | 0 | ,3796 | ,3000 | ,20890 | ,95 | ,05 | 1,00 | ,2500 | ,3000 | ,5000 |
| V33 | 49 | 0 | ,2355 | ,2000 | ,17922 | ,70 | ,00 | ,70 | ,1000 | ,2000 | ,3000 |
| V34 | 49 | 0 | ,1176 | ,1000 | ,10709 | ,40 | ,00 | ,40 | ,0050 | ,1000 | ,2000 |
| V35 | 49 | 0 | ,2357 | ,2000 | ,15546 | ,60 | ,00 | ,60 | ,1000 | ,2000 | ,3000 |
| V36 | 49 | 0 | ,1927 | ,2000 | ,15007 | ,70 | ,00 | ,70 | ,1000 | ,2000 | ,2250 |
| V37 | 49 | 0 | ,2367 | ,2000 | ,22448 | ,80 | ,00 | ,80 | ,0500 | ,2000 | ,3250 |
| V38 | 49 | 0 | ,2224 | ,2000 | ,12079 | ,50 | ,00 | ,50 | ,1500 | ,2000 | ,3000 |
| V39 | 49 | 0 | ,3031 | ,2500 | ,17091 | ,65 | ,05 | ,70 | ,2000 | ,2500 | ,4000 |
| V40 | 49 | 0 | ,2327 | ,2000 | ,12186 | ,50 | ,00 | ,50 | ,1750 | ,2000 | ,3250 |
| V41 | 49 | 0 | ,1796 | ,1500 | ,15307 | ,70 | ,00 | ,70 | ,0750 | ,1500 | ,2250 |
| V42 | 49 | 0 | ,2776 | ,2000 | ,19393 | ,70 | ,00 | ,70 | ,1500 | ,2000 | ,4000 |
| V43 | 49 | 0 | ,1514 | ,1000 | ,12457 | ,53 | ,00 | ,53 | ,0500 | ,1000 | ,2250 |
| V44 | 49 | 0 | ,1294 | ,1000 | ,13504 | ,70 | ,00 | ,70 | ,0500 | ,1000 | ,1750 |
| V45 | 49 | 0 | ,1371 | ,1000 | ,12448 | ,68 | ,02 | ,70 | ,0500 | ,1000 | ,2000 |
| V46 | 49 | 0 | ,0800 | ,0500 | ,05784 | ,20 | ,00 | ,20 | ,0500 | ,0500 | ,1000 |
| V47 | 49 | 0 | ,0698 | ,0500 | ,05117 | ,20 | ,00 | ,20 | ,0500 | ,0500 | ,1000 |
| V48 | 49 | 0 | ,0882 | ,0500 | ,07615 | ,40 | ,00 | ,40 | ,0500 | ,0500 | ,1000 |
| V49 | 49 | 0 | ,1420 | ,1500 | ,09097 | ,40 | ,00 | ,40 | ,0750 | ,1500 | ,2000 |
| V50 | 49 | 0 | ,0627 | ,0500 | ,04343 | ,20 | ,00 | ,20 | ,0500 | ,0500 | ,1000 |
| V51 | 49 | 0 | ,1435 | ,1500 | ,10925 | ,50 | ,00 | ,50 | ,0500 | ,1500 | ,2000 |

## Table 3: Frequency Table

**V1**

| Valid | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| ,05 | 5 | 10,2 | 10,2 | 10,2 |
| ,10 | 3 | 6,1 | 6,1 | 16,3 |
| ,20 | 5 | 10,2 | 10,2 | 26,5 |
| ,25 | 3 | 6,1 | 6,1 | 32,7 |
| ,30 | 2 | 4,1 | 4,1 | 36,7 |
| ,35 | 1 | 2,0 | 2,0 | 38,8 |
| ,40 | 6 | 12,2 | 12,2 | 51,0 |
| ,50 | 6 | 12,2 | 12,2 | 63,3 |
| ,60 | 6 | 12,2 | 12,2 | 75,5 |
| ,65 | 1 | 2,0 | 2,0 | 77,6 |
| ,70 | 10 | 20,4 | 20,4 | 98,0 |
| ,80 | 1 | 2,0 | 2,0 | 100,0 |
| Total | 49 | 100,0 | 100,0 | |

**V2**

| Valid | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| ,05 | 6 | 12,2 | 12,2 | 12,2 |
| ,10 | 7 | 14,3 | 14,3 | 26,5 |
| ,15 | 3 | 6,1 | 6,1 | 32,7 |
| ,20 | 14 | 28,6 | 28,6 | 61,2 |
| ,25 | 3 | 6,1 | 6,1 | 67,3 |
| ,30 | 4 | 8,2 | 8,2 | 75,5 |
| ,40 | 4 | 8,2 | 8,2 | 83,7 |
| ,50 | 2 | 4,1 | 4,1 | 87,8 |
| ,60 | 1 | 2,0 | 2,0 | 89,8 |
| ,70 | 3 | 6,1 | 6,1 | 95,9 |
| ,80 | 1 | 2,0 | 2,0 | 98,0 |
| ,92 | 1 | 2,0 | 2,0 | 100,0 |
| Total | 49 | 100,0 | 100,0 | |

**V3**

| Valid | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| ,05 | 4 | 8,2 | 8,2 | 8,2 |
| ,10 | 6 | 12,2 | 12,2 | 20,4 |
| ,15 | 1 | 2,0 | 2,0 | 22,4 |
| ,20 | 6 | 12,2 | 12,2 | 34,7 |
| ,25 | 8 | 16,3 | 16,3 | 51,0 |
| ,30 | 7 | 14,3 | 14,3 | 65,3 |
| ,40 | 5 | 10,2 | 10,2 | 75,5 |
| ,45 | 1 | 2,0 | 2,0 | 77,6 |
| ,50 | 1 | 2,0 | 2,0 | 79,6 |
| ,60 | 3 | 6,1 | 6,1 | 85,7 |
| ,70 | 5 | 10,2 | 10,2 | 95,9 |
| ,80 | 2 | 4,1 | 4,1 | 100,0 |
| Total | 49 | 100,0 | 100,0 | |

**V4**

| Valid | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| ,05 | 6 | 12,2 | 12,2 | 12,2 |
| ,15 | 1 | 2,0 | 2,0 | 26,5 |
| ,20 | 6 | 12,2 | 12,2 | 38,8 |
| ,25 | 7 | 14,3 | 14,3 | 53,1 |
| ,30 | 15 | 30,6 | 30,6 | 83,7 |
| ,40 | 1 | 2,0 | 2,0 | 85,7 |
| ,45 | 1 | 2,0 | 2,0 | 87,8 |
| ,50 | 2 | 4,1 | 4,1 | 91,8 |
| ,60 | 2 | 4,1 | 4,1 | 95,9 |
| ,65 | 1 | 2,0 | 2,0 | 98,0 |
| ,70 | 1 | 2,0 | 2,0 | 100,0 |
| Total | 49 | 100,0 | 100,0 | |

**V5**

| Valid | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| ,05 | 2 | 4,1 | 4,1 | 4,1 |
| ,10 | 6 | 12,2 | 12,2 | 16,3 |
| ,15 | 1 | 2,0 | 2,0 | 18,4 |
| ,20 | 1 | 2,0 | 2,0 | 20,4 |
| ,25 | 3 | 6,1 | 6,1 | 26,5 |
| ,30 | 6 | 12,2 | 12,2 | 38,8 |
| ,40 | 5 | 10,2 | 10,2 | 49,0 |
| ,50 | 10 | 20,4 | 20,4 | 69,4 |
| ,60 | 6 | 12,2 | 12,2 | 81,6 |
| ,65 | 1 | 2,0 | 2,0 | 83,7 |
| ,70 | 8 | 16,3 | 16,3 | 100,0 |
| Total | 49 | 100,0 | 100,0 | |

**V6**

| Valid | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| ,05 | 5 | 10,2 | 10,2 | 10,2 |
| ,10 | 5 | 10,2 | 10,2 | 20,4 |
| ,12 | 1 | 2,0 | 2,0 | 22,4 |
| ,15 | 1 | 2,0 | 2,0 | 24,5 |
| ,20 | 7 | 14,3 | 14,3 | 38,8 |
| ,25 | 1 | 2,0 | 2,0 | 40,8 |
| ,30 | 10 | 20,4 | 20,4 | 61,2 |
| ,40 | 5 | 10,2 | 10,2 | 71,4 |
| ,50 | 3 | 6,1 | 6,1 | 77,6 |
| ,60 | 1 | 2,0 | 2,0 | 79,6 |
| ,70 | 8 | 16,3 | 16,3 | 95,9 |
| ,80 | 1 | 2,0 | 2,0 | 98,0 |
| ,90 | 1 | 2,0 | 2,0 | 100,0 |
| Total | 49 | 100,0 | 100,0 | |

## Table 3:Frequency Table Cntd.

**V7**

| Valid | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| ,02 | 1 | 2,0 | 2,0 | 2,0 |
| ,05 | 4 | 8,2 | 8,2 | 10,2 |
| ,10 | 3 | 6,1 | 6,1 | 16,3 |
| ,13 | 1 | 2,0 | 2,0 | 18,4 |
| ,15 | 3 | 6,1 | 6,1 | 24,5 |
| ,20 | 4 | 8,2 | 8,2 | 32,7 |
| ,25 | 4 | 8,2 | 8,2 | 40,8 |
| ,30 | 9 | 18,4 | 18,4 | 59,2 |
| ,40 | 5 | 10,2 | 10,2 | 69,4 |
| ,50 | 5 | 10,2 | 10,2 | 79,6 |
| ,60 | 5 | 10,2 | 10,2 | 89,8 |
| ,70 | 3 | 6,1 | 6,1 | 95,9 |
| ,75 | 1 | 2,0 | 2,0 | 98,0 |
| ,80 | 1 | 2,0 | 2,0 | 100,0 |
| Total | 49 | 100,0 | 100,0 | |

**Table 4: One-Sample Kolmogorov-Smirnov Test**

| | N | Normal Parameters(a,b) | | Most Extreme Differences | | | Kolmogorov -Smirnov Z | Asymp. Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Absolute | Positive | Negative | | |
| V1 | 49 | ,4224 | ,23140 | ,146 | ,098 | -,146 | 1,021 | ,248 |
| V2 | 49 | ,2698 | ,21163 | ,241 | ,241 | -,149 | 1,690 | ,007 |
| V3 | 49 | ,3078 | ,18971 | ,231 | ,231 | -,116 | 1,614 | ,011 |
| V4 | 49 | ,3286 | ,21578 | ,206 | ,206 | -,100 | 1,440 | ,032 |
| V5 | 49 | ,2633 | ,15968 | ,246 | ,246 | -,091 | 1,720 | ,005 |
| V6 | 49 | ,4173 | ,21030 | ,163 | ,099 | -,163 | 1,141 | ,148 |
| V7 | 49 | ,3484 | ,23608 | ,193 | ,193 | -,136 | 1,354 | ,051 |
| V8 | 49 | ,3418 | ,21122 | ,170 | ,170 | -,093 | 1,192 | ,116 |
| V9 | 49 | ,3098 | ,20634 | ,152 | ,152 | -,104 | 1,062 | ,210 |
| V10 | 49 | ,2398 | ,15612 | ,192 | ,192 | -,114 | 1,347 | ,053 |
| V11 | 49 | ,2612 | ,16306 | ,182 | ,182 | -,100 | 1,271 | ,079 |
| V12 | 49 | ,3151 | ,15735 | ,150 | ,150 | -,067 | 1,053 | ,217 |
| V13 | 49 | ,1839 | ,17250 | ,197 | ,197 | -,143 | 1,382 | ,044 |
| V14 | 49 | ,3418 | ,24310 | ,210 | ,210 | -,142 | 1,470 | ,027 |
| V15 | 49 | ,4663 | ,19105 | ,155 | ,155 | -,125 | 1,085 | ,190 |
| V16 | 49 | ,1898 | ,14105 | ,187 | ,187 | -,120 | 1,308 | ,065 |
| V17 | 49 | ,7173 | ,14236 | ,207 | ,117 | -,207 | 1,446 | ,030 |
| V18 | 49 | ,2827 | ,14236 | ,207 | ,207 | -,117 | 1,446 | ,030 |
| V19 | 49 | ,3902 | ,22980 | ,123 | ,123 | -,112 | ,858 | ,453 |
| V20 | 49 | ,2998 | ,13958 | ,234 | ,234 | -,115 | 1,639 | ,009 |
| V21 | 49 | ,1957 | ,11293 | ,138 | ,138 | -,128 | ,965 | ,309 |
| V22 | 49 | ,1188 | | | | | | |

## Table 5 : Correlation coefficients

## Panel 1 : Correlation matrix for overconfidence bias

| The overconfidence bias : Pearson | | | V2 | V4 | V7 | V10 | V11 | V12 | V13 | V19 | V20 | V22 | V50 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Spearman's rho | V2 | Correlation Coefficient | 1,000 | -,003 | -,063 | ,063 | -,299(*) | ,148 | ,217 | ,403(**) | -,442(**) | -,368(**) | -,148 |
| | | Sig. (2-tailed) | . | ,984 | ,668 | ,668 | ,037 | ,310 | ,134 | ,004 | ,001 | ,009 | ,312 |
| | | N | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 49 |
| | V4 | Correlation Coefficient | | 1,000 | -,042 | -,196 | -,297(*) | ,031 | ,280 | ,183 | -,113 | -,244 | -,040 |
| | | Sig. (2-tailed) | | . | ,775 | ,177 | ,038 | ,835 | ,051 | ,208 | ,440 | ,092 | ,786 |
| | | N | | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 49 |
| | V7 | Correlation Coefficient | | | 1,000 | -,100 | -,206 | ,230 | ,039 | ,073 | ,098 | -,232 | -,063 |
| | | Sig. (2-tailed) | | | . | ,492 | ,155 | ,112 | ,792 | ,617 | ,501 | ,108 | ,666 |
| | | N | | | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 49 |
| | V10 | Correlation Coefficient | | | | 1,000 | ,324(*) | -,412(**) | -,544(**) | -,058 | -,029 | ,266 | -,011 |
| | | Sig. (2-tailed) | | | | . | ,023 | ,003 | ,000 | ,691 | ,845 | ,064 | ,939 |
| | | N | | | | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 49 |
| | V11 | Correlation Coefficient | | | | | 1,000 | -,560(**) | -,593(**) | -,351(*) | ,377(**) | ,243 | ,284(*) |
| | | Sig. (2-tailed) | | | | | . | ,000 | ,000 | ,013 | ,008 | ,093 | ,048 |
| | | N | | | | | 49 | 49 | 49 | 49 | 49 | 49 | 49 |
| | V12 | Correlation Coefficient | | | | | | 1,000 | ,148 | ,109 | -,095 | -,155 | -,220 |
| | | Sig. (2-tailed) | | | | | | . | ,310 | ,454 | ,514 | ,288 | ,129 |
| | | N | | | | | | 49 | 49 | 49 | 49 | 49 | 49 |
| | V13 | Correlation Coefficient | | | | | | | 1,000 | ,375(**) | -,300(*) | -,233 | -,121 |
| | | Sig. (2-tailed) | | | | | | | . | ,008 | ,036 | ,107 | ,406 |
| | | N | | | | | | | 49 | 49 | 49 | 49 | 49 |
| | V19 | Correlation Coefficient | | | | | | | | 1,000 | -,762(**) | -,725(**) | -,183 |
| | | Sig. (2-tailed) | | | | | | | | . | ,000 | ,000 | ,209 |
| | | N | | | | | | | | 49 | 49 | 49 | 49 |
| | V20 | Correlation Coefficient | | | | | | | | | 1,000 | ,409(**) | ,166 |
| | | Sig. (2-tailed) | | | | | | | | | . | ,004 | ,253 |
| | | N | | | | | | | | | 49 | 49 | 49 |
| | V22 | Correlation Coefficient | | | | | | | | | | 1,000 | ,078 |
| | | Sig. (2-tailed) | | | | | | | | | | . | ,593 |
| | | N | | | | | | | | | | 49 | 49 |
| | V50 | Correlation Coefficient | | | | | | | | | | | 1,000 |
| | | Sig. (2-tailed) | | | | | | | | | | | . |
| | | N | | | | | | | | | | | 49 |

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

## Panel 2 : Correlation matrix for self attribution and disposition effect biases

| Self attribution and disposition effect biases: Pearson | | V7 | V9 | V10 |
|---|---|---|---|---|
| V7 | Pearson Correlation | 1 | -,551(**) | -,111 |
| | Sig. (2-tailed) | | ,000 | ,448 |
| | N | 49 | 49 | 49 |
| V9 | Pearson Correlation | | 1 | ,006 |
| | Sig. (2-tailed) | | | ,969 |
| | N | | 49 | 49 |
| V10 | Pearson Correlation | | | 1 |
| | Sig. (2-tailed) | | | |
| | N | | | 49 |

** Correlation is significant at the 0.01 level (2-tailed).

| Self attribution and disposition effect biases: Spearman | | | V7 | V9 | V10 | V13 |
|---|---|---|---|---|---|---|
| Spearman's rho | V7 | Correlation Coefficient | 1,000 | -,545(**) | -,100 | ,039 |
| | | Sig. (2-tailed) | . | ,000 | ,492 | ,792 |
| | | N | 49 | 49 | 49 | 49 |
| | V9 | Correlation Coefficient | | 1,000 | ,015 | ,001 |
| | | Sig. (2-tailed) | | . | ,918 | ,996 |
| | | N | | 49 | 49 | 49 |
| | V10 | Correlation Coefficient | | | 1,000 | -,544(**) |
| | | Sig. (2-tailed) | | | . | ,000 |
| | | N | | | 49 | 49 |
| | V13 | Correlation Coefficient | | | | 1,000 |
| | | Sig. (2-tailed) | | | | . |
| | | N | | | | 49 |

** Correlation is significant at the 0.01 level (2-tailed).

## Panel 4 : Correlation matrix for mimetism bias

| The mimetism bias : Pearson | | V21 | V31 | V33 | V49 |
|---|---|---|---|---|---|
| V21 | Pearson Correlation | 1 | -,193 | ,288(*) | -,092 |
| | Sig. (2-tailed) | | ,184 | ,045 | ,531 |
| | N | 49 | 49 | 49 | 49 |
| V31 | Pearson Correlation | | 1 | -,512(**) | ,307(*) |
| | Sig. (2-tailed) | | | ,000 | ,032 |
| | N | | 49 | 49 | 49 |
| V33 | Pearson Correlation | | | 1 | ,022 |
| | Sig. (2-tailed) | | | | ,883 |
| | N | | | 49 | 49 |
| V49 | Pearson Correlation | | | | 1 |
| | Sig. (2-tailed) | | | | |
| | N | | | | 49 |

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

| The mimetism bias : Spearman | | | V21 | V31 | V33 | V49 | V25 | V29 | V48 |
|---|---|---|---|---|---|---|---|---|---|
| Spearman's rho | V21 | Correlation Coefficient | 1,000 | -,154 | ,324(*) | -,037 | ,472(**) | ,273 | -,016 |
| | | Sig. (2-tailed) | . | ,289 | ,023 | ,798 | ,001 | ,058 | ,913 |
| | | N | 49 | 49 | 49 | 49 | 49 | 49 | 49 |
| | V31 | Correlation Coefficient | | 1,000 | -,482(**) | ,332(*) | -,323(*) | -,155 | ,374(**) |
| | | Sig. (2-tailed) | | . | ,000 | ,020 | ,024 | ,288 | ,008 |
| | | N | | 49 | 49 | 49 | 49 | 49 | 49 |
| | V33 | Correlation Coefficient | | | 1,000 | ,079 | ,491(**) | ,506(**) | -,172 |
| | | Sig. (2-tailed) | | | . | ,588 | ,000 | ,000 | ,238 |
| | | N | | | 49 | 49 | 49 | 49 | 49 |
| | V49 | Correlation Coefficient | | | | 1,000 | ,036 | -,008 | ,332(*) |
| | | Sig. (2-tailed) | | | | . | ,804 | ,956 | ,020 |
| | | N | | | | 49 | 49 | 49 | 49 |
| | V25 | Correlation Coefficient | | | | | 1,000 | ,308(*) | -,244 |
| | | Sig. (2-tailed) | | | | | . | ,031 | ,091 |
| | | N | | | | | 49 | 49 | 49 |
| | V29 | Correlation Coefficient | | | | | | 1,000 | -,046 |
| | | Sig. (2-tailed) | | | | | | . | ,753 |
| | | N | | | | | | 49 | 49 |
| | V48 | Correlation Coefficient | | | | | | | 1,000 |
| | | Sig. (2-tailed) | | | | | | | . |
| | | N | | | | | | | 49 |

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

## Panel 5 : Correlation matrix for overopportunism bias

| The Over opportunism bias: Pearson | | | V14 | V43 | V51 |
|---|---|---|---|---|---|
| Spearman's rho | V14 | Correlation Coefficient | 1,000 | -,304(*) | ,315(*) |
| | | Sig. (2-tailed) | . | ,034 | ,028 |
| | | N | 49 | 49 | 49 |
| | V43 | Correlation Coefficient | | 1,000 | -,201 |
| | | Sig. (2-tailed) | | . | ,166 |
| | | N | | 49 | 49 |
| | V51 | Correlation Coefficient | | | 1,000 |
| | | Sig. (2-tailed) | | | . |
| | | N | | | 49 |

* Correlation is significant at the 0.05 level (2-tailed).

## Panel 6 : Correlation matrix for conservatism bias

| The conservatism bias: Pearson | | V34 | V39 |
|---|---|---|---|
| V34 | Pearson Correlation | 1 | ,189 |
| | Sig. (2-tailed) | | ,193 |
| | N | 49 | 49 |
| V39 | Pearson Correlation | | 1 |
| | Sig. (2-tailed) | | |
| | N | | 49 |

| The conservatism bias: Spearman | | | V34 | V39 | V2 | V4 | V13 | V36 | V40 | V46 |
|---|---|---|---|---|---|---|---|---|---|---|
| Spearman's rho | V34 | Correlation Coefficient | 1,000 | ,264 | ,020 | -,064 | -,240 | ,225 | ,393(**) | ,287(*) |
| | | Sig. (2-tailed) | . | ,067 | ,891 | ,661 | ,097 | ,119 | ,005 | ,046 |
| | | N | 49 | 49 | 49 | 49 | 49 | 49 | 49 | 49 |
| | V39 | Correlation Coefficient | | 1,000 | -,247 | -,126 | -,267 | -,241 | ,230 | ,246 |
| | | Sig. (2-tailed) | | . | ,087 | ,389 | ,063 | ,095 | ,111 | ,088 |
| | | N | | 49 | 49 | 49 | 49 | 49 | 49 | 49 |
| | V2 | Correlation Coefficient | | | 1,000 | -,003 | ,217 | ,131 | -,020 | -,112 |
| | | Sig. (2-tailed) | | | . | ,984 | ,134 | ,371 | ,892 | ,442 |
| | | N | | | 49 | 49 | 49 | 49 | 49 | 49 |
| | V4 | Correlation Coefficient | | | | 1,000 | ,280 | ,374(**) | -,106 | -,109 |
| | | Sig. (2-tailed) | | | | . | ,051 | ,008 | ,468 | ,456 |
| | | N | | | | 49 | 49 | 49 | 49 | 49 |
| | V13 | Correlation Coefficient | | | | | 1,000 | ,067 | -,159 | -,059 |
| | | Sig. (2-tailed) | | | | | . | ,648 | ,275 | ,689 |
| | | N | | | | | 49 | 49 | 49 | 49 |
| | V36 | Correlation Coefficient | | | | | | 1,000 | ,306(*) | ,039 |
| | | Sig. (2-tailed) | | | | | | . | ,033 | ,792 |
| | | N | | | | | | 49 | 49 | 49 |
| | V40 | Correlation Coefficient | | | | | | | 1,000 | ,406(**) |
| | | Sig. (2-tailed) | | | | | | | . | ,004 |
| | | N | | | | | | | 49 | 49 |
| | V46 | Correlation Coefficient | | | | | | | | 1,000 |
| | | Sig. (2-tailed) | | | | | | | | . |
| | | N | | | | | | | | 49 |

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

**Table 6: Results of the Principal Component Analysis**

**Pattern Matrix(a)**

| | Component | | | | |
|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** |
| **V1** | ,123 | ,005 | ,146 | ,226 | **-,629** |
| **V2** | ,076 | ,027 | **-,444** | -,351 | ,135 |
| **V3** | -,235 | -,036 | ,317 | ,115 | **,616** |
| **V4** | ,039 | **,503** | -,317 | -,241 | ,164 |
| **V5** | -,092 | -,084 | ,144 | ,195 | **-,426** |
| **V6** | -,045 | -,395 | ,259 | ,070 | ,100 |
| **V7** | -,021 | -,210 | **-,442** | ,061 | -,066 |
| **V8** | ,084 | ,112 | ,209 | -,185 | ,374 |
| **V9** | -,062 | ,126 | ,291 | ,119 | -,306 |
| **V10** | ,205 | ,120 | ,292 | ,092 | ,088 |
| **V11** | ,129 | -,263 | **,504** | -,098 | ,050 |
| **V12** | ,031 | -,210 | **-,516** | ,136 | -,003 |
| **V13** | -,335 | ,332 | -,270 | -,115 | -,125 |
| **V14** | ,173 | ,274 | -,231 | -,342 | **-,582** |
| **V15** | -,095 | -,356 | -,092 | ,383 | **,489** |
| **V16** | -,156 | ,002 | **,500** | ,069 | ,330 |
| **V17** | ,067 | **,403** | ,086 | ,002 | -,164 |
| **V18** | -,067 | **-,403** | -,086 | -,002 | ,164 |
| **V19** | **-,597** | -,005 | -,485 | -,124 | -,028 |
| **V20** | ,347 | -,228 | ,159 | ,193 | ,180 |
| **V21** | **,545** | ,103 | ,302 | -,142 | -,002 |
| **V22** | ,270 | ,229 | **,480** | ,420 | -,006 |
| **V23** | **-,748** | ,007 | -,081 | ,004 | -,294 |
| **V24** | **,513** | ,015 | -,057 | ,002 | -,001 |
| **V25** | ,384 | -,041 | ,000 | -,093 | **,656** |
| **V26** | **,545** | ,023 | ,250 | ,118 | -,238 |
| **V27** | **-,819** | ,089 | ,169 | -,166 | ,157 |
| **V28** | -,100 | **-,416** | -,131 | -,147 | -,190 |
| **V29** | **,583** | ,152 | -,146 | ,181 | ,321 |
| **V30** | **,579** | ,120 | ,073 | ,156 | -,279 |
| **V31** | -,371 | **,606** | -,117 | ,473 | -,011 |
| **V32** | ,075 | **-,749** | -,070 | -,304 | -,156 |
| **V33** | **,404** | ,079 | ,246 | -,280 | ,196 |
| **V34** | ,236 | -,008 | -,271 | **,465** | -,070 |
| **V35** | ,268 | -,120 | -,389 | ,221 | ,105 |
| **V36** | ,271 | **,504** | -,396 | -,105 | ,347 |
| **V37** | **-,620** | -,168 | ,383 | -,049 | -,157 |
| **V38** | ,203 | -,256 | **,547** | -,431 | -,190 |
| **V39** | ,212 | -,406 | -,125 | **,567** | -,338 |
| **V40** | ,364 | ,194 | -,222 | **,612** | -,166 |
| **V41** | **-,658** | ,459 | ,283 | -,125 | ,146 |
| **V42** | ,142 | -,055 | ,031 | **-,827** | ,278 |

**Table 6: Results of the Principal Component Analysis Contd.**

**Pattern Matrix(a) Contd.**

| | | | | | |
|---|---|---|---|---|---|
| **V43** | ,181 | **-,501** | ,081 | -,241 | ,393 |
| **V44** | -,110 | **-,582** | -,134 | ,045 | -,284 |
| **V45** | -,041 | -,012 | **-,602** | ,037 | ,234 |
| **V46** | ,254 | ,124 | ,222 | **,554** | -,043 |
| **V47** | ,150 | ,431 | ,259 | **,615** | -,052 |
| **V48** | **-,459** | ,272 | ,080 | ,163 | -,088 |
| **V49** | -,141 | **,519** | ,098 | ,008 | -,053 |
| **V50** | -,004 | -,057 | **,410** | -,065 | ,093 |
| **V51** | ,195 | ,444 | ,252 | **-,513** | -,223 |

Extraction Method: Principal Component Analysis.
Rotation Method: Promax with Kaiser Normalization.
Rotation converged in 20 iterations.