AN INVESTIGATION INTO ATTITUDES TOWARDS RISK AMONG MALES AND FEMALES: A LABORATORY EXPERIMENT.

By

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A Management Project Submitted in Partial Fulfilment of the Requirements for the Master of Business and Administration Degree.

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This management project is my original work and has not been presented for a degree in any other University.

Signed

Joel K. Lelei

To the final-year (1968) Bachelor of Commerce (Accounting Option) students of the University of Hawaii, this form of this examination procedure serves the "interests" of this work.

This management project has been submitted for examination with my approval as University Supervisor.

Signed

Dr. Joseph H. Kimura.
To the final-year (1986) Bachelor of Commerce (Accounting Option) students at the University of Nairobi who, apart from their unquestionable cooperation, became the "Laboratory" of this work.
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ABSTRACT

This study is concerned with the attitudes toward risk among males and females. The need for the study arises from the fact that whereas men and women have been said to differ in the way they "see" risk, no study appears to have been undertaken on sex-difference with regards to risk preference. With increased number of women pursuing careers and occupying high positions in traditionally male occupational areas, questions arise regarding whether (1) women have as much capacity to tolerate risk involved in these occupations as men, and (2) whether they are able to bear increased risk associated with these high positions in occupations as much as men.

In order to answer the questions raised, a laboratory experiment was carried out using 52 male and 16 female, third-year Bachelor of Commerce (Accounting Option), students. The data obtained consisted of risk preference scores which were subjected to the median test, the sign test, and the t test.

The results indicated (1) that there was no significant difference between males and females in terms of their risk preferences, and (2) that there was no significant difference between both sexes in terms of their risk preferences as a result of increase in the size of outcome involved in decisions facing them.
The conclusions reached were tentative and overall they appeared to support the issue of women having the same capacity to tolerate risk as men. The conclusions also appeared to suggest that women are probably, as able to bear increased risk associated with high positions in occupations as men.
CHAPTER I

INTRODUCTION

Background

One of the factors considered by investors in their investment decisions is the risk to which their assets are exposed (Gitman and Joehnk, 1981, p. 129). Risks vary in degree depending on an investment and situations prevailing in an environment in which an investment is made. Risk can be viewed differently by different people. For instance, to the income beneficiary of a trust, risk may be fear of a reduction in dividends while to the bondholder, it may be viewed as the failure of receiving principal and interest payments.

Though risk has been taken to be the chance of something undesirable occurring, its definition covers both the deviations of actual returns above and below the expected returns. The most common definition of risk is that "it is the possibility that actual returns may vary from the expected returns" (Robicheck, 1969, p. 514). Risk, as such, is associated with the variability of returns of an investment. The more variable or broader the range of possible return values associated with a given investment, the greater is its risk, and vice versa.
A risky situation is any situation in which the outcome of an event is not known with certainty but in which the number of alternative possible outcomes which are assumed to be finite, the value of each outcome and the probability of occurrence of each outcome are known (Townsend, 1969, p. 70). In risky situations, therefore, the expected value can be found by multiplying the value of possible outcomes with their corresponding probabilities and summing up the products. An individual in risky situations may select investments on the basis of their expected values. Whereas this is done in practice, Archer and D'Ambrosio (1969, p. 74) have pointed out that "the proper choice for an individual or a firm must depend on the owner's attitudes toward risk relative to the expected returns".

A decision maker's attitude toward risk shows how willing he is to bear risk for a given level of returns. Individuals differ in their attitudes toward risk. These attitudes have been identified in theory as a desire for risk, an aversion to risk, and an indifference to risk (Weston and Brigham, 1972, p. 359). Though these attitudes hold, many empirical studies have established that individuals generally are averse to risk (Pandey, 1979, p. 128). To induce them to take risk, they have to be paid a premium. Even where these individuals are not induced to take risks, they would still have to take risks if they make investments since risk is inherent in
most investments. What is left for the individuals therefore is to choose among alternatives that differ in the degrees of risk. These degrees of risk have been identified apparently as small, moderate and large (Archer and D'Ambrosio, 1976, p. 20).

Risk has been seen as one of the factors accounting for the differences among males and females in the concept of a career (Hennig and Jardim, 1978, p. 27). Hennig and Jardim pointed out that men see risk as loss or gain, winning or losing, and danger or opportunity. They pointed out further that men see risk as affecting the future. Concerning women, Hennig and Jardim pointed out that risk is seen as entirely negative. They noted that women see risk as a loss, danger, injury ruin or hurt, and as affecting all that they have at that particular time. As a result of these differences in their way of seeing risk, men and women are expected to differ in their attitudes toward risk. The present study will address itself to this issue of attitudes toward risk among males and females.

Statement of the Problem

"The effects of nonsexist legislation and the actual recent increase in the number of women pursuing careers in traditionally male occupational areas are generating interest in sex differences... " (Busch and
Bush, 1979, p. 438). This interest in sex differences may lead to more research being conducted in fields such as psychology and finance, to mentioned but two examples, in which women are contrasted with men in several aspects in order to determine their differences and the extent of the differences if any. Such differences could include differences among males and females with regards to risk which is inherent in occupations and business undertakings.

As women are taking over occupations traditionally considered as exclusively for men and also occupying high positions in these areas, the question arises regarding whether these women have as much capacity to tolerate risk involved in these occupations as men, and also whether they are able to bear increased risk associated with these high positions in occupations as men.

Though men and women differ in the way they see risk, no study appears to have been done to determine whether or not there are differences in risk taking preference among males and females. In view of this therefore, this study will investigate into attitude toward risk among males and females.
Objectives of the Study

This study examines risk taking preferences among males and females making investment decisions in their capacity as corporate decision makers. It is designed to obtain some empirical evidence about the possible variations among males and females in terms of their risk taking preferences. It's two main objectives are:

(1) To find out if there are significant differences among males and females in terms of their attitudes toward risk.

(2) To find out whether changes in levels of decisions (as indicated by size of outcomes) affect males and females equally in terms of their attitudes toward risk.

Importance of the Study

This study would be of interest and value to various groups of persons.

Firstly, the study would be of value to companies and other organizations especially in selection and training of managers and in determining the effects of bureaucratic tendency in their decision making. It acts as a model for evaluating risk-taking preference among males and females who are potential managers. For instance, it provides a means in which managers whose attitudes toward risk are in line with a company's risk taking
policy could be selected and trained. In addition to this, it provides a means for highlighting to an organization the adequacy of its reward system. The executives, for instance, may avoid risking losses because they believe rewards for taking risks are not enough to outweigh the penalties. By determining the risk taking preferences among the executives, their reaction to reward system in their organization could possibly be known, and the reward system could be modified accordingly.

Secondly, the study would be of benefit to consultants as it would make them better understand and therefore better serve their clients. In order to serve their clients, who may be males and females, in line with their attitudes toward risk, consultants have to understand the nature of risk taking. The study may contribute to such an understanding.

Thirdly, the study would be of interest and value to governments considering to use lotteries as means of raising revenue. Governments such as of France, Spain, and Mexico have conducted lotteries for revenue. Since lotteries involve risk, such governments (if any) considering to use or are using them to raise revenue may be interested in risk preference among males and females who are potential buyers of lotteries. The study could be useful to these governments as a basis
for determining and offering lotteries which appeal to both males and females thus making them to buy more lotteries thereby generating more revenue.

Fourthly, the findings of the study would be of interest to women in general. Killian (1971, p. 23) states that "women have been put on the defensive and feel that they must constantly prove themselves". They could do this by comparing themselves with men. Concerning risk, women would possibly want to know how their attitudes toward risk compare with those of men.

Lastly, to academics, the study could prove valuable as it would contribute more to the knowledge of risk taking behaviour. The study would appeal especially to the academics interested in sex differences and could be viewed as a point of departure for stimulating more research into the subject of risk taking.

Overview of the Project

This section describes the overview for the rest of the project. In the foregoing discussions in this chapter, the background, statement of the problem, objectives and the importance of the study have been considered.

Chapter II is devoted to a review of literature relevant to the study. Consideration is given in this
chapter to decision analysis, attitudes toward risk as explained using utility, and risk and return relationship, risk aversion and studies on risk taking in order to put the study into its proper perspective. The review of the relevant literature is followed by development of the hypotheses in Chapter III to help in answering the questions posed in the study. Research design is also discussed.

Chapter IV contains analysis of data and the results. This chapter gives way to summary, conclusions, suggestions for further research, and limitations of the study which are dealt with in Chapter V.
CHAPTER II

LITERATURE REVIEW

This chapter is divided into seven sections. The first section deals with decision analysis. It considers decision making in three situations namely, certainty, uncertainty and risk. The second section relates utility with risk and discusses the axioms necessary for deriving utility functions which reflect individual's attitudes toward risk. This is followed by discussion of the relationship between risk and return in the third section. The fourth section discusses attitudes toward risk considering the factors underlying them, and relating those attitudes with utility and returns. Risk aversion is discussed in the fifth section and studies on risk taking are reviewed in the sixth section. In the last section, a summary of the chapter is given.

Decision Analysis

Decision making is one of the most important management tasks (Townsend, 1969, p. 1). It is an inevitable human activity which "... is largely subjective, depending upon the personality, temperament and experience of the decision maker" (Seo and Winger, 1979, p. 11). Decision making is concerned with choice and involves reaching a conclusion.
In making decisions, a decision maker may face three environmental situations. These situations are certainty, risk and uncertainty.

In certainty situations, a decision maker knows in advance the specific outcome of each alternative. If faced with a choice among alternatives in such situations, a decision maker chooses an alternative with the greatest returns or best outcome.

Uncertainty is a state in which one or more alternatives result in a set of possible specific outcomes whose probabilities are not known or not meaningful (Seo and Winger, 1979, p. 16). These probabilities are not known because of lack of knowledge, past experience or sufficient historical data on which to base a probability estimate. There are a number of available criteria for decision making under uncertainty. Seo and Winger (1979, p. 23-27) have identified three modern basic criteria as the Wald, Hurwicz "alpha" and Savage decision criteria. They have also identified a criterion known as the Laplace decision criterion. Laplace criterion has been used for more than 2500 years.

Seo and Winger (1979), pointed out that the Wald decision criterion has been described as "the criterion of pessimism, the criterion of extreme conservatism, and
an attempt to maximize the security level." This criterion requires a decision maker to determine the worst possible outcome of each alternative and then select the alternative which yields the best of the worst results. Seo and Winger say further that since the criterion is fiscally conservative, it is well suited to small business firms whose survival depends upon avoiding losses.

As for the Hurwicz "alpha" decision criterion, Seo and Winger pointed out that a decision index \( d_i \) for each strategy is determined. This decision index is also known as the value of a strategy and is expressed as follows:

\[
d_i = \alpha M_i + (1 - \alpha) m_i
\]

Where: \( \alpha \) is coefficient of optimism

\( M_i \) are maximum payoffs

\( m_i \) are minimum payoffs

The coefficient of optimism ranges from 0 to 1, with values of 0 and 1 showing that the decision maker is extremely pessimistic and optimistic, respectively. Thus, using \( \alpha \), this criterion takes into account the decision maker's own attitude toward risk. Once \( d_i \) has been calculated for each strategy, the strategy with the greatest \( d_i \) is adopted.

The Savage criterion as has been pointed out by Seo and Winger seeks to minimize "regrets". Seo and
and Winger have gone further to define regret as "the absolute difference between the payoff for a given strategy and the payoff for the most effective strategy within the same state of nature."

Under this criterion, "regret" for each strategy is determined and "regret" table which shows "regrets" tabulated by strategy and state of nature is constructed. Maximum regret for each strategy is then listed down and the strategy with the least maximum regret is selected.

The Laplace criterion, as pointed out by Seo and Winger, works on the premise that if the probabilities of occurrence are unknown, they should be assumed equal. By assuming equal probability among the states of nature, a decision problem under uncertainty is transformed into one under risk. Under this criterion the expected value of each strategy is calculated and the strategy with the greatest expected value is selected.

In risky situations, each alternative leads to one of a set of specific outcomes, with each outcome occurring with a probability that is predictably known to the decision maker. Probability, which is the likelihood of occurrence of an event, may either be objective or subjective (Daniel and Terrell, 1975, p. 43). Subjective probabilities are educated guesses whereas objective probabilities are based upon historical data and common experience to support the assignment of
probabilities (Thierauf and Klekamp, 1975, p. 57).

Objective probabilities may be classified into two categories (Daniel and Terrell, 1975, p. 43). These are a priori or classical probabilities, and the a posteriori or the relative frequency concept. The a priori probabilities are computed through reasoning and do not rely on the result of any experiment. For instance, it is not necessary to toss a coin a large number of times in order to find out that the relative frequency of head (or tail) is one-half. One can deduce this by reasoning that when a fair coin is tossed, either a head or a tail is observed, thus giving a head or a tail a 0.5 chance each of occurring. The a posteriori probabilities rely on past experience. They are calculated on the assumption that past performances were typical and have to continue in the future. The a posteriori or the relative frequency on the other hand depends on the repeatability of some process and the ability to count the number of such repetitions along with the number of times that some event of interest occurs. Given these conditions, the probability of an event can be calculated as follows:

$$P(E) = \frac{m}{n}$$

Where: $P(E)$ is the probability of occurrence of $E$

$m$ is the number of times $E$ occurs

$n$ is the number of times some process (which generates $E$) is repeated.
As past data are not always available, the decision maker must rely on his own estimation of the various possible outcomes. Even if past data were available they would not be sufficient in determining probabilities. As Thierauf and Klekamp (1975, p. 57) pointed out, "The past is not a complete predictor of the future, thus objective probabilities may have to be tempered based upon judgement and intuition of the decision maker". Therefore, objective and subjective probabilities may have to be combined in some cases. This results in numbers which reflect the likelihood of occurrence of outcomes, and range from 0 to 1, zero being completely pessimistic and one being completely optimistic about the occurrence of outcomes respectively. These numbers are probabilities.

In risky situations it has been asserted that an individual would choose an alternative with the highest expected value, but this assertion has been questioned by some theorists (Taylor, 1984, p. 65) The reason for this can be explained from the fact that if individuals choose an alternative on the basis of its expected value then their utility functions would be linear. However, in reality not all utility functions of individuals are linear. In fact, most of them are concave. What is generally agreed upon so far by several writers is that individuals aim at maximizing their expected utility. Among these writers are Daniel
and Terrell (1975, p. 419) who pointed out that a decision maker in general will want to maximize expected utility rather than the expected monetary value. For that matter, a decision maker, in a risky situation, will select a course of action which provides him with the greatest expected utility.

**Utility Theory and Risk**

For a decision maker to maximize his expected utility, there is a need for measuring utility. Utility can be measured according to cardinal utility theory. Swalm (1966, p. 124) pointed out that according to this theory, each individual has a measurable preference among various choices available in risky situations, and this preference (called utility) is measured in arbitrary units called utiles.

Expected utility can be maximized if a decision maker behaves in accordance with certain axioms. These are known as axioms of cardinal utility and, as pointed out by Haley and Schall (1979, p. 90), they amount to a general assumption that people are rational and consistent in choosing among risky alternatives. Though there are several axioms, the ones which are essential for the problem at hand should be chosen. Five axioms are therefore given as follows:
Axiom 1. **Comparability**: Individuals have preferences among alternatives and can express them. Given any two alternatives X and Y, an individual either prefers X to Y, prefers Y to X, or is indifferent between them.

Axiom 2. **Transitivity**: Individuals are transitive in their preferences. If X is preferred to Y and Y is preferred to Z, then X must be preferred to Z. If an individual is indifferent between X and Y, and between Y and Z, then he is indifferent between X and Z.

Axiom 3. **Strong Independence**: If an individual is indifferent as to X and Y, and if Z is any other alternative, then he will also be indifferent as to between two gambles G1 and G2 where G1 offers a probability P of receiving X and a probability (1-P) of receiving Z, and G2 offers a probability P of receiving Y and a probability (1-P) of receiving Z.

Axiom 4. **Measurability**: There exists a certainty equivalent to any gamble. If X is preferred to Y, and Y is preferred to Z, then there exists some probability P that the individual will be completely indifferent to getting Y for certain or getting X with probability P and Z with probability (1-P).
Axiom 5. **Ranking:** If alternatives Y and U both lie somewhere between X and Z, gambles can be established such that an individual is indifferent between Y and gamble G1, while he is also indifferent between U and a second gamble G2 where G1 offers a probability $X_1$ of receiving X and a probability $(1-X_1)$ of receiving Z, and G2 offers a probability $X_2$ of receiving X and a probability $(1-X_2)$ of receiving Z. If $X_1$ is greater than $X_2$, Y is preferred to U.

Haley and Schall (1979, p. 91) pointed out that though people are not always rational and consistent in the sense of the axioms, it has been found that if their inconsistencies are pointed out to them, they will generally change their behaviour to conform to them. Thus, the axioms cannot be totally disregarded. Haley and Schall pointed out further that if an individual conforms to the axioms, an index that expresses the individual's preferences for both the certain outcomes and the choices in a risky situation can be derived. This index is the utility index or the utility function.

A utility function relates utility to the outcome from which the utility is derived. A person's utility is determined by the preference he exhibits for choices available to him in circumstances involving risk (Daniel and Terrell, 1975, p. 417). This is made
possible by a process that offers lotteries (Pandey, 1979, p. 128-129) or investments in risky situations (Swalm, 1966, p. 124-126) to an individual and determines his utiles for each offer. The data obtained from this process are used to construct an individual's utility function.

There are three general types of utility functions. These are linear, concave, and convex (Fama and Miller, 1972, p. 200). The shapes of utility functions have a bearing on risk as they reflect the individuals' attitudes toward risk. Even if the shapes of utility functions were disregarded, utility and risk are still related, and this by the process through which utility is derived. As has been mentioned above, a person's utility is determined by the preference he exhibits for choices available to him in risky situations. Therefore, in order to take into account risk in decision making under risk, a decision maker has to maximize the expected utility. Expected utility is a function of both the expected return and uncertainty (Van Horne, 1983, p. 31). Here uncertainty is considered as risk. Since decision makers consider both the expected returns and risks in decision making under risky situations, the expected utility, which takes into account these two factors (expected returns and risks) is superior to expected value.
Risks and returns are important in effective evaluation and selection of investments. These two factors affect the market value of the shares of a firm and as such a proper balance between them should be maintained to maximize the market value of the firm's share (Pandey, 1979, p. 15). This balance is the risk-return trade-off.

Returns motivate people to invest. As Gitman and Joehnk (1981, p. 129) put it"... returns can be viewed as the reward of investing". They may be made up of more than one source of income which can be broadly divided into current incomes and capital gains (or losses). Whereas current incomes occur periodically over the time an investment is held, capital gains (or losses) result from selling of an investment at a price above (or below) its original purchase price or cost.

The level of returns will depend on several forces and these have been identified by Gitman and Joehnk (1981, p. 103) as internal characteristics, external forces, and inflation.

Internal characteristics include the type of investments, the way investment is financed, the management, and other factors within an organization. The external forces include wars, shortages, price
controls and political events. These are not under the control of the organization. They affect investment differently so that two investments with similar internal characteristics may have different returns. Inflation affects prices and interest rates which in turn affect returns. Given these forces, the actual investment returns may vary from its expected value. This situation is termed as risk.

Total investment risk can be divided into systematic risk and unsystematic risk. Systematic risk is that portion of total variability in returns caused by factors affecting the environment overall. The sources of systematic risk include changes in economic, political and sociological environment. Systematic risk cannot be diversified away. Unsystematic risk on the other hand can be diversified away. It is that portion of risk which is unique to the firm or industry. It could be caused by such factors as labour strikes, management errors, inventions, advertising campaigns, shifts in consumer taste and lawsuits. Thus not only do variations in returns lead to risk but also the causes of these variations can be used as a basis for classifying risk categories.

The risk associated with a given investment is directly related to its expected return (Gitman and Joehnk, 1981, p. 119). This relationship is such that
higher returns are associated with higher risk, and vice versa. While returns motivate an investor to invest, risk tends to deter him from investing. Thus, for increased levels of risk, an investor requires higher levels of returns. In general, an investor will attempt to minimize risk for a given level of return or maximize return for a given level of risk (Gitman and Joehnk, 1981, p. 119).

It is difficult, however, to say which investment a given decision maker will choose when faced with an investment with a high expected return and a high risk or an investment with comparatively a low expected return and a low risk. Pandey (1979, p. 128) pointed out that the decision maker's choice in such a circumstance would really depend upon his risk preference. This supports Latane (Wu and Zakon, 1972, p. 465) who in discussing individual risk preference in portfolio selection, pointed out that "The choice between return and safety... depends on individual risk preference" Therefore, if an individual is given choices involving different degrees of risk and levels of returns, the choices he makes will reflect his attitude toward risk.

**Attitudes Toward Risk and Factors Underlying Them**

A decision maker's attitude toward risk shows how willing he is to bear risk for a given level of returns. In theory, three possible attitudes toward risk have
been indentified. These are a desire for risk, an aversion to risk and an indifference to risk which correspond, respectively, to risk-seeking, risk-aversion, and risk-neutrality.

A risk-seeker is an individual who is willing to accept large amounts of additional risk with relatively little increase in expected returns (Archer and D'Ambrosio 1969, p. 75). As shown in figure 1, the curve for a risk-seeker exhibits a less than proportional increase in risk from $X_1$ to $X_2$ calls for a less than proportional increase in return from $Y_1$ to $Y_2$.

FIGURE 1: The Basic Risk Preference Behaviours.

Faced with a choice between risky investments having identical expected monetary returns but different degrees of risk, a risk seeker would prefer the riskier investment.

A risk averter on the other hand requires a larger increase in expected return to compensate him for additional risk (Archer and D'Ambrosio, 1969, p. 75). The curve for such an individual as shown in figure 1 exhibits a more than proportional increase in return compared to risk. In this figure, an increase in risk from $X_1$ to $X_2$ calls for a more than proportional increase in return from $Y_5$ to $Y_6$ for a risk averter.

A risk-indifferent investor requires proportionate increases in return for given increases in risk. The curve for this individual in figure 1 shows that an increase in risk from $X_1$ to $X_2$ leads to an increase in return from $Y_3$ to $Y_4$. This is a proportionate increase.

Given a choice between risky investments having identical expected monetary returns but different degrees of risk, a risk averter would prefer a less risky investment while a risk neutral individual would not care which investment he selects.
Risk Premiums

Attitudes toward risk have implications of a risk premium (Schlaifer, 1978, p. 145). As a result of this, risk premium can be used to explain attitudes toward risk. Risk premium is the difference between the expected value and certainty equivalent of an alternative. This is expressed as:

\[ \text{Risk premium} = \text{Expected value} - \text{Certainty equivalent} \]

Certainty equivalent is the amount a person would have to receive with certainty so as to be indifferent between having either that amount or the gamble (Haley and Schall, 1979, p. 108).

For a risk seeker, risk premium is negative. This means that he attaches a higher value to a risky alternative than its expected value. He is willing as such to pay more than the expected value to enter into risky investments. A risk averter, on the other hand, has a positive risk premium. This individual attaches a lower value to a risky alternative than its expected value. Thus, he is not willing to pay more than the expected value to enter into risky investments but instead he requires to be paid a premium so as to enter into such investments. As for a risk-indifferent person, risk premium is zero. This individual attaches the same value to a risky alternative as its expected value.
The rationale for the attitudes toward risk can be explained using utility theory, with an individual being presented as acting to avoid pain but to seek pleasure (Weston and Brigham, 1978, p. 359-360). As stated by Bentham (Page, 1968, p. 1) in discussing the principle of utility:

"Nature has placed mankind under the governance of two sovereign masters pain and pleasure. It is for them alone to point out what we ought to do, as well as to determine what we shall do".

Pain can be taken here as a loss in utility from a shilling lost and pleasure as again in utility from a shilling gained.

A risk seeker therefore has a convex utility of wealth function and this implies that his marginal utility is an increasing function of wealth (see figure 2). If such an individual therefore loses a shilling, his utility would fall by an amount less than the rise in utility if he received the shilling. In other words, a risk seeker will get less "pain" from a shilling lost than "pleasure" from a shilling gained. Therefore, such an individual would be willing to make a bet with a 50-50 chance of winning or losing a shilling. This shows that he would prefer risk.
A risk averter has a concave utility of wealth function and this means that his marginal utility is a decreasing function of wealth (see figure 2). If he loses a shilling, his utility would fall by an amount more than the rise in utility if he received the shilling.
In other words, he will get more "pain" from a shilling lost than "pleasure" from a shilling gained. Therefore, given a bet with a 50-50 chance of winning or losing a shilling, he would prefer not to make the bet. He would avoid risking the shilling in making the bet.

As for the risk neutral, the utility of wealth function is linear implying that his marginal utility for wealth is constant (see figure 2). Such an individual attaches the same absolute value to a rise in utility for a shilling gained as the loss in utility for a shilling lost. Thus, he would be indifferent between making a bet or not, with a 50-50 chance of winning or losing a shilling. In other words, he would not care taking risk or not.

The foregoing discussion reveals and depicts three possible attitudes toward risk. Following this is a discussion of possible factors underlying the attitudes toward risk.

Some Explanatory Factors

Loss absorption capacity is a possible factor underlying attitudes toward risk. Consider a person in a competitive situation whereby if he competes and wins he gets shs.50 million but if he loses, the loss is shs. 2 million. If the individual is not able to absorb the loss, he will be more inclined to avoid getting into this risky
competition, though the potential reward is great. However, if the individual is able to absorb the loss, he will possibly be inclined to enter into the risky competition.

Closely connected to loss absorption capacity is the income an individual has. Lewis (1970, p. 47) has pointed out that willingness to bear risk is partly a matter of what one can afford, and the more secure one's economic foundation is, the more one can afford to risk. Thus, a rich man would be more inclined to take risk than a poor man although the latter has relatively little to lose.

Another possible factor is an individual's past experience. An individual's past experience may make him be inclined to avoid or to take risk. Henning and Jardim (1978, p. 85-86) pointed out that it has been a man's (not a woman's) heritage to see risk as a consequence of judgement based on experience. Though this singles out men, it relates experience and risk. Lewis (1970, p. 47) pointed out also that willingness to bear risk is partly a matter of the tradition in which one has been raised. This amounts to an individual's past experience. To see how an individual's past experience underly his attitude toward risk, take a situation where a person has suffered a loss because of assuming risk or has been taught that risk is totally bad. Such an individual will avoid risk as much as he can. However,
if an individual has gained as a result of assuming risk or has been encouraged to take risk, he will be more inclined to assume it.

Adventurism is another factor underlying attitudes toward risk. Lewis (1970, p. 47) pointed out that the attitude toward risk is an aspect of adventurous spirit and that willingness to bear risk is partly a matter of temperament. He suggested that it is possible that different groups of men inherit a biological propensity to risk in different proportions. People of adventurous disposition are more attracted by the prospects of a great success than they are deterred by the fear of failure (Archer and D'Ambrosio, 1976, p. 21). Thus, if a person is adventurous, he will inclined to venture into risky investments because he will be more attracted by the success than deterred by the fear of failure of such investments. This is exactly the opposite of a person who is not adventurous.

Influence by colleagues is another factor underlying attitudes toward risk. It has been found that the decisions made by groups are riskier than the average of the individual members' decisions prior to group discussion (Slovic, 1972, p. 779). This implies that an individual tends to take more risk in a group than when he is alone. One of the explanations of this is that each individual in the group feels less personal
blame if his choice fails, thus he is not afraid to choose or accept a riskier course of action.

Though the three attitudes toward risk hold, it has been found that individuals are generally risk averters.

**Risk Aversion**

Individuals in general tend to be risk averters and for a given increase in risk they require a greater than proportional increase in return. The amount of more than proportional return required by each investor for a given increase in risk will differ depending upon the investor's degree of risk aversion.

Three measures which indicate the degree or strength of risk aversion have been identified (Haley and Schall, 1979, p. 108-110). These are the risk premium, the absolute risk-aversion and the relative risk-aversion.

Risk premium has already been defined as the difference between the expected value and the certainty equivalent. As a measure of degree of risk-aversion, it is positive and the more risk-averse an individual is, the larger will be the risk-premium.
The absolute risk-aversion (ARA) which is developed from risk premium measures risk aversion for a given level of wealth. It is expressed as:

\[ ARA = - \frac{U''(x)}{U'(x)} \]

Where: \( U'(x) \) and \( U''(x) \) are the first and the second derivatives of utility of wealth, \( U(x) \), functions, respectively.

This measure is used to compare the degree of risk aversion of two different people or the same person at two different points in time. The larger the ARA of an individual, the more risk averse an individual is and vice versa. If two individuals differ in their degree of risk aversion such that individual A has a larger ARA than individual B, A will require a greater risk premium for a given gamble than B. ARA is likely to change with wealth level. As Copeland and Weston (1983, p. 89) stated "casual empiricism tells us that ARA will probably decrease as wealth increases". This implies that an individual is more inclined to assume risk as his level of wealth increases.

Relative risk aversion (ARA) is the product of the absolute measure of risk (ARA) and the level of wealth. This measure is expressed as:

\[ RRA = -x \frac{U'(x)}{U''(x)} \]

Where \( x \) is the level of wealth, and \( U'(x) \) and \( U''(x) \) are the first and the second derivatives of utility function respectively.
Since $\text{ARA} = -\frac{U''(x)}{U'(x)}$, $\text{RRA}$ can simply be expressed as:

$$\text{RRA} = x(\text{ARA}).$$

$\text{RRA}$ evaluates the degree of risk aversion for risks measured as a proportion of wealth. This measure increases with constant or increasing $\text{ARA}$. Thus, one can conclude as in the case of $\text{ARA}$ that, the larger the $\text{RRA}$ of an individual, the more the risk averse the individual.

As risk aversion generally holds, it means that investors have to be paid in most cases some premium in order to take risk. The more risk averse the investor, the greater the risk premium he requires in order to undertake a risky investment. It is not always that investors must be paid a risk premium to take risk since returns from investments they make motivate them to take risk. As investments are in most cases associated with risk, investors often find themselves in risky situations and have to take risk. This leaves the investors with choice among investments that have small, moderate or large risks. There is an assertion that people prefer extremely safe or extremely risky investments over investments with an intermediate degree of risk (Archer and D'Ambrosio, 1976, p. 26).

Even where an individual is not risk averse, there is a tendency for him to avoid risk and undertake safe
investments especially if the outcomes or costs involved in the investments are large. In connection to a company, Coyle (1972, p. 38) pointed out that company's curves for large decisions would tend to be risk averse in shape while the curves for small decisions would get closer to the risk neutral. Since it is people who make decisions in a company, these curves actually reflect the decision makers' attitudes toward risk as they make decisions for the company. Thus, one can conclude that decision makers tend to be risk averse as they make decisions involving large sums of money, for their company. The size of decision here depends on costs and outcomes involved in courses of action facing a company.

**Empirical Studies on Risk Taking**

Several studies have been undertaken on risk taking behaviour. These studies may have implications for investment decision making.

In studies reported by Slovic (1972, p. 793-796), subjects are asked to indicate their preferences and opinions among various gambles. The reason given by Slovic for the use of gambles was that they represented in abstract form, important aspects of real-life decisions - namely, probabilities, incentives, and risks.
Some theorists such as Fisher (1906), Allais (1953), and Markowitz (1959) have argued, as reported by Slovic, that the variance of returns on an investment should be considered as an investment criterion in addition to the mean or expected return. The question however is whether variance has any influence on risk taking.

As reported by Slovic, subjects in several psychological experiments have exhibited what seemed to be strong preferences for playing high or low variance gambles. This seems to be in agreement with the hypothesis that people in general must be paid to induce them to undertake moderate risk instead of subjecting themselves to either small or large risks. However, as reported further by Slovic, there is evidence to suggest that the subjects in these psychological experiments were choosing according to decision rules such as "minimize possible loss" or "maximize possible gain" rather than basing their preference on variance. Supporting this is another study noted by Slovic. This study revealed that perceived risk was not a function of the variance of a gamble but instead, riskiness was more likely to be determined by the probability of loss and the absolute amount of the loss.

Concerning the stability of risk taking preference, results of several studies as noted by Slovic indicated
little correlation in a person's preferred level of risk taking as he moves from one situation to another (ie. from economic to social situation). In other words, if an individual moves from one situation to another, his preferred risk taking level may not remain the same.

Latane (1960) undertook a study on individual risk preference when payouts and probabilities were specified. This study was based on the choices between hypothetical risky portfolios and safe portfolios carried out by three college investment classes. There were 74 students and each of them was asked to make 20 separate choices between 20 hypothetical risky portfolios and a standard safe portfolio. There was a wide range of risk and return among the portfolios in the test. The results showed that students would select portfolios with high expected returns and low standard deviations. The results also tended to contradict the hypothesis that people in general must be paid to induce them to undertake moderate risk instead of subjecting themselves to either small or large risks. They seemed to indicate that majority of students liked moderate better than either safe or very risky choices.

Among the other studies undertaken on risk taking include utility curve studies. These studies are based on the assumptions that individuals attempt to maximize
expected utility and that for each individual a relationship between utility and wealth can be found. This relationship can be mapped to give utility curves whose shapes have implications for individuals' attitudes toward risk.

Included in the utility curve studies is a study by Swalm (1966, p. 123-136). This study derived utility functions of 32 businessmen as they made corporate decisions in risky situations. Half of the businessmen were in a chemical company and half were in an oil exploration field. After discussing instructions for the task with each businessman, he was asked the maximum single amount he might recommend be spent in any one year. A "planning horizon" was established as twice the amount he might recommend be spent. By determining the planning horizon, it was possible for the experimenter to ask each man questions regarding the sums that had meaning to him. Each man was asked a series of questions about risky situations, involving sums of money up to the man's planning horizon, to obtain data which were transformed into utiles. These data and the utiles were plotted to yield utility functions which were found to differ in their shapes. This revealed that the executives differed in their attitudes toward risk. In situations involving loss to the organization, the executives tended to be conservative i.e. avoiding risk.
The other utility curve studies include studies by Grayson (1960), Halter and Beringer (1960), Green (1963) and Halter and Dean (1971). These studies are reported by Libby and Fishburn (1977, p. 283-284).

Grayson's study was on oil and gas exploration. The study as given by Libby and Fishburn showed a variety of utility curves for gains. There were curves showing risk aversion, risk seeking and mixtures of these attitudes toward risk. In the loss region, most of the curves exhibited steep drops below a certain point.

Green's study involved middle managers in a large chemical company and was based on percent return on investment. The utility curves derived were approximately linear above 20 percent return, and were risk averse below 20 percent, with very steep slopes at about the 5 percent level. This indicated that there was variation in attitudes toward risk with regards to level of returns.

Halter and Dean presented utility curves for an orchard farmer, a grain farmer and a college professor on a range of -$50,000 to $100,000. As noted by Libby and Fishburn, the orchard farmer's utility function was linear above zero and below zero, with a steep slope below zero. The grain farmer was risk seeking below zero and between $30,000 and $50,000, but risk averse on the other two gain intervals. The college professor
was risk averse for gains and slightly risk seeking in the loss region. The results show that there are changes in individuals attitude toward risk as the amounts involved in decisions change.

A study by Halter and Beringer concerned farmers. This study as noted by Libby and Fishburn revealed that farmers who had relatively high marginal utility for gains and relatively low marginal disutility for losses tended to specialize in high-risk farming such as cash crops, and also showed greater willingness to carry high debt-burdens. Farmers who had relatively low marginal utility for gains and large marginal disutility for losses engaged in low-risk enterprises such as general farming. This shows that attitudes toward risk affect selection of investments and perhaps careers.

Although the studies given above examined individual differences in risk taking within a given situation (i.e. in one field) or across different situations (i.e. from one field to another) they mentioned nothing about the possibility of differences in risk taking among males and females.

The present study will examine risk taking when sex differences are considered.
Summary

Decision making is one of the most important management tasks. It could take place in certainty, uncertainty and risky situations. Each of these situations requires its own criteria for decision making.

Risk is related with utility in that in risky situations a decision maker seeks to maximize the expected utility. This holds if axioms of rational behaviour are complied with. Risk is related with returns since in general, the higher the risk the higher expected returns and vice versa.

Attitudes toward risk show how willing individuals are to bear risk for given levels of returns. Three possible attitudes toward risk which can be identified in theory are a desire for risk, an aversion to risk, and an indifference to risk which apply to a risk seeker, risk averter, and risk neutral respectively. A risk seeker is willing to accept large amounts of additional risk with relatively little increases in expected returns. A risk averter requires larger increases in expected returns to compensate him for additional risk while a risk neutral requires proportional increases in returns for given increases in risk. Risk premiums are negative for a risk seeker, positive for a risk averter, and zero for a risk neutral.
The rationale for attitudes toward risk has been explained using utility curves. Utility curves for risk seekers are convex while those for risk averters and risk neutral are concave and linear respectively. The possible factors underlying attitudes toward risk are loss absorption capacity, income, past experience, adventurism and influence by colleagues.

Though individuals are generally risk averters and tend to be more risk averse when making large decisions, they differ in the degree of risk aversion. Measures indicating degree of risk aversion are risk premium, absolute risk aversion, and relative risk aversion. As risk is inherent in most business, individuals cannot completely avoid risk. They have therefore to choose among small, moderate and large risks.

Several studies have been undertaken on risk taking. These studies have suggested that risk is perceived as a chance of loss, and that individuals differ in their risk taking preference. The studies have also shown that risk taking preference of individuals can change with wealth and occupation.
CHAPTER III

RESEARCH METHODOLOGY

In the last chapter the following points were highlighted:

(a) That individuals differ in terms of their risk preferences.

(b) That risk associated with a given investment is directly related to its expected return such that the higher the risk the higher the expected returns. Individuals will therefore have to choose between returns and safety. This choice depends on one's risk preference.

(c) That individual's risk preference is likely to be affected by the size of his wealth, size of outcomes of a course of action facing him, and the situations in which he is making decisions, i.e. economic or social situations.

It is evident, therefore, that individuals will differ in terms of the courses of action they would undertake in risky situations. In addition to this, a course of action undertaken by an individual in risky situations for his corporation may not be in line with the corporation's risk taking policy. Thus, in selecting decision makers for management positions of a corporation, it would be of help if their risk preferences were determined to see if they are consistent with the corporation's
The following section presents research questions and the hypotheses set up in order to answer them.

Questions and Hypotheses

Hypothesis 1

The major question in this study is whether males and females differ in terms of their risk preferences as they make corporate decisions. It has been mentioned that men and women differ in the way they see risk. Men have been said to see risk as loss or gain, and as affecting future while women have been said to see risk entirely as a loss, and as affecting now. This difference in the way of seeing risk among men and women is likely to lead to a difference in their risk preferences.

The first hypothesis then tests the risk preferences among males and females:

\[ H_{01} : \] There is no significant difference between males and females in terms of their risk preferences.

\[ H_{a1} : \] There is a significant difference between males and females in terms of their risk preferences.
Hypotheses 2 and 3:

Individuals in general tend to avoid risk. This tendency is enhanced as individuals move to higher levels of decision making. That is, as the numerical outcomes of alternative investments the individuals are supposed to select from increase in magnitude, the individuals tend to prefer certainty to risk. There are also some individuals who, with the increase in magnitude of the outcomes of risky alternative investments facing them, become more inclined to take risk. Such individuals are attracted by the prospects of success more than they are deterred by the fear of failure in risky investments and, as a result, they become more inclined to take risk even with an increase in level of decision making. The question arising here therefore refers to the effect of changes in levels of decision making on the individuals' risk preferences.

To be considered here also is the issue of sex-difference as related to risk preference. It was mentioned in the foregoing discussion that men and women differ in the way they see risk. It was further suggested that a change in level of decision making affects individuals differently. Concerning the issue of sex-difference, the question that arises therefore is whether males and females are affected differently in terms of their risk preferences as the size of the outcomes in risky situations involved in decision facing them changes.
The hypotheses to be tested therefore are:

**Hypothesis 2:**

$H_0^2$: An increase in the size of the outcomes in risky situations involved in decision making has no significant effect of making individuals be inclined to avoid risk.

$H_a^2$: An increase in the size of the outcomes in risky situations involved in decision making has a significant effect of making individuals be inclined to avoid risk.

**Hypothesis 3:**

$H_0^3$: An increase in the size of the outcomes in risky situations involved in decision making has no significant effect of making males and females different in terms of their risk preferences.

$H_a^3$: An increase in the size of the outcomes in risky situations involved in decision making has significant effect of making males and females different in terms of their risk preferences.

**Other Research Question**

Many decisions are usually made not by individuals but by groups. Several studies have been undertaken to compare group versus individual risk taking tendencies.
The finding is that decisions made by groups are riskier than the average of the individual members' decisions prior to group discussion. One of the reasons given for this is that each group member feels less personal blame if his choice fails, thus he is not afraid to recommend or accept riskier courses of action when decisions are made by a group. For private decisions involving personal funds, an individual is likely to feel more personal blame if he makes a decision which turns out to have adverse results. He would therefore be more cautious in recommending or accepting riskier courses of action in which his money is involved. Since corporate decisions are made by persons as a group and a person in a group is more inclined to assume more risk than he would as an individual, a question arises as to whether an individual's risk preference is likely to change if a decision facing him is private rather than corporate.

The Laboratory Experiment

In order to test the hypotheses set up at the beginning of this chapter, a laboratory experiment was designed. The experiment was basically divided into two sections. The first section contained four sets of investment situations. Each set consisted of three investments involving different degrees of risk and size of returns (see Appendix I). One investment from each set was to be chosen by each subject. The second section consisted of eight questions, each question
involving two alternative courses of action (see Appendix I). One course of action in each question always involved an outcome that is certain while the other always involved risky outcomes. Though the questions in the second section were in two categories, one category involving small and the other large outcomes, the order of listing of the questions was randomized so that no distinct pattern could be easily detected.

The Experimental Task

The subjects being in a classroom were provided with questionnaires containing instructions requiring them to make decisions as corporate decision makers. Section A of the questionnaire contained four sets of investments with each set consisting of three investments involving different degrees of risk and size of returns. In this section each subject was required to look at the information provided in respect of each set of investment and mark in the appropriate box, the choice he or she would actually make in each set of investment. The instructions are given in detail in Appendix I. The cost of each investment in each set was given to make the subjects be conscious of the fact that investments involve costs. Each subject was also required to indicate in relation to each set of investment whether his or her answers would have remained the same if he or she made decisions as a private individual dealing with one’s own money, and not as a corporate decision maker. This was to test consistency
Section B of the questionnaire was intended to test the effects of changes in levels of decision (in terms of magnitude of the outcomes) on individuals' risk preferences. Each subject was required to mark in the appropriate box, in each question, the course of action he or she would choose, and then indicate whether his or her decisions would remain the same in relation to each question, if he or she made private rather than corporate decisions. The instructions are set out in Appendix I.

Consistency of individuals' risk preferences (as stated above) in consideration of changes in levels of decision making was also intended, by Section B, to be tested.

After the subjects had completed filling sections A and B of the questionnaire, it was possible for the researcher to determine the risk preferences of the subjects. Even then, there were questions to be answered and statements to be responded to which were set out in Sections C, D and E of the questionnaire (see Appendix I).

Section C contained statements of feeling about risk. The statements were Likert-type ranging from "disagree strongly" in one extreme end to "agree strongly" in the other end. Each subject had to indicate his or her feeling about these statements. There were six statements
in total. The statements were intended to test responses of individuals toward risk.

Section D contained three questions. The first question asked the subjects to indicate how they found the exercise. This was in respect of sections A and B. Five levels of difficulty used were as follows: Very difficult, difficult, fair, easy, very easy. The question was intended to test internal validity of the experiment. The second question asked the subjects whether they considered what they would actually do, what they felt they should do, or what they were expected to do, in making decisions. The third question was intended to test the extent to which the subjects exercised their personal judgement in making investment decisions.

Section E of the questionnaire contained questions of a personal nature. These questions sought some background information of the subjects. The background information required included subjects' working experience, investment decision making experience, investment ownership, money receipts, performance in Finance, Accounting, Quantitative Methods and Statistics courses, age, sex, marital status and residence.

Subjects

All the subjects were final-year Bachelor of Commerce (Accounting Option) students at the University
of Nairobi. The advantages of using these students in the study is that they had the necessary skills to handle the task, and that they were available and easy to be made to participate in the experiment. The subjects also knew the implication of risk in financial decisions.

The students were not told in advance that they were to participate in the experiment. However, on the day the experiment was carried out, they were given the questionnaires to fill in and were told that they were participating in an experiment which they had to take with seriousness.

All the students in the class participated. By observing them while doing the exercise, one could see that they were taking it seriously. In fact, one of the students asked whether the experiment was being used to recruit them for some employment. The exercise took them about 40 minutes to complete.

Though it was convenient to use the students in the experiment, the question as to whether they are good as surrogates of the real decision makers seems unsettled.

Hofstedt (1972, p. 679-692) compared the decisions based on the analysis of annual reports rendered by MBA students against those made by the executives. His results showed no significant differences between
executives and students in so far as the experimental task was concerned.

Ashton and Kramer (1980, p. 1-13) stated that there was little evidence on the adequacy of students surrogates in accounting. They pointed out that studies which had examined attitudes and attitudes' changes had found sizable discrepancies between students and other subjects, while those studies which had focused on decision making had found considerable similarities in the decisions and the apparent underlying information processing behaviour of students and non-student group.

Alderfer and Bierman (1970, p. 341-353) found in risk-taking task that students and managers made different decisions. This difference was attributed to the fact that the subjects did wager their own money in the course of the experiment. Their finding therefore should not be used as a basis of refuting the validity of using students as surrogates of real decision makers in the present study since the present study does not require individuals to make decisions in risky situations involving their own money but their corporations' money.

The foregoing discussion does not solve the issues of whether or not to use students as surrogates of real decision makers and when to use them. However, in his article, Abdel-Khalik (1974, p. 750) concluded that
generalizing from students' responses to real-life decision should not be encouraged until conditions under which surrogation would not entail a great sacrifice in describing the behaviour of actual (or real) decision makers are provided.

Regarding the present study, even if the students are not good as surrogates of real decision makers, they can provide clues as to the behaviour of the real-world individuals making corporate decisions in risky situations.

Data Analysis Tools

In order to test the hypotheses set out in this chapter and to find out whether the two categories of subjects, males and females, were homogeneous with respect to their background variables specifically ages and lengths of working experience, several statistics were used. These statistics were the median test, the sign test and the t test.

The median test was used to test hypotheses 1 and 3. Being a nonparametric test, the median test does not depend on the functional form of the parent population. In other words, it makes no assumption about the distribution of population. The median test focuses on the median as a measure of central tendency and enables the testing of null hypothesis that two independent samples
were drawn from populations having the same median. It provides a nonparametric alternative to the t test of testing a hypothesis regarding the difference between the medians of two populations which are not normally distributed. It was therefore appropriate to apply this test statistic to the hypotheses 1 and 3 because there was no basis of assuming that the data obtained were from normally distributed population. Since nonparametric tests are less efficient than parametric tests, the t test was also applied to hypotheses 1 and 3 to determine whether same conclusions would still be reached (as reached using the median test) if the assumptions that the populations of interest were normally distributed were defensible.

The sign test was used to test hypothesis 2. This test focuses on the median, rather than the mean, as a measure of central tendency. It is appropriate when testing hypothesis involving data representing "before and after" scores for the same subject or scores for matched subjects which have been treated in different ways. The sign test makes no assumptions about the shape or the parameters of the population frequency distributions. For this hypothesis a more efficient test which could have been used is the Wilcoxon test but this test involves more restrictive assumptions which may not be defensible for the data in the present study.
Apart from using the t test to test hypotheses 1 and 3, it was also used to test whether male and female students were homogeneous with respect to their mean ages and lengths of working experience. Since it was not known that the population variances were equal, and there was no basis of assuming that they were equal, the t test was not applied directly to the data. Instead, the test statistic was based on (Daniel and Terrell, 1975, p. 172):

\[
t' = \frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}
\]

Where: \( \bar{X}_1 \) and \( \bar{X}_2 \) are sample mean scores, \( \mu_1 \) and \( \mu_2 \) are population mean scores, \( s_1 \) and \( s_2 \) are sample standard deviation scores and \( n_1 \) and \( n_2 \) are sample sizes for male and female students, respectively. The test statistic \( t' \) is distributed as student's with degrees of freedom, \( df' \) given by (Daniel and Terrell, 1975, p. 146):

\[
df' = \frac{\left[\frac{(s_1^2/n_1) + (s_2^2/n_2)}{(s_1^2/n_1)^2 + (s_2^2/n_2)^2}\right]^2}{\frac{1}{n_1} + \frac{1}{n_2}}
\]
The students who participated in the experiment were 68. Out of these, 52 were males and 16 were females. The questionnaires handed in were 68. All these questionnaires were usable. Except for the open-ended questions, all the responses were coded and analysed.

Hypothesis 1 set out to establish whether there was a significant difference between males and females in terms of their risk preferences.

Before testing this hypothesis, the responses in each set of investment in section A of the questionnaire were coded numerically from -1 to +1, -1 representing small risks, 0 representing moderate risks, and +1 representing large risks. An individual who chose an investment with small risks obtained a score of -1 for that investment, while individuals who chose investments with moderate and large risks obtained scores of 0 and +1, respectively for the investments concerned. An individual's risk preference score was obtained by summing up scores from each investment he or she selected. The scores thus obtained represented the risk preference measure and these were classified into degrees of risks. An individual whose risk preference score fell in the class interval -4 to
-2 was considered as preferring small risks, while the ones whose risk preference scores fell in the class interval -1 to +1, and +2 to +4 were considered as preferring moderate and large risks, respectively. The number of subjects cross-tabulated by sex and degree of risk are shown in Table 1.

An examination of Table 1 reveals that the subject differ in terms of the degrees of risks they prefer.

Table 1

<table>
<thead>
<tr>
<th>Risk Degree</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>36 (69.2%)</td>
<td>7 (43.8%)</td>
<td>43 (63.2%)</td>
</tr>
<tr>
<td>Moderate</td>
<td>11 (21.2%)</td>
<td>6 (37.5%)</td>
<td>17 (25.0%)</td>
</tr>
<tr>
<td>Large</td>
<td>5 (9.6%)</td>
<td>3 (18.7%)</td>
<td>8 (11.8%)</td>
</tr>
<tr>
<td>Total</td>
<td>52 (100%)</td>
<td>16 (100%)</td>
<td>68 (100%)</td>
</tr>
</tbody>
</table>

(Percentages are shown in brackets).

Out of 68 students, 43 or 63.2% preferred small risks, 17 or 25% preferred moderate risks, and 8 or 11.8% preferred large risks. This means that small risks were preferred over moderate risks, and moderate risks were preferred over large risks. The results therefore tend to contradict the assertion that people prefer extremely safe or extremely risky investments over investments with an intermediate degree of risk.
Even when sex is considered, preference of small risks over moderate risks and moderate risks over large risks still holds. For instance, in the case of male students as shown in Table 1, 36 out of 52 (or 69.2%) preferred small risks, 11 out of 52 (or 21.2%) preferred moderate risks, and 5 out of 52 (or 9.6%) preferred large risks. As for the female students, 7 out of 16 (or 43.8%) preferred small risks, 6 out of 16 (or 37.5%) preferred moderate risks, and 3 out of 16 (or 18.7%) preferred large risks (see Table 1). These results also show that greater proportion of female than male students liked either large or moderate risks, while greater proportion of male than female students liked small risks.

In order to test hypothesis 1, the median test was performed. The median risk preference score of the combined sample of male and female students was -3. The numbers of subjects above and below the median score are given in Table 2.

<table>
<thead>
<tr>
<th>Number of Observations</th>
<th>Sex</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
</tr>
<tr>
<td>Above median</td>
<td>20</td>
<td>11</td>
</tr>
<tr>
<td>Below median</td>
<td>26</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>46</td>
<td>16</td>
</tr>
</tbody>
</table>

\[ \text{Chi-square value} = 3.033 \quad \text{Degree of freedom} = 1 \]
(The Table given on the preceding page gives the number of subjects falling above and below the median. Six subjects were on the median and so they are not included in the table.)

From Table 2, it can be seen that 20 (or 38.5%) of the male students had risk preference scores above the median of the combined sample. The corresponding number (or proportion) of the female students were 11 (or 68.8%). As for the risk preference scores below the median, male students were 26 (or 50%) while female students were 5 (or 31.3%). These results show that proportion of female students with risk preference scores above the median, and therefore being inclined to assume risk is greater than that of male students. They also show that the proportion of male students with risk preference scores below the median, and therefore being inclined to avoid risk is greater than that of female students. These results agree with the earlier findings in this section that greater proportion of female than male students liked either large or moderate risks, while greater proportion of male than female students liked small risks. Therefore it appears that there could be some difference between males and females in terms of their risk preference.

The question lies however, as to how significant this difference is. The answer to this question was arrived at by performing, the median test. The computed
Chi-square value for this test was 3.033. With 1 degree of freedom. This value is not significant at the 5% level. Thus at this level of significance, the null hypothesis that there is no significant difference between males and females in terms of their risk preference is not rejected. It can be concluded therefore that there is no significant difference between males and females in terms of their risk preferences, at the 5% level of significance. At the 10% level of significance the computed Chi-square value becomes significant, thus calling for the rejection of the null hypothesis.

To find out whether the conclusion reached above could still hold if the populations of interest were known to be normally distributed, the t test was performed. The computed t value was 1.8571 and the degrees of freedom were 24. This t value is not significant at the 5% level showing that the null hypothesis cannot be rejected at that level. It can be concluded therefore that there is no significant difference between males and females in terms of their risk preference, at the 5% level. The computed t value however, is significant at the 10% level. Thus, the conclusions reached using the median and the t tests are similar in this case. Therefore, whether the data came from a normally distributed population or not, the conclusion, reached above still hold.
Effects of Changes in Levels of Decision on Individuals' Risk Preference

Hypotheses 2 and 3 were designed to determine whether changes in size of outcomes involved in decision making have any effect on individuals' risk preferences and whether this effect (if any) would be similar for males and females.

In order to test these hypotheses, data were obtained using Section 8 of the questionnaire. Each question in this section involved two alternative courses of action, one whose outcome was certain and the other whose outcome was risky.

The responses to the questions were coded numerically. The code for a course of action with a certain outcome was -1, and that of a risky outcome was +1. An individual selecting a risky course of action would obtain a risk preference score of +1, while the one selecting a certain course of action (thus having a negative response to risk) would obtain a risk preference score of -1.

Questions 1, 2, 4 and 6 involved courses of action with numerically small outcomes while Questions 5, 7, 8 and 3 involved numerically large outcomes. An individual's risk preference score for small-outcome courses of action was obtained by adding up the scores he or she got from the choices he or she made in questions involving the relatively small outcomes. This applied also to the
individuals' risk preference score for courses of action with large outcomes.

Individuals' scores for either small-outcome or large-outcome courses of action ranged from -4 to +4. An individual whose risk preference score was in the range of -4 to -2 was considered as being inclined to avoid risk thus preferring certainty while an individual whose risk preference score was in the range +2 to +4 was taken as preferring risk. An individual whose risk preference score was 0 was considered as neither being inclined to avoid nor to prefer risk or, in other words, as neutral. The distribution of these individuals is shown in Table 3.

Table 3

Subjects Cross-Tabulated by Size of Outcomes and Risk Preference

<table>
<thead>
<tr>
<th>Risk Preference</th>
<th>Size of Outcome</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Small</td>
<td>Large</td>
<td></td>
</tr>
<tr>
<td>Prefer risk</td>
<td>30 (44.1)</td>
<td>30 (44.14)</td>
<td>30</td>
</tr>
<tr>
<td>Neutral</td>
<td>17 (25.00)</td>
<td>14 (20.6)</td>
<td>14</td>
</tr>
<tr>
<td>Prefer Certainty</td>
<td>21 (30.9)</td>
<td>24 (35.3)</td>
<td>24</td>
</tr>
<tr>
<td>Total</td>
<td>68 (100.0)</td>
<td>68 (100.0)</td>
<td>68</td>
</tr>
</tbody>
</table>

(Percentages are shown in brackets)
As shown in Table 3, the proportion of individuals who preferred risk for small-outcome courses of action was 44.1%. This proportion did not change with the increase in size of outcomes involved in the decision. However, the proportions of individuals who were neutral with regards to risk preference decreased by 4.4% from 25% to 20.6%, while those who preferred certainty increased by 4.4% from 30.9% to 35.3%. It can be seen therefore that changes in proportions of individuals who preferred certainty and those who were neutral were equal i.e. a shift from neutrality to certainty. The decrease in the proportion of individuals who were neutral with regards to risk preference as such must have been as a result of some of these individuals preferring certainty, rather than being indifferent, as the outcomes involved in decision increased in size. Preferring certainty means being inclined to avoid risk, and since those who preferred certainty increased in proportion with the increase in size of outcomes, it can be concluded that individuals tend to avoid risk as the size of outcomes involved in their decision increases.

To confirm whether an increase in size of outcomes involved in a decision has the effect of making individuals be inclined towards avoiding risk (which necessitates testing hypothesis 2) the sign test was performed. The calculated normal deviate (Z) value was 0.8452. This value is not significant at the 10% level. Thus the null hypothesis that an increase in size of outcomes involved
in decision making has no significant effect of making individuals be inclined to avoid risk is not rejected. Hence, it might be concluded at that level that an increase in size of outcomes has no significant effect of making individuals be inclined to avoid risk. The computed Z value was however significant at the 20% level, thus calling for the rejection of the null hypothesis at that level.

Hypothesis 3 set out to determine whether an increase in size of outcomes involved in decision facing males and females had similar effects on the risk preferences of these sexes. To test this hypothesis, data consisting of changes in risk preference scores of individuals brought about by an increase in size of outcomes were obtained. A positive change in risk preference scores represented an inclination of individuals to prefer risk while a negative change in the scores represented an inclination of individuals to avoid risk. The distribution of the changes in scores is shown in Table 4.

As given in Table 4, most of the subjects experienced no change in their risk preference with the increase in size of outcomes they had to make decisions about. Male students who experienced no change in their risk preference were 51.92% and the corresponding proportion of female students was 37.50%. Table 4 shows that the proportions of
male and female students experiencing some change in their risk preference decreased as the changes in risk preferences increased. For instance, as the changes in risk preference increased from 0 to 2 and 4, the proportion of male students experiencing changes in their risk preference decreased from 51.92% to 15.38% and finally 3.85%. The corresponding decrease in the proportion of female students was from 37.5% to 18.75% and finally 12.5%. This seems to suggest that males and females are affected fairly equally in terms of their risk preference as the size of outcomes increase.
Testing of Hypothesis 3 was accomplished using the median test. The median risk preference score-change was 0. The number of male and female students above and below the median is shown in Table 5.

Table 5

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above Median</td>
<td>10</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Below Median</td>
<td>15</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
<td>10</td>
<td>35</td>
</tr>
</tbody>
</table>

Chi-Square value = 0.2917 Degree of freedom = 1

(Thirty three subjects were excluded from analysis as they were on the median).

An examination of Table 5 shows that female students were distributed equally above and below the median change in risk preference score. Male students were not distributed equally above and below the median. Male students above the median were 10 and this figure is less than that of male students below the median which was 15.
The computed Chi-square value for the median test was 0.2917. This value is not significant at the 5% level. Thus, the null hypothesis that males and females are not affected differently in terms of their risk preferences by an increase in size of outcomes involved in their decision making is not rejected. It may therefore be concluded that a change in the size of outcomes of courses of action facing males and females does not affect them differently in terms of their risk preferences. This conclusion still holds at significance level of 10%. Using t' test, the null hypothesis cannot be rejected even at the significance level of 10%. Thus the failure of rejecting the null hypothesis still holds even with the use of t' test.

Relationship Between Individuals' Risk Preferences for Private and Corporate Decisions.

It was mentioned in Chapter III that individual's risk preference making corporate decision may differ from his or her risk preference when making private decisions involving his or her own money. To determine whether this difference exists "private" and "corporate" choices made by individuals were compared. The results are shown in Table 6.
Table 6 shows that choices made by individuals as private individuals dealing with their own money and as corporate decision makers making decisions for their corporation in risky situations were not the same in all cases. Proportions of subjects who indicated that their choices would remain the same if they changed from making corporate to private decisions involving their own money were 77.94% for investment set 1, 82.35% for investment set 2, 76.47% for investment set 3 and 75% for investment set 4. On the average 77.94% of the subjects indicated that they would make the same choices. It shows therefore that individuals in all cases do not exhibit the same risk preference for private and corporate decision.
increases can be answered by examining Table 7.

### Table 7

<table>
<thead>
<tr>
<th>Pair</th>
<th>Small Outcomes</th>
<th>Large Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>77.94%</td>
<td>77.94%</td>
</tr>
<tr>
<td>2</td>
<td>77.94%</td>
<td>72.06%</td>
</tr>
<tr>
<td>3</td>
<td>80.88%</td>
<td>75.00%</td>
</tr>
<tr>
<td>4</td>
<td>75.00%</td>
<td>77.94%</td>
</tr>
</tbody>
</table>

Pair 1=Questions 1 and 5, Pair 2=Questions 2 and 7  
Pair 3=Questions 4 and 8, Pair 4=Questions 6 and 3  
The first and the second question for each pair represent small and large outcomes respectively.

Table 7 gives the proportions of individuals who indicated that their choices would still remain the same if they made private rather than corporate decision.  
For decisions involving small outcomes, 77.94% of the individuals on average indicated that their choices would remain the same for private and corporate decisions. This proportion dropped to 75.74% on average when large outcomes were involved. Though the change was insignificant it shows that the difference in individuals risk preferences for private and corporate decisions is likely to widen as
the size of outcomes involved in decisions facing the individuals increases.

**Analysis of Response to Risk**

The risk preference of an individual can be determined by the preference he exhibits for choices available to him in risky situations. This is possible only if an individual concerned takes into account the riskiness of choices facing him. According to the opinion of the author, an individual is likely to take into account the riskiness of choices facing him if he has a positive feeling about risk, i.e. showing strong concern for risk.

In order to find out the responses of the subjects toward risk, 6 statements of feelings about risk were developed. The responses to these statements were coded from -2 to +2, -2 being "disagree strongly", and +2 being "agree strongly". All these statements except statement 3 were framed in such a way that agreement with them indicates a positive feeling about risk. One would expect those who agreed with these statements to take into account risk in decision making in risky situations. Statement 3, was framed in a way that agreement with it indicates a negative feeling about risk. Hence an individual agreeing with statement 3 would not likely take into account risk in decision making in risky situation.
For statement 3 to be summed up with the other statements in determining individuals' risk response scores, values assigned to it were multiplied by -1 each. The distribution of these risk response scores is shown in Table 8.

The maximum score an individual could get was +12 while the minimum score that could be obtained was -12. An individual who got a score of 0 was considered as neutral with regards to feelings about risk. An individual who had a negative score was considered to have "negative" feelings about risk while an individual who had a positive score was considered to have "positive" feelings about risk.

From an examination of Table 8, it can be seen that male and female students who had positive risk response scores were 92.31% and 87.50% respectively. It can be concluded therefore that most of the subjects considered risk in their decision making.

It should be noted, however, that those subjects who did not have "positive" feelings about risk were not excluded from the analysis. This is because these statements have not been tested to determine whether or not they actually serve as indicators of subjects' taking risk into account in their decision making. Thus, the conclusions reached are tentative.
### Table 8

Response Toward Risk

<table>
<thead>
<tr>
<th>Score</th>
<th>Males Frequency</th>
<th>Males Percent</th>
<th>Females Frequency</th>
<th>Females Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>1</td>
<td>1.92</td>
<td>1</td>
<td>6.25</td>
</tr>
<tr>
<td>-1</td>
<td>1</td>
<td>1.92</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
<td>3.85</td>
<td>1</td>
<td>6.25</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3.85</td>
<td>2</td>
<td>12.50</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>9.62</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>3.85</td>
<td>1</td>
<td>6.25</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>11.55</td>
<td>1</td>
<td>6.25</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>15.38</td>
<td>1</td>
<td>6.25</td>
</tr>
<tr>
<td>6</td>
<td>9</td>
<td>17.30</td>
<td>2</td>
<td>12.50</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>13.46</td>
<td>2</td>
<td>12.50</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>7.69</td>
<td>3</td>
<td>18.75</td>
</tr>
<tr>
<td>9</td>
<td>3</td>
<td>5.77</td>
<td>2</td>
<td>12.50</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>1.92</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>1.92</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>100.00</td>
<td>16</td>
<td>100.00</td>
</tr>
</tbody>
</table>

**Background Variables**

In making male-female comparisons in work attitudes, studies have found that critical variables such as education, occupation, organizational level and workers' role must be controlled (Busch and Bush, 1978, p. 439).
The implication of this for male-female comparison in the context of risk preference is that there is a need to control variables that are likely to contribute to variation in their risk preferences.

The variables considered in this study were age, working experience, investment decision making experience, investment ownership, money receipts, performance in class, marital status and place of residence. If males and females are homogeneous on these variables, then the effects of these variables on the risk preferences of both the sexes can be eliminated. As Kerlinger (1973, p. 309) pointed out "to eliminate the effect of a possible influential independent variable on a dependent variable, one can choose subjects so that they are as homogeneous as possible on that independent variable".

The distribution of ages of the subjects is given in Table 9. The ages of male students ranged from 22 to 31 years while those of female students ranged from 22 to 28 years. The computed $t'$ value to test for homogeneity of ages was 1.425 with 35 degrees of freedom (df'). The $t'$ value is not significant at level of significance of 5%. Thus it can be concluded that males and females were fairly homogeneous on ages.

Another variable considered was the length of working experience. Experience has been mentioned in
Chapter II as a possible factor underlying the attitude toward risk. The lengths in months of working experience of the subjects are shown in Table 10. The lengths of working experience ranged from 0 to 60 months, and from 0 to 50 months for males and females, respectively. To test whether there was a significant difference between both the sexes in terms of the lengths of their working experience, the t-test was performed. The calculated t-value was 0.157 and the degrees of freedom were 60. This t-value was not significant at the 5% level hence it could be concluded that males and females were fairly homogeneous with respect to the length of working experience.

Table 9
Ages of the Subjects.

<table>
<thead>
<tr>
<th>Ages</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>23</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>24</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>25</td>
<td>17</td>
<td>3</td>
</tr>
<tr>
<td>26</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>27</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>28</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>29</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>31</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>16</td>
</tr>
</tbody>
</table>
The mean ages for males and females was 24.25 and 23.94 years respectively. The standard deviations of ages for males was 1.67 and for females was 1.34 years.

Table 10

Lengths of Working Experience

<table>
<thead>
<tr>
<th>Months</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
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<td>9</td>
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<td>0</td>
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<td>12</td>
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<td>15</td>
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<td>1</td>
</tr>
<tr>
<td>16</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>17</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>6</td>
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<td>21</td>
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<td>0</td>
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<tr>
<td>22</td>
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<td>0</td>
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<tr>
<td>23</td>
<td>1</td>
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<td>4</td>
<td>1</td>
</tr>
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<td>25</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>31</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>50</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>60</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>16</td>
</tr>
</tbody>
</table>
Table 11

Subjects Tabulated by Sex and Background Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Males(%)</th>
<th>Females(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working experience</td>
<td>80.8</td>
<td>87.5</td>
</tr>
<tr>
<td>Investment decision making experience^1</td>
<td>67.3</td>
<td>75.0</td>
</tr>
<tr>
<td>Investment ownership</td>
<td>48.1</td>
<td>50.0</td>
</tr>
<tr>
<td>Additional money receipts (over termly allowance)</td>
<td>28.9</td>
<td>31.3</td>
</tr>
<tr>
<td>Class performance^2 (in F,A,QM,S):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average and above average</td>
<td>96.2</td>
<td>87.6</td>
</tr>
<tr>
<td>Below average</td>
<td>3.8</td>
<td>12.4</td>
</tr>
<tr>
<td>Marital status: Single</td>
<td>96.2</td>
<td>81.3</td>
</tr>
<tr>
<td>Married</td>
<td>3.8</td>
<td>18.7</td>
</tr>
<tr>
<td>Residence in halls of Residence</td>
<td>100.0</td>
<td>81.3</td>
</tr>
</tbody>
</table>

F = Finance, A = Accounting, QM = Quantitative Methods
S = Statistics

1 - Investment decision making experience refers to whether the subject has made any decision with regards to investment in real life.

2 - Performance was based on the average of subjects' performance in Finance, Accounting, Quantitative Methods, and Statistics, i.e. given arithmetic average.

Table 11 gives proportion of subjects cross-tabulated by sex and background variables. For example the proportion of males and females who had working experience were 80.8%
75

and 87.5%, respectively. An examination of variable by variable reveals that males and females were fairly homogeneous in terms of their background variables. Taking working experience, for instance, 80.8% of the males and 87.5% of the females indicated that they had working experience. There seems to be no significant difference between these proportions. This also applies to investment decision making experience, investment ownership, additional money receipts and marital status.

The issue of residence in University halls of residence might not have been of any relevance to the study. All the male students were residents while 81.3% of the female students were residents in the University halls of residents.

Analysis of class performance of the subjects revealed that the proportion of male students who had average or above average performance was 96.2% and the corresponding proportion of female students was 87.6%. It can be seen that overall, the subjects performed well in class considering the subjects given in Table 11.

On the whole, it can be seen that male and female students who were the subjects of this study were fairly homogeneous with respect to their background variables. Thus, it is possible to eliminate the effects of these variables on risk preferences, in male-female risk
preference comparison, thereby remaining with the effect of sex difference (the variable of interest) on risk preference.

Before giving a discussion on the results of the experiment, it is noteworthy to have a post experimental review. It has been seen so far that both the sexes were fairly homogeneous with respect to their background variables. Analysis of responses to risk done also revealed that most of the individuals had "positive" feeling about risk and therefore must have considered risk in their decision making.

Section D of the questionnaire contained some questions which were intended to test the difficulty of the exercise and the extent to which the subjects exercised their personal judgement in making decisions. The other question contained in section D of the questionnaire was whether the subjects considered what they would actually do", "what they felt they should do" or "what they were expected to do". This question was dropped from analysis since it was rather ambiguous.

Both the sexes were fairly equal in terms of they way they perceived the difficulty of the experiment. Male and female students who found the exercise either fair or easy were 55.8% and 62.5% respectively. This leaves 44.2% of the males and 37.5% of the females who found the exercise either difficult or very difficult. Therefore the results
On the issue of the extent to which the subjects exercised their personal judgement in making investment decision, over 63.5% of the male students and over 50% of the female students indicated that they exercised personal judgement in decision making without relying on some criteria. Thus, on average more than 50% of the subjects at least exercised personal judgement in decision making.

Discussion of the Results

From the preceding sections of this chapter, several points have come to light. These points are discussed in this section.

The first point noted is that males and females preferred in general small risks over moderate risks and moderate risks over large risks. This is contrary to the generally held view that people in general prefer small or large risks over moderate risks (Page, 1968, p.240-241).

This result can be explained from what has been established by many studies that individuals in general tend to avoid risk. As a result of this, individuals would be inclined to prefer small risks rather than moderate or large risks.

The study also found that females seemed to have been more inclined to assume risk than males. This is
contrary again to what can be expected of both the sexes regarding risk preference. As mentioned in Chapter I men do not see risk entirely as negative. They see it as loss or gain. Women on the other hand see risk entirely as negative. As a result of this women are expected to be more risk averse than men. This means that women are expected to be more inclined to avoid risk.

Though there may be no well established explanation of this finding, it may be said that the contrary results lie on the fact that female representatives in the study were operating in a male dominated class. There were 16 female representatives which is a lower figure compared to that of male representatives which was 52. It is possible that the female representatives had been influenced by male representatives in the course of their association to the extent that the former tended to accept riskier courses of action.

Overall, there was no significant difference amongst males and females in terms of their risk preference.

With regards to effects of changes in size of outcomes involved in decision on risk preference, it was found that with an increase in size of outcomes involved in decision the subjects were affected differently. There are subjects who became more inclined
to avoid risk while some became more inclined to prefer risk, and others were not affected at all. This is possible in that there are people who, when the amount of money involved in decision facing them increases, are more attracted by the prospect of gain rather than deterred by the fear of loss and, for that matter, become more inclined to take risk. There are people also who, with an increase in the amount of money involved in decision facing them, find it better to avoid risking this amount because if they lose it, the loss will be substantial. As a result, they prefer certainty rather than taking risk. For those whose risk preferences were not affected at all by the increase in size of outcomes involved in decisions facing them, there is a possibility that they ignored the changes in the size of outcomes.

Regarding the individuals who were affected, those who became more inclined to avoid risk with increases in the size of outcomes were more than those who became more inclined to take risk. This finding can be supported by Sharpe (1970, p. 25) who pointed out that a large body of evidence indicates that almost everyone is a risk averter when making important decisions. Importance of decisions could be attributed to the size of their outcomes, such that the larger the outcomes involved in a decision, the greater is its importance.
The increase in the size of outcomes involved in decision facing the subjects had no significant effect on avoidance of risk. This can be attributed to the possibility that the changes in the size of outcomes involved in decisions facing the subjects were not large enough to have an effect on the risk preferences of the subjects.

The findings of the study also showed that males and females were not significantly affected differently in terms of their risk preferences by an increase in size of outcomes. As has been explained in this chapter, there was no significant difference between males and females in terms of their risk preferences. This could have held even with the increase in the size of outcomes involved in decisions facing both sexes, especially if the change in the size of outcomes was not sufficiently large to affect the individuals in terms of their risk preferences.

Analysis of individuals' risk preferences for private and corporate decisions revealed that individuals in most cases did not exhibit the same risk preferences as they changed from making corporate to private decisions. This could be attributed to the fact that an individual would be more cautious in recommending or accepting riskier courses of action in which his money is involved than he would for a corporation. In fact, one of the subjects commented that on making decision involving personal money, he would choose less risky investments.
Regarding response to risk, analysis revealed that most of the subjects had "positive" feelings about risk. This suggests that most of the subjects took into account risk in their decision. This is consistent with the fact that the subjects of the experiment, having taken finance course, knew that risk was one of the factors to be considered in investment decision. The manner in which such risk was taken into account, i.e. processed, could not be discovered.
CHAPTER V

SUMMARY, CONCLUSIONS, LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

Risk is one of the factors considered in investment decision. Faced with investment decisions in risky situations, the choices individuals make depend on their attitudes toward risk. Individuals' attitudes toward risk reflect how willing they are to bear risk for a given level of returns. Three attitudes toward risk have been identified in theory as a desire for risk, an aversion for risk and an indifference to risk.

An individual with a desire for risk is a risk seeker. Such an individual is willing to accept large amounts of additional risk with relatively little increase in expected returns. An individual with an aversion for risk is a risk averter. This individual requires a larger increase in expected return to compensate him for additional risk. For a risk-indifferent individual, a proportional increase in return is required for a given increase in risk.

Many empirical studies have established that individuals generally are risk averse. This means therefore that, in general, individuals have to be paid a risk premium in order to be induced to take risk. Even if they are not induced to take risk, individuals will still have to take risk if they make investments.
since risk is inherent in most investment decisions. Individuals are therefore left in most cases to choose among alternatives that differ in the degree of risk. These degrees of risk are small, moderate and large.

The experiment carried out in this study was intended to determine whether males and females differed in terms of their risk preferences. It had been mentioned that men and women differ in the way they see risk. Men had been said to see risk as loss or gain while women see risk entirely as a loss. It was suggested that as a result of the difference in the way of seeing risk among men and women, both of these sexes are likely to differ in terms of their risk preferences. It was also mentioned that individuals tend to avoid risk as the numerical outcomes of alternative courses of action they are supposed to select from, increase in magnitude. Consequently, three hypotheses were developed.

The first hypothesis set out to determine whether there was a significant difference between males and females in terms of their risk preferences. The second hypothesis sought to determine whether an increase in the size of risky outcomes involved in decision making had a significant effect of making individuals be inclined to avoid risk. The third hypothesis was developed to determine whether males and females were affected in a significantly different way in terms of their risk preferences by an increase in the magnitude of outcomes involved in their
decision making in risky situation.

In order to test these hypotheses, a laboratory experiment was designed. The experiment was basically divided into two sections. The first section contained four sets of investment situations. Each set consisted of three investments involving different degrees of risk and size of returns. One investment from each set was to be chosen. The second section consisted of eight questions, each question involving two alternative courses of action, one being certain and the other being risky. Sixty eight subjects participated in the experiment. These subjects were final-year Bachelor of Commerce (Accounting Option) students at the University of Nairobi. They were considered as having the necessary skill to handle the experimental task which involved choosing a course of action from among alternative courses of action in risky situations on the basis of the given information.

Analysis of the data revealed the following:
(a) Males and females preferred in general small risks over moderate risks, and moderate risks over large risks.
(b) Though females seemed to have been more inclined to assume risk than males, overall, there was no significant difference between males and females in terms of their risk preferences.
(c) Increase in the size of outcomes involved in decision making appeared to have some effect on individuals with respect to their risk preferences. Of those who were
affected, more individuals became inclined to avoid than to assume risk.

(d) Though it had been suggested that increase in size of outcomes would make individuals be more inclined to avoid risk, this effect was not significant. That is, the increase in size of outcomes involved in the decision facing the subjects had no significant effect towards making them be inclined to avoid risk.

(e) There was no significant difference between males and females with regards to risk preference as the size of the outcome was increased.

(f) Individuals did not exhibit, in all cases, the same risk preferences as they changed from making corporate to private decisions.

Conclusions

The results reported above indicate that there is no significant difference among males and females in terms of their risk preferences. This is contrary to the expectation that females are more risk averse than males. It had been pointed out that women were taking over occupations traditionally considered as for men. The question arising there was whether the women had as much capacity to tolerate risk as men in those occupational areas. The results seem to suggest that the women have as much capacity to tolerate risk as men. It can be concluded from this that when it comes to selection of individuals for some occupation, the issue of risk
preference as related to sex should not influence decisions. In other words, women should not be barred from being employed in risky occupations with the fear that they cannot tolerate risks inherent in them because as indicated by their risk preferences they seem to have as much capacity to tolerate risk as men.

It had been pointed out also that women were not only taking over occupations traditionally considered as for men but were also occupying increasingly higher positions in these occupations. In connection to this, a question arose regarding whether with increased risk, associated with high positions in occupations, women would still be able to bear risk as men. Since the analysis of effects of an increase in the size of outcomes on risk preferences of males and females revealed no significant difference between these sexes' risk preferences, it can be concluded that women are probably as able to bear increased risk associated with higher positions in occupations as men. This means that women might also be promoted to high positions in organizations.

Limitations

This study has several limitations. As a result, the conclusions reached should not be generalized but should be taken as clues to what exists in real life.
The first limitation relates to the use of students as surrogates of real life decision makers. It was suggested that the question as to whether the students were good as surrogates of real decision makers was unsettled. It was even mentioned that students and managers did make different decisions in risk taking task. Though it was explained why this should not be used to refute the validity of using students as surrogates of real decision makers in this study, the question as regarding whether the students were actually good as surrogates of real decision makers in the present study is not settled. Thus, the use of students as surrogates of real decision makers makes it not justifiable to generalize the findings of the study to cover males and females as a whole.

The second limitation is that it was not known for sure whether the subjects were equal in terms of their wealth ownership. It had been pointed out that willingness to bear risk was partly a matter of what one could afford, and the more secure one's economic foundation was, the more one could afford to take risk. Since it was not known whether the subjects were equal in terms of the wealth they possessed, there is no basis of strictly attributing the findings of the study to sex difference only.
The third limitation lies on the question as to whether both the sexes were equal in terms of their comprehension of the task. No thorough investigation was done to determine if the subjects (taking into account their sex) understood equally or fairly equally the task in this study. Thus, there may be no justifiable basis of attributing the results of the study to only sex as a variable.

Lastly, the samples used in the study were so small that they could not be defended as being representative of the real population.

Suggestions for Further Research.

Issues that came to light in this study suggest that further research is still required if the results can be generalized.

An important point to be considered in this study is that of the subjects. Since the validity of using students as surrogates of real decision makers has been questioned, the results obtained using these subjects cannot be generalized. Consequently, the study should be broadened to include subjects with different occupations so that the results can be generalized. In addition to this, a similar study could be undertaken using larger samples than the ones used in this study. To enhance the results and enrich the conclusions of the study, it would
be worthwhile also to include subjects of different age-groups.

An area requiring a deeper study is whether individuals really take into account risks in their decision making in risky situations. The need to investigate into this comes from the fact that individuals may rely on some criteria for decision making, such as the expected value, which do not take into account risk. If this is so, then the question of risk preference may not be meaningful.
APPENDIX I

Instrument for Collecting Data

Answer all questions

Name ..................
Index No.............

SECTION A

(1) Your company has been offered investments involving different degrees of risk and size of returns. As a company decision maker, you are required to select one investment from each of the sets of investments given below which you believe your company should accept. In all cases assume that: (a) all returns will be earned in the very near future (b) all returns are net after taxes (c) all investments will earn either the returns with the probabilities as given below or no return at all, i.e. a zero return.

Please mark (x) in the appropriate box, the choice you would actually make in each set of investments. There are no wrong answers.

Set 1: Cost of each investment is Shs.4000.

<table>
<thead>
<tr>
<th>Investment</th>
<th>Returns(Shs)</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>35,000</td>
<td>0.2</td>
</tr>
<tr>
<td>B</td>
<td>14,000</td>
<td>0.5</td>
</tr>
<tr>
<td>C</td>
<td>8,750</td>
<td>0.8</td>
</tr>
</tbody>
</table>

Set 2: Cost of each investment is Shs.10,000

<table>
<thead>
<tr>
<th>Investment</th>
<th>Returns(Shs)</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>40,000</td>
<td>0.7</td>
</tr>
<tr>
<td>G</td>
<td>280,000</td>
<td>0.1</td>
</tr>
<tr>
<td>H</td>
<td>70,000</td>
<td>0.4</td>
</tr>
</tbody>
</table>
Set 3: Cost of each investment is Shs. 20,000

<table>
<thead>
<tr>
<th>Investment</th>
<th>Returns (Shs)</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>75,000</td>
<td>0.6</td>
</tr>
<tr>
<td>M</td>
<td>150,000</td>
<td>0.3</td>
</tr>
<tr>
<td>N</td>
<td>50,000</td>
<td>0.9</td>
</tr>
</tbody>
</table>

Set 4: Cost of each investment is Shs. 30,000

<table>
<thead>
<tr>
<th>Investment</th>
<th>Returns (Shs)</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>630,000</td>
<td>0.1</td>
</tr>
<tr>
<td>Y</td>
<td>70,000</td>
<td>0.9</td>
</tr>
<tr>
<td>Z</td>
<td>126,000</td>
<td>0.5</td>
</tr>
</tbody>
</table>

(2) If you made decisions as a private individual dealing with your own funds and not as a corporate decision maker, would your answers have remained the same for set:

   No  No  No  No

SECTION B

(1) Your company is faced with the alternative courses of action given below. All the outcomes will occur once and for all, and at the same time in the near future. Opportunities not accepted now will be lost.

Indicate in each case by marking (x) in the appropriate box, the course of action you would actually choose for your company. There are no wrong answers.

1. Your company owns the right to an investment which gives it a return of Shs. 12,000 with probability of 0.5 or no returns with probability of 0.5. Should the company sell the right for Shs. 6,000 or it should retain it?
   Sell  Retain
2. The problem facing your company is to decide whether to invest in machine A or machine B. Both cost the same. Machine A will yield an income of Shs.10,000 with probability of 0.3. Machine B will produce a saving that is certain of Shs.6,000. Which would you recommend?

☐ Machine A ☐ Machine B

3. Your company is faced with two choices. The first is to employ a certain amount of manpower in developing a new plant layout. You are certain that this would result in a net income of Shs. 100,000. The second alternative is to commit the same manpower to making a bid with probability of 0.6 of earning Shs.300,000 or no income with probability of 0.4. Which would you recommend?

☐ Develop the plant layout ☐ Make a bid.

4. Your company is faced with a problem of choosing either portfolio p or q. Portfolio p will give a return of Shs.45,000 with 0.5 chance or Shs.0 with 0.5 chance. Portfolio q is certain to give a return of Shs.10,000. Which portfolio would you choose?

☐ P ☐ q

5. Your company owns the right to an investment which gives it either no return with probability of 0.5 or a return of Shs.144,000 with probability of 0.5. Should the company sell the right for Shs.72,000 or it should retain it?

☐ Retain ☐ Sell

6. Your Company is faced with two choices. The first is to commit a certain amount of manpower to making a bid with probability of 0.4 of earning no returns or probability of 0.6 of earning Shs.15,000. The second alternative is to employ the same manpower in developing a new plant layout. You are certain that this would result in a net income of Shs.5,000. Which would you recommend?

☐ The first alternative ☐ The second alternative
7. Your company is faced with a problem of whether to invest in machine X or machine Y. You are certain that machine X will earn income of Shs.54,000. Machine Y will earn income of Shs.90,000 with probability of 0.7 or no income with probability of 0.3. Both the machines cost the same. Which do you recommend?

[ ] Machine X  [ ] Machine Y

8. Your company is faced with a problem of choosing either portfolio S or T. Portfolio S is certain to give a return of Shs.110,000. Portfolio T will give a return of Shs.495,000 with 0.5 chance or Shs.0 with 0.5 chance. Which portfolio would you choose?

[ ] S  [ ] T

(2) If you made decisions as a private individual dealing with your own funds and not as a corporate decision maker, would your answers have remained the same in question:

1. [ ] Yes  2. [ ] Yes  3. [ ] Yes  4. [ ] Yes
   [ ] No  [ ] No  [ ] No  [ ] No

5. [ ] Yes  6. [ ] Yes  7. [ ] Yes  8. [ ] Yes
   [ ] No  [ ] No  [ ] No  [ ] No

SECTION C

Indicate by marking (X) in the appropriate box the response that represents as accurately as possible your feeling about each of the following statements:

1. Investment decisions will be improved if risk involved in investments is taken into account.
   [ ] Disagree  [ ] Disagree  [ ] Neutral  [ ] Agree  [ ] Agree strongly
2. Individual's decisions involving risky investments reflect adequately his/her attitude toward risk.

☐ Disagree  ☐ Disagree  ☐ Neutral  ☐ Agree  ☐ Agree strongly

3. Measuring risk does not make sense.

☐ Disagree  ☐ Disagree  ☐ Neutral  ☐ Agree  ☐ Agree strongly

4. If I were to invest in a firm, I would seriously consider the riskiness of its returns.

☐ Disagree  ☐ Disagree  ☐ Neutral  ☐ Agree  ☐ Agree strongly

5. Given investment opportunities, I would always venture into new investments.

☐ Disagree  ☐ Disagree  ☐ Neutral  ☐ Agree  ☐ Agree strongly

6. People should be selected for employment as managers on the basis of their attitudes towards risk.

☐ Disagree  ☐ Disagree  ☐ Neutral  ☐ Agree  ☐ Agree strongly

SECTION D

(1) Indicate by marking (X) in the appropriate box, how you found the exercise to be

<table>
<thead>
<tr>
<th>Very Difficult</th>
<th>Difficult</th>
<th>Fair</th>
<th>Easy</th>
<th>Very Easy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section B</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(2) In making decisions, I considered: (Mark one).

What I would actually do
What I felt I should do
What I was expected to do
(3) I made decisions on the basis of personal judgement and not on criteria I know in making investment decisions. (Mark (X) in the appropriate box to indicate your feeling about this statement)

<table>
<thead>
<tr>
<th>Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Agree strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SECTION E

(1) (a) Have you worked in any organisation?

- Yes
- No

(b) If you answered Yes,

(i) Name the organization(s) that employed you ...

(ii) You worked for _______ Month(s) _______ Week(s)

(2) (a) Have you ever made any investment decision in real life?

- Yes
- No

(b) (i) If you answered Yes, what did the decision involve?

(ii) State the consequences of your decision.

(3) (a) Have you made any investment?

- Yes
- No
(b) If you answered yes, name the investment

........................................................

........................................................

(4) Do you receive any additional money other than your termly allowance?

☐ Yes ☐ No

(5) Indicate by marking (X) in the appropriate box how your performance has been in each of the following subjects:

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Excellent</th>
<th>Good</th>
<th>Average</th>
<th>Poor</th>
<th>Very Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finance</td>
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<tr>
<td>Accounting</td>
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<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

(6) My age is ________________ Years.

(7) Sex: Male ____________ Female ____________

(8) Marital status: Single ____________ Married ____________

Other ____________

(9) Residence in University halls of residence:

Resident ____________ Non-resident ____________
BIBLIOGRAPHY


