Cognitive bias, intuitive attributes and investment decision quality in commercial real estate in Uganda

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Abstract

Purpose – This study examines the relationship between investor cognitive bias, investor intuitive attributes and investment decision quality in commercial real estate in Uganda.

Design/methodology/approach – A cross-sectional research survey was used in this study, and data were collected from 200 investors of commercial real estate in Uganda using a structured questionnaire. Hierarchical regression analysis was used to test the hypotheses derived under this study.

Findings – The results indicate that investor cognitive bias and investor intuitive attributes are positive and significant determinants of investment decision quality in commercial real estate. In addition, the two components of Investor cognitive bias (framing variation and cognitive heuristics) are positive and significant determinants of investment decision quality, whereas mental accounting is a negative and significant determinant of investment decision quality. For investor intuitive attributes, confidence degree and loss aversion are positive and significant determinants of investment decision quality, whereas herding behavior is a negative and significant determinant of investment decision quality in commercial real estate in Uganda.

Practical implications – For practitioners in commercial real estate sector should emphasize independent evaluation of investment opportunities (framing variation), simplify information regarding investments (Cognitive heuristics), believe in own abilities (Confidence degree), be risk averse (loss aversion) and avoid making decisions based on subjective visual mind (mental accounting) and group think/herding in order to make quality investment decisions. For policymakers, the study has illuminated factors such as provision of reliable information that ought to be taken into account when promulgating policies for regulation of the commercial real estate sector. This will help investors to come up with investment decisions which are plausible.

Originality/value – Few studies have focused on investor cognitive bias and investor intuitive attributes on investment decision quality in commercial real estate. This study is the first to examine the relationship, especially in the commercial real estate sector in a developing country like Uganda.

Keywords Investor cognitive bias, Investor intuitive attributes, Investment decision quality, Commercial real estates, Uganda

Paper type Research paper

1. Introduction

Commercial Real Estates (CRE) are properties developed and/or invested in specifically and exclusively for generating rental income and/or appreciation in value to realize capital gains upon disposal, rather than as a living space for the owner of the property. When developed for rental purposes, the tenants may use CREs for residential purposes (e.g. apartments), office/work space, shopping malls, industrial parks, warehouses and hotels. Globally, investments in commercial real estate have shown diverse trends. Bollinger and Pagliari (2019) argue that most commercial real estate developers opt for diversified portfolios that bring appropriate yields over time. The recent global outlook report indicates that the USA commercial real estate investment market registered a downward trend as compared to the Asia Pacific and European real estate investment markets, which earned 6% and 8% returns, respectively (Rossi and Vismara, 2018).

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Uganda's commercial real estate sector earns annual rate of returns of 6.8% for retails, 10.6% for residential apartments and 11.9% for office and industrial estates (Cytonn, 2019). However, despite the comparatively high and stable returns, the quality of investment decisions in CREs in Uganda is questionable amidst widening unmet demand in one section of the sector. National Housing policy (2016) revealed that Uganda still faces a housing shortage of 600,000 units, especially in Kampala amidst the ever-growing population. It is not clear why commercial real estate investors ignore investments in affordable and low-cost houses, yet according to Hashemi and Cruickshank (2015), there is more demand for them, and they are more profitable than commercial high-cost buildings, especially in developing countries.

Studies, this far, have tried to explain Investment Decision Quality (IDQ) using standard finance theories. For example, Brown and Matysiak (2000), Yu and Zhang (2008) and Subramaniam and Velnampy (2017) suggest that IDQ is associated with relatively high rates of return on invested capital, leading to capital accumulation, profits, value creation and cost-efficient and enable investors to allocate their capital to the most strategically viable projects. And IDQ is the cornerstone between good and bad investment outcomes, with the less-than-optimal investment decision quality arising out of imperfect information and high transaction costs that act as barriers to informed quality investment decisions among investors in the industry (Muhammad and Jantan, 2009). Xiao and Tan (2007) indicate that the commercial real estate marketplace displays inefficient qualities, including high transaction costs and lag in the supply of properties due to increasing demand and lack of organized market for short selling. Besides, commercial real estate investment decision requires relatively large amounts of capital (Kinnard, 2003). Available studies have ignored the behavioral theories that could provide the requisite explanations, especially in emerging economies since behaviors of individuals do change with time and circumstances.

The current study is motivated to fill the void and is anchored on two complimentary theories, i.e. expected utility theory and prospect theory to show how behavioral factors – investor cognitive bias and investor intuitive attributes, affect commercial real estate investment decisions. The behavioral factors, which originate from psychology, may appropriately explain investment decision quality in an inefficient market like commercial real estate (Kahneman and Tversky, 1979; Shukla *et al.*, 2020). Investor cognitive bias refers to framing, cognitive heuristics and mental accounting, while investor intuitive attributes are confidence degree, loss aversion and herding behavior (Carstens and Freybote, 2019; Jasiniak, 2018). According to Wofford *et al.* (2010), mental shortcuts are biases used by investors to cope with information processing in a situation of market inefficiency. Tan *et al.* (2018) argue that real estate asset pricing is not simply about the investment fundamentals. However, due to bounded rationality, we anchor to the past and others' opinions, we herd, we react emotionally and we are overly averse to loss when assessing the quality of investment decisions. We overweight timely information and discard evidence that does not support our preconceptions. Thus, this study examines the relationship between investor cognitive bias, intuitive investor attributes and investment decision quality in commercial real estate in Uganda and finds that both are significant predictors of investment decision quality.

1.1 Study setting

Uganda provides a good setting for a study on IDQ in commercial real estate. The sector is liberalized with private investors competing with a quasi-government owned housing and construction company – The National Housing and Construction Company Ltd (NHCC, 2021). There is an enabling law, the Condominium Property Act (2001) that enables the

development and subdivision of properties into units for sale and/or renting purposes. The CRE sector is undergoing transformation, with most mega developments being less than 5-years old comprising of properties for renting out and capital appreciation and mainly in urban areas. Areas closest to the Central Business District of the capital city Kampala attract rent of between USD 2,000–4,000 per month for the high-end residential apartments. Out right sale of apartments attracts prices ranging from US$ 160,000 to US$ 450,000. The commercial office space sector in Kampala is relatively nascent, having a few commercial buildings. The Grade A offices offer the highest total return of 11.4% and occupancy rates of 87.3%. The grade B offices dominate the market with a 63% market share, having the highest occupancy rates at 86.6%. In comparison with other East African cities, Kampala has higher total return than Nairobi, with average rental total return of 6.8%, 10.6% and 10.2% for apartment (rentals), office and retail, respectively, against Nairobi's 5.6%, 9, 3% and 10.0% for the same themes (Cytonn, 2019; Knight Frank, 2019).

The rest of the paper is organized as follows: Section 2 provides the study's theoretical underpinnings and develops the study hypotheses. Section 3 is the methodology; Section 4 provides the results of the study. Section 5 discusses the study's findings, and the final section covers the conclusion, implications and limitations of the study.

2. Literature review

2.1 Theoretical foundation

This study is underpinned by two complementing theories, the expected utility theory and prospect theory. The expected utility theory posits that decision quality is associated with the weighted sums obtained by adding the utility of outcomes multiplied by their respective probability of occurrence (Pompian and Wood, 2006). It assumes that the quality of investment decisions is determined purely on perfect rationality and risk averseness. That it requires an efficient market framework, whereby investors can correctly share and process all the information available and choose the highest profit alternatives. However, perfect rationality alone may not fully and accurately measure investment decision quality in commercial real estate. Information in commercial real estate is not readily available without high cost (Waweru *et al.*, 2008). Hence, the prospect theory is proposed to cover the void. The prospect theory postulates that risky prospects exhibit several pervasive effects inconsistent with utility theory's basic tenets (Kahneman and Tversky, 1979). Notably, people tend to underweight outcomes that are merely probable compared to outcomes obtained with certainty. This practice contributes to risk aversion in choices involving sure gains and risk-seeking in choices involving sure losses (Lewandowski, 2017).

Further, this leads to inconsistent preferences when the same choice appears in different forms. Thus, prospect theory may be considered an appropriate theory to account for the uncertainties as investors view decision quality based on mental accounting, framing variation, cognitive heuristics, confident degree, loss aversion and herding. The theory negates the objective advanced in the expected utility theory. Thus, a decision-maker perceives each consequence subjectively and evaluates the probabilities of outcomes *a priori* with personal knowledge and beliefs.

2.2 Investor cognitive biases and investment decision quality

According to Ramalakshmi *et al.* (2019) investor cognitive capabilities are diverse providing an assorted stock of capabilities upon which an investor can draw when making quality investment decisions. According to Pak and Mahmood (2015), investors are more likely to

make effective higher quality decisions when they use of cognitive biases. Cognitive biases are the common tendency to attain good and correct decisions especially in conditions uncertainty and complex market like the commercial real estate. Investor cognitive biases are characterized as analytic, deliberative and rule governed mechanisms for assessing the quality decision-making. According to Rath and De (2014) investor cognitive biases are the processes of choosing an alternative option out of several options. Investor cognitive biases are essentially linked to fulfill attentional objectives and goals of an organization for example profitable prediction decisions. It is the ability to generate, transform and manipulate information, suppress interfering information and focus the attention of investors to arriving at quality investment decisions (Kanovich *et al.*, 2013). Investors' cognitive biases arrive at quality decisions through addressing complex and ambiguous issues that involve large amount of individual and organizational investments (Pandey and Jessica, 2019). Korniotis and Kumar (2011) argue that investors use their cognitive capability to gather the same information but make different decisions. Scholars like Lockton (2012) and Wang and Ruhe (2007) assert that decision quality is affected by cognitive biases significantly and intrinsic in human decision actions. In this study, investor cognitive biases focus on framing variation, mental accounting and cognitive heuristics as the subcontracts explaining investment decision quality.

In general, a frame is a combination of beliefs, values, attitudes that people adopt to comprehend a state of affairs before a decision is made (Dobson and Poels, 2020; Hanafi, 2018). Framing variation is the investors' tendency to various decisions depending on how these choices are presented (Beebe *et al.*, 2014). Kirchler *et al.* (2005) and (Kahneman *et al.*, 1979) observe that framing is people's understanding of problems by their frames' presentation. Consequently, Beebe *et al.* (2014) contend that presentation influences the interpretation of the same information by actors, and as a consequence, it affects the quality of investment decisions. Scholars like Sah *et al.* (2010) argue that framing effects significantly impact human decision-making within a property context. Jin and Gallimore (2010), Guo *et al.* (2017), Tidwell and Gallimore (2014) found that the way information was presented in commercial real estate market reports changed people's perceptions and, thus, they confirmed the existence of framing effects in the quality of investment decisions. Additionally, Campitelli and Gobet (2010) assert that cognitive heuristics are psychological dimensions widely used to reduce the effort associated with the decision-making process (see Wood and Highhouse, 2014; Muradoglu and Harvey, 2012). Gigerenzer and Wolfgang (2011) suggest that heuristic biases are instrumental in circumstances that need a quick response to an investment decision opportunity and maximize the expected utility. Correspondingly, Lavin *et al.* (2019) state that people use cognitive heuristics in uncertain situations to advance a quality investment decision.

Furthermore, Bowden (2015) also proposes that less information, reliable computations and time can improve investment decision quality by increasing its accuracy. Scott and Lizieri (2012), using an economic experiment to investigate arbitrary anchors' strength in judgments over house prices among a student group, found that individuals are prone to significant errors when making value judgments through cognitive shortcuts to simplify decision-making.

Scholars like (Santi *et al.*, 2019; Anolm *et al.*, 2015) also suggest that mental accounting is another cognitive bias that can explain the individuals' cognitive operations to evaluate investment decisions to ensure quality. Mental accounting models describe how bounded rational individuals adopt internal control systems to allocate, evaluate and regulate their investment funds, which is crucial in investment decisions. According to Choi *et al.* (2014) mental accounting assumes that the decision-making happens in a piecemeal approach. This affects the achievement of quality investment decisions (Thaler, 2017) and agrees with Almenberg and Karapetyan (2009). They show that mental accounting makes capital

structures inefficient and makes investors such as homeowners, use sub-optimal debt structures to finance commercial real estate investments.

A string of earlier scholars, Diaz and Hansz (1997), Hansz and Diaz (2001), Diaz and Wolverton (1998) using experimental approach in behavioral property research have documented results that show that appraisers of investment decisions anchored to their previous estimates. Diaz (1997) posted mixed results that appraisers familiar with the market did not anchor. Specifically, Hansz and Diaz (2001), using samples divided into two groups, conducted a study to test the hypothesis that transaction price feedback may bias valuation judgment. Among participating appraisers, evidence of asymmetrical response was found. The group that received transaction feedback indicated that current judgments were "too low" responded with judgments in subsequent unrelated valuations significantly higher than those that received no feedback. The response from "too high" feedback was in the expected direction (lower value judgments) but was not significant. Additionally, valuation dispersion of around 10% revealed in these experiments is consistent with studies of valuation variability and may reflect an upper bound of typical commercial appraisal dispersion.

Drawing from behavioral anchoring study on real estate appraisal and anchoring to asking price, Bokhari and Geltner (2011) investigated using the anchoring behavior of real estate brokers experimentally on property pricing decisions. They found persistent anchoring to asking prices in their estimates. Roy Black further pursued this point and showed significant anchoring to the asking price in Diaz *et al.* (1999). Such bias is very unlikely to be random, as the asking price is prone to be higher than the market price.

In light of the above we formulate the following hypotheses:

H1. Investor cognitive bias and investment decision quality are positively related.

H1a. Framing variation significantly affects investment decision quality.

H1b. Cognitive heuristics significantly affects investment decision quality.

H1c. Mental accounting negatively relates with investment decision quality.

2.3 Investor intuitive attributes and investment decision quality

The investor cognitive biases given their systematic and structured nature if used to assess the quality of investment decisions, the process can be slow, time-consuming and effortful and therefore not always appropriate to cope with the unpredictable, non-routine and complex situations that investors deal with from time to time in commercial real estate investments (Ramalakshmi *et al.*, 2019). In such situations, the process of valuation of quality decisions in property investment is better made under the intuitive decision-making process. According to Sadler-Smith (2016), investor intuitive attributes are often referred to as a domain-specific reasoning mechanism that enables quality decisions to be evaluated through rapid, non-conscious recognition of patterns and associations. This is in agreement with the works of Kahneman and Tversky (1979) that intuitions are valuable in their own right (Thompson *et al.*, 2011; Kahneman and Tversky, 1979) and can be as powerful and accurate as investment decision analysis. This is consistent with scholars (Sadler-Smith, 2016; Jean, 2008; Saiz-Álvarez *et al.*, 2013) who argue that investor intuitive attributes are cognitive processes that enable investors to leverage their tremendous knowledge when making investment decisions. They help investors to extract the right information drawn intuitively to synthesize the information quickly and effectively (Sadler-Smith, 2016). The intuitive attributes contribute to the cognitive approach's outcome as a concrete cognitive style, defined as how people perceive environmental investment opportunities and how they organize and use information from these opportunities that promote the quality of their investment decisions. This position is evidenced in the works of Hitt *et al.* (2005), who post that relying on intuition can improve quality decision-making under the constraints of bounded rationality.

Investment decision quality under the intuitive attributes is the primarily subconscious process of identifying a decision and selecting a preferred alternative which is satisficing and sufficient but not necessarily optimal. Indeed, Muradoglu and Harvey (2012) suggest that intuitions such as confidence degree, loss aversion and herding behavior have been applied to different fields to evaluate investment decisions.

In an investment decision context, loss aversion is the frequent evaluation undertaken to shift investors' long-term investment decision mix. When evaluating investment decision quality, the investor is more sensitive to losses than gains (Bao *et al.*, 2021; Merkle, 2020; Ainia and Lutfi, 2019). This assertion agrees with Ramalakshmi *et al.* (2019), who post that investor postpone the sales of stocks whose value is gone down and quicken the sales of stocks that increase in value. Investors tend to avoid making conclusions because of fear that the decision will turn out seriously. Their study (Hamsa and Bellundagi, 2017) reveals that the more frequently investors evaluate their investment decisions, the more risk-averse they become. According to Kahneman and Tversky (1979), the pain from a loss is more impactful than the benefit from a similar gain experience. Therefore, when faced with the prospect of evaluating the quality of an investment decision, the preference is to avoid possible losses (Bilgehan, 2014).

Further, the confidence degree is the ability to make decisions basing on the excellent acquisition and use of relevant information. It enables investors to act when faced with complex issues involving volumes of data from the market (Lainé, 2018). Bhandari and Deaves (2006) argue that confidence degree controls one's emotions to expend effort to achieve quality decisions. Thus, many decision-makers are persistently over-optimistic when making investment decisions and may positively or adversely impact the decision quality (Longjie and Anfeng, 2017; Malmendier and Tate, 2005). The confidence degree, if not controlled, leads to an underestimation of risks (Shiller, 2005).

Similarly, herding behavior is another intuition in behavioral finance literature may affect investment decisions' quality negatively (Naomi *et al.*, 2018). It is the imitation of a majority's behavior to avoid the complexity of processing volumes of information when investing. Moreover, herding behavior is associated with reputation and compensation structures that result in sub-optimal decisions that impact investment decision quality (Zhou and Anderson, 2013). Bikhchandani and Sharma (2000) also observe that herding is ordinarily functional and helps to harmonize the investment decision mechanisms by considering others' actions that affect the risk and return models, ultimately affecting the investment decision quality (see also Noami *et al.*, 2018).

In light of the above the following hypotheses are derived:

H2. Intuitive investor attributes positively relates with investment decision quality.

H2a. Loss aversion significantly affects investment decision quality.

H2b. Confidence degree significantly affects investment decision.

H2c. Herding behavior significantly affects investment decision quality.

3. Methodology

3.1 Research design and sample

The study is a cross-sectional survey, and we use a sample of 384 real estate investors and developers of the respective properties in Kampala Metropolitan from a population of 2,640 (Association of Real Estate Agents Uganda, 2021). The sample was determined in accordance with guidance of Krejcie and Morgan (1970). We selected respondents using simple random sampling to give each an equal opportunity. The analysis is based on 200 useable questionnaires that were returned, resulting into a response rate of 52%.

The demographic characteristics presented in Table 1 indicate that 52.5% of respondents are male, which indicates that commercial real estate sector in Uganda is dominated by male. In terms of age, 72.5% are above 30 years, with experience of at least six years (91%) in commercial real estate. In terms of education, 64.5% of respondents have a diploma. In terms of ownership, 54% operate in partnership, whereas 46% are sole proprietorships. 28.5% of investors had invested in apartments for generating rental income, 25.0% in industrial warehouses, 24.5% in retails as shopping malls while 22.0% in office space. The majority of the investments (88.5%) are between 10 and 80 UGX billions. 44.5% of the investor used bank loans, 40.5% used private equity and only 15% used own savings for investments. Collectively, the demographic characteristics suggests that respondents were knowledgeable, have the necessary experience in real estate investments and therefore provided valid responses to the items in the questionnaire.

Information	Frequency	%
Gender	$n = 200$	
Male	105	52.5
Female	95	47.5
Age	$n = 200$	
20–30	55	27.5
31–40	91	45.5
42–49	40	20.0
50–57	14	7.0
Experience	$n = 200$	
<5 years	18	9.0
6–10 years	46	23.0
11–15 years	87	43.5
16–20 years	18	9.0
>20 years	31	15.5
Education	$n = 200$	
Basic	71	35.5
Diploma	42	21.0
Bachelor degree	65	32.5
Master's degree	22	11.0
Venture ownership	$n = 200$	
Sole	92	46.0
Partnership	108	54.0
Capital investment (UGX in billions)	$n = 200$	
10–40	81	40.5
41–80	96	48.0
81–120	15	7.5
Above 120	8	4.0
Property type	$n = 200$	
Office space	44	22.0
Industrial warehouses	50	25.0
Retail: shopping malls and arcades	49	24.5
Rentals: apartments purposely for renting	57	28.5
Financing	$n = 200$	
Own savings	30	15.0
Private equity	81	40.5
Bank loan	89	44.5

Source(s): Primary Data

Table 1. Background information

3.2 Measurement and questionnaire design

Data were collected using a questionnaire with items anchored onto a 6-point Likert scale where 1-very untrue while 6-extremely true. A six-point scale was used to avoid the possibility of information loss, as respondents tend to be more precise in their opinions when the mid-point is eliminated (Converse and Presser, 1986) and also to increase validity and reliability of the data (Chomeya, 2010). IDQ is measured using profitability, value creation and cost-efficient Visinescu *et al.* (2017). The sample question items for IDQ are: "*. . . always consider proper accountability of investment decisions, . . . investment decision is characterized by input minimization, . . .low maintenance costs guide my investment decisions, . . . investment decisions attract asset growth and . . .investment decisions meet clients' financial position*". Investor cognitive biases are measured in terms of framing variations, mental accounting and cognitive heuristics (Winter, 2020). Sample questionnaire items are: "*the best investment decision in real estate is to separate income into current and future income, . . .investing in various types of real estate hedges loss, . . . use past good plans to make investment decisions, . . . rely on previous market experiences to make investment decision, and . . .interpreting information differently increases trust in my investment decisions*". Investor Intuitive attributes are measured with confidence degree, loss aversion and herding behavior (Loh, 2016). The sample questionnaire items are: "*. . . knowledge helps me make real estate investment decisions, . . . investment decisions depend on forecasting the future market demand, . . . control myself when making investment decisions, . . .incurring losses significantly impact my investment decisions invest in real estate*".

3.3 Data collection methods

To obtain the information for the development of our research, we collected data from investors and managers of commercial real estate properties since they are responsible for making investment decisions (Saunders *et al.*, 2012), using a closed ended questionnaire in accordance with Sudman and Bradburn (1982) to minimize respondents from giving their opinion and with as much nuance as they are capable. Previous studies that aim at calculating the mean ratings of the extent of agreement with the statements given have employed questionnaires with close ended questions. We put forward an additional requirement, namely not to include any property which it is not in use and which was not used for commercial purposes. The instruments were delivered to the investors and managers of commercial real estate properties of the selected commercial real estate properties by the researcher in order to ensure they had the required expertise to answer the questionnaire. Each respondent was given a month of time to complete the survey and within the first two weeks we sent a remainder to every respondent that received the survey instrument using the contact list generated during the distribution period of the questionnaire. The received questionnaires that were received and had not been answered by the categories of respondents specified above were eliminated from the sample.

3.4 Common method bias

According to Ketokivi (2019) and Montabon *et al.* (2018), it is not easy to eliminate common method bias, especially when cross-sectional data is used in analysis. Therefore, its impact was controlled through procedural remedies as Podsakoff *et al.* (2003) recommends. The procedural remedies in minimizing the influence of common method bias were careful design of the study procedure and protocol prior to data collection which included; the measurements were selected to avoid ambiguity for respondents and ensure content validity; the instrument was tested with experts in finance prior to distribution; unclear wordings were eliminated from the survey; and all respondents answers were allowed to be anonymous to

assure them there is no right or wrong answer. Additionally, measures of the independent and dependent variables were obtained from different sources from behavioral finance and real estate management literature as Podsakoff *et al.* (2003) suggest.

3.5 Measurement validation

A content analysis was used first to validated the questionnaire, where experts in the field of finance were requested to assess to rate the questionnaire's validity based on the soundness and unsoundness of the questions. Their comments were used to improve on the flow of the items to have clarity of meaning before carrying out pilot study. Second, in accordance with the guidance of Haneef *et al.* (2013) a pilot study was carried to further confirm the validity of the instrument. We used principal component analysis with the varimax rotation method to test for convergent validity. Where we considered Kaiser–Meyer–Olkin (KMO) value of 0.7 and all the study variables (investor cognitive biases 0.710, intuitive investor attributes = 0.770 and investment quality decision = 0.791) scored a KMO value above 0.7 as recommended by Tabachnick and Fidell (2007) meaning that data were sufficient and amenable to factor analysis. Also, for convergent validity items loadings of 0.5 and above and components with Eigenvalues above 1 were considered. The results revealed that all the study variables of intuitive attributes and investor cognitive bias each survived with three components explaining 74 and 87.2% respectively while investment decision quality with two components explaining 71% of the variance. Finally, the Bartlett's test of sphericity <0.05 was considered to indicating that the correlations between the items were sufficiently large hence supporting the data's factorability (Hadi *et al.*, 2016). To measure the internal consistency of the instrument's a Cronbach's alpha coefficient was used (Cronbach, 1951). The results indicated that all study variables Cronbach's alpha coefficient greater than 0.7 was considered. The results indicated that all study variables scored a Cronbach's alpha coefficient greater than 0.7 (see Framing variations, Confidence degree, Heuristics = 0.721, Loss aversion and Herding behavior = 0.751, and Investment decision quality = 0.855) indicating that the instrument can yield reliable results (see Table 2–4).

The following models were formulated to test the study hypotheses.

Model 1:

$$\mathrm{IDQ} = \beta_0 + \beta_1\,\mathrm{Age} + \beta_2\,\mathrm{Qual} + \beta_3\,\mathrm{Exp} + \varepsilon_j$$

Model 2:

$$\mathrm{IDQ} = \beta_0 + \beta_1\,\mathrm{Age} + \beta_2\,\mathrm{Qual} + \beta_3\,\mathrm{Exp} + \beta_4\,\mathrm{InvCogB} + \varepsilon_j$$

Model 3:

$$\mathrm{IDQ} = \beta_0 + \beta_1\,\mathrm{Age} + \beta_2\,\mathrm{Qual} + \beta_3\,\mathrm{Exp} + \beta_4\,\mathrm{InvCogB} + \beta_5\,\mathrm{InvATT} + \varepsilon_j$$

Model 4:

$$\mathrm{IDQ} = \beta_0 + \beta_1\,\mathrm{Age} + \beta_2\,\mathrm{Qual} + \beta_3\,\mathrm{Exp} + \varepsilon_j$$

Model 5:

$$\mathrm{IDQ} = \beta_0 + \beta_1\,\mathrm{Age} + \beta_2\,\mathrm{Qual} + \beta_3\,\mathrm{Exp} + \beta_4\,\mathrm{FVar} + \varepsilon_j$$

Model 6:

$$\mathrm{IDQ} = \beta_0 + \beta_1\,\mathrm{Age} + \beta_2\,\mathrm{Qual} + \beta_3\,\mathrm{Exp} + \beta_4\,\mathrm{FVar} + \beta_5\,\mathrm{Mentalacct} + \varepsilon_j$$

Statement	Components Confidence degree	Loss aversion	Herding behavior
My knowledge helps me make real estate investment decisions	0.642		
My investment decisions depend on forecasting the future market demand	0.503		
I Control myself when making investment decisions	0.762		
My judgment improves when making investment decisions	0.647		
Incurring losses greatly impact my investment decisions		0.830	
I Always associate risk to losses in my investment decisions		0.822	
I readily invest in real estate with minimal risk		0.794	
I rarely take risky decisions in real estate investments		0.751	
I follow the same pattern of choice like peer investors			0.512
My investment decisions are based others' actions			0.585
I usually benchmark my decisions with the market price trends			0.703
Eigen value	2.356	1.123	0.940
Variance %	39.260	18.724	15.662
Cumulative %	39.260	57.985	73.647

Table 2. Factor structure of Investor Intuitive attributes

Note(s): KMO = 770, approx. $X^2 = 399.743$; Bartlett's test of sphericity df: 78; sig. = 0.001; Extraction method: Principal component analysis. Rotation method: varimax with Kaiser normalization
Source(s): Primary Data

Model 7:

$$\text{IDQ} = \beta_0 + \beta_1 \text{Age} + \beta_2 \text{Qual} + \beta_3 \text{Exp} + \beta_4 \text{FVar} + \beta_5 \text{Mentalacct} + \beta_6 \text{Cogheur} + \varepsilon_j$$

Model 8:

$$\text{IDQ} = \beta_0 + \beta_1 \text{Age} + \beta_2 \text{Qual} + \beta_3 \text{Exp} + \beta_4 \text{FVar} + \beta_5 \text{Mentalacct} + \beta_6 \text{Cogheur} + \beta_7 \text{Confidegree} + \varepsilon_j$$

Model 9:

$$\text{IDQ} = \beta_0 + \beta_1 \text{Age} + \beta_2 \text{Qual} + \beta_3 \text{Exp} + \beta_4 \text{FVar} + \beta_5 \text{Mentalacct} + \beta_6 \text{Cogheur} + \beta_7 \text{Confidegree} + \beta_8 \text{Losaver} + \varepsilon_j$$

Model 10:

$$\text{IDQ} = \beta_0 + \beta_1 \text{Age} + \beta_2 \text{Qual} + \beta_3 \text{Exp} + \beta_4 \text{FVar} + \beta_5 \text{Mentalacct} + \beta_6 \text{Cogheur} + \beta_7 \text{Confidegree} + \beta_8 \text{Losaver} + \beta_9 \text{Herb} + \varepsilon_j$$

4. Results

4.1 Descriptive statistics and correlations analysis

Descriptive statistics in terms of the means and standard deviations were generated for the study variables to ascertain how respondents understood the investment decision quality in commercial real estate in Uganda. Results in Table 6 show that investment decision quality has a mean of 4.36 and standard deviation of 0.318. Investor Cognitive Bias has mean of 4.03

Statement	Components Mental accounting	Cognitive heuristics	Framing variations
The best investment decision in real estate is to separate income into current and future income	0.921		
Investing in various types of real estate hedges loss	0.721		
I Spread capital over different investment property types	0.904		
I Assess each investment differently when making decisions	0.695		
My investment decisions in real estate are based on market needs		0.577	
Invest in real estate properties that reflect market standards		0.758	
I use past good plans to make investment decisions		0.785	
I rely on previous market experiences to make investment decision		0.641	
I trust investment decisions based on information that fits my goals			0.904
Interpreting information differently increases trust in my investment decisions			0.737
I Consider different financial information to make investment decisions			0.858
Eigen value	3.559	2.032	1.403
Variance %	44.494	25.395	17.537
Cumulative %	44.494	69.888	87.425

Note(s): KMO = 710, Bartlett's test of sphericity approx. X^2 = 300.296; df = 91 sig. = 0.001; Extraction method: Principal component analysis. Rotation method: varimax with Kaiser normalization
Source(s): Primary Data

Table 3.
Factor structure of Investor Cognitive Biases

Statement	Components Cost-efficiency	Value creation
I Always consider proper accountability of investment decisions	0.832	
My investment decisions are characterized by input minimization	0.923	
My investment decisions are guided by low maintenance costs	0.991	
My investment decisions based on accurate information steadily appreciate		0.973
My investment decisions meet clients' financial position		0.962
My investment decisions attract asset growth		0.699
Eigen value	3.291	1.692
Variance %	47.016	24.176
Cumulative %	47.016	71.192

Note(s): KMO = 0.791, approx. X^2 = 972.737 Bartlett's test of sphericity df = 191 sig. = 0.001 extraction method: Principal component analysis. Rotation method: Varimax with Kaiser normalization
Source(s): Primary Data

Table 4.
Factor structure of Investment Decision Quality

and SD of 0.210 while its components (Framing variation, Mental accounting, Cognitive heuristics) have means and standards deviations (SD) of 4.08; 0.289; 3.83, 0.332 and 4.11, 0.282) respectively. Investor Intuitive Attributes has a mean of 3.97, and SD of 0.241, while its components; Confidence degree, Loss aversion and Herding behavior with means of 4.32, 3.94, 3.622 and standard deviation of 0.310; 0.358; 0.382 in that order. Having obtained a mean above 3 and standard deviation close to zero for investment decision quality, Investor

Variable	Acronym	Measure
Dependent variable		
Investment decision quality	IDQ	Global variable of value creation and cost efficiency
Predictor variables		
Investor cognitive bias (InvCogB)		Composed of faming variations, cognitive heuristics and mental accounting
Framing variations	FVar	Component of investor cognitive bias
Cognitive heuristics	Cogheur	Component of investor cognitive bias
Mental accounting	Mentalacct	Component of investor cognitive bias
Investor intuitive attributes (InvATT)		Composed of faming variations, cognitive heuristics and mental accounting
Loss aversion	Losaver	Component of investor intuitive attribute
Herding behavior	Herb	Component of investor intuitive attribute
Confident degree	Confidegree	Component of investor intuitive attribute
Respondent's age	Age	
Respondent's qualifications	Qual	
No. of years' experience	Exp	
	ε_j	Error term

Table 5.
Definition of variables

Source(s): Primary Data

	N	Minimum	Maximum	Mean	Std. Dev	Skewness Stat	Skewness Std. Error	Kurtosis Stat	Kurtosis Std. Error
Investor cognitive bias	200	3.21	4.58	4.0314	0.21002	−0.544	0.172	0.986	0.342
Framing variations	200	3.20	4.60	4.0890	0.28958	−0.927	0.172	0.595	0.342
Mental accounting	200	2.80	4.90	3.8335	0.33239	0.143	0.172	0.558	0.342
Cognitive heuristics	200	3.31	5.69	4.1173	0.28292	0.533	0.172	5.000	0.342
Investor intuitive attributes	200	3.13	5.00	3.9737	0.24097	−0.320	0.172	2.852	0.342
Confidence degree	200	3.30	5.50	4.3245	0.31037	−0.145	0.172	2.388	0.342
Loss aversion	200	2.75	4.92	3.9450	0.35859	−0.619	0.172	1.246	0.342
Herding behavior	200	2.67	5.22	3.6222	0.38231	0.310	0.172	1.084	0.342
Investment decision quality	200	3.46	5.20	4.3647	0.31844	−0.135	0.172	0.051	0.342
Value creation	200	2.90	5.60	4.4470	0.39493	−0.171	0.172	1.247	0.342
Cost efficiency	200	3.00	5.14	4.4564	0.44620	−0.469	0.172	0.291	0.342

Table 6.
Descriptive statistics

Source(s): Primary Data

Cognitive Bias and Investor Intuitive Attributes imply that data analyzed captures the views of the respondents under the study.

Pearson correlation analysis was used to establish whether the study variables are significantly associated as a prerequisite for running hierarchical regression models to test the study hypotheses. Results in Table 7 reveal that investor cognitive bias and investor

Table 7. Zero-order-correlations

		1	2	3	4	5	6	7	8	9	10	11
Framing variations	(1)	1										
Mental accounting	(2)	0.202**	1									
Cognitive heuristics	(3)	0.284**	0.219**	1								
Investor cognitive bias	(4)	0.759**	0.627**	0.706**	1							
Confidence degree	(5)	0.193**	0.162*	0.371**	0.344**	1						
Loss aversion	(6)	0.360**	−0.003	0.400**	0.379**	0.400**	1					
Herding behavior	(7)	0.052	0.161*	0.135	0.157*	0.054	0.134	1				
Investor intuitive attributes	(8)	0.312**	0.140*	0.447**	0.434**	0.671**	0.804**	0.560**	1			
Value creation	(9)	0.447**	−0.153*	0.397**	0.363**	0.435**	0.476**	−0.133	0.394**	1		
Cost efficiency	(10)	0.379**	−0.152*	0.222**	0.245**	0.321**	0.438**	−0.003	0.384**	0.629**	1	
Investment decision quality	(11)	0.500**	−0.103	0.413**	0.420**	0.455**	0.561**	−0.060	0.485**	0.882**	0.784**	1

Note(s): **. Correlation is significant at the 0.01 level (2-tailed)
*. Correlation is significant at the 0.05 level (2-tailed)
Source(s): Primary Data

intuitive attributes are significantly and positively related with investment decision quality ($r = 0.420^{**}$, $p < 0.05$; $r = 0.485^{**}$, $p < 0.05$) respectively. This result provides preliminary support to H1 and H2 that higher investor cognitive biases and intuitive attributes will lead to better investment decisions. Also, results indicate that for the components of investor cognitive bias, framing variation: $r = 0.500$, $p < 0.05$ and cognitive heuristics: $r = 0.413$, $p < 0.05$ are significant and positively related to investment decision quality. This provides initial support of H1a and H1b but not H1c; implying that investors with better ways of interpreting information (framing variations – H1a) are more able to make quality decisions. And those investors that are more able to simplify information (Cognitive heuristics-H1b) regarding investments will make better investment decisions at less cost. Mental accounting ($r = -0.103$, $p > 0.05$) is negative and not significantly related to investment decision quality. Regarding the components of investors' intuitive attributes, herding behavior ($r = -0.060$, $p > 0.05$) is not significantly related to investment decision quality; while loss aversion ($r = 0.561$, $p < 0.05$) is significant and positively associated with investment decision quality. This provides preliminary support to H2a and H2b but not H2c. This implies that the more loss averse (H2a) an investor is, the higher will be the quality of the investment decision. Confidence degree ($r = 0.455$, $p < 0.05$) is also significant and positively associated with investment decision quality. This suggests that the higher the degree of confidence the investor exhibits (H2b), the higher will be the quality of the investment decision.

4.2 Regression analysis

We run two hierarchical regression analysis to test the study hypotheses. Hierarchical regression model one was run to test the hypotheses H1 and H2 which sought to establish the relationships between investor cognitive bias, investors' intuitive attributes and investment decision quality. Three models were run, where control variables age, qualification and experience were entered in model 1. The result indicates that none of these control variables is a significant predictor of investment decision quality. Then investor cognitive bias and investors' intuitive attributes were entered in models 2 and 3 respectively. The results in Table 8 reveal that investor cognitive bias ($\beta = 0.268$, $p \leq 0.05$) and investors' intuitive attributes ($\beta = 0.363$, $p \leq 0.05$) are positively and significantly related with investment decision quality. This fully supports H1 and H2 in that an increase in Investor cognitive biases and investor intuitive attributes will respectively lead to better investment decision quality. In the overall model (model 3) both independent variables account for a significant 29.3% variance in investment decision quality (adjusted $R^2 = 0.293$, $p < 0.001$).

Table 8.
Hierarchical multiple regressions for global variables

Item	Model 1	Model 2	Model 3
Constant	4.247**	1.568**	0.678**
Age	−0.058	−0.014	−0.029
Qualification	0.061	0.096	0.081
Experience	0.112	0.108	0.095
Investor cognitive bias		0.429**	0.268**
Investor intuitive attributes			0.363**
R^2	0.024	0.204	0.311
Adjusted R^2	0.009	0.188	0.293
R^2 change	0.024	0.181	0.106
F-statistic change	1.582	44.295	29.897
Sig-*F*-Change	0.195	0.000	0.000
Tolerance	0.916	0.929	0.866
VIF	1.128	1.081	1.162
Durbin–Watson (** = $p < 0.01$)			1.312

Hierarchical regression model 2 was run to test the sub-hypotheses (H1a, b and c and H2a, b and c). In model 1 we controlled for age, qualification and experience. Results show that these variables have no significant relationship with investment decision quality meaning that they do not have confound effect on the results of this study and thus the models are highly credible. In models 2 to 4 Investor cognitive bias components (*Framing variation, Mental accounting* and *Cognitive heuristics*) are sequentially entered and all of them accounting for 39.4% (Adjusted $R^2 = 0.394$, Sig-*F* Change = 0.000) variance in investment decision quality. In model 5 to 7 the components of investors intuitive attributes (*Confidence degree*, *Loss aversion* and *Herding behavior*) were successively entered, they contribute an additional significant variance in investment decision quality of 15.3% to a penultimate significant variance explained of 54.5% (Adjusted $R^2 = 0.545$) in the final model (Model 7).

Results in Table 9 confirm that H1a is fully supported in that framing variations is positive and significantly affects investment decision quality ($\beta = 0.375$, $p < 0.05$). This implies that increases in framing variations will lead to an increase in the quality of investment decision. This study suggests that presenting the financial information to an investor in commercial real estate in different formats, enhances his understanding of the issue at hand, thereby enabling him to come up with a decision with proper accountability. Results further fully support H1b in that cognitive heuristic is positive and significantly affects investment decision quality ($\beta = 0.159$, $p < 0.05$). This implies that increases in cognitive heuristics will lead to an increase in the quality of investment decision. This means that the more the investor is able to simplify information about real estates the better the quality of the investment decision. Results further show that mental accounting is negatively and significantly related with investment decision quality ($\beta = -0.219$, $p < 0.05$). This supports H1c; implying the less an investor involves him/herself into visualization of investment opportunities/returns and avoids ambitious decisions (i.e. less mental accounting) the better will be the quality of the penultimate investment decision.

Item	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Constant	4.247**	1.797**	2.367**	1.525**	0.752*	0.649	0.871*
Age	0.061	0.117	0.105	0.014	0.045	0.034	0.046
Qualification	−0.058	0.054	0.056	0.082	0.077	0.078	0.081
Experience	0.112	0.083	0.066	0.061	0.048	0.046	0.045
Framing variations		0.523**	0.562**	0.469**	0.448**	0.377**	0.375**
Mental accounting			−0.196**	−0.254**	−0.280**	−0.239**	−0.219**
Cognitive heuristic				0.330**	0.216**	0.152**	0.159*
Confidence degree					0.334**	0.261**	0.256**
Loss aversion						0.258**	0.274**
Herding behavior							−0.121*
R^2	0.024	0.281	0.318	0.412	0.506	0.552	0.565
Adjusted R^2	0.009	0.267	0.300	0.394	0.488	0.533	0.545
R^2 change	0.024	0.258	0.036	0.095	0.094	0.046	0.014
F-statistic change	1.582	69.896	10.321	31.163	36.338	19.472	6.042
Sig-*F*-Change	0.195	0.000	0.002	0.000	0.000	0.000	015
Tolerance	1.000	0.959	0.892	0.849	0.689	0.950	0.868
VIF	1.000	1.043	1.121	1.178	1.451	1.052	1.056
Durbin–Watson							1.531

Note(s): Dependent Variable: IDQ
**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)
Source(s): Primary Data

Table 9.
Hierarchical multiple regressions

Results in Table 9 confirm that H2a is fully supported, in that loss aversion is significant and positively affects investment decision quality ($\beta = 0.274, p < 0.05$). This suggests that the more an investor considers losses more than gains, the better will be the quality of the decision made and hence higher investment decision quality. Further, results confirm and support H2b in that confidence degree is significant and positively affect investment decision quality ($\beta = 0.256$, $p < 0.05$). This suggests that the more confident and experienced an investor is, the better the quality of the investment decision made. Further, results show that Herding behavior is negatively and significantly related with investment decision quality ($\beta = -0.121$, $p < 0.05$). This supports H2c. This suggests that the less an investor follows others (i.e. herding) ignoring his/her own interpretations, the better will be the investment decision quality.

5. Discussion

The purpose of this study was to examine the relationship between investor cognitive bias, investor intuitive attributes and investment decision quality in commercial real estate in Uganda. The study has established that investor cognitive bias is significant and positively related with investment decision quality. This finding implies that investors possessing diverse assorted stock of cognitive capabilities are able to cautiously react to various financial information differently and therefore make quality decisions. This finding is in line with Ramalakshmi *et al.* (2019), who emphasized that investors who are characterized as highly analytical, deliberative and having rule governed mechanisms are able to make quality decisions. Further this finding resonates with Amidu *et al.* (2019) who indicates that investors having business skills are able to extract the best available information associated with desirable and attractive outcomes, thereby increasing the asset growth.

In addition, the study has revealed that framing variations as a component of investor cognitive bias is positive and significantly related with investment decision quality. This implies that an investor who receives and analyses incoming information regarding investment opportunities in different ways is likely to make appropriate decisions that minimizes costs and create value in terms of profits. This is because interpreting the information differently increases the investors' confidence and trust, cautiousness in the decision-making process, leading to cost efficiency, hedging his assets against loss of value and be able to maximize profit. Our finding is consistent with Candraningrat *et al.* (2018), who found a positive relationship of framing variation in information and investment decisions at Indonesia Stock Exchange. This finding also supports prospect theory (Tversky and Kahneman, 1981) which posits that when information is presented in different frame will cause a person to differ in behavior and this affect the quality of decisions he/she makes.

The study also finds that cognitive heuristics positively and significantly relates with investment decision quality, which implies that the mental computational steps necessary for an investor to make an investment decision is associated with the quality of a decision made. This is because mental computational steps enable an investor to relate current events with past events and recognize plans that worked well so as to come up with cost-efficient decisions. This finding is consistent with earlier Waweru *et al.* (2008), Massa and Simonov (2005) who established that investors assess the quality of decisions based on most available information because of minimum search cost attached to them.

Relatedly, the study finds a negative but significant relationship between mental accounting and investment decision quality. This finding means that the more an investor subjectively allocates available pool of funds across investment options without regard to the intercorrelation between the investment options, the lower will be the quality of the investment decisions. The detriment of mental accounting is to make investment options appealing, yet they may not be beneficial to the investor in the long run, resulting into low quality investment decisions. This finding supports Agarwal *et al.* (2016) who argue that creating separate investment accounts in the mind based on a variety of subjective reasons

tend to assign different functions to each investment, which often has an irrational and negative effect on the quality of investment decision.

Further, we find that investor intuitive attributes and investment decision quality are positive and significantly related. This finding means that an investor with the ability to acquire knowledge without recourse to conscious reasoning is likely to enhance investment decision quality. This is in line with Ramalakshmi *et al.* (2019) who indicates that an investor who bases on *intuitions* and instincts will make quick and efficient investment decisions. The study has revealed that for investor intuitive attributes to positively relate with investment decision quality, requires an investor with a high confident degree and high loss aversion low herding behavior. The study had revealed a positive and significant relationship between confident degree and investment decision quality. This is because a quality of an investment decision depends on two factors: first a reliable forecast and second the confidence with which this forecast is made. This means the greater the weight of confidence in respect of the expectation from the investment, the more substantial the basis on which to rank the quality of decision, and presumably, the more confident the investor will be that the decision is an appropriate guide to success. This notion is consistent with scholars like (Baron and Tang, 2011; Morris *et al.*, 2012) who assert that a high level of confidence seems to foster mental agility and creative thinking, which is a very positive consequence. The study finding also are in line with Dent (2010) who observe that the more confidence one gains, the higher the quality of investment decisions he is likely to make.

Also, a positive and significant relationship between loss aversion and investment decision quality implies that when an investor puts more weight on losses than gains is likely to make better decisions and invest in profitable property. This study has established that investors who are loss averse always aim at minimizing risks in real estate investments. This finding supports Li *et al.* (2021) who indicates that investors prefer maintaining the current state of affairs since any change from that status quo is perceived as a loss, thereby distorting investment decision quality. This is in line with the expected utility theory which asserts that the quality of investment decisions is determined purely on perfect rationality and risk averseness (Pompian and Wood, 2006). Lastly, the study reveals a negative but significant relationship between herding behavior and investment decision quality. The less an investor follows investment patterns and decisions of others the better will be the investment decision he/she makes. This finding collaborates Javed *et al.* (2017) 's argument that making investment decisions by imitating what others have done creates a continuous volatility in stock prices due to quick reaction of masses towards a particular trend.

6. Summary and conclusion

Underpinned by two complementing theories, the expected utility theory and prospect theory, the present study examined the influence of investor cognitive bias and investor intuitive attributes on investment decision quality in commercial real estate with the context of Uganda, a developing country. This was achieved through a questionnaire survey of 200 commercial real estate investors. The results indicate that investor cognitive bias and intuitive investor attributes are positive and significant determinants of investment decision quality in commercial real estate. Further, the two components of Investor cognitive bias (framing variation and cognitive heuristics) are positive and significant determinants of investment decision quality, whereas mental accounting is a negative and significant determinant of Investment decision quality. In addition, the two components of Investor intuitive attributes (confidence degree and loss aversion) are positive and significant determinants of investment decision quality, whereas herding behavior is a negative and significant determinant of investment decision quality.

Overall, the findings of this study have important implications for academics and practitioners in the real estate industry. For academics, the study has revealed that investor

intuitive attributes are a more dominant determinant of investment decision quality in comparison with investor cognitive biases. For practitioners in commercial real estate sector should emphasize independent evaluation of investment opportunities (framing variation), simplify information regarding investments (Cognitive heuristics), believe in own abilities (Confidence degree), be risk averse (loss aversion) and avoid making decisions based on subjective visual mind (mental accounting) and group think/herding in order to make quality investment decisions. For policymakers, the study has illuminated factors such as provision of reliable information that ought to be taken into account when promulgating policies for regulation of the commercial real estate sector. This will help investors to come up with investment decisions which are plausible.

Like any other research, this study has limitations. The study is limited to views of the respondents in Uganda where a developer is also considered to be an investor. The findings may not be generalized to other settings, where there is a differentiation between a developer and an investor. Future studies in other settings may use secondary data and/or other methods to overcome such limitation. More so, the study used cross-sectional data to collect information from the real estate market in Uganda. Future studies may use longitudinal research to investigate the long-term behavior within the Ugandan estate market. Nevertheless, the diagnostic interactions with data buttress our findings.

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