



EVOLUTION OF RISK ATTITUDES FOR DIFFERENT DEMOGRAPHIC CHARACTERISTICS WITH VARIANT CIRCUMSTANCES.

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DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the Research Project contains no material previously published or written by another person except where due reference is made in the Research Project itself.

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Lwanga Truphena Khalayi

Signature

Date

This Research Proposal has been submitted for examination with my approval as the Supervisor.

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ABSTRACT

This study endeavors to determine how risk attitudes in the context of personal business decisions and financial investing of persons from different age groups, gender and of different initially ascribed risk attitudes evolve with variant circumstances by undertaking an experimental Sports betting questionnaire technique on the local University population. Furthermore, the study seeks to provide an inkling on how the shape of the utility curve of individuals morphs over time with variant circumstances inferring information on how decisions regarding asset allocation for individuals' portfolios (IPS) based on risk preferences are to be approached by investment managers given certain circumstances.

Keywords; utility curve, risk attitudes, decisions, variant circumstances, investment, IPS

LIST OF ABBREVIATIONS

BART – Balloon Analogue Risk Task

DOSPERT- Domain-Specific-Risk-Taking-Scale

EU -Expected Utility theory

G&P – Gneezy and Potters Method

GDRA – Gender discriminating risk attitudes

MLB –Money line bet

MPL – multiple price list

O/UB –Over/Under bet

PB – Parlay bet

SB – Spread bet

CHAPTER 1: INTRODUCTION

1.1 Background

Risk attitude is broadly defined by both the proponents of the EU(Expected Utility) theory and their variants representing the Prospect theory to mean a descriptive label for the shape of the utility function of a person presumed to underlie the person's choices (Weber, Blais, & Betz, 2002). Whereby under the EU theory the blanket terms risk averse and risk seeking are more often than not purposed to describe the curvature of a particular person's utility curve.

Furthermore, various frameworks have been developed by numerous economists, psychologists as well as financial professionals to categorically explain risk attitudes and their respective implications in decision-making particularly financial decision making namely; the EU theory having a metric of measuring risk attitude defined as:

$$= \frac{u''(x)}{u'(x)}$$

Where u' and u'' are indicative of the first and second derivatives of the utility function (Pratt, 1964), the risk-return framework of risky choice in Finance (Sarin & Weber, 1993), whereby people's preferences for risky choice is reflected as a trade-off between an option's expected benefit usually equated to an expected value and its riskiness tantamount to its variance (Weber, Blais, & Betz, 2002) .

In all these studies on the risk attitudes of various individuals, the ever-present topic of gender-discriminating risk attitudes has gained much momentum since the publication of the 2001 *Risk as Feelings* that related risk attitudes to emotions felt further implying that the difference in these emotions in kind and degree on men and women could easily offer an explanation for the phenomena of GDRA especially within certain age brackets.

As a result many studies on the topic seeking to forecast risk attitudes in men and women, (Eckel & Grossman, 2008) as well as to study the effect of gender stereotypes on forecasting risk attitudes

(Lugovskyy & Grossman, 2006) have been done and most have confirmed that GDRA's existence stating loosely that men on most occasions are more risk seeking as opposed to women depending on certain domains as proposed by (Weber, Blais, & Betz, 2002) . For example women were observed to be more risk seeking in social domains as opposed to men (Weber, Blais, & Betz, 2002).

1.2 Motivation of study

Despite there being some confirmations of the aforementioned GDRA not all studies definitively reveal a stable sex difference in risk attitudes, as factors such as economic status have also been observed to eliminate the theory of GDRA between men and women (Eckel & Grossman, 2008). From the latter, it is thus very interesting to continue studying the validity of the GRDA theory and its various underlying rationales that are debatable at the moment especially in a population that has not been particularly studied with regards to this phenomenon.

Moreover, yet another intriguing result is that across all these different methodologies decisions regarding risk are very sensitive to the framing of the choice task and its varying individual characteristics (Brañas-Garza, Georgantzís, & Guillen, 2007) as well as the feelings those characteristics elicit in individuals which is consistent with what this study endeavors to embark on.

Furthermore, in studies by Ajzen and Fishbein the relationship between risk attitudes and behaviors has been illustrated further cementing the theory of reasoned action and its elaboration in the theory of planned behavior. A theory whose framework dictates that attitudes among other factors determine the likelihood of certain behavior occurring (Weber, Blais, & Betz, 2002). This has inspired this study in a reversionary sense because the study below studies behavior as per certain responses from the study's subjects to determine the risk attitudes underlying them.

¹ Lastly the study is further prompted by the fact that in recent times Sports betting has become rather widespread in Kenya across all genders, age groups and among persons with differing initial risk propensities, thus serving as a good avenue to use for the determination of individuals risk attitudes and how they evolve with changing circumstances as is this study's mandate. It has also been theorized by certain major bookmakers in the business that GDRA does not exist as per the gender betting statistics in the recent past of which the study seeks to prove or disprove in the course of this study.

1.3 Problem statement

The risk as feelings hypothesis has been one of the arguments used by for GDRA. It posits the role of anticipatory feelings in decision making whilst assuming that these feelings have strikingly different manifestations in females as opposed to males. Thus theorizing that it is this difference in 'feelings' that brings up the disparate gender discriminating risk attitudes in men and women. (Loewenstein, Hsee, Weber, & Welch, 2001).

A theory that has been confirmed severally, for example in the study on a thrift savings account that uncovered that women invest more in the safer pensions assets and conservatively than men. It was also seen that women decided to invest more in the minimum risk stock portfolio as opposed to men. (Croson & Gneezy, 2009). Thus this study seeks to test the validity of these theories in the developing world using a Sports betting, experimental questionnaire framework.

First and foremost the study seeks to determine the initial risk attitudes of individuals of different ages and genders using a control experiment.

¹ Sports Betting EAST AFRICA Summit & Exhibition-April 2016

Subsequently the study aims to determine the way in which these risk attitudes of persons with differing genders as well age brackets evolve with changing circumstances. Therefore enabling one to analyze possible **reflection effects** between different genders, age groups or initial propensities towards risk whereby when persons of differing groups in the aforementioned categorizations are exposed to the same variant circumstances they react in perfectly opposite directions with each variant circumstance leading to a verdict on GDRA .As well as the **certainty effect's** impact on financial decision making whereby with more certainty or more 'perceived' certainty towards a gamble a person overweighs the probabilities of the choices in a gamble (Kahneman & Tversky, 1979) and is more likely to be less risk averse. Furthermore, the **isolation effect's** impact on evolution of risk attitudes with variant circumstance across certain genders or age brackets because the theory posits that different persons decompose the difference between certain gambles differently thus leading to eventual differing risk preference (Kahneman & Tversky, 1979) and this theory has been used as a possible explanation for the reflection effect earlier mentioned.

1.4 Research questions

1. How do risk attitudes for different genders evolve with changing circumstances?
2. How do risk attitudes for youthful persons aged 18-30 evolve with changing circumstances given certain initial risk attitudes?
3. Is there any reflection effect across different genders or persons with differing initial risk attitudes and (or) implications of the certainty and isolation effects across different genders or in the population aged 18-30?

1.5 Research hypothesis

Hypothesis 1: GDRA are somewhat extant in the developing world thus implying reflection effects between the evolutions of risk attitudes of different genders

Hypothesis 2: The certainty effect is more conspicuous on males as opposed to females as well as for the youthful population between ages 18-30.,

Hypothesis 3: There are different patterns in the way risk attitudes evolve as circumstances change amongst persons of different genders and differing initial propensities towards risk taking due to the isolation effect. (Kahneman & Tversky, 1979)

1.6 Importance of Study

As earlier mentioned the terms risk averse and risk-seeking are used to determine the extent of the curvature of an individual's utility curve whereby a flatter curve implies less risk aversion while a more curved curve implies more risk aversion and therefore this study can be used to advance the description of the changes in the curvature of the individual's utility curves with variant circumstances that may engender reactions caused by the certainty or isolation effect. This can further aid in theories reliant on the utility theory such as the rational man's consumer and savings functions and how they are dependent on the individual's risk attitude.

The study's result can also influence the predictive role that gender and age have on an individual's risk attitude and how it evolves with respect to a variation in circumstances. Thus influencing the theories on investment decisions that are related to risk attitudes for example the risk adjusted return that is heavily reliant on risk aversion. In this regard it can inform the how the return should be adjusted with the inclusion of risk, as well as how the adjustment in the return of a specific asset or portfolio changes with a variations of circumstances that in turn change the risk aversion of the individual. It can prove quite useful in tactical asset allocation when choosing assets based

on their risk adjusted returns and how these returns change overtime depending on the change in circumstances that in turn change the risk aversion that is used to adjust the return .As a result informing asset allocation with changing circumstances, ergo determining how to go about investment decisions to some extent.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction.

This section gives a brief description of literature that has been undertaken by various scholars heretofore on some of the issues examined, their influencing factors and techniques used in this particular research paper namely; the methodologies that have been used in earlier studies to elicit and assess risk attitudes, results on studies aimed at testing the validity of the popular belief that gender discriminating risk attitudes exist and inform most people's investment decisions as well as the proposed explanations for the aforementioned results. Lastly, experimental studies on psychological biases in sports betting have also been reviewed with a pronounced interest in cases to do with emotions, risk attitudes, psychological biases and how these have shaped some of the vibrant Sports betting securities and markets. All of which was done with a particular interest in Football and basketball games whose betting frameworks are more popular and widespread in this country despite the fact that many other sports betting markets have been studied for example Horse-racing, athletics, boxing and even car racing .

2.2 Methods used to elicit & assess risk attitudes.

(Charness, Gneezy, & Imas, 2013) Discussed various experimental techniques that both economists and psychologists have contrived for use in eliciting and assessing the different risk attitudes.

The methods discussed are classified as per their complexity where it was shown that the more complex methods are more often than not used to estimate parameters to be used later on as evidence for or against particular proposed theories of decision making. Meanwhile, simpler methods are described to be captors of more meaningful information from the populations examined because the participants' sample need not have a high degree of mathematical sophistication tantamount to the participants' having more comprehension of what is required of them and thus providing reliable data for examination.

A summary of the methods is provided outlining their relative complexity, populations they were used on, whether or not gender differences were examined and lastly whether the data was used to estimate certain parameters. Some of the methods being the balloon analogue risk task (BART), questionnaires, Gneezy and Potters method (G&P) and the multiple price list method (MPL) among many others.

2.3 Gender discriminating risk attitudes.

In (Eckel & Grossman, 2008) an experiment to examine risk attitudes amongst university students was designed. Subjects were instructed to choose among one of any five 50/50 gambles where one is a sure thing while the other four choices 's expected payoff and risk increases linearly conducted in three frameworks. All of which revealed that females tend to be more risk averse than men.

Additionally the participants were asked whether or not they thought a person's gender was a risk preference signal after which they were asked to guess the choices of other participants based on their gender. Averagely most favored gender discriminating risk preference attitudes, further solidifying a theory in (Lugovskyy & Grossman, 2006) that predictions on others' risk attitudes are heavily influenced by gender stereotypes even after more reliable information to guide predictions on others' risk attitudes has been availed. 27% of the guesses were accurate which is well above chance thus further implying that gender discriminating risk attitude stereotypes indeed have some predicting power on people's actual risk preferences.

(Katic & Booth, 2012) Also uncovered gender discriminating risk attitudes in certain instances as young women were observed to invest less and more conservatively when confronted with a clearly specified investment decision based on hypothetical lottery winnings.

Lastly, (Muller & Rau, 2016) analyzed whether gender differences in charitable giving were engendered by gender differences in risk taking of which they found to be true as women were observed to donate more and be more risk averse than their male counterparts. A positive correlation between risk tolerance of women and their donations was found to be the case but with regards to women while no correlation whatsoever was found about men.

2.4 Explanations for gender discriminating risk attitudes

In (Loewenstein, Hsee, Weber, & Welch, 2001) the paper seeks to explain a wide range of phenomena that influences the formation of risk attitudes in a manner outside of the cognitive-consequentialist interpretation norm heavily employed by psychologists supporting the risk-return framework of risky choice in Finance; people making decisions based on anticipated emotions that they think will be engendered by the outcomes their decision will bring forth.

In lieu of the norm the paper explains risk attitudes as per the influence of emotions termed as anticipatory emotions; emotions that an actor experiences while in the process of making a decision such as dread, fear or anxiety among many others which until then had been cast aside as being epiphenomenal, having no significant implications to risk attitudes.

These 'anticipatory emotions' are also referred to as feelings and are also shown to display no need for cognitive mediation as prescribed by the aforementioned cognitive-consequentialist interpretation. This paper forms the beginnings of the factors that are said to explain gender discriminating risk attitudes that have been previously discussed.

(Loewenstein, Hsee, Weber, & Welch, 2001), a paper that looked at the various gender differences with regards to risk, social and competitive preferences to help explain the phenomenon of

gender-specific outcomes in the goods market seems to concur with (Loewenstein, Hsee, Weber, & Welch, 2001). This is because it also stated that feelings are the primary factors for the gender discriminating risk preferences because they vary in kind and degree in men and women. It was found that fear and anxiety is prevalent in women in anticipation of negative outcomes thus greatly reducing the utility derived from more risky investment choices ergo engendering risk. Meanwhile anger is the common denominator in men which increases the propensity towards risk tolerance.

Feelings were also seen to affect the perceptions of probabilities of success and failure on an investment decision because fear in the actor of a decision on a fairly risky investment choice was observed to underestimate the probability of success whilst anger in the actor making a decision on the very same choice was observed to underestimate the probability of failure further explaining the different risk attitudes in males and females (Croson & Gneezy, 2009).

Lastly, yet another explanation posited was overconfidence when one makes investment decisions ,which was observed in both males and females but more so on males as opposed to females (Croson & Gneezy, 2009).

2.5 Sports Betting & Psychological biases

(Krieger, Pace, Clarke, & Girdner, 2015) Examined closing and opening lines of spread bets that dictate whether or not potential let down effects are priced by bookmakers thus illustrating the level of the sports betting market efficiency with regards to letdown effects as observed in the NBA and NFL betting securities.

The letdown effect referring to a bias that once the teams that have clinched good playoff positions in the post-season they tend to be susceptible to losing focus either intentionally or unintentionally and thus betting on them to win becomes a non-profitable strategy (Krieger, Pace, Clarke, & Girdner, 2015). This bias goes against the theory of affect that is the desire to associate with the perceived good ,be they ; firms, projects or securities that thereby influences financial

judgment causing one to deviate from a pure risk-return theory (Krieger, Pace, Clarke, & Girdner, 2015).

This clearly shows that these psychological biases greatly influences the decisions and risk attitudes of the actors in the sports betting market demonstrated by their particular bets to partake to and so much so that the market(bookmarkers) adjusts the spreads to reflect these biases as was uncovered, therefore the market efficiency is seen to be dependent on the psychological biases that alter risk attitudes affecting bet choices and eventual causing the entire market to shift to accommodate this as a result.

2.6 Conclusion

The various studies above shaped much of the direction and technique of this research paper for example the methodology was heavily advised by the various techniques on how to elicit and assess risk attitudes especially to design a very simple and convenient method. (Krieger, Pace, Clarke, & Girdner, 2015) Informed the framework of the methodology to be based on the sports betting securities as they offered fertile and creative grounds to use to test whether psychological biases affecting gender discriminating risk attitudes and how risk attitudes evolve with variant circumstances.

The results proposing gender discriminating risk preferences also validated the study since none of the reviewed literature sought to explain how the risk attitudes of different genders and youthful persons change with alterations to circumstances using a sports betting framework which this study aims to do.

Furthermore, despite the scattered explanations and isolated evidences of gender discriminating risk attitudes none of the literature concretely prove or disprove the existence of GDRA.

CHAPTER 3: METHODOLOGY

3.1 Preliminaries

Preceding manifestations of alterations of circumstances on sports betting securities were required to be incorporated into the data collection technique so as to see how and if at all the risk attitudes of different genders and age brackets do indeed change when the circumstances change. The targeted changes were supposed to make the participants feel as though they have more wealth to spend on betting, more perceived information about the sport being betted on and more perceived technique in betting.

Thus the preliminary interviews with bettors and observations of the machinations of the sports betting securities as well as bettors' perceptions in this market would enable design the experiment as per the observed betting norms so as to represent the earlier mentioned alterations.

Furthermore, it was discovered that betting enthused most bettors more during any particular major sporting season in this case football which to was to be incorporated into the experiment's design as the study will be undertaken during the period concluding the famous quadrennial Euro 2016 Championship to have many more respondents to the study.

As for the variant circumstances to make the participants feel that they had more money to spend that they had not earned, initial spending incentives such as free winnings once you register as a bettor was deemed to be a good representative of that alteration and therefore the data would inform us on how risk attitudes of a person change when they are betting with their own hard earned money as opposed to when betting with free winnings from the game that can only be used within the game thus engendering an individual feeling that they have extra unearned money to spend.

With regards to the alteration to make the participants feel they have more expertise in betting on the bet that they are about to place, a bet guru would be the representative of that change in

the experiment. This was deduced from interviews as most bettors were observed not to be particularly knowledgeable of the games they are betting on and instead relied on gurus to guide their bets and the experiment would now deduce just how much did one's risk attitude change when betting on their guru's merit as opposed to betting on their own.

Lastly, the change to make the participant's feel as though they had 'more information' on the bet would be represented by a shift from pre-game betting to live betting as the particular sport being betted on was ongoing and at a point when the bettor had watched enough of the game to feel that they had more information about the possible outcome of the game. Therefore it was to be deduced how this perception of having more information would change one's risk attitude as opposed to pre-game betting when there was no recent information on how the game could turn out. This was chosen especially because most bettors in the interview expressed that betting before the game was largely different to betting during the game as there is more perceived certainty in live betting as opposed to pre-game betting despite the fact that most games both during or before the game were expressed by the bettors to be highly unpredictable.

3.2 Population and Sampling

3.2.1 Targeted Population

The targeted population sample is mostly persons aged between ages 18-45 who are both expected to legally be allowed to bet thus being versed with basic Sports betting terminology and fitting the ages of persons whose risk attitudes regarding financial matters can be deduced from their participation in the betting experiment questionnaire. The persons most targeted are young university-going men and women as well as young professionals who likely participate in Sports betting outside of the experiment.

3.2.2 Sampling Technique

In order to get the maximum number of respondents the snowball sampling technique will be used because from the preliminary interviews with certain avowed bettors within the targeted population it was clearly that bettors have groupings that are not particularly easy to locate as betting practice is quite taboo but it also became very evident that once you located one bettor they would lead you to all the others.

For this reason the questionnaire used was sent to the a priori known bettors who were then encouraged to pass the message on to fellow bettors who would also be encouraged to pass on the message to fellow bettors and the ripple effect from one bettor would determine the sample.

Moreover, this would be the most convenient way of accessing responses on the taboo topic of gambling and therefore would encourage many persons to participate.

3.3 Data collection technique

The questionnaire technique was chosen for its simplicity and convenience and because from the preliminary observation it was the most favored method by the bettors who would form the population the study sought to study.

To begin with the study participants were asked to fill in their respective genders.

Thereafter they are presented with a hypothetical prospective football game of 2 known countries, where one of the countries is clearly labelled as the 'underdog' and as a result has a higher multiplier representative of higher winnings if the participant was to bet on their success which has higher risk and higher reward.

The second question asks the participant which kind of bet they would place given the aforementioned information.

The choice of bets available are ranked to represent various risk aversion levels 1 being the most risk averse and 4 being the least risk averse but the various options exhibit a diminishing return with increasing risk . They are:

1- Over/under bet (O/UB) to win 5*betted amount

2- Spread bet (SB) to win 6*betted amount

3-Money line bet (MLB) to win 6.5*betted amount

4-Parlay bet (PB) to win 6.8*betted amount

The over/under bet represents the safest bet that can be placed as it is a bet on whether the total scores of the game will be over or under a specific number and as a result has the lowest return in case the bettor wins. The spread bet represents the second-most safe bet because it generally represents the range of values that the 2 different team's scores should differ by and has a better return if the bettor gets the bet correct. This option is deemed to be more risky than the over/under bet as the range of values to which the difference should fall within is not as large as the over/under bet's allowed range.

The money line bet refers to the second-most risky bet as it involves choosing which team will win and the exact scores of the winning team and the losing team in order to win the bet. As a result it has a higher return than the aforementioned bets but exhibits a lower diminishing return for the additional risk. Finally, the parlay bet which is by far the riskiest as it depends on predicting the exact outcomes of 2 matches, at this point another match is introduced without mention of the an underdog to imply further uncertainty. As expected the return is the highest of all possible bets but like the previous bet its return exhibits a diminishing increase in return for the additional risk taken on.

The particulars of the various bets are made known to all participants beforehand to ensure comprehension of the survey by the participants although it usually general knowledge as

observed from the preliminary studies of regular bettors who are the targeted population to be studied.

The above question is used to indicate the initial risk attitude inhabited by the participant after which the very same question is paraphrased to include the aforementioned changes which will then reveal how the risk attitudes of the participants' evolve with changes in the circumstances of the underlying security or factors influencing success on the bet chosen, thus 3 other questions with the alterations are posed to the participant yet again and they again pick which kind of bet they would prefer in light of the variation in circumstances.

The changes are that a guru's remarks are added to the question to determine the change in risk attitude once the participant perceives that they have acquired elevated expertise as they bet. The alteration of giving the participant unearned winnings that can only be used in the game determine how the participant's risk attitude changes once they are betting with free winnings instead of their own hard earned money. Lastly, the element of live betting is appended to the generic question to see how the risk attitude of an individual changes when they perceive to have more information about the game which is typical as bettors who bet during the match seem to believe that they have more information about the possible match's turnout despite the unpredictable nature of most sporting matches as found from the preliminary observations and interviews with Sports gurus and regular bettors.

3.3 Anticipated Analysis

After the data collection is completed the responses will be analyzed according to the criterion of gender and age as well as the sub-criteria of frequency of betting which ascribes the initial risk attitude with those stating to bet 'a lot' being deemed the least risk averse with the scale increasing risk aversion with answers 'once or twice' and 'never' respectively.

Furthermore to ensure the criteria of gender and age are independent of each other contingency tables utilizing the chi square were used to determine whether the criteria were independent of each other or not.

3.5 Limitations of the methodology

First and foremost the questionnaire method to be employed in this study isn't directly incentivized and as a result from previous studies it has been debatable whether responses from the questionnaire method are reliable (Charness, Gneezy, & Imas, 2013).

Secondly, according to the DOSPERT scale developed by (Weber, Blais, & Betz, 2002) to weed out variations dependent on variations of elicited risk attitudes in different domains which has 40 items in the domain of recreation, social and ethical risks as well as 4 in the domains of gambling and investment (Weber, Blais, & Betz, 2002). It demonstrated that risk attitudes differ with different domains and since our questionnaire under the Sports betting has elements of recreation, gambling and investment it may be hard to determine whether the responses to the participants can be used to deduce risk attitudes with regards to serious financial matters reliably.

Moreover, the data collection technique does not truncate responses from persons suffering from pathological gambling, which is a mental illness documented under the Diagnostic Statistical Manual of Mental Disorders published by the American Psychiatric Association (Brañas-Garza, Georgantzís, & Guillen, 2007) that would skew the data collected entirely.

The snowball sampling technique is also likely to lead to a slightly biased sample because the bettors would most likely refer the study to their friends who are similar to them in terms of betting style and risk attitudes. The dangers of biased information are very present.

Lastly since the population targeted is specific the results of the study may not apply to all population regardless of the useful discoveries that may be discovered.

CHAPTER 4: RESULTS AND FINDINGS

4.1 Data description

Responses were collected from a reported 105 persons although only 79 responses were fully filled in with 30(38%) being female responses and 49(62%) being male responses.

Responses from the 18-30 year old age bracket were 98% of collected responses therefore analysis was restricted to the aforementioned age bracket due to lack of information from the 'under 18', '30-45' and 'above 45' age groups.

Key

The questionnaire aims at classifying respondents according to gender and age group as a result the aforementioned serve as criteria 1 and 2 respectively as referred to in the analysis. The frequency of betting of the responses is also used to initially determine the risk attitudes of respondents and in its own right is also used as a classification criteria and therefore it is referred to as *sub-criteria* in the analysis with the options '*a lot/always*' representing the least risk averse, '*once or twice*' representing the moderately risk averse and '*never*' representing the most risk averse.

Moreover, the question after determining a respondent's categorization using both criteria as well as the sub-criterion of betting frequency serves as a control question to determine the respondent's risk attitude given normal conditions the following three questions are then an alteration of the control question to engender the perception that the respondent has increased expertise in betting, free winnings to spend and more information to use as a betting basis which are referred to as treatment 1, 2 and 3 respectively in the analysis.

4.2 Contingency tables

The classification criteria 1 and 2 were checked to see whether or not the categories were independent to validate their use. This was done through the use of contingency tables and the chi square test on 3 summary data sets (treatment 1, treatment 2 and treatment 3) which respectively yielded the following p-values (0.9183, 0.8495, 0.8212) thus validating the null hypothesis that indeed the similarities between data collections under criteria 1 and 2 were not statistically significant (0.05) thus the 2 criteria are independent of each other.

treatment 1	AGE				
	GENDER	18-30	30-45	over 45	Grand Total
female		28	1	1	30
male		49	2	1	52
Grand Total		77	3	2	82

EXPECTED	AGE				
	GENDER	18-30	30-45	over 45	Grand Total
female		28.17073171	1.097560976	0.731707317	
male		48.82926829	1.902439024	1.268292683	
Grand Total					

chi square test
0.918312474

treatment 2	AGE				
	GENDER	18-30	30-45	over 45	Grand Total
female		28	1	1	30
male		50	1	1	52
Grand Total		78	2	2	82

EXPECTED	AGE				
	GENDER	18-30	30-45	over 45	Grand Total
female		28.53658537	0.731707317	0.731707317	30
male		49.46341463	1.268292683	1.268292683	52
Grand Total		78	2	2	82

0.849520252

treatment 3	AGE				
	GENDER	18-30	30-45	over 45	Grand Total
female		27	1	1	29
male		51	1	1	53
Grand Total		78	2	2	82

EXPECTED	AGE				
	GENDER	18-30	30-45	over 45	Grand Total
female		27.58536585	0.707317073	0.707317073	29
male		50.41463415	1.292682927	1.292682927	53
Grand Total		78	2	2	82

0.821201196

Table 1.0 Contingency tables

4.3 Betting Frequency Analysis

NEVER

The respondents under this betting frequency are termed to be most risk averse in normal conditions although with perceived increase in expertise the group becomes more risk loving with percentages for the riskiest options money line bet and the parlay bet rising by 7% and 4% respectively while the percentage for the less risky spread bet reducing by 11%. Respondents also appear to become more risk loving with the increase of winnings as the percentage of those selecting the parlay bet (riskiest choice) rises by 11% and the same goes for treatment 3 where the

respondents perceive to have more information thus certainty on the game's outcome and become more risk loving as the percentage for the riskiest choices; parlay and money line bet rise by 4% and 7% respectively.

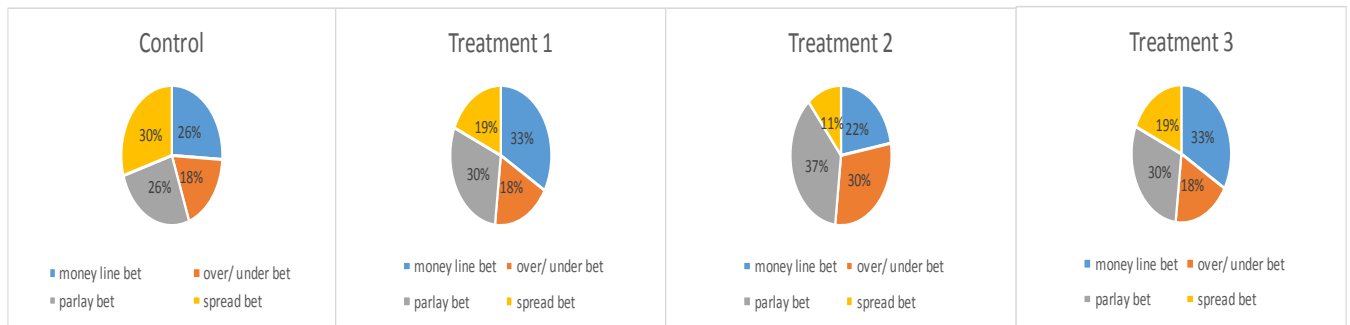


Figure 1.0 Pie-chart showing evolution of risk attitudes over treatments for 'Never' betting frequency group

ONCE OR TWICE

The respondents under this betting frequency are termed to be moderately risk averse in normal conditions although with perceived increase in expertise the group becomes less risk loving with percentages for the riskiest option the parlay bet rising dropping by 7% while the percentage for the less risky money line bet rising by 7%. Respondents also appear to become less risk loving with the increase of winnings as the percentage of those selecting the parlay bet (riskiest choice) drops by 18% and the same goes for treatment 3 where the respondents perceive to have more information thus more certainty on the game's outcome but in this case they become less risk loving as the percentage for the riskiest choices; parlay drops by 7% while the percentage of the safer spread bet rises by 18%.

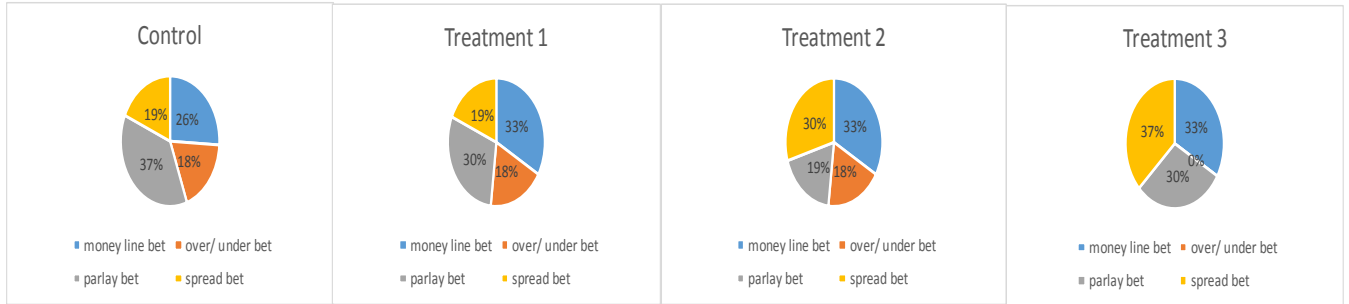


Figure 2.0 Pie-chart showing evolution of risk attitudes over treatments for 'Once or twice' betting frequency group

A LOT/ALWAYS

The respondents under this betting frequency are termed to be least risk averse in normal conditions although with perceived increase in expertise the group becomes less risk loving with percentages for the riskiest options the parlay bet and money line bet dropping by 7% and 4% respectively while the percentage for the less risky spread bet rising by 15%. Although respondents also appear to become much risk loving with the increase of winnings as the percentage of those selecting the parlay bet (riskiest choice) rises by 11% as the spread bet drops by 15%. Although, the safest bet of the over/under rises by 23% from the control results. As for treatment 3 where the respondents perceive to have more information thus more certainty on the game's outcome but in this case they become less risk loving as the percentage for the riskiest choices; parlay drops by 7% while the percentage of the safer spread bet rises by 4% as well as the less risky money line bet rising by 7%.

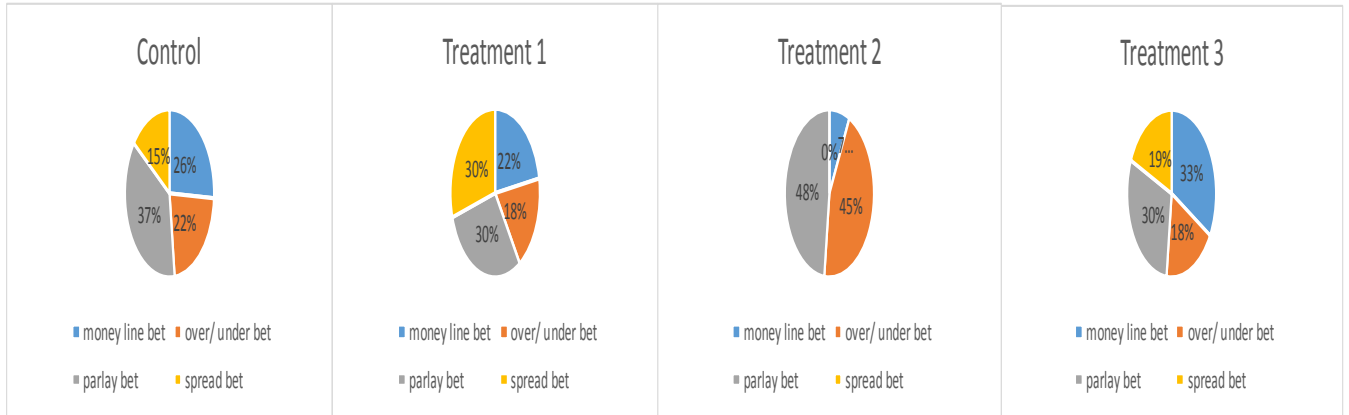


Figure 3.0 Pie-chart showing evolution of risk attitudes over treatments for 'A lot' betting frequency group

4.4 Age analysis

For persons aged 18-30 persons appear to be more risk averse as in the control experiment the highest percentage of choices is towards the safest choice, the over/under bet(56%) while the riskiest bet receives the lowest response at 8%. With an increase in perceived expertise the group seems to become more risk loving as the choice for the riskiest bat, parlay bet rises by 14% as well as a 6% rise for the riskier spread bet while the safest bet, over/under drops by 20%. The same is observed when winnings are increased as the choice for the riskiest bet, parlay bet, rises by 18%. Also with increased information on the outcomes the population reverts becomes moderately risk averse as the percentage for the riskiest bet only rises by 1% as well as the spread bet that drops by 8%

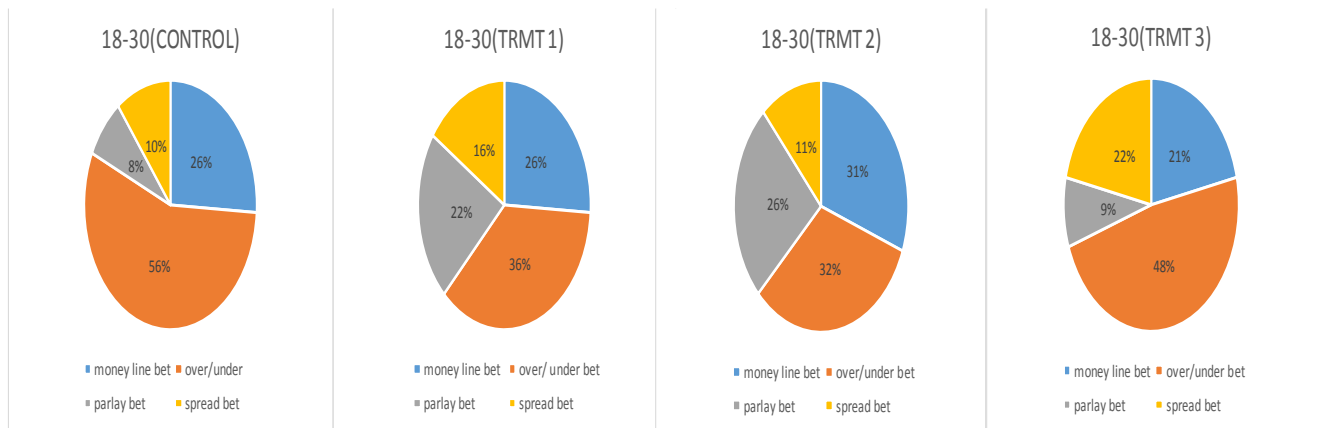


Figure 4.0 Pie-chart showing evolution of risk attitudes over treatments for 18-30 age group

4.5 Gender Analysis

FEMALES

Initially females appear to be highly risk averse with only 10% selecting the parlay bet in the control experiment although in both the treatments that lead to perceived increase in skill and winnings the females became extremely risk loving with responses for the parlay bet rising by 30% in both. Meanwhile with the perceived increase in information females become the less risk loving indicated by the percentage of parlay bets dropping by 3% from an already low 10% while the percentage for the much safer spread bets rises by 16%.

Charts showing evolution of risk tendencies for females over treatments.

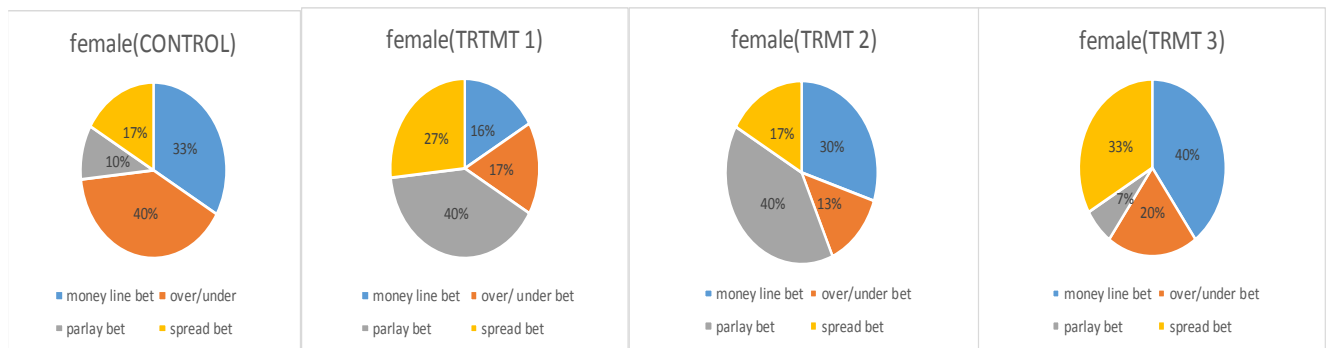


Figure 5.0 Pie chart showing the evolution of risk tendencies for females over treatments

MALES

Initially males appear to be highly risk averse with only 6% selecting the parlay bet and 65% choosing the over/under bet (safest bet) in the control experiment although .In subsequent treatments that lead to perceived increase in skill and winnings the males became moderately risk loving with responses for the parlay bet rising by 6% and 12% respectively as the percentages for money line bets rise by 85 and 7% respectively. Meanwhile with the perceived increase in information makes males become the slightly more risk loving indicated by the percentage of parlay bets rising by 4%.

Charts showing evolution of risk tendencies for males over treatments.

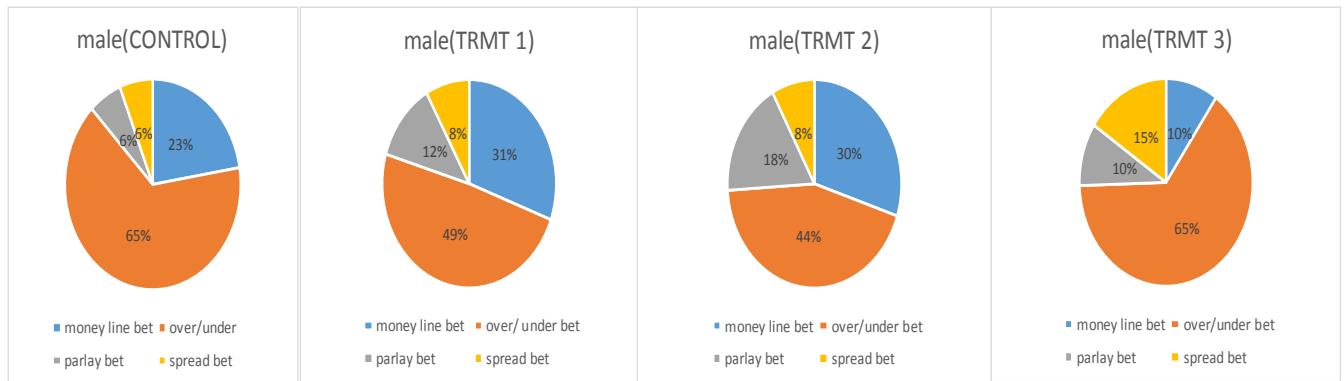


Figure 6.0 Pie chart showing the evolution of risk tendencies for males over treatments

4.6 Summary

Analysis as per betting frequency(sub-criteria)

NEVER(most risk averse)*

	Control	Treatment 1	Treatment 2	Treatment 3
Over/under bet	18%	18%	30%	18%
Spread bet	30%	19%	11%	19%
Money line bet	26%	33%	22%	33%
Parlay bet	26%	30%	37%	30%
	100%	100%	100%	100%

ONCE OR TWICE

	Control	Treatment 1	Treatment 2	Treatment 3
Over/under bet	18%	18%	18%	0%
Spread bet	19%	19%	30%	37%
Money line bet	26%	33%	33%	33%
Parlay bet	37%	30%	19%	30%
	100%	100%	100%	100%

ALWAYS(least risk averse)*

	Control	Treatment 1	Treatment 2	Treatment 3
Over/under bet	22%	18%	45%	18%
Spread bet	15%	30%	0%	19%
Money line bet	26%	22%	7%	33%
Parlay bet	37%	30%	48%	30%
	100%	100%	100%	100%

Table 1.1 Percentage analysis of population responses per betting frequency

SUMMARY OF AGE 18-30

	%				
	over/under	spread bet	money line bet	parlay bet	Grand Total
18-30(CONTROL)	56%	10%	26%	8%	100%
18-30(TRMT 1)	36%	16%	26%	22%	100%
18-30(TRMT 2)	32%	12%	31%	26%	100%
18-30(TRMT 3)	48%	22%	22%	9%	100%

Table 1.2 Percentage analysis of responses for population aged 18-30 years old

Gender analysis

Evolution with variant treatments(as per choices made)

FEMALE

	Control	Treatment 1	Treatment 2	Treatment 3
Over/under bet	40%	17%	13%	20%
Spread bet	17%	27%	17%	33%
Money line bet	33%	16%	30%	40%
Parlay bet	10%	40%	40%	7%
	100%	100%	100%	100%

MALE

	Control	Treatment 1	Treatment 2	Treatment 3
Over/under bet	65%	49%	44%	65%
Spread bet	6%	8%	8%	15%
Money line bet	23%	31%	30%	10%
Parlay bet	6%	12%	18%	10%
	100%	100%	100%	100%

Table 1.3 Percentage analysis of responses for population as per gender

CHAPTER 5: DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Discussion and Conclusions

Betting frequency analysis

The reflection effect between persons who are moderately risk averse (once/twice) and highly risk averse (never) in normal occasions is evident because when exposed to more wealth and more perceived certainty by increasing expertise or information about the gamble the latter becomes more risk loving while the former becomes less risk averse with their risk attitudes mirroring each other with each condition. This therefore implies the isolation effect between these two groups of persons as they clearly decompose the differences in the gambles differently with respect to one another thus leading to differing consequential risk preferences.

The certainty effect is only evident in the highly risk averse (never) group as with more perceived information and expertise they are more willing to take on risk and even incorrectly weighing the probabilities of the seemingly more certain gambles.

The utility curves of the highly risk averse and moderately risk averse persons tends to become flatter and more curved respectively with the changing circumstances of more wealth, more information and more expertise. The utility curve of least risk averse persons is also seen to become more curved over time with the exception of increasing wealth that whets their risk appetite.

Age analysis

The certainty effect is most evident here as with more perceived information and expertise the 18-30 year old age group overweigh the probabilities of their choices in the gamble thus becoming more risk loving. Furthermore the wealth increment serves to raise their risk appetite possibly due to the money illusion because in essence the free winnings are not real money as they can only be used in the game.

With the variant circumstances in this study it follows that with more wealth and more certainty by way of increasing expertise and information in the gamble the utility curve for the 18-30 year old age group flattens

Gender analysis

A reflection effect between the different genders is not evident and thus the study fails to prove GDRA. Although the certainty effect seems to affect males much more than females as with both increased information and certainty males become more risk loving in the choices they make while females only become more risk loving in their bets with increasing expertise.

For both males and females their utility curves seem to flatten with variant circumstances with the exception of increasing information for women which engenders more risk aversion. Lastly money illusion (free winnings only to be used within the experiment) seems to affect both sexes as with more wealth comes more risk loving preferences.

5.2 Recommendations

For highly risk averse (never) individuals and moderately risk averse individuals (once or twice) when portfolio managers are engaging in tacit asset allocation and encountering changes of more wealth and more certainty in the markets the asset allocation for the aforementioned individuals should be geared towards more risky and least risky asset classes respectively for example equities and bonds. As for the least risk averse(a lot group) individuals with more certainty the portfolio should be geared towards less risky asset classes but with more wealth the asset allocation should be geared towards more risky asset classes

With regards to managing portfolios of relatively youthful persons any changes increasing wealth or certainty should lead to the portfolio being adjusted towards more risky asset classes although less so when there is more information as the risk loving grows ever so slightly.

Following the lack of proof for GDRA it is only logical to assume that when dealing with portfolios of different sexed persons with other similar characteristics the two should not be dealt with differently as risk attitudes and their evolution with certain circumstances are not gender based.

Furthermore with the changes of increased certainty and wealth the portfolios of both genders should be geared more towards riskier asset allocation less so for the females though because with more perceived information on the gamble market they become more risk averse as there is absence of the workings of any certainty effect whatsoever.

5.3 Limitations of the study

In spite of the results validity the study does suffer from a number of shortfalls. First and foremost the study is unable to capture much information from respondents with only 79 of the 105 respondents fully answering the questionnaire greatly attributed to the lack of incentive. Furthermore, the study's methodology is unable to capture data for different age groups and as a result only the youth 18-30 age group is analyzed as it is the only group providing sufficient information for analysis thus making the other implications discussed as a result of classification of gender and betting frequency are only applicable to the 18-30 year old age group.

Lastly the snowball sampling technique biases the sample collected for analysis since it relies on respondents to source for more respondents which can be a blessing and a curse the former because without the snowball sampling method the respondents were nearly impossible to locate as the topic of betting is quite taboo meanwhile the latter is true because by employing the snowball method the sample may consist of very similar individuals thus reduce the diversity from the initial population.

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