

# **Potential underdog bias, overconfidence and risk propensity in investor decision-making behaviour**

Sean Combrink and Charlene Lew

Gordon Institute of Business Science, University of Pretoria

## **ABSTRACT**

Investor decision-making requires an absence of bias and appropriate levels of risk-taking. In this study we investigate whether investors are prone to take risks, both in terms of how they rate their risk propensity and their behavior in choosing between options with different risk levels, and whether they display overconfidence and underdog bias. We also investigate the relationships among underdog bias, overconfidence and risk propensity. The results indicate overconfidence levels similar to that in other populations and do not reveal underdog bias or high levels of risk propensity. We found support for a negative predictive relationship between underdog bias and overconfidence. Further findings reveal that the highest self-ratings appeared for those with most investment experience, and females displayed higher underdog bias than men. The findings hold implications for the development of self-perception in investors.

## **Keywords**

Investor decision-making; Risk propensity; Underdog bias; Overconfidence; Decision bias

## **Introduction**

The investment community relies on investors to make rational decisions as they are custodians of the wealth of the community. However, rationality and predictability in decision-making is an unattainable ideal as decision makers may often act irrationally (Kahneman [2011]) and sometimes even consistently so (Rabin and Thaler [2001]). Irrational choices may partially be explained by System 1 thinking (Evans [2008]) which is fast, instinctive and emotional, and leads to decision shortcuts (Stanovich and West [2000]) as opposed to less deliberate System 2 thinking. For Kahneman (2011) instinct, salient memories, recent events and external impressions lead to the development of cognitive biases in System 1 thinking. Against this backdrop of the limitations of human thinking and decision-making it is important to consider the potential cognitive biases and behavioral propensities of investors.

To be able to consider these biases and propensities, one may imagine asking investors to rate their own investment competence by asking the following two questions: ‘Do you believe you have overcome all odds to be a successful investor?’, and: ‘How likely are you to take investment risks?’ As the answers to such questions hold many implications for investment outcomes, this paper explores three potentially significant factors that may impact investment decision-making: (a) the level of confidence in abilities or self-rated performance (Guenther and Alicke [2010]); (b) perceptions of whether life supports success or the ‘top dog versus underdog’ bias (Davidai and Gilovich [2016]) and (c) the tendency to take risks or personal risk propensity (Hoffmann, Post, and Pennings [2015]).

From a social comparison theory (SCT) perspective, we know that individuals consistently evaluate how good they are, but fail to do so accurately. A recent meta-analysis of SCT spanning 60 years suggest that we tend to evaluate ourselves more highly after comparison with people lower than our standard and lower after comparison with people higher than our standard, thus contrasting ourselves with others rather than assimilating traits (Gerber, Wheeler, and Suls [2018]).

Therefore, SCT suggests that we are prone to poor self-rating of our performance or tend to assess the quality of our own abilities and performance inaccurately – especially in relation to the abilities and performance of others. If investors overrate their own performance in relation to others, rather than consulting new information or advice, this may lead them to make less optimal investment decisions.

Over and above investors’ views of their own performance, we might also ask whether they believe they have succeeded against all odds, or stated differently, succeeded without that having been likely. Davidai and Gilovich (2016) postulate that people remember the headwinds of their past experiences more poignantly than they do the tailwinds. This refers to a biased view that their lives had had more obstacles than success-enabling factors, also known as headwind-tailwind asymmetry. Such perceptions may be due to availability or even attention bias: since obstacles require more attention to be resolved, and benefits are simply enjoyed, it is much easier to remember the obstacles. This phenomenon is referred to as ‘underdog bias’, implying a biased feeling of being mistreated by life and being successful despite the presence of multiple obstacles. One may postulate that ‘underdog bias’ will relate to overconfidence, which refers to investors’ propensity to inadequately consulting advice or information.

Furthermore, in the presence of a view of personal competence and a sense that life is a battle that has been won, one may wonder to what extent investors are risk seeking in their decisions. Risk propensity is seen as “...the general tendency of a decision maker to take or

avoid risks” (Sitkin and Pablo [1992], p. 18) and forms the natural or base line of risk-taking. The undergirding principles of prospect theory suggest that investors may be risk averse, preferring guaranteed wins, but then change to risk seeking behavior when potential losses are at stake (Kahneman and Tversky [1979]). However, it’s clear that often investors misjudge the future value of stocks by basing their assessments on the past performance thereof (Barberis, Mukherjee, and Wang [2016]). In contrast, sometimes the loss aversion of prospect theory enable investors to predict the performance of bonds (Zhong and Wang [2018]). It is known that both situational and personal factors determine risk behavior (Iqbal [2013]) and that investors, as custodians of value for shareholders and customers, are expected to mitigate risk and increase shareholder value. Risk propensity also varies between individuals (King and Slovic [2014]) and the pursuit of extrinsic goals such as fame and money to better one’s standing in relation to others may increase the propensity to take financial risks (Djeriouat [2017]). Knowledge of the risk propensity of investors is thus clearly relevant to help mitigate against hasty or misguided decisions.

By focusing on professionals responsible for investment decisions in their firms, we can begin to answer the question of how self-rated performance, risk propensity and underdog bias appear within the South African investment community. This paper therefore firstly presents an overview of the theoretical framework in which these constructs occur. Then, by making use of both a conventional and new scale of risk propensity, as well as through assessments of underdog bias and self-rated performance, the paper presents a portrait of these tendencies and the relationships among them for the South African investment community.

## **Theoretical background**

### ***The theoretical roots of bias and risk***

Ever since it has become clear to economists that humans are not rational but bounded in our ability to solve complex problems (Simon [1955]), scholars have explored this boundedness, especially where decision makers cannot optimize choice, but merely satisfice, making the best possible decision within limitations. Economists have assumed rational decision laws whereby preferences among multiple options can be predicted (Baye and Prince [2013]), or where the perceived utility of outcomes is relative to the departure point (Nutter [2010]). However, evidence suggests that decision behavior deviates from expected or standard economic models (Stanovich and West [2000]). This means that all decision makers, including investors, are unable to assess the likelihood of outcomes properly; do not always maximize utility; and even enforce their opinions on others, partially due to the dual process reasoning (Evans [2008]).

As opposed to the use of deep and analytical System 2 thinking (Kahneman [2011]; Stanovich and West [2000]), the unconscious level of instinctive, immediate and default System 1 level thinking (Evans [2009]) may give rise to heuristics. Such decision short cuts may lead to biased decision-making (Kahneman [2011]) and errors in judgement (Iqbal [2013]).

Insights into heuristics lay the foundation for understanding not only the underdog bias and overconfidence bias constructs explored by this study, but even risk propensity. Based on assumptions of bounded rationality, biases and heuristics, we might assume that investors may display underdog bias, believing that they are heroes in their life stories; may believe that their judgement supersedes available information and, accordingly, are likely to take risks in their decision-making.

Slovic, Fischhoff, Lichtenstein and Roe (1981) earlier described heuristics as inferential rules that enable people to transform complex or unknown problems into simpler ones, which are potentially advantageous in the decision-making process, but can sometimes lead to bias when used inappropriately in different contexts (Kahneman [2011]). Biases refer to inappropriate use of information or erroneous assumptions about self and the decision situation.

Availability bias describes the use of readily available or recalled information rather than base rate information (Tversky and Kahneman [1973]). When we do not have all the necessary information we may assume the information we have depicts the full picture (Kahneman [2011]), or we may simply ignore the information we do not know (Slovic *et al.* [1981]). Our recollections and available information shape the worldview we hold and which is often distorted (Ross and Sicoly [1997]; Taylor [1991]). This may drive the behavior of investors, such as causing them to overreact to big stock price changes in their immediate decisions (Kliger and Kudryavtsev [2010]), especially for small and volatile stocks (Kudryavtsev [2018]). Such availability bias lies at the heart of underdog bias, overconfidence bias and risk perception relevant to this study.

### ***Underdog bias***

The sense that, compared to others, one has faced more salient barriers than enablers, describes underdog bias. Under this bias one remembers the difficulties along one's life path more acutely than the positive events due to the effort to overcome difficulties (Davidai and Gilovich [2016]). Underdog bias aligns closely to availability bias where the most salient information in one's memory gains the greatest importance in decisions. In contrast, Rozin and Royzman

(2001) suggest that memories are skewed in a positive direction, resulting in negative events being downplayed over time. More recently, Madan, Ludvig and Spetch (2017) found that we remember extreme life outcomes, whether positive gains or negative losses, more acutely. When memories of struggle are more readily available, and people perceive themselves as heroes in their own life stories, having overcome the difficulties they have had (Davidai and Gilovich [2016]), we assume the presence of underdog bias.

This may lead to individuals' overestimating their own contributions to work (Schroeder, Caruso and Epley [2016]) and performance in teams (Davidai and Gilovich [2016]). This perception, in turn, may lead to a sense that the playing fields need to be levelled even to the point of questionable ethical behavior (Davidai and Gilovich [2016]; Tamborksi, Brown and Chowning [2012]), which holds several implications for investment decision-making.

Davidai and Gilovich (2016) imply a relationship between self-attribution and underdog bias by describing how individuals that think that they face stiffer headwinds than others also think that they are more entitled to a larger share of benefits. At the same time, we know that the notion that life has been difficult, implied in underdog bias, contrasts the tendency to recall positive events, as in overconfidence, and therefore there may be an inverse relationship between underdog bias and how investors rate their performance. This suggests that underdog bias may play a role in recollection of events and self-rated performance and ultimately in overconfidence bias.

### ***Overconfidence bias***

The perception that one's performance is on average better than average is known as overconfidence bias (Guenther and Alicke [2010]). A proliferation of literature indicates how investors' irrational thoughts lead to overconfidence, then irrational behavior and ultimately irregularities in the financial markets. For instance, Merkle (2017) argues that overconfidence causes investors to take higher risks, diversify less and increase their trading activities. Along the same lines, Graves and Ringuest (2018) found that overconfidence relates to investment predictions. This applied when overconfidence was operationalized as investors' overrating the accuracy of their own knowledge, as well as a belief in their ability to anticipate the future better than others.

Overconfidence bias has its roots in distortions resulting from information availability, optimism, egocentric tendencies or hindsight bias (Williams and Gilovich [2008]); or the tendency to attribute success to oneself rather than others (Schroeder *et al.* [2016]; Koo and Yang [2018]). Availability bias partially explains why people would overrate their own

personal contribution to group outcomes, as it is easier to recall one's own actions than that of others (Schroeder *et al.* [2016]).

Hindsight bias may be another key root of overconfidence, where people deem information on previous success to be a predictor of their future success. In the much cited book *Black Swan*, Taleb (2007) cautions that the past is not a good predictor of the future, despite our tendencies to build the rationale of the future on events of the past. Interestingly, perceived and actual expertise is likely to increase hindsight bias (Knoll and Arkes [2017]). This means that the expertise of the investment community may indeed provide for unrealistic confidence that their past successes will result in similar future gains.

When considering whether there is a relationship between overconfidence and risk taking one may note that overconfidence bias leads to risk taking that does not realise benefits (Lovallo and Kahneman [2003]).

One having lived a specific experience may cause availability bias that explains why some situations are perceived as more or less risky by an individual (Kahneman [2011]), or alternatively lack of information may cause ignorance of risk (Stanovich and West [2000]).

Similarly, overconfidence may lead to an overestimation of one's ability to judge the riskiness of a situation and their own risk mitigation actions (Hoffmann, Post, and Pennings [2013]). Overconfidence may thus also lead to the expectation of the best case scenario (Lovallo and Kahneman [2003]) and if that is combined with a sense of control over the risk, the propensity to take risks increases (Gilovich and Douglas [1986]).

### ***Risk propensity***

Due to the inadequacies of utility theory to explain risk preferences (Baye and Prince [2013]; Iqbal [2013]), Kahneman and Tversky (1979)'s seminal prospect theory presents an alternative viewpoint. Prospect theory suggests that individuals are risk-averse when faced with a potential gain and risk-seeking when faced with a potential loss, because of seeking certainty. Naturally people are loss averse (Kahneman [2011]), but there is some evidence that risk propensity is based on individual reference points of personal preference (Novemsky and Kahneman [2005]). Expected gains become the reference point according to which risk aversion plays out (Baye and Prince [2013]). Moreover when a person owns something, the endowment effect increases the perceived value of the item over willingness to pay for the same item (Thaler [1980]).

Beyond the effects of reference points and the endowment effect, risk propensity can also be as a result of individual factors such as feelings about an option. King and Slovic (2014)

showed how affect can impact risk propensity in investment decisions. A risk propensity trait of individuals can also influence their behavior (Iqbal [2013]). In addition to personal factors, external factors may cause people to be more risk seeking or averse (Lovallo and Kahneman, [2003]). For instance, Bucciol and Miniati (2018) have shown that risk propensity is higher just after economic growth, such as after positive stock market returns, and also when investors have had large risk exposure in their own portfolios. For ease of understanding, we refer to risk propensity that relates to prospect theory as “risky choice propensity”, and to self-rated risk propensity as “personal risk propensity”.

### ***Research question and hypotheses development***

As the overview of seminal and recent literature has shown, bounded rationality theory provides for a number of insights into the limitations of decision-making. These limitations rest in either the inappropriate use of information, or a tendency to seek or avoid risk, based on the option being evaluated, one’s own expectations of gain, an individual traits and emotions and external or situational factors. It seems that when investors make decisions past experience may lead to overconfidence, an awareness of past obstacles and the likelihood of taking risks.

We do not yet know if investors would display underdog bias, and whether they are then indeed overconfident and risk-seeking. One could argue that if investors believe that they have had a tougher time to succeed than their peers (underdog bias), they would be less likely to believe that their insights exceed that of their peers due to hindsight effect (Knoll and Arkes [2017]). In other words, since the recollection of positive life events is an antecedent of overconfidence, a focus on negative past events as in underdog bias suggests a possible inverse relationship between these biases.

It is not yet clear whether overconfidence in turn may result in investors taking risks. Risk aversion is at the heart of individual risk propensity where we may expect that investors will be risk-averse when they are certain of gains, but risk-seeking in an attempt to prevent losses (Kahneman and Tversky [1979]).

Apparently, no study has yet attempted to determine whether any relationships exist among underdog bias, overconfidence and risk propensity. However, Davidai and Gilovich (2016, p. 837) state that “[t]he belief that they have faced stiffer headwinds than others can also make people feel entitled to greater benefits than they’ve received”. This statement implies a potential relationship between underdog bias and self-attribution, but not necessarily overconfidence. In the present study we thus sought to answer the question: *Will an investor*

*have overcome more obstacles than others to reach success also unduly attribute success to their own efforts?*

Since there seems to be a relationship between risk perception and self-rated performance (Lovallo and Kahneman [2003]), one may wonder whether there is also any relationship between risk propensity and overconfidence. Michailova and Schmidt's (2016) experiment shows that markets with overconfident investors bring about higher incidences of stock price bubbles. Similarly, Merkle (2017) found that overconfidence relates to risk taking in the form of over-precision and over-placement of transactions for their UK based sample, and cites several examples where overconfidence links to specific risk taking behaviors. A further pertinent question thus emerged: *Will a South African investor who overly ascribes success to their own judgement also be likely to take on more risk in decision-making?*

Literature suggests that underdog bias may lead to people taking short cuts in their decisions (Davidai and Gilovich [2016]). In line with this statement we also asked: *Will an investor who is subject to underdog bias also have greater propensity towards risk?* Here one might caution that ascribing risk aversion or risk seeking behavior to an individual is difficult (Iqbal [2013]) as extraneous variables may determine related risk perception (Lovallo and Kahneman [2003]).

From the theoretical background and our preliminary questions the following research questions emerged: (a) to what extent do investors display overconfidence?; (b) to what extent do investors display underdog bias?; and (c) are investors risk seeking? Furthermore we proposed hypotheses regarding possible relationships among the variables as outlined:

*H<sub>1</sub>: Underdog bias predicts self-rated performance.*

As we know that recollection of past experiences impact decision bias, we presume that there may be a relationship between underdog bias and self-rated performance.

*H<sub>2</sub>: There is a statistically significant correlation between underdog bias and risk propensity.*

From Davidai and Gilovich's (2016) experiments we inferred that a sense of being unfairly treated may result in risky corrective action, which leads to the assumption that risk propensity may increase along with a tendency to display underdog bias, and consequently take risks. Also, since overconfidence may entail excessive belief in one's own risk assessments



and control (Hoffmann, Post, and Pennings [2013]), it may lead to greater risk propensity. Thus, the following hypothesis:

*H<sub>3</sub>: There is a statistically significant positive correlation between self-rated performance and risk propensity.*

## **Method**

### ***Participants***

Given their risk related decisions and their financial custodian responsibilities, the risk investment community was an ideal population for this study. We targeted individuals who were partially or fully responsible in their organisations for investment in business or financial instruments. Respondents were limited to decision makers within investment teams in the South African market. We focused the population only on individuals responsible for identifying returns for external investors through funds as their returns would be the mechanism for the measurement of success in order to ensure greater homogeneity of the sample and to optimally describe the risk propensities and bias propensities of the sample.

Through non-probability purposive sampling, we approached 894 investors via email and obtained 184 willing respondents, yielding a response rate of 23.2%, compared to the expected 20.4% (Deutskens, Ruyter, Wetzels, and Oosterveld [2004]).

We complemented the purposive sampling with snowball sampling by requesting the investors to recommend further suitable respondents, which yielded a further 8 responses. The resultant sample of 161 respondents, after incomplete surveys were removed, was sufficient to overcome the increased risk of sample error (Wegner [2016]).

Of the respondents 53% were in the younger and 47% in the older category (when the sample was split in half) with as many as 43% in the 30–39 year old age group. Only 12% was female, and 88% held postgraduate qualifications at the time, which may give an indication of the gender and educational composition of the investment community in South Africa (Hoffman et al. 2013). Only 2.5% of the sample did not have an undergraduate degree. Eighty-four respondents had ten or fewer years of experience (or 53% of the sample), and 136 respondents had less than 20 years of experience (or 85% of the sample).

The types of investment businesses represented were Pension/Provident Fund Management firms (29%), Private Wealth Investment (27%), Private Equity (14%), Hedge Fund Management (7%), Equity Trading (7%), Fund of Funds (6%), Bond Trading (3%), Stock

Broking (2%) and Insurance (1%). We asked the respondents to indicate the current risk level of their funds. Forty nine percent indicated that they operated in a moderate risk context, 29% in a high risk context, 11% in a mixed risk context and 11% in a conservative context.

**Table 1:** Demographics of participants

Age	18-29	15	9%
	30-39	70	43%
	40-49	45	28%
	50-59	26	16%
	60+	5	3%
Gender	Male	142	88%
	Female	19	12%
Education	High school or lower	1	1%
	Diploma	3	2%
	Undergraduate degree	15	9%
	Honors or post graduate diploma	89	55%
	Masters	47	29%
	Doctorate	6	4%
Risk perception of environment	Conservative	18	11%
	Moderate	79	49%
	High	46	29%
	Mixed	18	11%
Experience	0-5	40	25%
	6-10	44	28%
	11-15	23	14%
	16-20	29	18%
	21-25	14	9%
	26+	10	6%

## ***Procedure***

### **Measures**

The survey's preamble was used to introduce the research, obtain consent and screen the participants based on demographics. The remainder of the survey consisted of measures of Underdog Bias, Self-Rated Performance, a Risk-Propensity Measure based on Prospect theory and a newly designed Investor Risk Propensity Scale. The scales appear in Appendix A.

*Underdog bias* was measured on a 7-point Likert scale between 'entirely agree' and 'entirely disagree' for eight items relating to the construct as described by Davidai and Gilovich (2016) and availability bias literature. After Pearson Correlation calculations six items were retained to ensure convergent validity, and the Cronbach alpha scores indicated internal

consistency of the instrument ( $\alpha = 0.744$ ). Sample items are: “*I have to work harder than others to get the recognition I deserve*” or “*My investors are more demanding than other investors, even when I produce the same results.*” The average of the five items yielded the single underdog bias construct score per participant. The method is similar to the method adopted by Davidai and Gilovich (2016) for their research amongst accounting faculty.

The measurement of *Self-Rated Performance* was a combination of the scale used by Williams and Gilovich (2008) and the questions from the Core Self-Evaluation Scale (CSES) (Judge *et al.* [2003]) that were adapted for the investment community. The scale provided the investors the opportunity to compare themselves to their peers on a sliding scale of 0% indicating worst performance to 100% indicating best performance and with the score for the average investor set at 50%. Descriptive statistics were calculated by assigning a score of -50 to the lowest rating, and +50 to the highest rating, with average scores at zero. Following Pearson Correlation calculations three questions were removed for this sample. The final eight-item instrument was internally consistent ( $\alpha = 0.785$ ). Typical items for participants to compare themselves to the performance of others were: “*I determine what will happen in the investments we make*”; “*I generally generate returns above my target*”; and “*I am coping with most of the problems at work*”.

The first measure of *risk propensity*, or risky choice propensity, was designed from prospect theory (Kahneman and Tversky [1979]) offering respondents a choice between binary options such as: Would you rather take an “*80% chance of R4 million and a 20% chance of nothing*” versus a “*100% chance of R3 million?*”; or a “*20% chance of losing R4 million and an 80% chance of losing nothing*” versus a “*25% chance of losing R3 million and a 75% chance of losing nothing?*”.

The validity of the scale was examined by comparing it to the original Kahneman and Tversky (1979) results and only one item did not yield comparable results. As a consequence the certainty value of the options for each of the items was calculated to assign a score of 0 to more certain options and of 1 to riskier options, using the cumulative prospect theory formula (Tversky and Kahneman [1992]). A single score was then developed for the construct using a simple average of all ten questions to create a single prospect theory scale score for each respondent. Calculation of quartiles and standard deviations, with only slight positive skew of the data, indicated that there were no outliers that needed to be removed.

The second measure of *risk propensity*, or personal risk propensity, in the investment community was designed with consideration of the Dospert scale (Blais and Weber [2006]), and Hoffman, Post and Penning’s assessment of risk (2013; 2015). Based on a 7-point Likert

scale that ranges from ‘entirely disagree’ to ‘entirely agree’, the instrument asked the investors to rate themselves on items such as: “*I get a thrill by taking decisions that I don’t know the outcome of*”; “*I tend to take large but reasonable risk in my investment decisions*”; and “*I take more risk than my fellow investors*”. Lack of significant correlations ( $p > 0.05$ ) of three of the items led to their removal. The removal of a fourth item resulted in the increase of the internal consistency measure (from  $\alpha = 0.632$  to  $\alpha = 0.792$ ).

### Data gathering and analysis

The questionnaire was piloted among six investment professionals and two non-investment professionals to make minor adjustments. The final questionnaire was distributed electronically to reduce time and potential data capturing errors. Thirty incomplete surveys were removed from the data set.

After being tested for construct validity and internal consistency of the measures, descriptive statistics were calculated and the relevance of the sample’s demographic variables for this construct was calculated through single factor ANOVAs. Regression modelling was then used to determine the predictive values of underdog bias on self-rated performance (overconfidence) and of both self-rated performance and underdog bias on the two risk propensity measures of the investors.

### Results

Table 2 presents the descriptive statistics of the data.

**Table 2:** Descriptive statistics of the variables

	Underdog bias <sup>i</sup>	Self-rated Performance <sup>ii</sup>	Risk propensity: Prospect theory <sup>iii</sup>	Risk Propensity <sup>iv</sup>
<b>Mean</b>	2.28	17.02	0.38	2.61
<b>Standard Error</b>	0.08	0.93	0.01	0.08
<b>Median</b>	2.40	16.38	0.40	2.67
<b>Mode</b>	3.00	27.88	0.40	2.00
<b>Standard Deviation</b>	1.02	11.78	0.15	1.00
<b>Sample Variance</b>	1.04	138.79	0.02	1.01
<b>Kurtosis</b>	-0.25	-0.09	0.48	-0.35
<b>Skewness</b>	-0.05	0.33	0.18	-0.18
<b>Range</b>	5.00	62.00	0.60	4.67

<sup>i</sup> 7-point Likert scale

<sup>ii</sup> Range from 0-100

<sup>iii</sup> Codes of 1 assigned to risk options based on expected probability, and 0 assigned to less risky options (closer to expected probability)

<sup>iv</sup> 7-point Likert scale

Table 3 presents the demographic differences for the underdog bias, self-rated performance, risk propensity variables. Only two significant differences were found, namely gender-based differences for underdog bias and experience-based differences for overconfidence as described below.

**Table 3:** Demographic differences (ANOVAs) of underdog bias, self-rated performance and

	Underdog bias			Self-rated performance		
	F-Crit	F-Stat	p-value	F-Crit	F-Stat	p-value
Age	2.66	1.29	0.279	2.66	1.93	0.128
Gender	3.90	10.10	0.002**	3.90	0.60	0.441
Education	2.66	0.58	0.627	2.66	0.75	0.523
Risk Level (Org)	2.66	1.63	0.186	2.66	0.75	0.523
Experience	2.27	0.69	0.629	2.27	3.84	0.003**
Fund Type	1.94	1.40	0.192	1.94	0.59	0.800
	Risk Propensity			Risky choice propensity (prospect theory)		
Age	2.66	0.77	0.515	2.66	0.73	0.535
Gender	3.90	0.72	0.396	3.90	0.17	0.679
Education	2.66	0.38	0.768	2.66	1.33	0.267
Risk Level (Org)	2.66	1.50	0.216	2.66	1.82	0.146
Experience	2.27	1.12	0.351	2.27	0.37	0.870
Fund Type	1.94	0.19	0.995	1.94	0.99	0.450

\*\* . Correlation is significant at the 0.01 level

\* . Correlation is significant at the 0.05 level

### Investor underdog bias

The mean of the sample ( $M = 2.28$ ,  $SD = 1.02$ ) was lower than the midpoint, and based on a single sample t-test statistically significantly lower than the hypothetical population mean ( $p < 0.0001$ ). The mean of underdog bias was significantly higher for the female respondents ( $M = 2.96$ ,  $SD = 1.00$ ) than the male respondents ( $M = 2.19$ ,  $SD = 0.95$ ) (see Table 3).

In contrast to the findings of Davidai and Gilovich (2016) among sports fans, American voters, siblings, university students, and university accounting faculty, it is interesting to note that investment decision-makers in South Africa do not display underdog bias. In other words, there was no clear indication that they were of the opinion that other investors have had an advantage over them in the industry. The standard deviation indicates that this was indicative of most of the sample, without outliers. Each of the items scored under the midpoint which means the investors are less prone to feel that they work harder than others to achieve similar results, work with more demanding investors, work harder to get earned recognition or that other investors get recognition beyond what they deserve.

The results may vary from previous findings on underdog bias due to the specific investment-based questions. In Davidai and Gilovich's study (2016) respondents compared themselves to specific others, such as their own siblings, where our study referred to the investment community in general. In our study the investors did not feel they faced more headwinds, or were hard done by, compared to others in the community.

A boundary condition of underdog bias mentioned by Davidai and Gilovich (2016) is that people are acutely aware of benefits that they receive from others. This could explain why the investment community was aware, for instance, of the recognition received from investors (a tailwind). As the headwinds in investment are normally market-driven, they may believe that their decisions are aligned to what other investors would have made with similar information. It may be that the community neutralizes or minimizes the value of poor decisions (Taylor [1991]), and that investors have positive memory bias, due to the time gap between decisions and outcomes (Rozin and Royzman, 2001). However, the reason for this boundary condition in the underdog bias of investors still needs to be empirically examined.

Given that it is uncertain that a boundary condition is at play, the finding was useful in showing that this investment community does not lean towards believing they are the heroes in their own difficult life stories, and that their environment is sufficiently enabling.

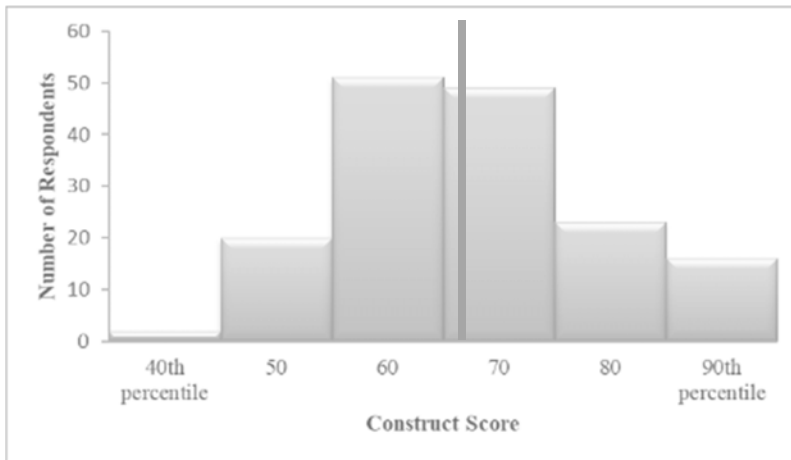
It is also useful to consider that the female investors were more likely to perceive headwinds than their male counterparts. Possible explanations for this may be the general gender based experience of lack of support from the environment (Morgenroth and Ryan [2018]), which may be further amplified by the potential underrepresentation of females in the industry.

### **Investor overconfidence**

The mean of the investor overconfidence was slightly above the average ( $M = 17.02$ ,  $SD = 11.78$ ). Overconfidence differed in terms of the years of experience of the respondents (see Table 3). The Tukey-Kramer test (Jaccard, Becker and Wood, 1984) indicated that those with less than five years of investment experience displayed significantly less confidence than those with 26 years and more experience ( $q = 5.05$ ;  $p < 0.05$ ), as did the group with only 6-10 years investment experience ( $q = 4.30$ ;  $p < 0.05$ ).

Measurement of self-rated performance rested on two principles: (a) an understanding of investors' traits of self-esteem, generalised self-efficacy, neuroticism, and locus of control in investment decisions as adapted from the Core-Self Evaluation Scale (CSES) (Judge et al., 2003); and (b) comparison to peers in the industry as adapted from Williams and Gilovich

(2008). When their performance across a number of abilities and behaviors is compared, on average the respondents rated themselves in the 67<sup>th</sup> percentile of the population, comparable to previous studies among university students of 60<sup>th</sup> – 65<sup>th</sup> (Williams and Gilovich [2008]) or 65<sup>th</sup> – 75<sup>th</sup> percentile rankings (Geunther and Alicke [2010]), or among working individuals in the 77<sup>th</sup> – 79<sup>th</sup> percentile range (Judge *et al.* [2003]).



**Figure 1:** Histogram of self-rated performance in relation to others (overconfidence)

Whereas hubris is often associated with the investment industry, the investors did not rate their own performance above that of other investors. It should be noted that they did not compare themselves to professionals in other industries. Still they showed above average rating of themselves for getting the success they deserve at work, generating returns above their targets, completing their tasks successfully, determining the outcome of the investments made and coping with most problems at work. Similarly they opined that they were below average with regard to getting depressed with the investment industry and not feeling in control of success in their careers. This applied to all the demographic subgroups.

Interestingly, those with the least experience rated their self-performance the lowest (63<sup>rd</sup> percentile) and those with the most experience the highest (78<sup>th</sup> percentile). This was, however, not a progressive pattern for the age groups. Although there is a large difference at the extreme poles of the sample it remains interesting nonetheless that overconfidence appears in all the groups but especially those who have been in the profession for an extensive time. Conversely, one may argue that the participants' high degree of confidence is based on accurate perceptions of their industry-specific competence. The availability heuristic of past success may play a role in this self-analysis (Tversky and Kahneman [1973]). According to Kahneman (2011), expertise is difficult to attain in this industry given the volatility in the investment markets, and

since repeatable tasks is a prerequisite of expertise (Kahneman and Klein [2009]). We have also noted in the literature that expertise relates to hindsight bias, and thus overreliance on the past (Knoll and Arkes [2017]).

Given the above, and that past successes are not predictors of future outcomes (Fischhoff [1975]), we can infer that the higher than average rating of the very experienced investors in this sample still represents a degree of overconfidence. The lower rating of the most inexperienced group is indicative of a lower level of bias rather than actual performance or competence.

### **Investor risk propensity**

Investor risk propensity appeared as a normal distribution for this data set ( $M = 2.61$ ,  $SD = 1.00$ ) and there were no significant differences based on demographics. For risky choice propensity, the descriptive statistics indicated a mean closer to a preference for certainty than risk ( $M = 0.38$ ,  $SD = 0.15$ ). On comparing the converted percentile scores of the two risk propensity scales through a matched pair t-test, we found that there was a difference in mean of the two measures of risk propensity between 3–9% either positively or negatively. We also found a weak positive correlation between the two measures at a 10% confidence interval ( $r(161) = 0.14$ ,  $p = 0.086$ ).

It was essential to develop a scale to measure the risk propensity of the investment community based on the behavioral principles of the Dospert scale (Blais and Weber [2006]). We also utilized the risk tolerance measure from the Hoffmann *et al.* (2013, 2015) studies that explored decisions influenced by the potential or actual risk taken by investors to formulate the items of the Risk Propensity Measurement Scale.

The investors on average scored just below the mean for amount of risk taken compared to fellow investors; a sense of thrill when taking decision for which the outcomes are not known; an openness to take somewhat more risk to ensure greater returns; a sense that greater risk taking leads to higher performance and a preference for risk taking, and for taking larger, but reasonable, risks. The mean was lower than the mean for the associated risk tolerance scale in a study (Hoffman *et al.* [2015]) that found a correlation between risk tolerance and risk expectation. Canadian studies with the Dospert found mean scores for financial risk taking of 49% and 44% for two samples (Weber, Blais, and Betz [2002]), whereas our associated tool yielded a comparative risk propensity score of 44%.

The lower than midpoint score obtained is not indicative of a lack of risk-seeking behavior for this sample. Comparative studies with other population groups and further norms are



required to evaluate level of risk propensity. However, it is notable that the respondents didn't rate their risk propensity highly. We did not find differences based on demographics, or as one may expect based on previous research, that investors with more experience (Heath and Tversky [1991]; Hoffmann *et al.* [2015]) or sometimes less experience were likely to take on more risk (Goetzmann and Kumar [2008]), or that female investors would be more risk averse (Ch'ng [2017]).

The risky choice propensity measure used similar comparisons to Kahneman and Tversky (1979) but incorporated a further four items that contained both a potential loss and a potential gain.

**Table 4:** Comparison of prospect theory risk items for original and current study

	Options		Kahneman & Tversky(1979)		Current Study	
	A	B	A	B	A	B
1	(4000, 0.8)	(3000)	80%	20%	80%	20%
2	(4000, 0.2)	(3000, 0.25)	65%	35%	60%	40%
3	(3000, 0.9)	(6000, 0.45)	86%	14%	13%	87%
4	(-4000, 0.8)	(-3000)	92%	8%	76%	24%
5	(-4000, 0.2)	(-3000, 0.25)	42%	58%	66%	34%
6	(-3000, 0.9)	(-6000, 0.45)	92%	8%	76%	24%

We found differences from the outcomes of the original study for our sample. One question offered investors a choice between the following options: A: a 45% chance of R6 million and a 55% chance of nothing; or B: a 90% chance of R3 million and a 10% chance of nothing. Using the original certainty equivalent formula in the outlier question 3 we calculated that option A had a certainty equivalent of 2038.39 and option B a certainty equivalent of 2089.41. According to prospect theory the investors should favor option B which our sample did, contrary to the original study (Kahneman and Tversky [1979]). We reason that the reason our investment professionals preferred a higher probability lower loss option was because their loss-gain ratio differed from that of the original population.

The outcome of a further question required investigation. This question offered the investors a choice between the following options: A: a 20% chance of losing R4 million and an 80% chance of losing nothing, or B: a 25% chance of losing R3 million and a 75% chance of losing nothing. Since the probabilities of 20% and 25% are at face value negligible, it may be that our investors simplified the problem by rounding off the figures (Kahneman and Tversky [1979]), resulting in them only comparing the lower outcome loss.

For analysing results, options with higher expected value and lower certainty based on certainty equivalent scores, were coded as the riskier options. The overall mean score confirmed fewer risky choices (or lower risk propensity) for our sample. This applied across the demographic groupings.

We therefore found comparative results for the Investor Risk Propensity Scale that operationalised risk as perceived behavior and the prospect theory-based measure that evaluated actual probability calculations to avoid uncertainty and optimize value or gain. Both behavior and perception did not yield a high propensity to take risks. One could consider whether the fact that only 29% of the investors operated in a high risk context impacted the risk propensity result, as Bucciol and Miniac (2018) found a relationship between personal risk experience and risk taking behavior.

Overall, the descriptive statistics indicate that the investment decision-makers do not display underdog bias but experienced investors do display a degree of overconfidence. They do not display risk propensity. The question remains whether there are relations among these two biases and risk propensity.

Table 5 displays the correlation results between the variables of the study.

**Table 5:** Pearson correlation results

	<b>Underdog bias</b>	<b>Overconfidence</b>	<b>Risk propensity</b>	<b>Risky choice</b>	<b>Age</b>	<b>Gender</b>	<b>Education</b>	<b>Risk env.</b>
<b>Underdog Bias</b>								
<b>Overconfidence</b>	-0.240**							
<b>Risk Propensity</b>	0.129	0.064						
<b>Risky Choice</b>	-0.115	0.070	0.136					
<b>Age</b>	-0.153	0.187*	0.045	-0.046				
<b>Gender</b>	0.244**	-0.064	0.060	0.044	-0.0228**			
<b>Education</b>	-0.025	0.065	-0.076	-0.133	0.155	-0.101		
<b>Risk environment</b>	-0.033	-0.035	.045	0.049	-0.159*	0.034	-0.009	
<b>Experience</b>	-0.121	0.229**	0.018	-0.010	0.744**	-0.197*	0.106	-0.123

N= 161 \*\* p<.00 \* p<.05

## Underdog bias and self-rated performance

When testing for the relationships between underdog bias and self-rated performance we found a weak negative correlation ( $r(161) = -0.24, p < 0.001$ ). Regression analysis (see Table 6) indicated that underdog bias negatively predicted self-rated performance ( $R^2 = 0.0578, F(1,161) = 9.76, p < 0.001$ ). Hypothesis 1, indicating a relationship between underdog bias and self-rated performance is supported, and an inverse relationship is confirmed.

**Table 6:** Linear regression results for underdog bias and overconfidence biases (controlling for demographic variables)

	Overconfidence			Overconfidence Model 2		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Underdog bias	-2.78	0.89	-0.24*	-2.59	0.92	-0.22*
Age				0.05	1.41	0.00
Gender				0.12	0.26	0.04
Education				1.30	2.94	-0.08
Experience				-0.02	0.08	0.04
Investment environment				-0.26	1.10	-0.02
$R^2$		0.06			0.10	
$R^2$ adjusted		0.05			0.01	
<i>F change</i>		9.76*			1.49	

$N = 161$  \*  $p < .05$  \*\*  $p < .01$

We reason that the availability heuristic (Tversky and Kahneman [1973]) may be the mechanism that explains the relationship. The inverse relationship between underdog bias and self-rated performance means that the less the investors felt that they had more difficult work requirements, or ability to gain recognition, the more they rated their own ability to produce investment success, succeed in their careers and belong in the industry. The implication is that a sense of an enabling environment may have an opposite effect on self-rating of performance in relation to others. We caution however that the significant relationship found was weak and more work should be done to understand which other factors interrelate with a perception of headwinds in life and confidence. An optimism bias (Lovallo and Kahneman [2003]), or positive feedback (Schroeder *et al.* [2016]) may be among those contributing factors, which require further investigation.

### **Underdog bias and personal risk propensity**

The results indicated a weak and insignificant correlation (see Table 5), and therefore no predictive relationships between underdog bias and personal risk propensity ( $r(161) = 0.129, p > 0.05$ ) and risky choice propensity ( $r(161) = -0.115, p > 0.05$ ). Consequently underdog bias also did not relate to personal risk propensity ( $R^2 = 0.01, F(1,161) = 2.67, p = 0.10$ ) or risky choice propensity ( $R^2 = 0.01, F(1,161) = 2.13, p = 0.15$ ) (Table 5). Underdog bias therefore did not significantly predict the tendency to take risk.

We therefore reject the hypothesized relationship between underdog bias and personal risk propensity (hypothesis 2). In other words, we did not find that a biased view of overcoming hardships to reach success had any relation to the risk propensity of the investors. We do know from literature that there is a relationship between a strong sense of conviction in one's views and the tendency to take on risk (Hoffmann *et al.* [2013]). We also know that a sense of control may relate to risk taking behavior (Gilovich and Douglas [1986]). We had assumed that wanting to right the wrongs of the past, ensuring fairness, may result in taking more chances (Davidai and Gilovich [2016]), but this was not the case. A question remains regarding other potential attitudes and behavioral outcomes of those who display high levels of underdog bias instead.

### **Self-rated performance and risk propensity**

For this sample we also found that self-rated performance (and related overconfidence) did not relate to or predict personal risk propensity. The correlations between these variables were also weak and insignificant ( $r(161) = 0.07, p > 0.05$ ). As may then be expected, self-rated performance did not significantly predict personal risk propensity ( $R^2 = 0.00, F(1,161) = 0.60, p = 0.42$ ). We hypothesized this relationship based on knowing that high self-rated performance predicts risk perception (Slovic *et al.* [1981]), and overconfidence leads to risk propensity through planning fallacy (Lovallo and Kahneman [2003]).

The lack of support for hypothesis 3 means that there was no relationship for our sample between how they rated their own successes and the propensity to take risk, or choose riskier options when faced by two choices. Since King and Slovic (2014) have shown that feelings may blur the riskiness of situations, or instinctive and irrational thought may take over (Evans [2008]), other factors that impact on risk propensity should be explored.

It would seem that, in the option analysis of risks, our investors fared well in taking certain decisions. We wonder whether the exposure to risk contexts have made the investors more or less cognizant of risk assessment and analysis during decision-making.

## Conclusion

We set out in this paper to examine the level and potential impact of underdog bias, confidence levels and perceived and choice-based risk propensity on investment decision-makers, and whether these variables are interrelated. Understanding how these variables interrelate would hold implications for the investment community on how to improve decision-making. By using a new measure of risk propensity our study made a modest empirical contribution to assess risk propensity for investors more easily as we were able to compare the outcomes thereof with the risk propensity scale based on decisions between options according to prospect theory.

The findings firstly indicated relatively low levels of underdog bias for the sample. We found that the investment professionals did not think that past barriers were more significant than enablers in their work and careers. This is the only known empirical support for the potential boundary effect that Davidai and Gilovich (2016) describes, namely better recall of people based benefits versus event based obstacles, and goes against several of their findings that confirm a tendency towards underdog bias. Personal, rather than impersonal conditions such as market forces, may have led to a more positive experience. Our sample reports an enabling interpersonal environment. The study contributes to an understanding of underdog bias of investors and future studies would need to explore whether benefits from people are better recalled than obstacles.

Secondly, we found that the experienced investment professionals rated themselves above average in performance in comparison to their peers, a rating similar to those of different types of populations (Williams and Gilovich [2008]; Geunther and Alicke [2010]), and which therefore confirms the presence of overconfidence bias, but only for certain levels of experience. This contributes not only to literature on overconfidence bias, but also to a growing body of literature that investigates the relationship between expertise and decision bias (Knoll and Arkes [2017]).

Thirdly, based on both the descriptive measure of risk propensity and another that draws the seminal Kahneman and Tversky (1979) scale, we did not find a higher risk propensity for the investors. The prospect theory-based scale yielded similar results to the original work, with the exception of items that were explained through the certainty equivalent value calculations (Tversky and Kahneman [1992]). This finding adds to previous literature that yielded varying results on the risk propensity of decision makers (Djeriouat [2017]), Iqbal [2013] King and Slovic [2014]).

Although the measure of personal risk propensity requires thorough validation, we established internal reliability for this new tool that is different to scales which either reflect the perception of market risk (Hoffmann et al. [2013]) or individual choice of options (Tversky and Kahneman [1992]). Yet the instrument yields similar results to comparable but less focused scales on risk (e.g. Weber, Blais and Betz [2002]). We also found only a 3–9% difference between the two assessments of risk propensity used in the study.

Testing of the three hypotheses on the relationships among the three variables, we found an inverse relationship between underdog bias and self-rated performance. A weak tendency to see the obstacles over enablers would predict a higher rating of self-performance and related overconfidence. This implies that the investors in this sample, who experienced being enabled by their interpersonal environment, did not rate their own performance higher relative to their peers.

The other two hypotheses, that examined the relationships between both underdog bias and self-rated performance and risk propensity, were not supported. As we expand insights into decision bias, this finding makes a contribution in the understanding that perceptive biases, such as underdog bias and overconfidence, can occur independent of a person's risk propensity. Likewise it means that a tendency to seek out risky options does not necessarily go hand in hand with the tendency to overrate one's own performance. Moreover, it means that an investor may be circumspect and seek out certain options and not take on risks, even while being overconfident in their performance. Also importantly, when investors overrate their performance, this does not necessarily predict that they will also make risky investment decisions. An interesting further exploration would examine the necessary conditions for actual past risk behavior rather than risk propensity, in relation to decision bias. Since other research suggests a relationship between overconfidence and observed risk taking behavior in practice (Merkle [2017]), our research shows that more work is required to understand the conditions under which overconfidence would predict risk propensity.

Further research among investors may explore aspects of the self-regulation of risk propensity. New measures of risk propensity should also account for a potential best foot being put forward by respondents (Stephens-Davidowitz [2014]) by including an assessment of scenario-based assessments and actual behavior.

The implication for the findings in business in an emerging market is reassuring as cautiousness of the investors, as well as their level of self-rated performance are similar to what may be expected in the general population. However, further interventions may be developed

to help make investors aware of any bias in terms of their own knowledge, so as to make better use of information sources in decision-making.

Moreover, when investors do not see the barriers in their careers as having been caused by themselves, this may hold implications for their view of the causes of mistakes. This again highlights the need for the development of sound perspectives on investor performance. Early research has shown that individuals with a high internal locus of control, with good cognitive complexity skills and who are introverts, are better at self-assessing accurately (Yammarino and Atwater [199]3). More work should be done to determine how to develop accurate self-perceptions among investors.

Limitations of this research include the need for validation of the newly developed Investment Risk Propensity Scale, possible biased responses by the investors, and the limitation of the scope of the sampling frame to the South African investment population. These limitations call for further research on bias and risk propensity of investors in different contexts. The measurement of investment decision-making was limited to the proxy investment examples used by Kahneman and Tversky (1979) and did not include actual investment decisions. Future research should incorporate measures of practice-based investment decision-making. Control variables should also be introduced better to understand the conditions that impede or enable underdog bias.

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## Appendix A: Measuring instruments

### Underdog bias

1. When I source research, I have to work harder than others to achieve the same result.
2. My investors are more demanding than other investors, even when I produce the same results.
3. I have to work harder than others to get the recognition I deserve.
4. My investors tend to blame me more harshly than others when the market takes a downturn.
5. My peers get more recognition than they deserve compared to the work that they have done.

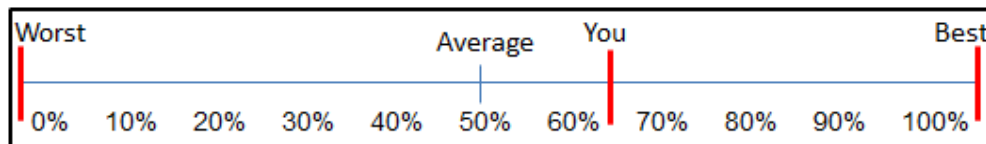
### Overconfidence bias/self-rated performance

(Adapted from the Core Self-Evaluation Scale (CSES) (Judge et al. [2003]) and the overconfidence continuum (Williams and Gilovich [2008])

Please answer the following questions in relation to where you perceive yourself to be when compared to your peers.

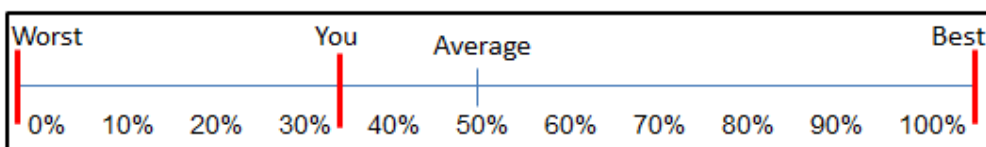
For example: Where do you rate in terms of sprinting at your local running club?

Top:  Slightly above average



Where do you rate in terms of weight lifting at your local gym?

Top:  Below average



1. I achieve the success I deserve at work.

2. Sometimes I get depressed with the investment industry. \*
3. I generally generate returns above my targets.
4. Sometimes when I fail, I feel like I can't choose the right investments. \*
5. I complete my tasks successfully.
6. Overall, I am satisfied with my performance.
7. I do not feel in control of my success in my career. \*
8. I am coping with most of the problems at work.

(Reverse scored items marked with asterisk)

### **Investor Risk Propensity Scale**

For each of the following statements please indicate the level it normally applies to you.

Please select an answer on the following 7-point Likert scale: (Entirely Agree/ Mostly Agree/ Somewhat Agree/ Neither Agree or Disagree/ Somewhat Disagree/ Mostly Disagree/ Entirely Disagree).

1. I take more risk than my fellow investors.
2. I get a thrill by taking decisions that I don't know the outcome of.
3. If I could take a little bit more risk, I could secure a higher return for my fund.
4. The more risk I take the better I perform.
5. I like to take risks.
6. I tend to take large but reasonable risk in my investment decisions.

### **Risky Choice Propensity (prospect theory)**

In this section please answer the question as to which option you would prefer (either A or B).

For the following questions please assume you administer a fund or investment portfolio of R10 million.

1. A: 80% chance of R4 million and a 20% chance of nothing, or  
B: 100% chance of R3 million
2. A: 20% chance of R4 million and a 80% chance of nothing, or

- B: 25% chance of R3 million and a 75% chance of nothing
3. A: 45% chance of R6 million and a 55% chance of nothing, or  
B: 90% chance of R3 million and a 10% chance of nothing
4. A: 80% chance of losing R4 million and a 20% chance of nothing, or  
B: 100% chance of losing R3 million
5. A: 20% chance of losing R4 million and an 80% chance of losing nothing, or  
B: 25% chance of losing R3 million and a 75% chance of losing nothing
6. A: 45% chance of losing R6 million and a 55% chance of losing nothing, or  
B: 90% chance of losing R3 million and a 10% chance of losing nothing
7. A: 50% chance of losing R2 million and a 50% chance of gaining R4 million, or  
B: 60% chance of losing R3 million and a 40% chance of gaining R6 million
8. A: 30% chance of losing R3 million and a 70% chance of gaining R2 million, or  
B: 50% chance of losing R3 million and a 50% chance of gaining R5 million
9. A: 80% chance of losing R1 million and a 20% chance of gaining R5 million, or  
B: 30% chance of losing R2 million and a 70% chance of gaining R1 million
10. A: 30% chance of gaining R2 million and a 70% chance of losing R1 million, or  
B: 20% chance of gaining R4 million and an 80% chance of losing R1.5 million