Measuring Risk Attitudes and Personal Values: The Bounded Rationality Approach

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ABSTRACT

Attitude towards risk is a fundamental facet of behavior influencing decision making in diverse settings. We use the bounded rationality approach to predict investment choice of individual investors by interrelating aspiration data and risk attitudes. In an experimental study subjects invest in a portfolio that contains a risk-free but profitable bond and in a risky asset with high or low return states. The aspiration data facilitates to calibrate a unique risk co-efficient that captures the degree of risk aversion. We then categorize investors based on their degree of risk aversion and importance to personal values (SVS; Schwartz, et al., 2001) such as conformity, power, achievement, stimulation and more. The study highlights two distinctive investor groups with individual interests and collective interests. The basic values that drive risk aversion are self-transcendental and those which drive risk seekers are individualistic.

JEL Classification: C91, G11, D81, A13

Keywords: Bounded Rationality, Investment Decisions, Decision under risk, Personal Values

1. Introduction

Attitude to risk is an important determinant of individual choice and decision making process. People routinely make decisions in incomplete information, while most economic theory is built on the preposition that individuals have rational expectations and incorporate all information in an unbiased and coherent fashion. Individuals have different perception of risk because of their different interpretation of reality. Attitude to risk is formally modeled as the shape of the decision makers' utility function (Keeney and Raiffa, 1976). The axiomatic approach of expected utility assumes decision maker has well defined preferences, follows a set of rationality axioms and evaluates all possible decision to choose the one that scores the best. However, the empathetic stream of behavioral finance accommodates deviations from rational expectations and takes into account limitations of knowledge, cognitive issues, behavioral biases and emotional factors. While it might be useful to measure attitudes to risk, it would also be more worthwhile to understand antecedents and correlates to risk. Research studies have identified a wide range of factors, some exogenous and some endogenous, that influence attitudes to risk. Existing research supports the influence of exogenous factors such as socio-demographic variables on risk perceptions (Hartog, Ferre-i-Carbonnell and Jonker, 2002). However, attitude to risk is also recognized as a highly abstract constellation of psychological attributes, influenced by past experiences, beliefs, emotions (Loewenstein et al. 2001), personality (Nicholson et al. 2002)), the context and presentation formats (Kahneman & Tversky, 2000) which characterize real environments. Hence, there is a need to study financial behaviour patterns, rational or irrational, to reduce the distance between economic theories and the actual behavior that does not appear to be sufficiently linked to principles of rationality (Thaler, 1992; Shefrin, 1999; Shiller, 2000).

In this study, we examine attitudes to risk among individual investors and study the influence of personal value systems and demographics. We explore more natural ways to calibrate attitudes to risk using the bounded rationality approach (Simon, 1982). In an experimental study coined 'Riskitude'; subjects invest in a portfolio that contains a risk-free but profitable bond and a risky asset with high or low return states. We predict the portfolio allocation by interrelating aspiration data of investors in low and high return states. The aspiration data also facilitates to calibrate a unique risk co-efficient that captures the degree of risk aversion. We further categorize investors

based on their degree of risk aversion and importance to personal values (SVS; Schwartz et al., 2001) such as conformity, power, achievement, stimulation and more. Personal values systems act as standards of conduct (Kluckhohn, 1951; Meglino and Ravlin, 1998) and influence decision making process. The study attempts to answer the question; do values like security, conformity, achievement, stimulation or more segment investors with different risk preferences? The study highlights two distinctive investor groups with individual interests and collective interests. The basic values that drive risk aversion are self-transcendental and those which drive risk seekers are individualistic.

The paper is organized as follows: Section 2 discusses briefly the decision making approaches and attitude to risk. Section 3 examines the bounded rationality and satisficing approach. The experimental design to formulate the bounded rationality approach and research method is discussed in Section 4 and 5 respectively. Section 6 describes the calibration of risk attitudes. Section 7 explains segmentation of investor types and personal value systems that drive differences in risk perceptions. The paper concludes with a discussion in Section 8.

2. Decision Making Approaches and Risk Attitudes

Attitude towards risk is a fundamental facet of behavior influencing decision making in diverse settings. Decisions are made in uncertain environments on the basis of limited information and cognitive challenges. Attitude to risk is a core factor in models of choice and decision approaches (Kahneman & Tversky 1979; Camerer & Weber, 1987), it is observed as a personality trait (Zuckerman, 2000) which maybe domain specific (Weber, 2002). The expected utility approach provides a reigning basis for analysis of individual decision making under uncertainty. The utility framework provides key insights to empirically determine an individual investors' attitude towards risk with specification of a utility function (Keeney and Raiffa, 1976). The utility function accommodates different attitudes to risk; such as risk-averse, risk-seeking or risk-neutral types. The investor can determine the optimal investment strategy by maximizing his expected utility. However, the framework makes strong assumptions of rationality, each decision-maker is able to evaluate and maximize the utility function. The critics of the expected utility approach focus on its unrealistic assumptions about human analytical capabilities and in many situations these assumptions do not accurately describe how people make decisions (Camerer, 1995). Studies prove that deviations from the rational approach could arise due to

various reasons such as social preference in decision making contexts (Guth, Schmittberger and Schwarze, 1982), loss aversion where people tend to weigh the possibility of a loss more heavily than that of a gain (Kahneman & Tversky, 1979) or even when utility is difficult to evaluate or maximize. Individuals seem to have limited cognitive resources (Simon, 1982) and choices appear to be lead by affective attitudes or subjective inclinations more than by economical reasons based on gain maximization (Kahneman, Ritov and Schkade, 1999). The view is that people use much simpler approaches or heuristics to arrive at decisions (Simon, 1955; Gigerenzer, 2001). Hence, there is a need for a more psychologically plausible view of rationality that enables natural choice with limited mental resources. Therefore the paper explores the applicability of the bounded rationality approach to calibrate attitudes to risk where basic principles of aspiration formation and satisficing behavior are conformed by individual investors. Therefore, the decision maker is guided by aspiration adaptation rather than utility maximization in his decisions.

3. Bounded Rationality and Satisficing Approach

Bounded rationality is based on the premise that an individuals' rationality is limited to cognitive ability and environment. The term "Satisficing" was coined by Herbert Simon in 1955 which means 'satisfy + suffice' where one finds sub-optimal solutions due to cognitive limitations and complexity of environment. The idea was that individuals do not seek the very best outcome but rather they stop searching once they find an outcome that is good enough. The concept of satisficing came originally from the realization that most maximizing problems are extremely complex and often lead to simple rules of thumb solutions. Hence, in complex environments such as financial markets, investors are boundedly rational as there would be various scenarios when they would just "satisfice" or find 'good enough' solutions rather than the 'best solution'. Intuitively, this lies between cognitive ability and adaptation to the environment, governed by simple and straightforward heuristics. In the spirit of bounded rationality, Gigerenzer (2001) points out three distinct processes of the model:

- Simple Search Rules
- Simple Stopping Rules
- Simple Decision Rules

Rationality itself is seen as an adaptive toolbox that is built on the building blocks provided by simple heuristics. Using these rules as a foundation, individuals develop an adaptive toolbox to deal with different problems in different circumstances; this is where the idea becomes relevant to investors. There are numerous investment options with different possible outcomes or returns that considering all of them would be implausible. For this reason, investors reflect over their aspiration levels, a lowest threshold that one wants to guarantee and a higher return level representing a real success. Lopes (1987) proposed a two-factor theory of risky choice in which she introduced a situational factor called Aspiration level. Aspiration is a link between goals and choice in the presence of uncertainty; goal for risk-averse people is security and risk-seeking is potential. Friedman and Savage (1948) noted that security and potential might co-exist in the same person; hence individuals buy both lottery tickets and insurance. Individual investors construct their portfolio as pyramid of assets (Statman and Shefrin, 1997) where they hold cash and bonds in the downside protection layer of their portfolio to prevent poverty and growth stocks in the upside potential layer of their portfolio to make them rich. Hence we use the bounded rationality approach to make investment decisions and predict portfolio allocation that satisfices investor aspirations. Fellner, Guth, and Martin (2007) examine whether individuals prefer satisficing over the optimizing approach in a simple investment decision. They view satisfying as more sensible and realistic, as it not only delivers an investment advice but also implies the outcome to be associated to their aspiration levels. However, the satisficing approach needs to be operationalized on a case specific basis and individuals have to explicitly learn what aspirations mean in specific task. In section 4, we detail the satisficing approach for making the investment decision in terms of aspiration setting and choosing the first alternative that exceeds the aspiration settings.

4. Experimental Design

Our experiment builds upon the study by Fellner, Guth, and Maciejovsky (2005). The financial decision environment and formalization of the bounded rationality approach are motivation for this study. The experiment illustrates an investment decision task where the subject has two financial assets, a risky one and a risk-free asset (bond), available to him as avenues for investment. The risk-free bond yields a fixed rate of return which is known to the investor prior to the investment decision. On the other hand, risky asset can land the investor is two states

termed 'high' and 'low'. The investor is aware of the rates of return in both states but does not know which state would occur at the time of investment decision. There are control questions to qualify participation in the experiment where subjects are expected to make simple calculations and identify different asset classes. Once qualified for participation, subjects are primarily classified into risk-averse, risk-neutral and risk-seeking category based on their investment choice. It is essential to categorise the subjects as characteristics of the assets are different for risk-averse and risk-seeking category as explained below.

- The characteristics of the asset in possible states for risk-averse category are as follows:

R is the return offered by the bond, $R = 1.10$

H is the return offered by the risky asset in high state, $H = 1.42$

L is the return offered by the risky asset in low state, $L = 0.80$

E is the amount for investment decided by the investor himself

I is the amount invested in the risky asset

B = (E – I) is the amount invested in the bond

p is the probability that the risky asset will attain a high state; $p = 0.5$

In the risk-averse category, $L + H > 2R$; the expected value from the risky asset is greater than the return from the bond as the risk-averse investor needs a clear incentive to take risks.

- The characteristics of the asset in possible states for risk-seeking category are as follows:

R is the return offered by the bond, $R = 1.10$

H is the return offered by the risky asset in high state, $H = 1.36$

L is the return offered by the risky asset in low state, $L = 0.80$

E is the amount for investment decided by the investor himself

I is the amount invested in the risky asset

B = (E – I) is the amount invested in the bond

p is the probability that the risky asset will attain a high state; $p = 0.5$

In the risk-seeking category, $L + H < 2R$; the expected value from the risky asset is lesser than the return from the bond. A risk-seeking investor perceives this as a clear chance to become rich and does not want to miss the chance inspite of its meager promise.

The experiment coined *'Riskitude'* is presented using an Excel tool. Riskitude is introduced to the subjects as an attempt to understand how investors make financial decisions in a complex

environment. Riskitude begins by asking the participants to indicate an amount that they would typically invest for a year. In designing the decision task, we take into account the research findings on the sources of bias (Hershey and Schoemaker, 1985). The main source of bias arises when the assessment does not match the subjects' real decision situation. The task fits the real decision situation when subjects themselves decide the amount of money they would like to invest. There are also a set of control questions that needs to be answered to qualify participation in the experiment (Annexure 1.1). Once qualified, the subjects give their preference for investing in risk-free asset which gives an assured amount of return, risky asset with variable return in high and low states or whether they are indifferent between both the asset classes. This preference primarily categorises the subjects into risk-averse, risk-seeking and risk-neutral category and proceeds to capture their aspirations levels (Annexure 1.2). The subjects are explained that investment in the risky asset may land them in a state of loss (low state) or in a state of profit (high state). The experiment attempts to capture aspirations in both states, the amount of loss one is willing to take (A_1) and the amount of profit desired (A_2). Based on this amount the model helps to allocate the money in risk-free and risky asset class so that the subjects' aspirations are satisfied. Given these structural specifications, the participants are familiarized with the satisficing approach. As stated by Guth et. al. 2005, satisficing approach is absorbable, which may require some amount of teaching and consulting. Subjects are free to decide whether they would make their portfolio decision based on satisficing approach, else leave the experiment. The experiment also captures importance to personal value constructs as given by Schwartz et. al. 2001 and demographics of the subjects.

4.1 The Satisficing Approach

The satisficing approach is set to two aspiration levels in the investment task.

A_1: the minimum amount desired in the low state

A_2: the minimum amount desired in the high state

The task invariably imposes constraints such as $0 < L < 1 < R < H$. Specifications for risk-averse category of investors are $L + H > 2R$ and $L + H < 2$ for risk-seeking category. The former inequality implies that for risk-averse investors, the expected value from the risky asset has to be greater than the return from the bond to induce them to take risk. The latter inequality is justified as risk-seekers would perceive it as a chance to become rich. The subjects are asked to state

their aspirations A_1 and A_2. The Excel tool computes if the aspirations are 'valid', the validity conditions being:

- $EL \leq A_1 \leq ER$
- $ER \leq A_2 \leq EH$
- $A_1 \leq A_2$

For every subject there is a feasible region of aspirations which constructs a valid combination of A_1 and A_2 for a specific investment amount as specified by the subject (Exhibit 1). The task would not allow the subject to be irrational and state aspirations lower than EL or higher than EH. The validity constraints are based on the rationale that if A_1 has to be guaranteed, the subject has to restrict himself to a feasible A_2. More specifically, aspirations have to be stated such that there is at least one investment possibility warranting a combination of A_1 and A_2 (Exhibit 2). Subjects change their aspiration if there is no investment that could fulfill both A_1 and A_2 and/or voluntarily if the subject does not like the suggested investment.

Exhibit 1: Feasible Region for Aspirations (A_1 and A_2)

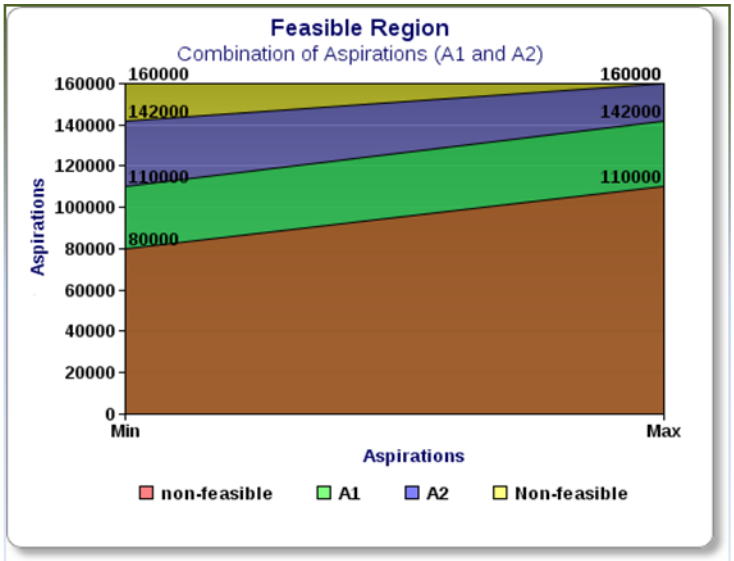


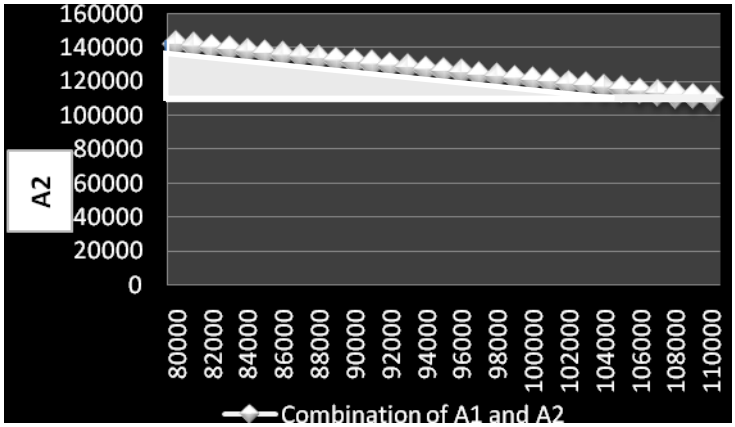
Exhibit 1 depicts example of a subject willing to invest Rs. 100,000. The feasible region for his lower aspiration (A_1) is from Rs. 80,000 – Rs. 110,000 and for higher aspiration (A_2) is Rs. 110,000 – Rs. 142,000. The experiment does not allow him to aspire beyond this range.

When the subject enters a valid A_1, say Rs. 90,000, the bounds of A_2 changes accordingly to Rs. 131,333; Hence A_2 for a given A_1 is:

$$A_2 = \left(\frac{(ER - A_1)}{(R - L)} \times H\right) + \left(E - \frac{(ER - A_1)}{(R - L)} \times R\right) \quad (1)$$

We see that the bounds of the lottery keep decreasing when subjects exhibit greater risk-aversion in A_1.

Exhibit 2: Investment Possibility for Combination of A_1 and A_2 for risk-averse subject



The valid aspirations (A_1 and A_2) suggest a solution set of investment in risky asset I such that:

$$\frac{(A_2 - ER)}{(H - R)} \leq I \leq \frac{(ER - A_1)}{(R - L)} \quad (2)$$

$$I_1 = \frac{(A_2 - ER)}{(H - R)} \quad (3)$$

$$I_2 = \frac{(ER - A_1)}{(R - L)} \quad (4)$$

subject to constraints such that $I_2 \geq I_1$

The respondent is therefore guided to invest a specific amount *I* in the risky asset based on the range given by I_1 and I_2 that satisfices his stated aspirations in A_1 and A_2 (Annexure 1.3). Therefore, for every valid combination of A_1 and A_2, there is a solution set of I(s) and the respondent is guided to enter a specific value of valid I. Thus we can describe a boundedly rational portfolio choice by the investment I with $0 \leq I \leq E$ in the risky asset meaning that the residual endowment (E – I) is invested in the risk-free asset.

5. Research Methods

5.1 Overview

We use the bounded rationality approach to calibrate attitudes to risk of individual investors in context of a financial decision in an experimental set-up at National Institute of Securities Markets (NISM). Respondents are introduced to the experiment coined 'Riskitude which illustrates an investment decision in risk-free and risky asset classes. The name 'Riskitude' could lead to framing effect but it may be worth noting that sometimes putting people into a frame which helps understand the context maybe useful (Dew, 2009). Based on the aspiration levels given by the subjects, the model calibrates a measure of risk aversion and further elicits individual characteristics such as demographics and personal values that might drive differences in their attitudes to risk.

5.2 Data Collection

The required data is primarily collected from a sample of 76 subjects as the data collection is still in process. The raw data needed cleaning as some responses were given without understanding and hence considered invalid. The present form of data came from 60 subjects of whom 44 are risk-averse and 16 are risk-seeking. The sampling technique used is purposive sampling (Patton, 1990) in which subjects are selected because of certain specific characteristics such as prior experience and knowledge in making investment decisions. In this case, the subjects were selected from various workshops conducted at National Institute of Securities Markets.

6. Calibrating attitudes to risk

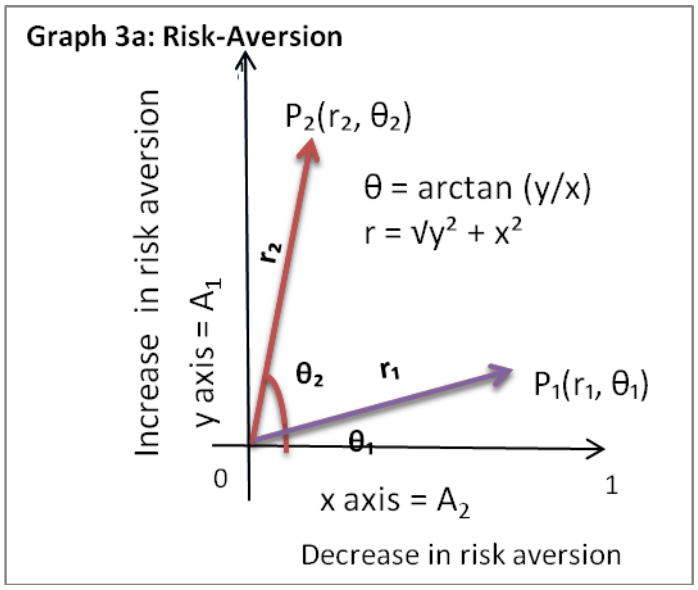
We determine the risk co-efficient, a measure of risk-aversion and risk-seeking, based on aspiration data, A_1 and A_2, in low and high return states as given by the subjects. As subjects specify different investment amounts, aspiration amounts are standardized and scaled between 0 and 1 to facilitate comparison among subjects. We use concepts from polar coordinates in which each point on a plane is determined by a distance from a fixed point (r) and an angle from the x axis (θ). The two dimensions of the co-ordinate system (x, y) represent higher aspiration and lower aspiration ((A_2, A_1) which are converted to polar coordinates *r* and θ.

$$r = \sqrt{y^2 + x^2} \qquad (5)$$

$$\theta = \begin{cases} \arctan\left(\frac{y}{x}\right) & \text{if } x > 0 \\ \frac{\pi}{2} & \text{if } x = 0 \text{ and } y > 0 \\ 0 & \text{if } x = 0 \text{ and } y = 0 \end{cases} \quad (6)$$

In Exhibit 4a, x axis denotes A_2, aspiration in case of high state and y axis denotes A_1, aspiration in case of low state. Consider the subject investing Rs. 100,000; his range for A_1 is Rs. 80,000 – Rs. 110,000 and A_2 is Rs. 110, 000 – Rs. 142,000. As he aspires a greater amount along the x axis risk aversion decreases and as he travels upward along the y axis risk aversion increases.

Exhibit 3a: Polar co-ordinates for Risk-aversion

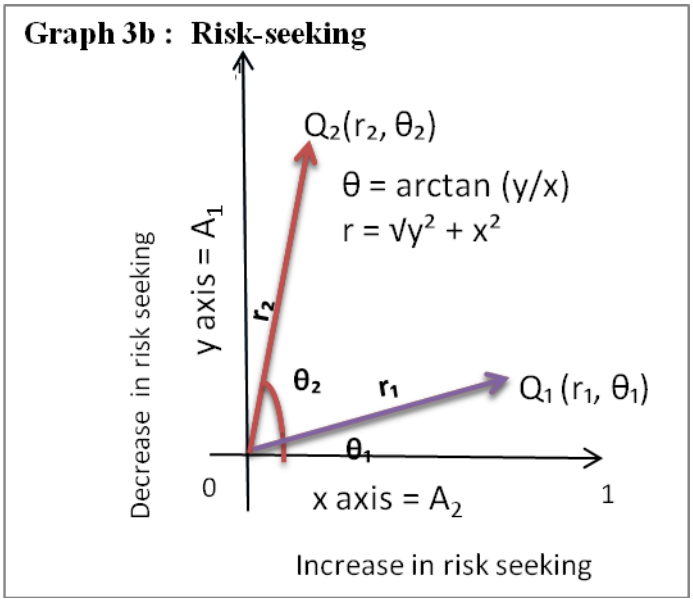


The position of point P_1 is described as (r_1, θ_1) and P_2 is (r_2, θ_2), where r denotes the distance from the pole and θ is the angle r makes with the x axis. Intuitively, r represents the distance and θ the direction where the aspirations lie on the plane. Hence, the risk parameter (R) is an f {r, θ}. R is computed as a product of r (distance) and θ (angle), to get values ranging from 0 to 1, R is divided by ∏/2.

$$R = \left(r \times \theta/_{\pi/2}\right) \quad (7)$$

Hence, for risk-aversion, R (r, θ) value closer to 0 denote less risk-aversion and values closer to 1 denote higher risk-aversion. In Exhibit 4a, Point P_1 is less risk-averse than Point P_2. Similarly, Exhibit 4b illustrates the risk-seeking category where R values ranging from 0 to 1 represent more risk-seeking (Q_1) to less risk-seeking (Q_2).

Exhibit 3b: Polar co-ordinates for Risk-seeking



We find that R cannot be a continuous variable for risk-averse and risk-seeking categories; higher R denotes higher risk-aversion in risk-averse category while a lower R denotes higher risk-seeking among risk-seekers. Therefore we calibrate Risk co-efficient (R) independently for risk-averse and risk-seeking groups.

However, R returns a unique value for each respondent, as two individuals have may the same *r* but the differentiating factor is the angle θ which represents direction on the plane. It is possible that, $r_1 = r_2$ but $\theta_1 \neq \theta_2$, in the feasible region allowing R to be a unique co-efficient. Hence R (r, θ) is the polar representation of A_1 and A_2, a bounded rational risk co-efficient.

Intuitively, the satisficing approach gives every subject a solution set of I(s) which represents investment in the risky asset guaranteeing aspiration set A_1 and A_2. If we use the rational choice approach and assume a utility function, namely $u(x) = x^{\alpha}$ we can imply a range of α for the range of I(s). Here α corresponds to the degree of risk aversion; $\alpha > 1$ implies risk-seeking where $pH + (1-p)L < R$; $\alpha = 1$ is risk-neutral and $0 < \alpha < 1$ implies risk-aversion where $pH + (1-p)L > R$.

The range of α can be derived by maximizing the expected utility function $u(x) = x^{\propto}$ where *x* represents return on portfolio investment and *E* represents the initial investment amount as given by the subjects.

$$u(I) = p[R(E-I) + HI]^{\propto} + p[R(E-I) + LI]^{\propto} \quad (8)$$

$$\propto = 1 + \left\{ \frac{\log \frac{p(H-R)}{(1-p)(R-L)}}{\log \frac{[R(E-I)+LI]}{[R(E-I)+HI]}} \right\} \quad (9)$$

As *I* approaches 0, $\propto$ is undefined hence to facilitate estimation we set $\propto$ value to 0.

$$ARA = -\frac{u''(x)}{u'(x)} = \frac{(1-\propto)}{x} \quad (10)$$

Further α helps calibrate the Arrow-Pratt measure of risk aversion (ARA). The absolute risk aversion coefficient is a nice way to measure risk aversion. It indicates how strongly decision makers exhibit their risk attitudes. Hence as ARA goes from positive to negative, it changes from risk aversion to risk seeking, at 0 it is risk neutral. Exhibit 4 illustrates mapping ARA with risky asset I for the risk-averse and risk-seeking category. In the risk-averse category, a higher positive ARA denotes acute risk-aversion and higher negative ARA denotes greater risk-seeking behavior. Hence ARA is negatively correlated with investment in risky asset for risk-averse category and positively correlated for risk-seekers.

Exhibit 4: Mapping I with ARA for risk-averse and risk-seeking category

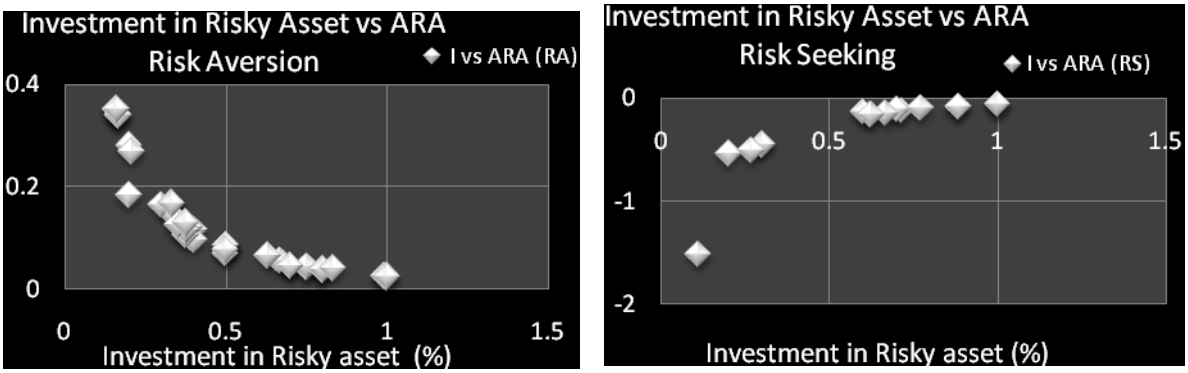


Exhibit 5 maps bounded rational risk co-efficient *R* with the Arrow-Pratt measure for absolute risk-aversion (*ARA*) for risk-averse and risk-seeking category and Table 1 gives the summary of findings of the estimated risk parameter for 60 subjects. We see that in the risk-averse category

R maps pretty closely with ARA since both the values occur within 0 to 1. ARA for risk-seeking takes values between -∞ to 0, which may not scale with R values between 0 and 1. But intuitively, a lower negative ARA maps with higher positive R, which means less risk-seeking behavior in both cases.

Exhibit 5: Mapping R and ARA for the risk-averse and risk-seeking category

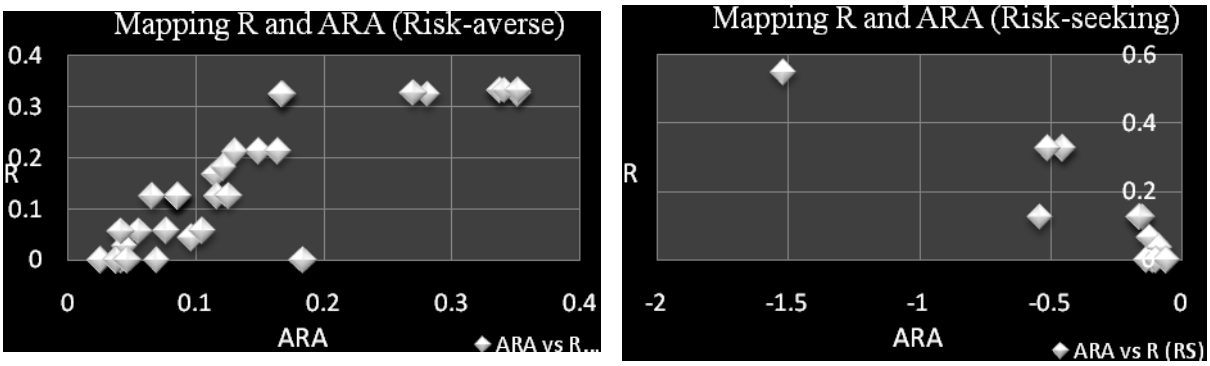


Table 1: Summary of Findings for the Estimated Risk Parameter

Respondent's Task	State aspiration levels in low state and high state for an investment amount			
Valid Response %	80%			
Decision Approach	Satisficing Approach			
Descriptive for Risk-averse Category	Range		Mean (SD)	N
	Low	High		
Aspiration in low state (A_1)	0.000001	0.49	0.21 (0.19)	44
Aspiration in high state (A_2)	0.48	1	0.78 (0.14)	44
Risk Parameter – R	0.000001	0.34	0.14 (0.13)	44
ARA	0.02	0.35	0.13 (0.10)	44
Descriptives for Risk-seeking Category	Range		Mean (SD)	N
	Low	High		
Aspiration in low state	0.000001	0.79	0.20 (0.23)	16
Aspiration in high state	0.48	0.95	0.82 (0.12)	16
Risk Parameter - R	0.000001	0.54	0.14 (0.16)	16
ARA	- 1.51	- 0.05	- 0.29 (0.37)	16

7. Segmentation of Investor Types

Participants in the marketplace are not a homogenous group but individuals with varied investment goals, different levels of financial literacy, experience, diverse risk preferences, values and beliefs. This evidence of market fragmentation suggests that financial service providers need to better understand the diverse investor base with its wide-ranging needs and various behaviors (Speed and Smith, 1992). The Finance literature supports an increasing role of demographic factors influencing risk perceptions, Lewellen and Schlarbaum (1974), Friend and Blume (1975), Riley and Chow (1992) find a positive relationship between risk tolerance and individual demographics such as education, income, and wealth levels. Schooley and Worden (1999) find that investors with post-secondary education and those who are married hold higher percentages of equity securities in their portfolios. Barnewall (1987) finds that certain occupational groups such as corporate executives, lawyers, and medical and dental non-surgeons are more risk averse. Hartog, Ferrer-i-Carbonell and Nicole Jonker (2002) find that entrepreneurs are less risk averse than employees, civil servants are more risk averse than private sector employees, and women are more risk averse than men. However, non-demographic traits such as personality (Deck et. al., 2009), lifestyles (Sjoberg, 2005), tastes and preferences also influence attitudes to risk. Nonetheless, there has been very little research exploring the influence of personal value systems on attitudes to risk. Consequently, behavioral scientists have applied the concepts of values and value systems as predictors of consumer behavior (Henry, 1976, Bekker and Connor, 1981, Munson and McIntyre, 1979, Schwartz and Bilsky, 1987). This paper tries to investigate relationship between a measure of risk aversion and personal values such as conformity, power, self esteem, and social recognition. We explore differences among investors in terms of their attitude to risk and personal value systems.

7.1 Personal Value Systems

Personal Values are cognition about what is desirable. Personal Values as summarised by many theorists and researchers are defined as internal states; ***Guiding Principles*** (Kluckhohn and Strodtbeck, 1961; Schwartz, 1994a); ***Beliefs*** (Rokeach, 1973; Schwartz and Bilsky, 1987); ***Schemas*** (Feathers, 1975); ***Criteria*** (Williams, 1979; Schwartz, 1992); ***Standards*** (Kohn and Schooler, 1983); ***Tendencies*** (Hofstede, 1980); ***Goals*** (Schwartz, 1994a); or ***Cognitions*** (Verplanken and Holland, 2002). The literature on value theories places emphasis on the stability

of values and their structure, attesting the influence of personal values on individual behaviour in groups, organizations and society (Munson and Posner, 1980). Research evidence suggests that value function acts as standards of conduct (Kluckhohn, 1951; Meglino and Ravlin, 1998) and the strength of such values influences decision making process. When activated, values prime attitudes and guide selection of events (Feather, 1995; Schwartz and Bilsky, 1987; Rokeach, 1973). Fessler et. al. (2004) demonstrates that anger increases risk taking in men while disgust decreases risk taking in women. Risk attitudes change as a function of trust in the agent rather than the expected gain of the transaction (Audun Josang and Stephane Lo Presti, 2004) and when gambles are bundled with esteem, individuals may be especially risk averse (Tyler Cowen and Amihai Glazer, 2003). The new notion of decision making in bounded rationality recognizes "bounded self-control" where individuals have the right intentions or beliefs, but they lack the willpower to carry out the appropriate changes in behavior (Mullainathan and Thaler, 2000). There is also "bounded self-interest" or "bounded selfishness" (Mullainathan and Thaler, 2000) which acknowledges that many people do seek to maximize their personal welfare, yet they prove far more cooperative and altruistic than economic theory predicts they will be. The above literature establishes strong bedrock of thoughts from researchers who have recognized behavioral influences on the decision making process. However, there is little published research exploring the role of personal values on risk attitudes. No doubt, reality is so complex that trying to fit an individual's values or beliefs into a model is impossible. But, to a certain extent, we can borrow concepts from social psychology where behavioural patterns, rational or irrational, are developed and empirically tested. It will help understand the why and how aspect of behaviour, which can have managerial implications for policy makers.

7.1.1 Measuring Personal Values

Values are difficult to define because they share similar characteristics with concepts such as attitudes, preferences and viewpoints (McCarty and Shrum, 2000). They are inherently positive constructs and exhibit little differentiation among themselves making it a difficult task to measure them. The total number of values a person possesses is relatively small; people possess similar values at different degrees (Rokeach, 1973). Schwartz (1992) designed the "Schwartz Values Inventory" to target individual human values that vary in importance and serve as guiding principles in people's lives. He theorized that values address three human needs: biological,

social and group survival. The crucial content that distinguishes among values is the type of motivational goals they express. The basis for the value theory is that values direct people's individual choices and can be ranked in the order of importance.

7.2.2 Shwartz Value Theory

Shalom Schwartz (1992, 1994) used his 'Schwartz Value Inventory' (SVI) survey over 60,000 culturally diverse individuals in 64 countries to identify common values that act as 'guiding principles for one's life'. He specifies ten universal and motivationally distinct types of values as indicated in Table 2.

Table 2: Definitions of the Motivational Types of Values in Terms of their Core Goal

Value Domain	Core Goal
Power	Social status and prestige, control or dominance over people and resources
Achievement	Personal success through demonstrating competence according to social standards
Hedonism	Pleasure and sensuous gratification for oneself
Stimulation	Excitement, novelty, and challenge in life
Self-Direction	Independent thought and action – choosing, creating, exploring
Universalism	Understanding, appreciation, tolerance and protection for the welfare of all people and for nature
Benevolence	Preservation and enhancement of the welfare of people with whom one is in frequent contact
Tradition	Respect, commitment, and acceptance of customs and ideas that traditional culture or religion provide to Self
Conformity	Restraint of actions, inclinations and impulses likely to upset others and violate social expectations or norms
Security	Safety, harmony and stability of society, of relationships, and of Self

Schwartz (1994) argues that values are structured through a combination of social and psychological conflicts, experienced by the individuals expressing these values. Over time these conflicts and harmonies among value priorities result in a structure or value system which provides an ordered framework to individuals for decision-making. It is generally accepted that variations in value structures motivate behavior and values must influence decision making (Kluckhohm, 1951; Meglino and Ravlin, 1998). Values summarize previous experience and

provide strategy for dealing with choices (Kahle, 1993). Hence this study is an endeavor to assess importance of personal values among individuals using the Schwartz Value Survey (SVS; Schwartz, et al., 2001). Respondents, on a nine-point likert scale, report importance of personal values that act as guiding principles while making financial decisions. We would like to directly answer the question; do values like security, conformity, achievement, stimulation or more segment investors with different risk preferences?

We apply cluster analysis to segment investors and identify distinct clusters that share common characteristics in risk perception and personal values. The hierarchical cluster procedure with Ward's linkage and squared Euclidean distances as the dissimilarity measure, is used to identify the number of clusters and define group centroids. Since the present data for risk-seeking is extremely small (16) we apply cluster analysis only for the risk-averse category of 45 participants. Subjects were classified into two clusters, with cluster size of 37 and 8. Cluster 1 represents values like Achievement, Power, Hedonism, Stimulation and Self-direction. Cluster 2 represents values like Benevolence, Conformity, Security, Tradition and Universalism. Table 3 gives the descriptive of the two clusters.

Table 3: Descriptive Statistics of Clusters

Ward Method		N	Min	Max	Mean (SD)
Cluster 1	Risk Parameter	37	0.8	0.22	.15 (0.08)
	Achievement	37	4.00	9.00	7.26 (1.26)
	Hedonism	37	2.00	9.00	6.27 (2.03)
	Power	37	2.00	9.00	6.13 (2.15)
	Self direction	37	6.00	9.00	7.73 (0.94)
	Stimulation	37	5.00	9.00	7.13 (1.25)
Cluster 2	Risk Parameter	8	0	0.14	0.06 (0.11)
	Benevolence	8	7.00	9.00	7.88 (0.64)
	Conformity	8	6.00	9.00	7.25 (1.03)
	Security	8	7.00	9.00	7.87 (0.64)
	Tradition	8	5.00	8.00	6.75 (1.28)
	Universalism	8	7.00	9.00	8.25 (0.70)

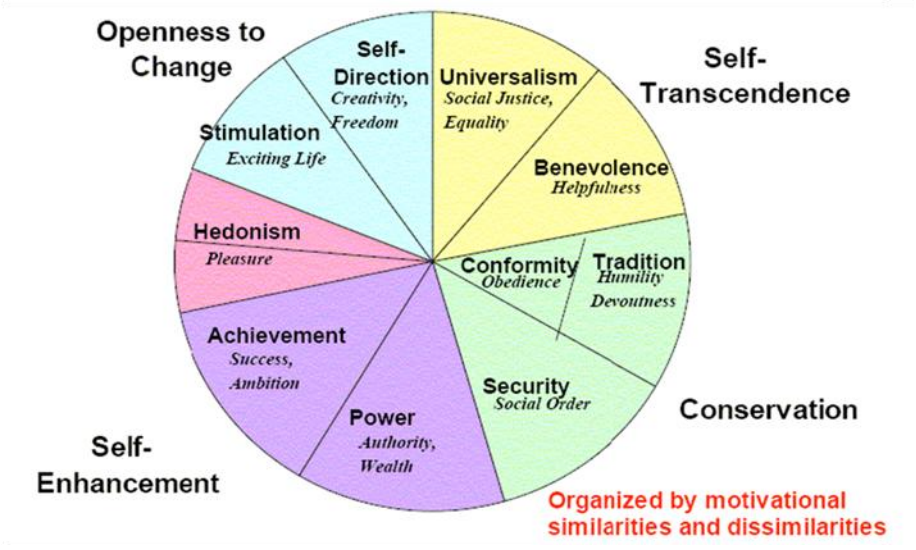
The two clusters are described as:

Cluster 1 – Individual Interest: This cluster represents lower risk-aversion and are driven by values like self-direction, achievement, stimulation, power and hedonism. The Schwartz (1992) defines these value systems as representation of individual interests. Therefore the motivational goals for less risk-averse investors are primarily to enhance own welfare and pursue individualistic interests.

Cluster 2 - Collective interest: Values postulated to serve collective interests are benevolence, tradition and conformity (Schwartz, 1992). This cluster represents investors with higher risk aversion guided by values like universalism, security, benevolence, conformity and tradition. Universalism and benevolence are concerned with enhancement of others and transcendence of selfish interests while tradition and conformity stress on self-restraint and submission. Therefore, we see that the intrinsic motivation for risk-averse counter-parts is conservatism and self-transcendence to achieve collective goals.

Interestingly, Schwartz theory (1992, 1994a) also organizes the 10 motivationally distinct values around two bipolar dimensions: openness to change and self-enhancement versus conservation and self-transcendence, as shown in Exhibit 6. These values form something of a spectrum, with successive values often having a close relationship. Therefore, the findings further reflect that more risk-averse investors are primarily driven by conservation and self-transcendence, while the risk-seeking counter parts are influenced by self-enhancement and openness to change.

Exhibit 6: Theoretical Location of Values (adapted from Schwartz 1992, 1994a)



8. Discussion and Conclusion

Much of contemporary economic and finance theory assumes that investors make decisions to maximize their economic well being. The present study is reflective that investors are bound by cognitive limitations and structure of the environment, which induces them to make satisficing decisions that may be linked to risk attitudes. The personal value system helps us segment and understand investor behavior as they play a central role in an individuals' cognitive process because of their supposed stability over a period of time.

Attitude towards risk is a fundamental facet of behavior influencing decision making in uncertain environments. The study is a step towards calibrating degree of risk aversion by using the main idea of bounded rationality and satisficing approach in a simple financial decision. Concepts of aspiration formation and satisficing provide reliable and more natural ways of classifying risk attitudes and predicting investment choices. However, the measurement of risk attitude is subject to error and possibly bias, especially because it is not incentivized and an inherently subjective construct. Nonetheless, the process of assessing aspiration formation may be a valuable experience in itself, because it invites the decision maker to confront the risk-reward tradeoffs that are inherent in any real decision. Interestingly, Malkiel (1996) argues that, for individuals, assessing capacity for and attitude to risk is the key to successfully implementing an investment policy.

The results of the study also support the contention that there are behavioural linkages to the decision making process. Risk attitude is psychologically intuitive, which can also be related to personal values such as achievement, self-direction, stimulation, conformity, security and more. The study highlights two distinctive investor groups with individual interests and collective interests. The value based segmentation explains the motivational goals that drive risk preferences. The basic values that drive risk aversion are self-transcendental and those which drive risk seekers are individualistic. A better understanding of the determinants of differences in risk attitudes and behaviour allows financial services and advice to be more effective.

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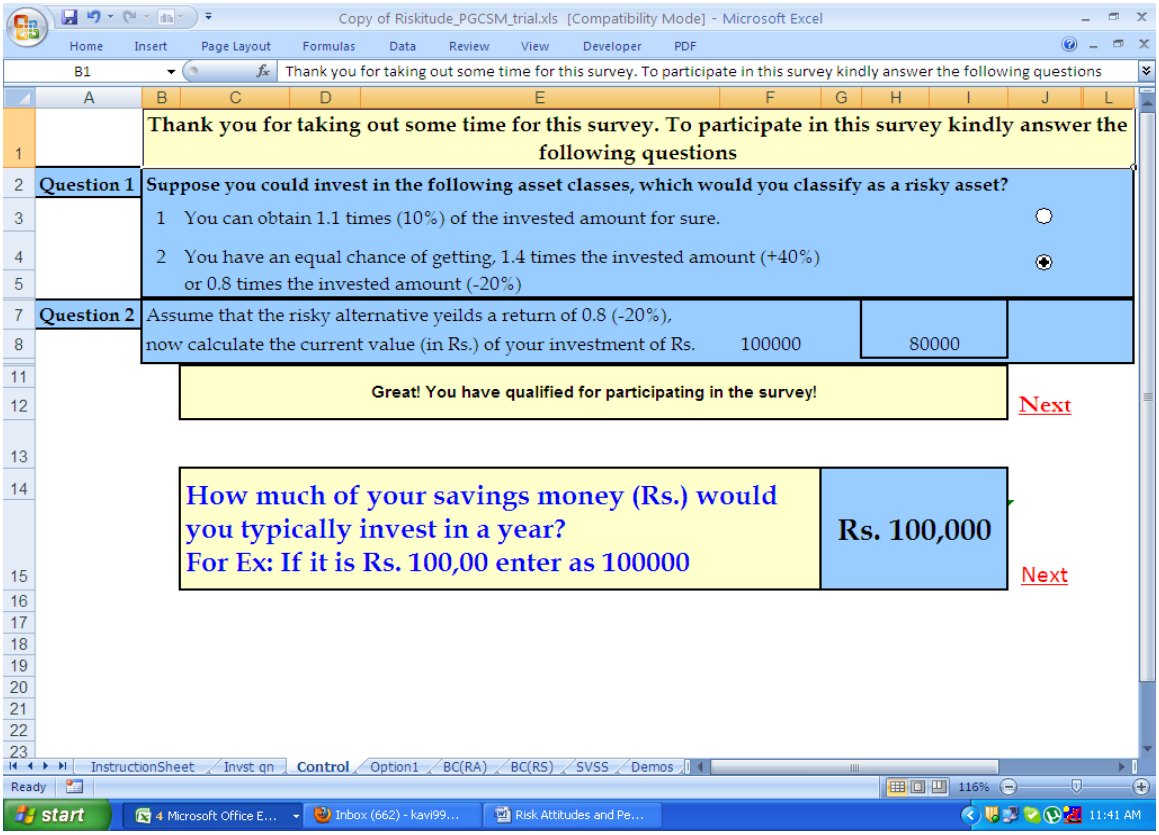
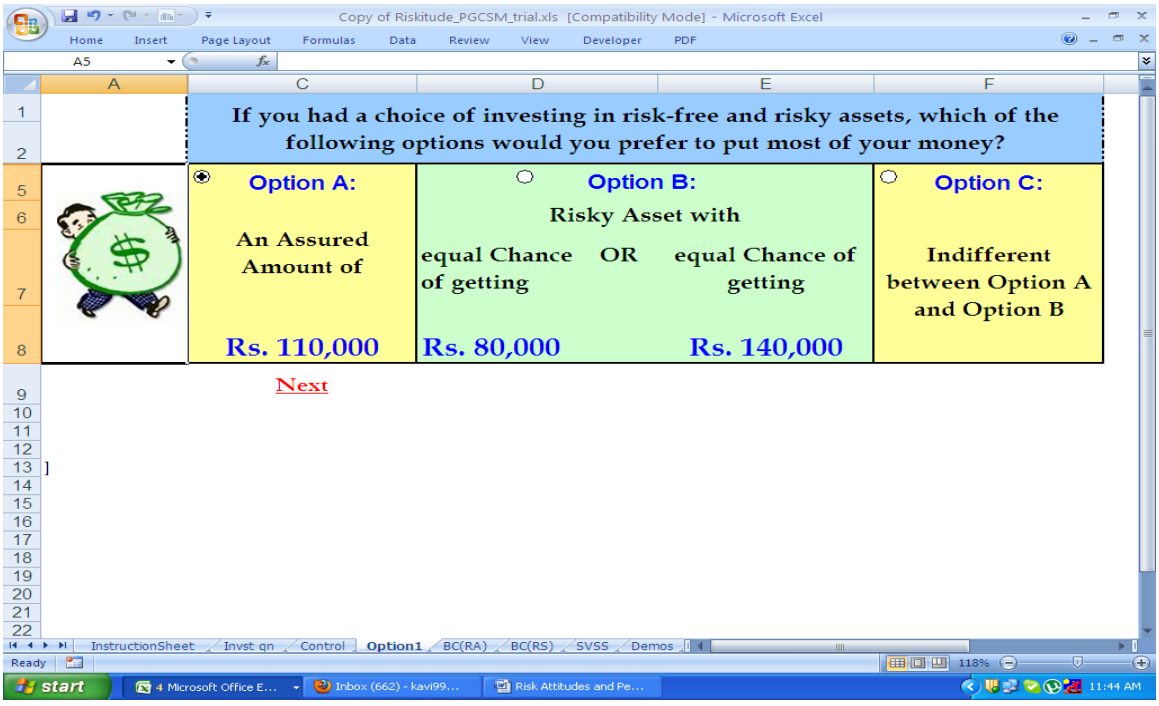
Annexure 1: Snapshots of the Experiment Riskitude

1.1 Control Questions:



1.2 Investment choices:



1.3 Detailing the Satisficing approach: