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Assessment of Cognitive Errors on Investor's Decision Making in Nigeria

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Abstract:
The study assessed the degree of influence of cognitive errors on investor's decision making. The study used primary data. The population consisted of clients of the top 10 stockbroking firms registered by the Nigerian Stock Exchange as at 31st January, 2017. These 10 firms were selected because they constituted 68.72% of total value of transactions as at 31st January, 2017. Data on assessment of cognitive errors in investment decision making among investors in Nigeria were obtained through structured questionnaire which was administered to 30 clients of each stockbroking firm, totalling 300. The data were analysed using percentage and binary logistic regression. The study concluded that cognitive errors, proxied by anchoring and adjustment bias, representative bias, illusion of control bias, hindsight bias, framing bias and gamblers fallacy, significantly influenced investor's decision making in Nigeria. The study therefore recommends that, investors should seek knowledge about behavioural biases to understand which biases they are susceptible to and how to either avoid or adapt to them.

Keywords: *Behavioural finance, cognitive error, anchoring bias, framing bias, hindsight bias, illusion of control bias*

1. Introduction

Traditional finance paradigm is founded on neoclassical economics which assumes that individuals' possess perfect knowledge, are risk averse and are strictly concerned about maximizing their personal utility. An investor that behaves this way is termed as a 'Rational Economic Man' (Chandra, 2008). A rational economic man is expected to make decisions consistent with the axioms of 'Utility Theory'. Friedman and Savage (1948) proposed the Utility theory by the analysis of choice under risk and uncertainty. They opined that it is possible to quantify exactly, how much utility an individual will derive based on the uncertain outcome of an economic decision. They propounded that individual can choose between various options to arrive at an optimal decision which maximizes the individual's expected utility. Normatively, this is how people should make economic decisions.

The work done by two psychologists Daniel Kahneman and Amos Tversky which contributed to psychology literature in the 1970s, served as basis which prompted a new paradigm in finance in the 1980s called Behavioural Finance. According to Nofsinger (2001), Behavioural finance differs from traditional finance in that it focuses on how investors and markets behave in practice rather than in theory by focusing on actual behaviour of investors in decision making. As knowledge in behavioural finance continues to increase, efforts to understand what drives individual investors and market behaviour will increase (Subash, 2012).

Complete understanding of human decision making might not be attainable because humans are not predictable by scientific models or theories but behavioural finance helps to provide framework to understand the implication of decision-making process of investors and financial practitioner. Behavioural finance does not assume that people behave rationally or put into consideration all information available to them in decision making and also, that markets are efficient but assumes people are 'normal'. According to Statman (1999), normal people have emotions and biases which impacts their decision as against 'rationality assumption.'

Behavioural finance describes behaviours and biases that differentiates individual investors from rational economic man. This was supported with notions of bounded rationality and cognitive limitation that is, individuals prefer decisions that moderately satisfy and not necessarily the optimum decision and that individuals do not have the ability to possess and process all relevant information as assumed by the traditional finance. According to Statman (1999), traditional finance asks too much of investors by assuming rationality, he proposed the rejection of the assumption of rationality of investors but as Statman (1999) wrote, 'Traditional finance individuals are modelled as rational while behavioural finance individuals are termed normal'. Rational investors will poses perfect rationality, self-interest, have perfect access to all relevant information and make an unbiased interpretation of information in a consistent manner while normal investors are expected to show biases as in the practical world as people tend to act 'normal' than rational.

It is expected for 'normal' individuals to act under biases, preference or personal beliefs and why individuals act according to these biases is yet to be identified by any researcher (Pompian, 2006). There are many biases identified by researchers over the decade but all of these biases are attributed to faulty reasoning that is, cognitive errors or feelings, that is, emotional biases. Statman (1999) who opined that traditional finance individuals are modelled as 'rational' while behavioural finance individuals are termed 'normal' further argued that, normal investors are expected to have beliefs, preferences and personal values which will result in biases in decision making. Financial market volatility caused by investors' unpredictable reactions to information for investment decisions is usually of concern to capital market operators and policy makers. According to Bernstein (1998), financial proofs discloses frequent patterns of inconsistency, irrationality, and unskillfulness in human behaviours when making decisions and choices while confronted with risk and uncertainty which in-turn affect the financial market. In similar manner, Obamuyi (2013) discussed that the Nigeria stock market is exposed to constant series of positive and negative sentiments created by unpredictable reactions of investors to information. He opined that this contributed to the crash of Nigeria stock market as at 2009. As a result of this views, the traditional finance view of investment decision making is being challenged by behavioural finance that view biases as involved in investment decisions. However, despite the availability of studies in developed economies linking sub-optimal investment decision with individual biases, such studies are sparse in Nigeria; hence this study.

2. Literature Review

2.1. Conceptual Review

2.1.1. Cognitive Errors

Cognitive errors are statistical, informational - processing and memory errors as a consequence of defective reasoning or analysis and personal beliefs that causes individual decisions to deviate from rational decisions of traditional finance. Cognitive errors or biases are better corrected than emotional biases as investors are better able to identify sources of logical biases and could easily adapt or modify their decision making processes even when the decision making process is not completely understood by the investor. Cognitive errors could be called blind spots or distortion in human intellectual. Cognitive errors basically stems from faulty reasoning and could be corrected for by better information, education and better advice and thus cognitive errors could be better corrected for to a large extent and even eliminated in investors decision making process.

Cognitive errors are classified into two categories. The first category is the belief perseverance biases. This category deals with the way information is being received, interpreted and updated, while the second category is the information processing errors by the investor.

2.1.2. Belief Perseverance Biases

These are biases that occur as a result of conflict of newly introduced information with earlier held views or cognitions. To overcome this form of conflict, individuals are inclined to notice information merely of relevance and concern to them (selective exposure), they disregard or alter information which conflicts with previously held beliefs (selective perception), or recall and take into consideration only information which affirms their previously held beliefs (selective retention). The biases categorised under this are conservatism bias, confirmation bias, representativeness bias, illusion of control bias and hindsight bias.

2.1.3. Information Processing Biases

Information processes biases give rise to information being processed and used irrationally or illogically. These biases deal with how information is being processed and applied for decision making process. The biases categorized under this are anchoring and adjustment bias, mental accounting, framing bias, availability bias and gamblers fallacy bias.

2.1.4. Assumptions of Behavioural Finance

Behavioural finance assumptions were made in order to relax the assumptions of rational decision making process of investors. The major assumptions are;

- Bounded Rationality: This assumption assumes knowledge capacity limit, that is, inability to have all relevant information or access to perfect information and unwinds the assumption which stated that all existing and obtainable information is usually used in wealth-maximization decision process by a rational economic investor. Simon (1957) propounded the concept of bounded rationality. Simon's studies revealed that people tend to satisfy and suffice rather than optimize when arriving at their decisions. Somil (2007) also opined that, the concept of rational investor was opposed by the neoclassical economic theory which assumes that every individual investor has restricted and limited access to data and information, also, an individual is limited by external constraining factors and one's personal behaviours.
- Cognitive Limitation: Cognitive limitation stems from the lack of resources either mentally or mechanically to thoroughly interpret or process available information. Cognitive limitation could be as a result of behavioural bias or lack of knowledge concerning available information. Gervais (2009) concluded that individual investors tend to make irrational decisions and do not behave rationally due to their limited capacity to process all available information.

2.2. Theoretical Framework

This study is anchored on the Prospect Theory.

2.2.1. Prospect Theory

Expected utility theory has dominated the study of decision making under uncertainty and risk. Expected utility theory was largely established as the normative model of rational decision and broadly employed as a descriptive model of economic behaviour. As such, it is therefore assumed that all sensible individual would desire to conform to the axioms of utility theory. Similarly, it is assumed that in reality, most individuals actually do comply with the axiom of utility theory more frequently (Kahneman & Tversky, 1979). In response to this assertion, Prospect theory was developed as an alternative to expected utility theory by Kahneman and Tversky (1979). This theory proposes how individuals make decisions in circumstances when they are to decide between alternatives that involve risks and uncertainty where they have to appraise probable losses or gains. The theory utilizes the perception of individuals and effects of framing bias, that is, the framing of alternatives and decisions as to either gains or losses and evaluating uncertain consequences. Kahneman and Tversky (1979) suggested that anomalies may arise as a result of editing of prospects. For example, the inconsistencies associated with the isolation effect result from the cancellation of common components because different choice could be interpreted in various forms, which could result to varying preference

The evaluating phase is the second phase of prospect theory. Kahneman and Tversky (1979) opined that individuals ascribe values on alternatives in terms of weighted and probability that is weighted outcome is used to decide expected utility.

2.3. Review of Empirical Studies

DeBondt and Thaler (1985) opined that people tend to over-react to dramatic and unanticipated information which can consequentially cause a substantially weak form of inefficiency in the stock market. They concluded that mental accounting is a cognitive tool which is usually employed by individuals to organise, estimate, appropriate, evaluate and monitor personal financial decisions.

Welch (2000) concluded that some investors, rationalise their decision making process based on facts that other investors are using by purchasing similar stocks. He opined that the behaviour of relying on other people's decisions help to create a personal sense of security for investors. they study further revealed that investors tend to align their decisions with the public opinion when making decisions for profit creation and concerning the prospects of certain stocks in value creation.

Ritter (2003) rejected the traditional norms and axioms of expected utility theory maximization with rational investors in efficient market. He suggested that, there are two building blocks of behavioural finance. Which are; cognitive psychology (How People Think) and the limit of arbitrage (when market will be inefficient). His study additional emphasized many perceived patterns like the stock market bubbles in Japan, Taiwan and The United States.

Chandra (2008) examined the connections between investor's attittude to risk and behavioural process of decision-making. The study observed that unlike the assumption proposed by the traditional finance theory, individual investors do not consistently make rational decisions when investing. The study concluded that investment decision-making is largely influenced by behavioural elements like cognitive dissonance, greed, fear, mental accounting, anchoring and various heuristics. It further recommended that behavioural factors that is biases, should be taken into consideration as well as risks factors while making investment decisions.

Gervais (2009) made a reviewed of literatures on the consequence of behavioural biases on capital budgeting. He discovered that people investors to be overconfident and exaggeratedly optimistic. He observed that biased firm managers over-invest their firm's cash flows, propose the start of more firms and trivia projects, originate too many mergers and are usually inclined to stick with unproductive investment policies longer than rational prescribed. The study therefore recommend corrective methods and tools to reduce the effect of manager's biases. This includes learning about financial biases and investment strategies, contractual incentives and proper use of tools like the inflated discount rate. The study further stress that the effectiveness of this methods and tools in curbing over investments are limited.

Ibrahim and Umar (2017) investigated the behavioural factors effect on investment performance in Nigerian capital market. The study determined that investment decision making were significantly swayed by prospect factors, heuristic, rationality and herding among Nigerian individual investors. It further recommends that investors should make proper research into cognitive errors and emotional biases in other to reduce the negative effects of behavioural biases when making investment decisions.

Ishaya, Muturi and Memba (2017) surveyed the influence of overconfidence bias on investment decision making. The study concluded that overconfidence has a significant influence on investment decision making and recommended that investors should seeks awareness on the bias in other to develop a strategy to minimize the effects of the bias and also seek proper advise and opinions from financial consultants before making investment decisions in other to minimize the influence of the bias.

3. Methodology

This study used primary data. The population consisted of clients of the top 10 stockbroking firms registered by the Nigerian Stock Exchange as at 31st January, 2017. These 10 firms were selected because they constituted 68.72% of total value of transactions as at 31st January, 2017. Data on assessment of cognitive errors on investment decision making among investors in Nigeria were obtained through structured questionnaire which was administered to 30 clients of each stockbroking firm, totalling 300. The data were analysed using simple percentage and binary logistic regression.

In determining the influence of cognitive errors on investment decision making, the variables, representative bias (REP), anchoring bias (ANCH), illusion of control bias (IOC), hindsight (HSG), framing bias (FRM) and gamblers (GAB) were used to capture the cognitive errors. The study adopted a model in line with Ishaya et al. (2017) in examining the influence of cognitive errors on investment decision. The data were analysed using binary logistic regression analysis.

3.1. Validity of Research Instrument

The internal consistency of the instrument was determined using Cronbach's Coefficient Alpha which indicate a Cronbach alpha of 0.818. The collected data were obtained from 28 respondents from two firms not included in the sample used for the research. Data were then analysed using Pearson Product Moment Correlation Coefficient (PPMC) to determine the degree of reliability of instrument of the study indicates the scale of all the items are within the satisfactory parameters. The estimate Cronbach's alpha is above the .80 which indicates good reliability.

3.2. Model Specification and Data Analysis

The study adopted model in line with Ishaya et al. (2017) in examining the influence of cognitive errors on investment decision. Cognitive errors were measured by; Representative Bias (REP), Anchoring and Adjustment Bias (ANCH), Illusion of Control (IOC), Hindsight Bias (HSG), Framing Bias (FRM), Gamblers Fallacy (GAB). Econometrically, the relationship between cognitive errors and investor's decision can be given as

INV=f (cognitive errors)

INV=f(Representative, Anchoring, Illusion of Control, Hindsight, Framing, Gamblers Fallacy)

$$INVt = \beta 0t + \beta 1\, REPt + \beta 2\, ANCHt + \beta 3\, IOCt + \beta 4\, HSGt + \beta 5\, FRMt + \beta 6\, GABt + \varepsilon \qquad (i)$$

Where; β_0, β_1, β_2, β_3, β_4, β_5, β_6 were coefficients in the model and ε is the residual value.

INV = Investor's Decision Making; REP = Representative Bias;

ANCH = Anchoring and Adjustment Bias; IOC = Illusion of Control;

FRM = Framing Bias; GAB = Gamblers Fallacy; β_0, β_1, β_2, β_3, β_4, β_5, $\beta_6 > 0$

These variable were captured on the questionnaire using a 5-point Likert scale namely; Very Low (VL), Low (L), Fair (F), High (H) and Very High (VH).

4. Result Interpretation and Discussion of Findings

Influence of Cognitive Errors on Investment Decision Making	Very Low Extent	Low extent	Fair extent	High Extent	Very High Extent
Consideration of past performance of a stock before making an investment	24 (12.8%)	27 (14.4%)	39 (20.7%)	67 (35.6%)	31 (16.5%)
Finding future value of a share through detailed analysis of past performance	21 (11.2%)	32 (17.0%)	44 (23.4%)	62 (33.0%)	29 (15.4%)
Familiarity with a company prompt investment in it	23 (12.2%)	28 (14.9%)	35 (18.6%)	81 (43.1%)	21 (11.2%)
Ability to anticipate the ends of good/poor market returns	27 (14.5%)	37 (19.9%)	54 (29.0%)	53 (28.5%)	15 (8.1%)
Consideration of returns or losses before investing	21 (11.2%)	27 (14.4%)	40 (21.4%)	64 (34.2%)	35 (18.7%)
Anticipating of a rise in value of a losing stock	24 (12.8%)	25 (13.4%)	57 (30.5%)	55 (29.4%)	26 (13.9%)

Table 1: Influence of Cognitive Errors on Investment Decision Making
Source: Field Survey (2017)

Variable	B	Z	Sig.	Exp(β)
REP	4.315	25.569	.000	74.786
ANCH	1.890	20.691	.000	6.621
IOC	-.567	2.771	.037	.567
HSG	-2.495	18.465	.000	.083
FRM	-1.352	11.741	.001	.259
GAB	-1.711	14.522	.000	.181
Constant	1.613	12.324	.000	5.019

Table 2: Logistic Regression Result
Source: Logistic Regression Result Analysis (2017)

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	65.451[a]	.627	.842

Table 3: Model Summary

a. Estimation Terminated at Iteration Number 8 Because Parameter Estimates Changed by Less Than .001.

Source: Result Analysis (2017)

The study assessed the influence of cognitive errors on investor's decision in Nigeria. Six cognitive errors were examined namely; Representative bias, Anchoring and Adjustment Bias, Illusion of Control Bias, Hindsight bias, Framing Bias and Gamblers Fallacy. These biases were tested on 188 investors and most of the investors exhibited representative bias and anchoring bias while illusion of control bias, hindsight bias, framing bias and gamblers fallacy was mildly exhibited according to the Exp (β) which represent the odd ration as seen Table 2.

All of the biases showed significant relationship with investment decision as the level of significance is < 0.05 according to Table 2. Cognitive errors like anchoring, representative, gamblers fallacy, hindsight were reviewed by Waweru et al. (2008), Subash (2012), Chandra (2008) and Sukanya (2015) on their influence with investor's decision making process. They all concluded that investor's decision making process were highly influenced by these biases which is confirmatory to the findings of this study on cognitive errors. The exhibition of this cognitive errors indicate a high likelihood of investors failing to update their beliefs constantly, fail to analyse investment properly by using smaller samples in investment analysis and ultimately, making investment decisions that are sub-optimal when compared to traditional finance investment analysis.

5. Conclusion and Recommendations

Cognitive errors are associated with intellectual capability of investors and the exhibition of cognitive errors indicate that investors in Nigeria possess less knowledge about finance and personal investment theories and they are more likely to rely on simple strategies which are not effective and efficient for investment and portfolio management. This agrees with the study of Ibrahim and Umar (2017) and Ishaya et al. (2017) concerning investors decision making process in Nigeria. It also confirms the conclusions of Waweru et al. (2008), Subash (2012), Chandra (2008) and Sukanya (2015) concerning the influence of behavioural factors on investment decision making.

Therefore, this study recommends that investors in Nigeria ought to increase their knowledge on behavioural finance by educating themselves on behavioural finance paradigms. Also, investors are advised to seek knowledge about behavioural biases to understand which biases they are susceptible to and how to either avoid or adapt to them. This will enhance their ability to make better investment decisions especially when making decisions under risk and uncertainty. The behavioural biases should also be reviewed always by investors as change in biases may occur over time. This could also be a means of improving and refreshing knowledge about behavioural finance by investors. It should be noted that, studies are yet to confirm the relationship between knowledge of behavioural finance and investor's rationality as rational investors tend to make good investment decisions, nevertheless, increase in knowledge of behavioural finance among investors is bound to help in making good investment decisions by investors.

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