

The Validity of Financial Advisor's Heuristic Risk Tolerance Categorisation: Evidence From a Risk Tolerance Assessment Tool

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Abstract

A central tenet of the financial services industry in Australia and abroad is the measurement and categorisation of investor's financial risk tolerances. Recent reforms to the industry now require financial advisors to directly question investors about their risk tolerance. Prior to these reforms, financial advisors used heuristics to categorise investors into different classes or categories of risk tolerance. In order to determine if these reforms are fruitful, and if financial advisors heuristics are systematically inept, we utilised a psychometrically validated risk tolerance questionnaire composed of direct questions and demographic information. Firstly, we constructed two categories (broad and narrow) of heuristically determined risk tolerances that financial advisors may employ. Secondly, we compared these heuristically determined categories against each investor's response to four direct questions. Our results indicate that misclassification of risk tolerance categorisation is severe under both broad and narrow categories, with the main influences being the number of categories and type of direct question. In the main, financial advisor's use of heuristics in categorising investor's risk tolerances is inefficient, and in some cases grossly under (over) estimates an investor's actual risk tolerance.

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1. Introduction

The assessment of financial risk tolerances of individual investors has been the subject of many experiments and surveys. Such studies empirically illustrate that subjects (investors) may not have well defined risk preferences, but often use heuristics to make investment decisions [(Benartzi and Thaler, 2002, Shefrin, 2000, Thaler and Johnson, 1990)]¹. Similarly, people that provide financial advice (financial advisors) are also prone to using heuristics when assessing an investor's financial risk tolerance [(Riley, Bland and Trimm, 2003, Riley and Russon, 1995, Roszkowski and Snelbecker, 1990, Roszkowski and Grable, 2005)]. Thus, the potential for a financial advisor to misclassify an investor's risk tolerance is quite probable given that investors themselves are not fully aware of their own attitudes towards financial risk.

To counter the problem of risk tolerance misclassification, The Financial Services Reform Act (2001) was introduced imposing sweeping reforms to the Australian financial services industry. Integral to this notion is that all financial advisors, gather reliable and relevant information from the individual investor rather than rely on general heuristics. This information will form the basis of subsequent investment advice. In particular, this information identifies the investor's investment objective, as well as their attitude towards financial risk. The attitude towards financial risk determines the asset allocation for the desired investment objective. Thus, any misclassification of risk tolerance by financial advisors can reduce the quality of advice, and provide an investment performance that an investor may not be comfortable with, as by inferred their financial risk tolerance.

Risk tolerance assessment of individual investors has become a mandatory function of the financial advising process. As a result, a growing field of literature has emerged that aims to identify predictors of risk tolerances, as well as assessment methods that measure risk tolerances. Commonly used heuristic predictors of risk attitudes are age, income, gender and wealth [(Grable and Lytton, 1999, Hallahan, Faff and McKenzie, 2003, Sung and Hanna, 1996, Yao, Hanna and Lindamood, 2004)]. These variables are heuristics or "clinical judgments" (Roszkowski and Grable, 2005) that financial advisors

¹ Not all studies use investors as either their respondents or subjects. Students and academic staff were used in experiments and questionnaires investigating investment behaviour and financial risk attitudes.

use to categorise investors risk tolerances. At the minimum broadest level of categorisation, risk tolerances have three broad categories ranging from, risk averse to risk neutral and risk seeking. Broad risk tolerance categories (i.e one or two categories at most) may reduce the severity of misclassification if risk adjusted returns are not significantly different. However, as the level of categorisation increases, then misclassification becomes an important issue, as the financial advisor may not be fulfilling the requirement of “knowing your client”.

While heuristics may provide financial advisors with a broad band of risk tolerances, they suffer from several disadvantages in terms of relevant, reliable and informative information about the individual investor. The greatest disadvantage heuristics possess, is that they do not provide the financial advisor with any directly observable measure of an investor’s attitude to situations that characterise financial investment decisions (choice under uncertainty). Heuristics such as age, sex, income and wealth, are used as generalized assumptions to categorise investors into risk tolerance categories. Under the terms of the Act and the “know your client” rule, a specific measure or understanding of an investor’s risk tolerance to financial risk must be considered. Failure to do so compromises the validity and reliability of financial advice and recommendations.

The purpose of this paper is to compare the validity of commonly used heuristics (clinical judgments) by financial advisors, versus investor’s responses to directly observable questions that also categorise financial risk tolerances. Our analysis involves the comparison of two sections of a psychometrically validated risk tolerance questionnaire. Firstly, we construct an investor’s perceived or clinically judged risk tolerance based on common heuristics employed by financial advisors, as evidenced in the literature. We then compare the investor’s heuristically determined risk tolerances with their responses to several questions that directly measure observed risk tolerances (questions part of a survey instrument). The two questions we address through this analysis are: (i) the extent and severity of misclassification of risk tolerances and (ii) the influencing factors of misclassification (number of categories, types of questions and demographic factors).

This paper extends upon the existing risk assessment literature in several ways. Firstly and most importantly, is the comparison between a heuristically determined risk tolerance, and a directly observable measure of financial risk tolerances. Secondly, the data set being employed in this study consists of completed risk tolerance assessments of actual investors, ensuring the data is valid and reliable. Thirdly, most risk assessment studies have employed small samples or use students to participate. Conversely, have a relatively large sample and our data uses real investors (approximately 70,000 responses). Finally, our direct observable risk tolerance measures comprise both qualitative and quantitative forms of risk tolerance measurement.

The remainder of the paper is structured as follows. Section two reviews previous literature on heuristics used by both financial advisors and individual investors. We also, review previous studies on choice under uncertainty. This section bridges two areas of risk assessment literature and illustrates our contribution to each area. Section three describes our unique data set and how the data was gathered. Section four outlines the methodology of our analysis, including how the validity of heuristics will be tested. Our results and discussion is presented in section five, and section six concludes with future research issues and limitations of this research.

2. Literature Review

The purpose of this literature review is to draw on elements from two fields of research into individual investor behaviour; “determinants of financial risk tolerance” and “choice under uncertainty”. Both fields aim to explain and describe investor behaviour, using a variety of research methods. For the purposes of this study we draw only on the above fields for two reasons. Firstly, to identify the heuristic determinants of financial risk tolerance, we need to review the literature to ascertain the predictors of financial risk tolerances. Secondly, a review of studies on “choice under uncertainty” enable us to use directly observable measures of financial risk tolerances.

The contribution of this study is to provide evidence for the validity of heuristic based risk tolerance assessment methods used by financial advisors, versus directly observable measures of financial risk tolerances. Moreover, this study also provides original evidence that the “know your client” rule may be compromised in environments

with varying categories of risk tolerances. Prior to reviewing these studies, we must define what financial risk tolerances are, and how they are measured in practice and research.

2.1 Financial Risk Tolerance and Measurement

The terms financial risk tolerance and risk profile are interchangeable terms that have been used in both research and practice (Hallahan, Faff and McKenzie, 2003). (Grable, 2000) defines risk tolerance as the “maximum amount of uncertainty that someone is willing to accept when making a financial decision”. Similarly, (Harlow and Brown, 1990) define risk tolerance as the “degree to which an investor is willing to accept the possibility of an uncertain outcome to an economic decision.” More recently, (Callan and Johnson, 2002) define risk tolerance as “degree to which a client is willing and able to accept the possibility of uncertain outcomes being associated with their financial decisions”. From these definitions, it can be inferred that financial risk tolerance and attitudes reflect an investor’s attitude towards uncertainty. Alternatively risk tolerance can be interpreted as volatility of returns over a period of time, from an investment perspective.

In terms of the legal framework for provision of financial advice, the Act refers to levels of ‘tolerance’ of investment risk, rather than using the term ‘risk attitude’. However, as stated above the two terms are often used interchangeably in the sense that risk attitude profiling provides a measure of an individual’s tolerance of financial risk. In neo-classical portfolio theory, an investor’s risk tolerance is reflected by the shape and position of their utility indifference curves which then uniquely determines an optimal portfolio choice. The optimal portfolio is determined through a tangency solution with the risk-return frontier of efficient portfolios positions given by “the point on the efficient frontier at which one of the investor’s indifference curves just touches the frontier” (Sharpe, 1997). Thus, in terms of investment advice, identification of an investor’s risk tolerance, determines the asset allocation decision.

A review of the literature yields three primary methods of measuring financial risk tolerance. These methods range from primitive qualitative interpretations of statements, to highly quantitative measures of attitudes towards financial risk

(Roskowski, 2003). The three methods are; interviews, assessing actual investment behaviour and assessing responses to situations that characterise investment choice under uncertainty (questionnaire).

Callan and Johnson (2002) report that client-centred interviews and conversations are often the primary data collection tool for risk tolerance profiling by financial advisors. This form of risk tolerance profiling allows the financial advisor to gain initial insight into the investor's attitudes towards certain types of risky investments. Interviews provide ability to probe the comfort levels of an investor's choices between alternative types of investments or asset classes that are characterised by return uncertainty.

Research into investment advisors interpretations of risk tolerance is limited. Pioneering work by Snelbecker et al (1990) found that given a hypothetical investor's statements, financial advisors make substantially different interpretations. This finding is concerning for investors who receive and act upon advice from one advisor, despite theoretical variability in the validity of that advice. Interviews and informal discussions with investors regarding their previous and current investments are not scientific or objective, and do not provide any substance for investment advisors to provide advice on.

Another method of measuring financial risk tolerance is by assessing an investor's current behaviour. This is achieved through inferring attitudes to risk by examining the investor's composition of assets in their portfolio (Droms and Strauss, 2003, Riley and Russon, 1995, Schooley and Worden, 1996). However, there are short comings to this approach. Most notable, is the relationship between age and asset allocation. For example, older investors tend to have a considerable portion of their portfolio in the equity (risky) class. However, this can be attributable to participation in pensions and superannuation investment schemes, rather than reflecting their risk tolerance. Interestingly, some researchers such as (Cordell, 2001, Droms, 1988) assert, that investors that have the financial "capacity"² to invest and tolerate financial negative returns may be biased towards equity type investments.

The questionnaire method is an experimental data collection method, drawing on facets of the above two methods. This method is the most widely used method in practice

² "Financial Capacity" in this context is part of the multi-dimensional construct of risk attitude that these researchers measure.

and research (Hallahan, Faff and McKenzie, 2003) and appeals due to its ability to gauge an investor's response to a variety of situations that characterise investment decision making under uncertainty. An interesting aspect of these studies were the different choice situations that a risk assessment instrument contained³. A further advantage of the questionnaire is that it allows researchers and financial advisors to gather demographic information about their investors/participants. This information can be used to heuristically categorise investors into risk tolerance categories, as well as assist in the research of financial risk tolerance predictors.

2.2. Heuristics as Predictors of Financial Risk Tolerance

Research into the determinants of financial risk tolerance is relatively new, and yet a vastly growing area of financial services research. As such, a lot of empirical work has provided some interesting, and at times contradictory results. The purpose of this paper is to assess the validity of commonly used heuristics by financial advisors to categorise investors risk tolerances, as compared to investor's responses to directly observable risk tolerance measures. To identify these heuristics, we review the literature on determinants (demographic variables) of financial risk tolerance. They are namely, age, gender, income and wealth

Age is an integral heuristic used by financial advisors and researchers alike as a predictor of financial risk tolerance. However, the literature on this variable seems to have produced mixed results. At first, age was hypothesised to have a negative relationship with risk tolerance (Morin and Suarez, 1983, Palsson, 1996). These results seemed reasonable, as older investors (often retired/unemployed) would not have the financial capacity to sustain losses, compared to younger investors whom have the benefit to earn a regular income from employment. Similarly, younger investors also have the capacity to recover from potential losses suffered through risky investments, due to their longer investment (Bodie, 1995). Some researchers have found the relationship between age and risk tolerance to be non-linear and concave (Hallahan, Faff and McKenzie, 2003, Riley and Russon, 1995). Conversely, researchers have found some

³ The first study from these authors reduced a risk assessment instrument from 20 to 13 items (questions). A follow up study in 2003 tested the reliability and validity of such an instrument on a larger sample than the initial sample.

mixed evidence of either a positive relationship or non-existent relationship between the two variables (Grable and Lytton, 1998, Grable and Lytton, 1999, Hanna, Gutter and Fan, 1999, Hariharan, Chapman and Domain, 2000, Riley, Bland and Trimm, 2003, Sung and Hanna, 1996, Wang and Hanna, 1997). Nevertheless, age has attracted significant research, and for the purposes of this study, will be included as part of the heuristic approach to financial risk tolerance measurement by financial advisors.

Gender is another variable that has received considerable attention from researchers examining predictors of financial risk tolerance and risk preferences. From empirical research, men have found to be more risk tolerant than women (Ackert, Church and Englis, 2002, Grable, 2000, Grable and Joo, 2000, Hallahan, Faff and McKenzie, 2003, Palsson, 1996, Sung and Hanna, 1996). (Felton, Gibson and Sanbonmatsu, 2003) suggest that difference in gender may be attributable to a specific group of males (optimists). (Roszkowski and Grable, 2005) examined the relationship between the risk tolerance scores of investors and financial advisors, and concluded, financial advisors overestimated the risk tolerance of men and underestimated those of women. On the contrary, (Grable and Lytton, 1999, Hanna, Gutter and Fan, 1999) find opposing results and (Ackert, Church and Englis, 2002) produce results that are indecisive.

Wealth and income are two predictors of financial risk tolerance that have also been central to much research. Both variables have been identified as positive predictors of financial risk tolerance (Cohn, Wilbur, Lease and Schlarbaum, 1975, Grable and Lytton, 1999, Hanna, Gutter and Fan, 2001, Schooley and Worden, 1996). Intuitively, this is a reasonable assumption as those investors that have greater incomes and wealth, have the financial capacity to incur uncertain returns over a sustained period of time. Moreover, being financially larger in terms of assets and wealth, allows investors to utilise leverage to increase their asset base. In opposition to this, some researches such as (Hallahan, Faff and McKenzie, 2003) found investors that are very wealthy (i.e earning more than \$200,000 AUD) are more cautious (or risk-averse) than those less wealthy.

This review of the above predictors of financial risk tolerance, allows us to form a basis for constructing a heuristically determined risk tolerance score for investors. The above predictors are frequently used as part of the “knowing your client” rule, and

thereby, are commonly used heuristics that financial advisors employ to assess investors financial risk tolerances.

2.3 Direct Observable Measures of Risk Tolerances

The definition of risk tolerance was reviewed previously, highlighting the recurring theme amongst the definitions that risk tolerance is an attitudinal construct. In terms of financial risk tolerance, we are seeking to identify an investor's propensity to incur financial risk, or uncertainty, with their investments. In order to satisfy the "know your client" rule, financial advisors should have some conception of an investor's psychological comfort and tolerance towards investments with uncertain outcomes.

Direct observable measures of risk tolerances are hypothetical or experience based situations, where investors are posed questions asking them to make a choice between several actions in the financial markets. The questions are reflective of the expected utility paradigm. The literature often refers to these measures as choices between gambles and prospects. Focusing on choices between simple gambles with monetary outcomes and specified probabilities will reveal basic attitudes towards risk. (Kahneman & Tversky, 1983).

Utility theory does possess shortcomings however. One in particular being the problem of question framing. Kahneman and Tversky (1979) illustrated through Prospect Theory, that when a problem is "manipulated" through responses available to choices, different outcomes and attitudes towards risk result. Whilst probabilistically the chance of risky outcomes occurring is the same irrespective of the frame (gain or loss, certainty versus uncertainty, etc), the change in context leads individuals to interpret outcomes and utility associated with choices differently (Bazerman, 1998). An example of this contextual influence is that people are more willing to take on risky outcomes when facing certain losses, as opposed to taking risks when there is certainty to make gains (profits). Substantial literature that reaffirms this behaviour (MacCrimmon and Wehrung, 1986, Schoemaker, 1990, Shapria, 1995, Slovic, 1974) to name just a few.

Another approach to directly measure risk tolerances is through a psychometric method or questionnaire type instrument. Questionnaires provide researchers and financial advisors with the ability to measure an illusive construct such as risk attitude by

asking closed ended questions (Grable and Lytton, 1999). Hypothetical investment situations, questions on previous investment experience, probability (expected utility) and portfolio composition questions are all examples of this approach. Responses are scaled from low to high risk, numerically coded to represent a particular scale (e.g 1= low risk and 4= very high risk) and added together (at times adjusted for factor weightings). The final score represents categories of risk tolerance. These categories may be broad (3 categories) or narrow (greater than 3 categories).

A closely related psychometric approach to investigate risk tolerances of managers was conducted by (MacCrimmon and Wehrung, 1986, Shapria, 1995). These studies used closed ended questionnaire type questions to measure risk tolerances of situations/ experiences that characterised managerial decisions commonly faced. The development of a psychometric risk tolerance measurement instrument for financial advisors is still relatively new. (Grable and Lytton, 1999) initially developed a 13 item instrument based upon similar methods used in management. Their questions (items) related to several dimensions of risk that they believed necessary in a questionnaire assessing financial risk tolerances needed to capture. This instrument was tested by Grable and Lytton (2003) and empirically demonstrated the validity of a 13 item risk assessment instrument (questionnaire). Furthermore, they found responses to this instrument were correlated with portfolio ownership, with a significant relationship between equity ownership (proxy for risk) and risk tolerance.

Although relatively new to the financial services industry, psychometric questionnaire approaches to measuring risk tolerances seem to address the requirements of the “know your client” rule. These approaches are directly observable measures of risk tolerances as responses can measure attitudes in situations where a choice under uncertainty is involved. Questionnaires have the ability to scale responses, increase validity (eliminating response bias if being assessed by several financial advisors) (Grable and Lytton, 1999),and can include a variety of questions that form the risk attitude construct.

3. Data and Sample

The data used in this study was provided by FinMetrica. FinMetrica is an Australian company that has developed a psychometric questionnaire instrument to measure financial risk tolerances. The FinMetrica Personal Profiling System is commercially available to financial services providers in Australia, New Zealand, Canada, United States and the United Kingdom. The system is a psychometric attitude test that contains 25 questions reflecting a vast array of decisions and choices that characterise investment under uncertainty. Responses to these questions generate a standardized score out of 100. Higher scores are interpreted as an investor that is risk tolerant.

The psychometric qualities of the FinMetrica system have been subjected to scientific testing by the University of New South Wales. The FinMetrica system was found to have reliability statistics exceeding international psychometric standards. Furthermore, the system was normed against an adult sample of 5000 respondents⁴.

To assess the validity of commonly used heuristics by financial advisors versus directly observable measures of risk tolerances, we use questions from the FinMetrica system. These questions and the reasons for their selection will be discussed in the next section. In addition, to the 25 questions that provide a standardized risk tolerance score, the FinMetrica system also has a set of eight demographic questions. These questions include age, sex, income, total assets, postcode, marital status and number of dependents. Thus, we are able to form a heuristically determined risk tolerance score from this information.

The overall purpose of the FinMetrica Personal Profiling System is to provide the financial advisor with a risk tolerance score (RTS). This score (on a scale of 1-100) indicates to the financial advisor where an investor is positioned within a risk tolerance spectrum (ranging from risk averse to risk tolerant). FinMetrica also provides an asset allocation based on the RTS, however, advisors are not obliged to use this particular

⁴ For more information on the FinMetrica Personal Risk Profiling System and information on the psychometric qualities of the system, see www.risk-profiling.com

allocation⁵. The sample used in this study contains investors/respondents from different sections of society. Investors, students, public and other are all part of the sample⁶, representing a cross section of investors that seek professional personal investment advice. It should be noted that the sample being used in this study is quite large (69,387), and the majority of people in this sample are investors (approximately 90%). Interestingly, this data comprises of respondents from both Australia and the United States.

The average respondent was 51-60 years old, university educated, married, male, earning \$50,000 to \$100,000 and having net assets of \$250,000-\$500,000. The average RTS was 55.35. Males have an average RTS of 57.79, which is significantly greater than females who have an average RTS of 51.18⁷. Table 1 summarises the demographic data of participants in the sample.

<INSERT TABLE 1 HERE>

4. Method

The purpose of this paper is to assess the validity of commonly used heuristics by financial advisors to measure an investor's financial risk tolerance. To do this we construct categories of risk tolerances based on established heuristics, and compare this to an investor's responses to several psychometric questions asked in a financial risk tolerance assessment. If the financial advisor's use of heuristics is accurate, there should be no difference between a financial advisor's categorisation of an investor's risk tolerance, and the investor's response to a direct risk assessment question. This section will describe how we formed broad and narrow categories of heuristically determined risk tolerances and, the directly observable risk tolerance questions that will be used.

⁵ See www.risk-profiling.com for more details on the asset allocation that FinMetrica provide financial advisors that use their Personal Profiling System.

⁶ "Other" refers to individuals that were involved in the psychometric testing of the FinMetrica Personal Profiling System.

⁷ The t-test for equality of means was used with a significance level of 1%.

4.1 Broad Heuristic Risk Tolerance Categorisation

A broad heuristic risk tolerance category incorporates demographic variables such as age, gender, income and wealth. Section 2.1 reviewed research into these variables as predictors of financial risk tolerance due to financial advisors propensity to use them as a basis of financial advice. Financial advisors also need to categorise investors into classes of risk tolerance. In the simplest form (broad), there are three categories; risk averse, risk neutral and risk seeking. The term “broad” is used, as the categories are relatively large and therefore may encompass a variety of investors that have differing risk tolerances in one category. We will now discuss how this index was constructed.

Section 3 discussed the data source of this study. Part of this data contained demographic information from respondents that participated in risk profiling questionnaire. After reviewing literature on the demographic determinants of risk tolerance; age, gender, wealth and income were selected to form the broad heuristic risk tolerance.

The risk tolerance was constructed by firstly giving each demographic variable a score. These scores were then summated and categorised into three broad categories of risk tolerance. Scoring reflected what has been empirically performed in previous studies. Answer choices for each demographic variable were given equal weights, except for gender. A male would be given 1 (one) and a female 0 (zero). This follows the literature of males being more risk tolerant than women. Age was given a range of 6 (six) to 1 (one) to reflect younger investors being more risk tolerant than older investors. Age categories are the same as in Table 1. For income and wealth, a scale of 1 (one) to 6 (six) was used. The more income and wealth a respondent has, the higher their score. Thus, the total score for an investor is out of eighteen (18).

Finally, investors scores are summated and categorised into a risk tolerance category. The categories are; Risk Averse (1-6), Risk Neutral (7-12), and Risk Tolerant (13-18).

4.2 Narrow Heuristic Risk Tolerance Categorisation.

The process of creating these categories of risk tolerance is similar to the broad heuristic tolerance, except for the range of categorisation of risk tolerances. Identical

demographic information is used to form an investor's score out of eighteen (18). The narrow heuristic risk tolerance category contained four categories. They were formed on the following scores; Defensive (1-4) (similar to Risk Averse), Conservative (5-8), Moderate (9-12) and Aggressive (13-17) (similar to Risk Tolerant). Both conservative and moderate are similar to Risk Neutral on the broad heuristic risk tolerance scale.

A narrow scale is used to determine if narrower categorisation of risk tolerances provides more or less validity of financial advisor's heuristics. Moreover, there is anecdotal evidence that some financial advisors categorise investors into narrower scales than what we present under a broad scale.

4.3 Direct Questioning

To assess the validity of financial advisors use of heuristics in determining risk tolerances, we need to compare their risk tolerance categorisation with a control measure. In this instance, we utilise responses to direct questions used in the FinMetrica Personal Profiling System. These questions are ideal as they are aligned with relevant legislation on the requirements of a risk tolerance questionnaire. The "Know your client rule" states that the financial advisor must question their clients about their risk tolerances. In other words, how they would react or feel in situations that characterise investment situations or decisions under uncertainty.

The FinMetrica Personal Profiling System provides a variety of direct questions which encapsulate investment decision making under uncertainty. Questions are presented in qualitative and quantitative forms. All questions, except one are closed form questions. Responses to each question can be categorised into the same risk tolerance categories, that were established for both broad and narrow heuristic risk tolerances. Thus, to test the validity of financial advisors risk tolerance assessments, we need to determine if there are any differences between responses to direct observable questions, and the financial advisor's heuristically determined risk tolerance. This section now briefly describes the questions used, and how the responses are categorised.

Both qualitative and quantitative questions were selected for direct questioning. These types of questions were selected as the concept of risk tolerance is a multidimensional (Roskowski, 2005) and cannot be measured by a uni-dimensional

calculation type question (as in terms of expected return and standard deviation) or, responses to situations or events where outcomes are uncertain. Grable and Lytton (1999) also used a combination of both qualitative and quantitative types of questions to identify investors risk tolerances in their development of a risk tolerance assessment tool. Furthermore, experimental methods in behavioural finance have seen researchers use both methods when investigating regarding risk preferences [Slovic, (1992), Thaler and Johnson (1990) and Slovic (1974)] and framing [Kahneman and Tversky (1979 and 1984), Tversky and Kahneman (1981), and Weber (1997)]. Utilisation responses from both qualitative and quantitative forms of direct questioning allows us to compare questions to previous studies, as well as examine the validity of financial advisors heuristically determined risk tolerances.

4.4 Qualitative Direct Questions

The qualitative direct questions employed to assess the validity of heuristically determined risk tolerances by financial advisors, characterise investment decisions that investors may face when investing in financial markets. As mentioned earlier, the “Know your client rule” requires financial advisors to question their clients when providing financial advice that pertains to investments with uncertain returns. To this end, we select two qualitative questions that categorise an investor’s attitude towards investment risk. These questions provide a scale of responses that enable us to categorise risk tolerances of investors into both broad and narrow categories.

The first direct qualitative question selected characterises to a great extent an investor’s attitude to a number of investments. These investments are most likely to be long term, with large capital sums, and pension/superannuation investment. Below is the actual question:

When faced with a major financial decision, are you more concerned about the possible losses or the possible gains?

- 1 .Always the possible losses.
2. Usually the possible losses.
3. Usually the possible gains.
4. Always the possible gains.

Upon inspection of the four responses available to investors, it is evident that there is an increasing trend of risk tolerance with each response. The first response, “Always the possible losses”, would be selected by an investor that does not desire uncertainty with their investment returns. This type of investor may be concerned with capital protection and views losses to be more painful than gains. Conversely, the fourth response “Always the possible gains” would be selected by an investor that is mindful of the volatility of returns. This type of investor may find the utility associated with gains to be more than equal that of losses. Thus, this direct question not only allows us to categorise investors into risk tolerances, but also tells us how they value losses and gains, as Prospect Theory suggests⁸. To categorise the investor’s responses within the broad and narrow risk tolerances the following process was used. For the broad category, a response of one (1) denotes the investor as being risk averse, responses of either two (2) or three (3) classed the investor as risk neutral, and a response of four (4) was categorised as risk tolerant. The narrow risk tolerance categorisation was as follows; a response of one (1) denoted a defensive type of investor, two (2) a conservative investor, three (3) a moderate investor and four (4) an aggressive investor.

The second direct qualitative question to measure risk tolerances is similar to the first, but differs by asking investors how they feel after making an investment. According to the assumptions of choice under uncertainty, all investors should have the same level of risk aversion for all levels of wealth. Behavioural economists have shown this is not the case [Kahneman and Tversky (1979) and Thaler and Johnson (1990)]. Below is the second direct question:

How do you usually feel about your major financial decisions after you make them?

1. Very pessimistic.
2. Somewhat pessimistic.
3. Somewhat optimistic.
4. Very optimistic.

⁸ For a detailed discussion of Prospect Theory see Kahneman and Tversky (1979).

Again, the responses move from a low to high risk tolerance scale, assuming that the major financial decisions refer to tolerating uncertainty. Those investors that are “very pessimistic” can be associated with those that feel losses to be more unsatisfying than the satisfaction that is received from gains. Conversely, those that are “very optimistic” are more concerned about the gains from their financial decisions. Investors are categorised identically to the first qualitative question. Both categories of risk tolerance maintained an increasing level of risk tolerance, for each response to the direct question.

4.5 Quantitative Direct Questions

The FinMetrica Personal Profiling System also provides direct questions that are quantitative in terms of the responses available to investors. These questions will strengthen our analysis of severity of misclassification of risk tolerances, and the influencing factors of misclassification (such as type of direct question). Additionally, the responses to quantitative questions can be categorised into categories that are applicable to both broad and narrow risk tolerance categories. Below is the first quantitative direct question:

Investments can go up and down in value and experts often say you should be prepared to weather a downturn. By how much could the total value of all your investments go down before you would begin to feel uncomfortable?

- 1 .Any fall in value would make me feel uncomfortable.
- 2 .10%.
- 3 .20%.
- 4 .33%.
- 5 .50%.
- 6 .More than 50%.

To employ this question as a direct question, we examined its primary aim, that is, to quantify the level of losses that an investor would be willing to tolerate with their

investments. The question also asks the investor to consider the, “total value of all your investments”. In this respect, the question is definitive in that it focuses on losses for an entire portfolio. The responses available allow categorisation of investors into relevant categories. For the broad risk tolerance; an investor selecting either one (1) or two (2) is classed as risk averse, three (3) or four (4) as risk neutral and, five (5) or six (6) to be risk tolerant. Similarly, for the narrow risk tolerance; an investor that selected response one denotes as defensive, two as conservative, three or four as moderate, and five or six to be an aggressive investor.

The second direct quantitative question is excellent for risk tolerance categorisation. This question provides a set of responses that can categorise risk tolerance on a number of scales. This type of question is also similar to other risk preference studies [Schoemaker, (1990), Shapria, (1995) and MaCrimmon and Wehrung, (1985)] in that respondents are given an opportunity to state their preference for no risk (certainty) or increasing levels of risk (uncertainty). Below is the question:

Most investment portfolios have a mix of investments - some of the investments may have high expected returns but with high risk, some may have medium expected returns and medium risk, and some may be low-risk/low-return. (For example, shares and property would be high-risk/ high-return whereas cash and term deposits would be low-risk/low-return.) Which mix of investments do you find most appealing? Would you prefer all low-risk/low-return, all high-risk/high-return, or somewhere in between?

Please select one of the seven portfolios listed below.

Portfolio	High Risk/Return	Medium Risk/Return	Low Risk/Return
1	0%	0%	100%
2	0%	30%	70%
3	10%	40%	50%
4	30%	40%	30%
5	50%	40%	10%
6	70%	30%	0%
7	100%	0%	0%

Portfolio one and seven are definitive with their risk classifications. Portfolio one is 100% low risk/return, whereas portfolio seven is 100% high risk/ return. These differences in portfolio compositions allow us to ascertain the various risk tolerances of investors. For the broad risk tolerance category; an investor selecting either one or two is classed as risk averse, three to five as risk neutral and, six or seven to be risk tolerant. Similarly, for the narrow risk tolerance category; an investor that selected response one denotes as defensive, two or three as conservative, four or five as moderate, and six or seven to be an aggressive investor.

4.6 Calculating Difference Between Heuristic and Direct Questioning Approach

The main focus of this paper is to compare the validity of financial advisors use of heuristics versus investor's responses to directly observable questions. If financial advisors are accurate in their assessment, there should not be any significant statistical difference between the two methods. The methods used to determine the heuristic and direct question risk tolerance have been discussed above, as has the construction of both broad and narrow risk tolerance categories. This section will explain how the validity will be measured.

After categorising investor's heuristic scores into both broad and narrow risk tolerance (see section 4.1 and 4.2) the same procedure was implemented to categorise investor's responses to the direct questions. Section 4.3 described the response scales used to categorise investor's responses to direct questions into both the broad and narrow risk tolerance categories. Thus, to identify if there are any differences, we use the difference between the categorisation under the direct questioning and heuristic approach. Below we state the operation of terms.

$$DIFFERENCE = CATEGORY_{DIRECT} - CATEGORY_{HEURISTIC}$$

5. Results and Discussion

The results will be presented in two distinct sections. The first will address the question of the extent and severity of misclassification of risk tolerances. The second section will discuss the influencing factors of misclassification (number of categories,

types of questions and demographic factors). Our analysis primarily relies on univariate statistical analysis, and with graphical reinforcement of the lack of validity that financial advisors heuristics have when assessing investor's risk tolerances. The results are presented in this manner due to the nature of the research questions and the data used.

5.1 Severity of Misclassification

To understand the severity of misclassification, we first need to examine the categorisation of heuristic based risk tolerances under both broad and narrow risk forms of categorisation.

<INSERT TABLE 2 HERE>

This table demonstrates the use of broad categorisation of risk tolerances, the broad heuristic approach, effectively categorises investors into either risk neutral or risk seeking categories. The results from our sample indicate that most investors are risk neutral (75%) with the remainder being risk seeking. Less than 1% of investors are risk averse. This highlights the problem of using broad categories of risk tolerances, meaning the fewer categories can increase the likelihood that an investor's risk tolerance is likely to be different when compared against direct questions. Conversely, when using a narrow categorisation of risk tolerance, there is a marked difference.

<INSERT TABLE 3 HERE>

Under narrow categorisation, risk tolerances are more evenly distributed across the spectrum of categories. However, the lowest category "Defensive" is similarly represented as "Risk Averse" investors were under broad categories. The middle two categories, "Conservative" and "Moderate", represent almost 85% of investors. Also, the "Aggressive" category (15.3%) has a significantly lower amount of investors than "Risk Seeking" (24.9%) under the broad category. By utilising narrower or more intimate categories of risk tolerances, the financial advisor has a lower chance of misclassifying an investor's risk tolerance when compared to responses to direct questions. This may occur

due to smaller ranges that each risk tolerance category possesses, compared to the broad scale.

5.2 Graphical Depiction of Misclassification of Risk Tolerance

To assess the validity of financial advisors use of heuristics in assessing risk tolerances, a comparative objective assessment tool was required. For reasons mentioned previously, direct questions were used to categorise investor's risk tolerances, as compared to financial advisors heuristically determined methods. Displaying the severity of misclassification (i.e by how many categories of risk tolerance) highlights the inaccuracy of heuristics that financial advisors use. These differences can be interpreted through the use of line graphs to display the frequency of movement between risk tolerance categories. Each figure plots movement under both broad and narrow risk tolerance categories, compared to responses to direct questions. Starting with the first qualitative question, we examine the severity of misclassification under both broad and narrow risk tolerance categories for all four direct questions.

<INSERT FIGURE ONE HERE>

Looking at figure one; we can see the frequency of misclassification between responses to the first direct qualitative question and the heuristic approach to the categorisation of risk tolerances. Whilst, there is a large percentage of investors that have their risk tolerances correctly categorised (approximately 70% for broad and 50% for narrow risk tolerance categories), there are a significant number that are not. Most investors incurred a decrease in risk tolerance by one, and in some cases, two categories. This is apparent under both forms of categorisation, however it is slightly more significant under the narrow form. This movement can be interpreted as an investor having their risk tolerance classified by a financial advisor as risk seeking or risk neutral, to be risk neutral or risk averse when having their risk tolerance assessed through direct question methods. Based on heuristic approaches to the categorisation of risk tolerances, financial advisors therefore overestimated investors risk tolerances. Conversely, those investors who incur an increase in risk tolerance, have had their risk tolerance

underestimated by financial advisors use of heuristics. It is evident that the narrow form of categorisation has a greater percentage of investors misclassified. The narrow form of categorisation illustrates the likelihood of financial advisors heuristics being incorrect, increases with increasing categories, hence the smaller frequency of movement between risk tolerance categories.

The second direct qualitative question provided further evidence of financial advisor's heuristics lacking validity. Again, we used broad and narrow risk tolerance categories, to depict differences between the two methods graphically. Figure two displays the severity of misclassification, using the second direct qualitative question.

<INSERT FIGURE TWO HERE>

The broad categorisation of risk tolerances demonstrates that whilst the majority of investors display no deviation between the financial advisor's heuristically determined risk tolerance and the direct question method, there is still a significant amount of variability in the categorisation of investors. Most investors that moved categories, have either decreased risk tolerance by approximately 20%, or increased by one category by approximately 10%. In the majority, the difference between the two risk tolerance categorisation methods is at most one category. Investors with a decrease in risk tolerance were given overestimated risk tolerance categories by financial advisors. On the other hand, those with increasing risk tolerances were underestimated by financial advisors. Examining the narrow form of categorisation, it is clear there is more variability with narrow risk tolerance categories. The number of investors that have no difference in categorisation of risk tolerance (zeros) is much lower (approximately 55% compared to 70%) than with the broad categorisation. Interestingly, the number of investors that have an increase in risk tolerances is much more than with broad categorisation of risk tolerance. Again this highlights the advantage of narrow categorisation, allowing for greater finite approximations of investor's risk tolerances.

The third direct question is quantitative, requiring quantitative responses In contrast to the above two questions, the movement between risk tolerance categories are

characterised by variance. These results highlight the ability of direct questions to affect choice, and hence risk tolerance categorisation of investors.

<INSERT FIGURE THREE HERE>

Looking at figure three, a great deal of movement between risk tolerance categories under both forms of categorisation is evident. Approximately 50% of investors under the broad form of categorisation have not moved, however, under the narrow form approximately 30% of investors have not moved categories. The movement indicates the amount of error financial advisors' heuristics incur in the categorisation of risk tolerances. Furthermore, this direct question highlights the effect of the type of question on categorisation. Overall, investors that have moved risk tolerance categories have had a decrease in their risk tolerance. In other words, their risk tolerance has been overestimated by financial advisors heuristics. This is an interesting result as empirical evidence suggests when confronted with investment decisions where the only possible outcomes are losses, investor's are risk tolerant or risk seeking [(Thaler and Johnsson (1991), Kahneman and Tversky (1981)]. This is due to the inclination of investors to recover their losses. However, in this case the majority of investors are risk averse. This could partly be due to way the question is presented. The question asks investors how much the total value of all their investments could go down before they would begin to feel uncomfortable. It does not say what they would do if their investments have *fallen*. Under narrow categorisation of risk tolerances, financial advisors heuristics are more substantially incorrect than in previous direct questioning approaches. Narrow categorisation also illustrates that some of the misclassifications are quite large (up to three categories) emphasising the use of heuristics in categorising risk tolerances, caused gross overestimation.

The second direct quantitative question as discussed in section 4.3, asked investors which portfolio they would select from. These portfolios were all given their asset allocations according to different levels of risk ranging from low to high. Figure four shows an interesting trend compared to the previous quantitative question.

<INSERT FIGURE FOUR HERE>

Figure four shows the results between responses to the second direct quantitative question approach and financial advisor's heuristic approach, under both forms of risk tolerance categorisation. Strikingly, both forms of categorisation are identical, with the line graphs almost overlapping each other and the number of investors that have not moved categories is over 50% under both forms. We can see that the majority of deviation (from zero) is a one category increase in risk tolerance. Compared to all other direct questions, this is the only question that has a net positive increase in risk tolerance. Thus, this form of direct questioning may have an effect on investor risk tolerance categorisation in that this question may incline investors to be more risky in their selections than other direct questions. Under a broad categorisation, approximately 15% of investors increased one category. With narrow categorisation, that figure jumps to almost 35%. In the main, then, this direct quantitative question provides less variance in categorisation than the previous three, highlighting the effect of direct questions categorisation of risk tolerances.

The purpose of the graphical depiction of the movement between categories of risk tolerances under both forms of categorisation was to illustrate two points. Firstly, the number of investors whose risk tolerances were incorrectly categorised through financial advisors use of heuristics, and secondly the degree of misclassification. In some cases, this was quite large and it raises the issue of how questions are presented. We will now discuss some of the implications of misclassification.

5.3 Implications for Misclassification of Risk Tolerance

The validity of financial advisors use of heuristics in categorising investor risk tolerances, has proven questionable. The implications of misclassification for financial advisors must be addressed. In terms of the Act there are some consequences that are more important than others.

In light of the FSRA, and the "Know your client rule", financial advisors do not fulfill their obligations by simply using heuristics. As mentioned previously, investors need to be questioned about how they would react or feel in a particular investment

situation. Our results have illustrated the need to question investors through direct questioning methods, with statistically enough investors whose risk tolerance differs from the heuristic approach than the direct question method. Based on our sample, which is representative of investors that seek financial advice, financial advisors are obtaining incorrect risk tolerances of investors too often.

A major implication of misclassification of risk tolerance is investment advice, with an investor's risk tolerance determining their asset allocation. However, in the risk tolerance questions above, we have shown that there is disparity between questions and the heuristic approach. In a substantial number of cases, investors have either had their risk tolerance over or under estimated. Thus, an investor that is categorised as risk neutral using heuristics may in fact be risk seeking or risk averse when answering particular risk tolerance questions. The type of question asked not only influences the categorisation of risk tolerance, but also, the asset allocation an investor will be given from their financial advisor.

An example of how misclassification of risk tolerance can have a dramatic effect on investment decisions is with long term investments such as superannuation or pensions. Often, these investments have approximately defined investment horizons, regular contributions and tax advantages as opposed to other investments. The major risk of this form of investment is having insufficient terminal cash flows at the terminal period to satisfy the investor. This is a result of two investment strategies; either being too risky or not being risky enough. Therefore, it is imperative that financial advisors use the best available tools to accurately assess investor's risk tolerances so they can achieve their investment goals.

5.4. Influencing Factors of Misclassification

There were considerable differences in the categorisation of risk tolerances under various direct questioning methods, resulting in misclassification. This section will discuss and present the statistical results for testing the validity of financial advisor's heuristics in the categorisation of risk tolerances. We will also discuss the effect of the number of categories, the types of questions and demographic factors that influence the results above.

Table four assists understanding of the validity threats of financial advisors heuristics. This table summarises the results of the Wilcoxon signed rank sum test on each of the direct questions. This test statistic was used for two reasons, the first being that we wanted to know if the difference between the financial advisor's heuristic determined risk tolerance, and direct questioning approach was statistically significant. Secondly, the data used were categorical and ordinal. Therefore, the best type of analysis is non parametric, as we make no assumptions about the distribution of the data.

<INSERT TABLE FOUR HERE>

Examining the results displayed in table four, it is evident under the narrow form of risk tolerance categorisation, there is far more variability in categorisation of risk tolerances. This can be seen by the number of ties being less than under the broad categorisation of risk tolerances under both types of questions. Also, the numbers of positive differences are larger under narrow risk tolerance categorisation. Conversely, with the broad categorisation of risk tolerances, it is the negative differences that are more prevalent. This change highlights the importance of the categorisation scale. The narrower the scale, the greater underestimation of risk tolerance. This may be due to the number of categories available to classify investor's risk tolerances, or more finite cut off points for classification. By employing broad categories of risk tolerance, the financial advisor is reducing the chance of error, however they are not developing an intricate knowledge of the investor's attitude towards financial risk as the statistical and graphical results illustrate. Secondly, all the differences, positive and negative are statistically different from the ties. This suggests there is enough variability from the sample to imply that financial advisors incorrect categorisation of risk tolerances under either broad or narrow categories, is due to systematic errors, rather than by chance.

Another factor that influenced misclassification was the type of questions used to compare the financial advisors heuristically determined risk tolerances. Evident from the graphical depictions, some questions provided more variability (with more zeros in differences). Both quantitative questions had more movements in risk tolerance categories than the qualitative question. This could be explained by the available

responses (and categories effectively) that investors had to answer these particular questions, which were more defined with solid quantitative classes of responses. On the other hand, the qualitative questions were closed ended attitudinal questions that may not have provided the appropriate response (and category) for each investor. The primary outcome that the direct questioning approach provided, is the variability in risk tolerance categorisation. Both qualitative and quantitative questions provided enough movement between categories to suggest that the type of direct questions used influence misclassification and categorisation of risk tolerance.

The demographic factors (heuristics) used to formulate investor risk tolerances do not represent all those that financial advisors may use. We utilised demographic variables that were most prevalent in the related literature, with others due to inconclusive evidence regarding their prediction of risk tolerance. An example being couples or marital status. The selected heuristics reflect how financial advisors in general, assess and categorise the risk tolerance of their investors.

6. Conclusion and Future Research

The purpose of this paper was to compare the validity of commonly used heuristics (clinical judgments) by financial advisors, versus investor's responses to directly observable questions that measure financial risk tolerances. This was achieved through the use of responses by real investors to a psychometrically validated risk tolerance assessment questionnaire. Our results indicated at on several levels that financial advisors use of heuristics is grossly inefficient. This paper addressed two specific questions we addressed: (i) the extent and severity of misclassification of risk tolerances and (ii) the influencing factors of misclassification (number of categories, types of questions and demographic factors).

In addressing the first research question, we found that there was misclassification in all cases when comparing financial advisor's heuristics to direct questions used in risk tolerance assessment. This result is also statistically significant in all cases too. However, the extent and severity of misclassification did differ when comparing questions. This leads to the address of the second research question. When we examined the severity of misclassification under both broad and narrow risk tolerance categories, we found that

misclassification occurred most under narrow categories. This is due to the number of categories increasing, as well as being more definite and finite than broad categorisation. Under broad categorisation of risk tolerance, we ultimately found that investors were either risk neutral or risk tolerant, rarely were they risk averse. The types of questions also influenced misclassification. Direct quantitative questions provided more misclassification in general (the number of ties were the lowest). However, the qualitative questions still provided sufficient evidence to suggest these types of questions can invalidate a financial advisor's heuristically determined risk tolerance of investors. In terms of demographics, we only included those supported by the literature suggested to construct the financial advisors heuristically determined risk tolerances.

Interestingly, this study may also confer to previous financial decision making studies through our focus on heuristics, a behavioural bias. As investors are known to make sub-optimal investment decisions due to information overload and rules of thumb, the same may apply to financial advisors and their assessment of risk tolerances. Our results illustrate that whilst financial advisors heuristics are accurate for some investors, they are too frequently incorrect to be scientifically valid.

A major limitation of this paper is the construction of heuristically determined risk tolerances of investors. In an ideal world, we would obtain financial advisors categorisation of investors in our data set. However, due to legal constraints this is impossible. We believe though, our methods support anecdotal evidence.

This paper can be extended in several areas for future research. One, would be to use a longitudinal data set of investors responses to a risk tolerance questionnaire. This may reveal more about investor behaviour, and in particular what influences their risk tolerance over time. A second area would be to use a different set of demographic variables (heuristics) to investigate the prevalence of misclassification. The final area of research would be to use different types of direct questions to compare responses. Our results may be reinforced by these extensions, or with the use of narrower categories of risk tolerance.

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Table 1: Demographic Characteristics of Sample

This table reports the demographic characteristics of participants involved in the sample. Each panel represents different demographic characteristics of the sample. The demographics used to construct the heuristic risk tolerance of investors are; gender, age, income and net assets (wealth).

Panel A: Type	<i>Clients</i>	<i>Public</i>	<i>Students</i>	<i>Other</i>	<i>Total</i>			
<i>Observations</i>	60952	6953	1018	464	69387			
<i>% of Sample</i>	87.80%	10.00%	1.50%	0.07%	100%			
Panel B: Country	<i>AU</i>	<i>USA</i>	<i>UK</i>	<i>NZ</i>	<i>Other</i>			
<i>Observations</i>	47262	17229	3292	794	810			
<i>% of Sample</i>	68.10%	24.80%	4.70%	1.10%	1.30%			
Panel C: Gender	<i>Males</i>	<i>Females</i>						
<i>Observations</i>	43726	25661						
<i>% of Sample</i>	63%	37%						
Panel D: Age	<i>< 30 yo</i>	<i>31-40 yo</i>	<i>41-50 yo</i>	<i>51-60 yo</i>	<i>61-70 yo</i>	<i>>70 yo</i>		
<i>Observations</i>	4082	12543	16714	20801	12038	3206		
<i>% of Sample</i>	5.90%	18.10%	24.10%	30.00%	17.30%	4.60%		
Panel E: Income (\$'000)	<i>< 30</i>	<i>30-50</i>	<i>50-100</i>	<i>100-200</i>	<i>> 200</i>			
<i>Observations</i>	14486	14449	21664	12196	6592			
<i>% of Sample</i>	20.90%	20.80%	31.20%	17.60%	9.50%			
Panel F: Education	<i>D. N. H. S.</i>	<i>Comp H.S.</i>	<i>T. / D.</i>	<i>Degree +</i>				
<i>Observations</i>	5249	12201	16105	35832				
<i>% of Sample</i>	7.60%	17.60%	23.20%	51.60%				
Panel G: Marital Status	<i>Married (incl. defacto)</i>	<i>Single</i>						
<i>Observations</i>	67053	2334						
<i>% of Sample</i>	96.60%	3.40%						
Panel H: Net Assets (\$'000)	<i>< 50</i>	<i>50-100</i>	<i>100-150</i>	<i>150-250</i>	<i>250-500</i>	<i>500-1,000</i>	<i>1,000-2,500</i>	<i>> 2,500</i>
<i>Observations</i>	2998	2892	3154	6848	16620	18296	13228	5351
<i>% of Sample</i>	4.30%	4.20%	4.50%	9.90%	24.00%	26.40%	19.10%	7.70%

Table 2: Frequency Table of Heuristic Based Risk Tolerances with Broad Categorisation

This table presents the frequency of risk tolerances categories of investors based on the heuristic risk Tolerances approach. Additionally, this table only reports the frequencies of risk tolerances under the broad categorisation of risk tolerances.

<i>Risk Tolerances Category</i>	<i>Frequency</i>	<i>Percent (%)</i>	<i>Cumulative Percent (%)</i>
Risk Averse	266	0.004	0.004
Risk Neutral	51,840	74.7	75.1
Risk Tolerant	17,278	24.9	100
Total	69,387	100%	100%

Table 3: Frequency Table of Heuristic Based Risk Tolerances with Narrow Categorisation

This table presents the frequency of risk tolerances categories of investors based on the heuristic risk Tolerances approach. Additionally, this table only reports the frequencies of risk tolerances under the narrow categorisation of risk tolerances.

<i>Risk Tolerances Category</i>	<i>Frequency</i>	<i>Percent (%)</i>	<i>Cumulative Percent (%)</i>
Defensive	87	0.001	0.001
Conservative	15,261	22	22.001
Moderate	43,431	62.6	84.7
Aggressive	10,605	15.3	100
Total	69,387	100%	100%

Table 4: Summary of Risk Tolerance Categorisation Movements Between Heuristic and Direct Questioning Methods.

This table reports the total number of differences for each investor’s risk tolerance between the heuristic and direct questioning approach, using each of the direct questions. Responses to each question, and the heuristic determined risk tolerance are categorised into broad and narrow risk tolerance categories. This is calculated by the difference between the direct questioning risk tolerance category score (i.e 1, 2 or 3) and the heuristic risk tolerance category score (i.e 1, 2 or 3). Negative differences indicate that investors have had their risk tolerance overestimated, however it does not report the magnitude (i.e by how many categories). Positive differences indicate that investors have their risk tolerance underestimated, however it does not report the magnitude (i.e by how many categories). Ties indicate no change under either method of categorisation risk tolerance.

Panel A: Qualitative Questions

Question	1		2	
	Broad	Narrow	Broad	Narrow
No. of Negative Differences	19,501	24,715	14,142	7,900
No. of Positive Differences	2,468*	11,723*	7,384*	24,803*
No. of Ties	47,415	32,946	47,858	36,681
Total	69,384	69,384	69,384	69,384

Panel B: Quantitative Questions

Question	1		2	
	Broad	Narrow	Broad	Narrow
No. of Negative Differences	32,327	20,080	13,667	14,214
No. of Positive Differences	4,401*	14,200*	15,076*	18,271*
No. of Ties	32,656	35,104	40,061	36,899
Total	69,384	69,384	69,384	69,384

* Significant at 0.01% level of significance.

Figure One: Movement between Risk Tolerance Categories (Qualitative Question One)

Figure one illustrates the variability of financial advisors' use of heuristics in the categorisation of risk tolerances, using qualitative question one. This figure displays the frequencies (percentage) of misclassification, and by how many categories. The horizontal axis indicates the difference between the investor's response categorisation to the direct question, and the financial advisors' heuristic categorisation of risk tolerance. This is done in terms of both broad and narrow forms of risk tolerance classification. Movements between categories that are positive (negative) indicate that an investor's risk tolerance was underestimated (overestimated) by the financial advisor's heuristic based risk tolerance categorisation. The vertical axis represents the percentage of investors from the sample that have or have not moved categories.

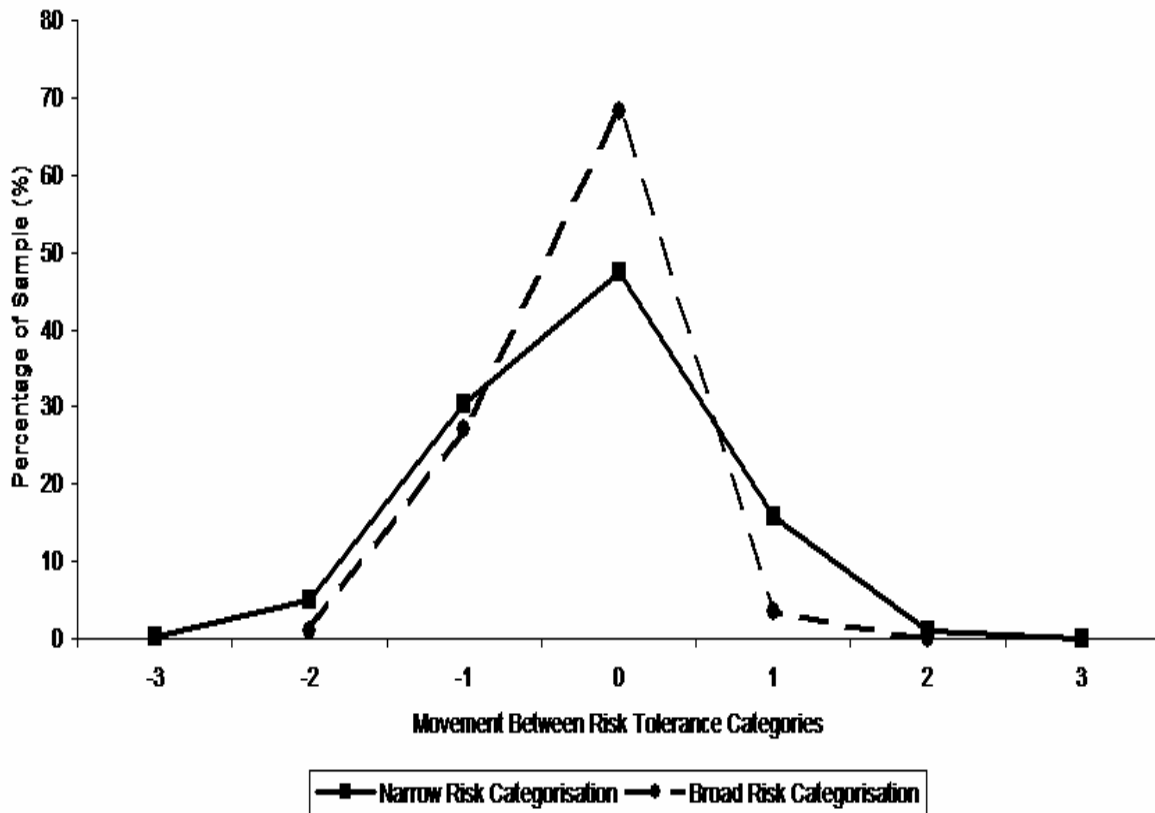


Figure Two: Movement between Risk Tolerance Categories (Qualitative Question Two)

Figure two illustrates the variability of financial advisors' use of heuristics in the categorisation of risk tolerances, using qualitative question two. This figure displays the frequencies (percentage) of misclassification, and by how many categories. The horizontal axis indicates the difference between the investor's response categorisation to the direct question, and the financial advisors' heuristic categorisation of risk tolerance. This is done in terms of both broad and narrow forms of risk tolerance classification. Movements between categories that are positive (negative) indicate that an investor's risk tolerance was underestimated (overestimated) by the financial advisor's heuristic based risk tolerance categorisation. The vertical axis represents the percentage of investors from the sample that have or have not moved categories.

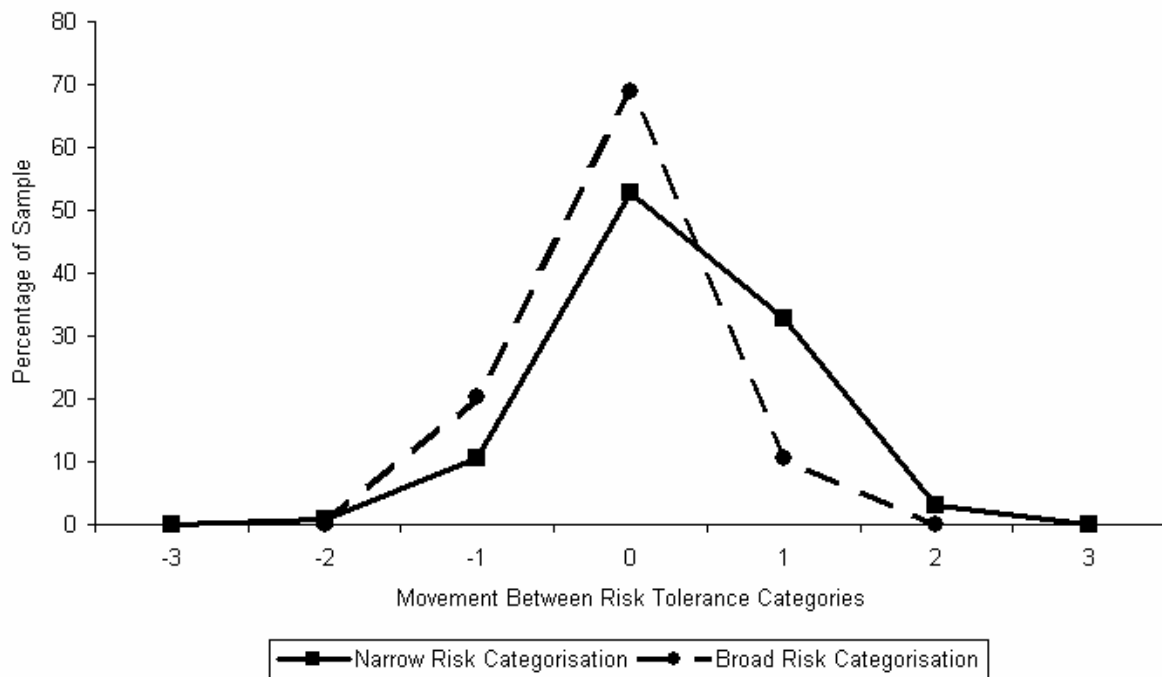


Figure Three: Movement between Risk Tolerance Categories (Quantitative Question One)

Figure three illustrates the variability of financial advisors' use of heuristics in the categorisation of risk tolerances, using qualitative question two. This figure displays the frequencies (percentage) of misclassification, and by how many categories. The horizontal axis indicates the difference between the investor's response categorisation to the direct question, and the financial advisors' heuristic categorisation of risk tolerance. This is done in terms of both broad and narrow forms of risk tolerance classification. Movements between categories that are positive (negative) indicate that an investor's risk tolerance was underestimated (overestimated) by the financial advisor's heuristic based risk tolerance categorisation. The vertical axis represents the percentage of investors from the sample that have or have not moved categories.

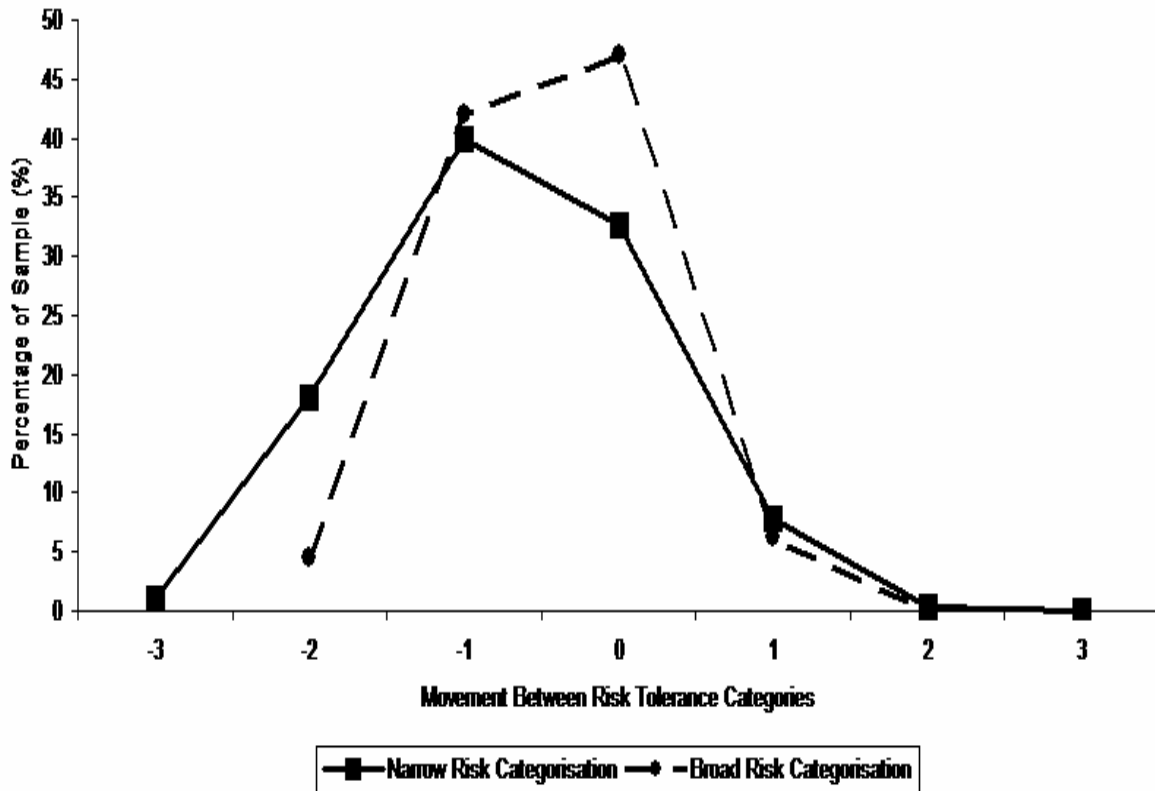


Figure Four: Movement between Risk Tolerance Categories (Quantitative Question Two)

Figure four illustrates the variability of financial advisors' use of heuristics in the categorisation of risk tolerances, using qualitative question two. This figure displays the frequencies (percentage) of misclassification, and by how many categories. The horizontal axis indicates the difference between the investor's response categorisation to the direct question, and the financial advisors' heuristic categorisation of risk tolerance. This is done in terms of both broad and narrow forms of risk tolerance classification. Movements between categories that are positive (negative) indicate that an investor's risk tolerance was underestimated (overestimated) by the financial advisor's heuristic based risk tolerance categorisation. The vertical axis represents the percentage of investors from the sample that have or have not moved categories

