A Discriminant analysis of The Willingness to Take Risk of Lebanese Bank Managers

A DISCRIMINANT ANALYSIS OF THE WILLINGNESS TO TAKE RISK OF LEBANESE BANK MANAGERS

A Research Topic
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By

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The follwoing professors nominated to serve as the advisor of the above candidate has approved his research work.

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For my mother,

For her encouragement and support.

CHAPTER I

Introduction.

General Background

Risks are an important part of everyone's life. Some risks such as natural disasters are dramatically obvious, and they affect many people. Volcanoes and earth quakes can destroy entire communities in minutes. Other risks are more personal. Working in a polluted environment or borrowing money are everyday risks that most of us face. In many situations, our choices do not just affect us, they affect many other people. Business and government decisions can influence the risks faced by thousands or millions of others. Risk is a pervasive part of all actions. Although death is the ultimate risk, the economic and social risks that we face can be more oppressive. Secure jobs may disappear in economic hard times. Life requires choices, choices require risks. While one can choose to minimize the risks he faces, he cannot avoid risks completely. Risk is one of the certainties of life. Perhaps the best definition of risk taking is that it is the difference between your reach and your grasp.[1]

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1. Byrd E. Richard, "A guide to personal risk taking", (London: Irwin-Dorsey Int., 1978) p. 10.

Stated in other words, "risk is the uncertainty with respect to gain or loss for any person or company toward a particular opportunity."[2] However, the actual or perceived grasp of the individual plays a great part in determining the risk level of any given opportunity. In general, avoiding one kind of risk will introduce some other risk. Some actions appear to be free of risk. Suppose someone invests his life savings in a "risk-free" savings account insured by the government instead of entering in a business venture. Although this action seem to have predictable outcome, it has risk of its own. Several years after putting the money into the saving account, it provides little security because of rampant inflation. Investing in a business venture would have provided better security against changes in the price level. Thus even apparently riskless actions have risks associated with them due to unforseen events or changes in prespective. We sometimes think that by not taking an action we can avoid risk. However, by avoiding this risk we could be losing the opportunity to improve our status. Not only can risks not be totally avoided, but most individuals seek risks in at least some

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2. Ibid, p. 12.

aspects of their lives. Uncertainty about outcomes of virtually all important activities provides the excitement as well as creating the anxiety that worries. People play the stock market, and they gamble partly because of the stimulation that accompanies the risk. Success itself increases risks as we discover whether we can handle the new oppotunities that become available. We must face risks in all aspects of our lives and in the many roles we play. We face personal risks that are financial, physiological, medical, social and so forth. We expose ourselves to personal financial risks in several ways. We can hold too many of our assets in investements that have a chance of major losses. We can hold too great a share of these assets as highly levered investemnts that are subject to the control of creditors. Setting high goal can also involve social risks which result in negative consequences if we fail to meet them. Most business decisions involve tradeoffs that lead to different risks for employees stockholders, consumers, suppliers, and management.

Need for the study.

Most of us hold stereotyped views such as these about who does, and who does not, take risks.

Sometimes these views are based on observations of those around us. Sometimes they are based on logic. A study such as the one conducted here is recommended by experts in the field of statistical analysis for decision making. MacCrimon and Wehrung who presented in their study in 1986 a model on risk taking and personl characteristics concluded that differences in risk propensity between different nationality groups may exist.[3] In this study, although it illustrate the relationship between risk and a number of personal and financial characteristics in the lebanese community, it would be in the interest of the researcher to highlight the differeces, if any, in risk propensity between an arab community -lebanese- and the western community.

Purpose of the study

The purpose of this study is to analyze the relation between personal and/or financial characteristic and the willingness to take risk.

The emphasis will be on constructing a discriminant function analysis to determine if the risk propensity - or the willingness to take risk - of

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3. MacCrimon and Wehrung, Taking risk, (NewYork: The Free Press, a division of Macmillan, Inc., 1986), p. 251.

one person is different from another.

Research Questions and Hypothesis:

This piece of research will try to answer different questions and test different Hypothesis. Among the questions tackled are:

1. How can one classify the banks managers included in this study and other banks manager in general into risk averters and risk takers?
2. Do managers take more risk in their business decisions rather than in their personal ones?

Among the research hypothesis tested are :

1. The younger the manager is, the higher his willingness to take risk is.
2. Managers with higher income are more willing to take risk than managers of lower income.
3. The willingness to take risk is greater when manager have postgraduate education.
4. Managers with business specialization are more willing to take risk than managers with different specialization.

Limitation of the study

The willingness to take risk or the risk propensity of a person could be measured in many different

ways. For instance, risky assets, debt ratio, self insurance, resignation and many others could be used as indicators of a person's willingness to take risk. However, this researcher chose a personl gamble situation and a business gamble one to measure the willingness to take risk of managers.

CHAPTER II

Review of Literature

The concept of risk taking has played a central role in psychological research during the past years. Somewhat less attention has been paid to individual differences in risk taking, including relationship to age. Age is a frequently used variable in psychological research and its relationship to a large number of diverse behaviors has always been under study. But little is known about age and risk taking, particularly among mature adults. In one of the few studies dealing with this question, Wallach and Kogan (1961) compared risk-taking behavior on their choice-dilemma tasks of college age and elderly men and women. The older both males and females, were found to be significantly more conservative than the college students. They attribute the observed differences to the financial anxieties that affect the aged in the society.

A short version of Kogan and Wallach's choice-dilemma test was administered to 1,484 managers from over 200 companies. This study was conducted by Victor H. Vroom and Bernd Pahl in 1971. The age of

the sample was approximately normally distributed with a mean of 39.34 yr., a standard deviation of 6.79yr., and a range of 22-59 yr. Risk taking was measured by using a subset of the standard Kogan and Wallach (1964) choice dilemma questionnaire.[1] This subset questionnaire consists of the following situations, all concerned with a safe, certain outcome versus a more desirable, riskier alternative:

1. A married engineer has to decide between a safe secure job and a fledgling company that offers more responsibilities ans advancement.
2. The captian of a college football team has to decide between a sure play to tie the arch rival, or a risky play to win.
3. A chess player is faced with a deceptive, risky maneuver that could expose him to certain defeat.
4. A prisoner of war is contemplating escape, knowing he will be executed if he is caught.
5. A research physicist has to decide between research topics that would be either plodding and sure or risky and uncertain.

Managers were tested in groups ranging in size from

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1. Vroom H. Victor and Pahl Bernd, "Relationship between age and risk taking among managers", Journal of applied psychology, vol. 55, p. 399.

20 to 60 participants. Each manager was given a booklet containing the five problems and an answer sheet on which to record his responses. He was asked to indicate the minimum probability alternative for each problem. Responses to each item were to be chosen from the odd numbers 1, 3, 5, 7, 9, representing the chances out of 10 that the risky alternative would be successful. If a respondant indicated that he would not choose the risky alernative regardless of its probabilities of success, his response was scored 10.

In addition, each manager was asked to estimate whether the average participants in his group would respond with higher number to an item (i.e, they would be more conservative) or lower number (i.e, they would be riskier). If he believed that others would be more conservative than he was on an item, he indicated this with a plus following his own reponse; if he believed that others would be riskier, he indicated this with a minus following his own response. Those who believed that their response was at the average were instructed to record no sign.

The results show a significant relationship between age and measures of both risk taking and the value

placed on risk.[2] The relationship are small in size (although highly significant) when individual scores are correlated with age but increase markedly when mean score are used.

What kind of mechanisms underlie or might underlie these findings? Vroom and Paul argue that one possiblity is that the regression line relating age to risk-taking constitutes a developmental track along which people move as they increase in age. As a person gets older, he gets married, has children, and acquires responsibilities to persons other than himself that operate against his taking risks that he might well have taken earlier in his development. It is also possible that the explanation is not developmental at all, but cultural. The younger a person, the less likely he is to have experienced the depression, and the more likely he is to have been reared in an atmosphere of affluence and economic stability. According to this explanation, risk taking is a relatively stable attribute of personality that is learned fairly early in life with the sociocultural conditions prevalent at that time being instrumental in its determination. The points along the regression line do not constitute a

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2. Ibid, p. 404.

track along which people move but rather, indications of sociocultural change. Each age group is moving along its own track.

These explanations are not, of course, mutually exclusive. Both processes of development of sociocultural change may underlay the relationship of age to risk taking.

Another study conducted by Richard A. Cohn, Wilbur G. Lewellen, Ronald C. Lease, and Gary G. Scghlarbaun in may 1975 attempts to investigate empirically the effect of wealth on the proportions of individual portfolios allocated to risky assets.[3] While theories of portfolio selection have been developed, very little is known about how individuals actually go about constructing their asset portfolios. This study was part of a continuing investigation into the characteristics and behavior of the individual investor. It was based on data obtained by means of a mail questionnaire survey among customers of a large nation-wide (U.S.A.) retail brokerage firm. The survey was

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3. Cohn A. Richard, Lewellen G. Wilbur, Lease C. Ronald, and Schlarbanm G, Gray, "Individual investor risk aversion and investment portfolio composition", Journal of France, 1975, vol XXX, No. 2, p. 605.

conducted among 2506 accounts randomly selected according to a geographical stratification from the population of accounts of the firm which had been open continuously during the period from January 1, 1964, through December 31, 1970. 972 usable replies were recieved from investors who had at least one common stock transaction during that seven-year period.

The questionnaire sought information on both demographic characteristics and investment attitudes. Included among the demographic variables were age, sex, marital status, family size, income, asset holdings, education and occupation. The sample is more heavily male, wealthier, and older than the general U.S. population. It also is highly educated. Seventy seven percent of the subjects had at least some college training, and fifty four percent had at least one degree. Of those who were employed, the cast majority fell into either the professional / technical or the managerial classifications. Thirty two percent were not employed. The questionnaire was a lengthy one. More than one hundred items were the subject of inquiry. Information was elicited with respect to security market beliefs, investment decision processes and goals, and asset holdings. In

particular, the respondents were asked to report, to the nearest $ 100, the market value of their holdings in a number of mutually exclusive major asset categories. These latter data provide the raw material for the study, which treats the percentage of the portfolio invested in risky assets as the dependent variable. Of the 972 usable questionnaires in the total sample, 588 provided complete portfolio allocation information. That subsample was used as the focus of the investigation. Demographic data indicate that the subsample is representative of the total sample. As indicated by the divergence between mean and median holdings, distribtions of holdings of many asset categories were skewed positively. An "adjusted" mean value of holdings is also presented based on removing extreme observations, these defined as above or below the original mean by more than two standard deviations. The percentage of the sample having zero holdings is indicated for each category.

The selection of a proxy for the proportion of wealth invested in risky assets, of course, is a delicate matter. Basic concepts must be clearly defined for rigorous results of obtain. Financial economics is no exception, and the notion of the

"riskless asset" has been an important one in the development of modern capital market theory. But it is difficult in real world terms to designate in general a particular asset or asset category as truly "riskless". Empirical work in finance, especially with respect to tests of capital market theory, has often employed short-term Treasury Bills as a surrogate for the riskless asset, but those securities are not fully satisfactory since they are not a complete hedge against changes in the absolute price level, and they provide no protection against unanticipated changes in the relative price vector. Other asset types suffer still more by comparison. Even default-free long-term bonds are riskless in nominal terms only if the investor's time horizon corresponds precisely to their maturity.

The important question, however, is not so much whether an asset is riskless, but whether the individual in his portfolio planning regards the stream of benefits the asset provides as free of relevant uncertainty. Thus, the argument would be that any classification is again an impirical issue. For that reason, the designations in the study were arrived at largely on an intuitive basis, with the ambiguities about appropriate definitions resolved

by establishing two alternative classifications for long-term fixed-income securities. Classifications # 1 treats government bonds, corporate bonds, and preferred stock as risky assets; Classification # 2 regards them as riskless. Although the logic of the two classification schemes is transparent, some comments are in order. While options such as warrants, puts, and calls can be used to reduce the risk of an asset portfolio, they generally appeared in other questionnaire responses to serve the opposite purpose for the members of the sample, and they comprised a very small fraction of the asset totals in any case. The "nonfinancial" assets - personal residence and other personal property- were treated as riskless because of the relatively low uncertainty of the real stream of benefits they provide.

Two seperate measures of aggregate wealth were also employed. One treated total assets as wealth (Defintion # 1). The other treated wealth as total financial wealth, that is, total assets less personal residence and other personal possessions (Definition # 2). Thus, four measures of the dependent variable - the percentage of each investor's wealth invested in risky assets - are

available.

The results reported in the study concentrate on the definition based on classification # 2 of asset categories and definbition # 1 of wealth, but these results are quite similar to those obtained using the other three definitions, a condition which perhaps indicate the reasonableness and internal consistency of the four measures.

One of the questions asked of the survey respondents had to do directly with their risk preferences. They were requested to indicate, on a scale from one to five - ranging from "strongly disagree" to strongly agree" - their reaction to the following statement: "I like to take substantial financial risk to realize significant financial gains from investments." The definition of the percentage of assets invested in risky instruments that evidenced in a cross-tabulation the most regular and systematic relationship to the responses to the "risk preference" question was that based on Calssification # 2, Definition # 1. Stepwise linear regressions were performed using the percentage invested in risky assets as the dependent variable, and demographic variables as candidate independent variables.

The results were, statistically speaking, significant. The following equation exemplifies those findings:

$$Y = \underset{(5.16)}{33.5} + \underset{(.03)}{.20\ X_1} + \underset{(.08)}{.36\ X_2} - \underset{(2.6)}{11.2\ X_3}$$

$$R^2 = .10$$

Where Y is the percentage of the individual's portfolio invested in risky assets; X_1 denotes income in thousands of dollars; X_2 is age in years; and X_3 is a dummy variable representing marital staus, taking on the value of zero if the individual is single and one if he or she is married. The numbers in parantheses are the standard errors of the regression coefficientrs. The low coefficient of determination is understandable, given the nature of the sample and the underlying process. One would expect a large household sample to exhibit a substantial amount of "noise" with respect to their specific individual portfolio decisions. A number of problems also arose in interpreting such results. The linearity assumption of least-square regression was blatantly violated, and there was evidence of heteroscedasticity. That is, married individuals appear to invest smaller proportions of their portfolio in risky assets than do single individuals, other things being equal. Wealth and

income were, not surprisingly, highly correlated (positively), and regressions in which wealth was substituted for income as an independent variable produced results similar to those portrayed.

Another study was conducted by Kenneth R. MacCrimon and Donald A. Wehrung 1986 from the faculty of Commerce and Business Administration in the University of British Columbia, Canada.[4]. This piece of research studied the relationship between risk and a number of personal, financial and business characteristics. The representative measure of risk propensity is the percentage of personal assets held in risky categories. Thus, in discussing the relationship between risk propensity and a characteristic such as managerial position, the study describes the relationship between a manager's position and his holding of risky assets. Commodity furures, Business ventures, Long/short stock, Common stock and Mutual funds were considered "Risky" categories; whereas Real estate, Saving Accounts and other assets were considered "safe" categories. There are many personal, financial, and abusiness characteristics that could be related to

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4. MacCrimon R. Kenneth and Wehrung A. Donald, "Taking risks", (NewYork, The free press, a divison of Macmillan Inc., 1986).

risk. This study focus on four personal characteristics: age, dependents, education, and nationality. It highlights two financial characteristics: wealth and income. Then it considers five business characteristics: position, authority, seniority, firm size, and industry. MacCrimmon and Whrung used two forms of mulivariate analyses: multiple regression and discriminant analysis. The conclusions reported here are those based on the discriminant analysis.

When the researchers looked at the effect of age by itself, older managers were not more risk-averse in terms of the focal maesure of risk (i.e, the holding of risky assets). When they took other factors into account, however, they did find a negative relationship between age and risk. This means that when they controlled for factors related to age. such as dependents or position, older managers did have a tendency to be more risk-averse.

The researchers found that managers with fewer dependents took more risk; people with more dependents took less risk. As may be expected managers with more dependents put a higher proportion of assets in relatively safe categories such as housing. When they held other

characteristics constant, the negative relationship between risk and dependents became even stronger. This confirms that what is observed is really the effect of differences in dependents rather than some other factor, However, the researchers argue that implications should be made with some caution, until the effect of the number of dependents is more clear-cut. If subsequent studies do confirm that mangers with more dependents tend to be more risk-averse, then the conclusion of the effect of the number of dependents on risk taking arrived at in this study would be more reliable. Among the managers taken in this study, there was a significant positive relationship between education and risk. Managers who had postgraduate training were higher risk takers than managers with less education. Managers with a bachelor's degree, though, were not more risk-taking than high school graduates. When all the personal characteristics were taken into account, the positive relationship between education and risk was confirmed. Higher education seems to promote risk taking rather than deterring it.

This study includes a comparison between American managers and Canadian ones. Although the researchers

found no significant diffrence in risk propensity between them, there may be differences between other nationality groups.

As for financial characteristics the study found that managers with higher wealth did take more risk. Managers with higher wealth held a significantly greater percentage of their wealth in risky assets. However, this study cannot tell whether people were risk takers because they were wealthy or whether they were wealthy because they were risk taker; In other words, the study does not mean to imply a causal direction.

The study found on extremely strong positive relationship between income and risk (as measured by the holding of risky assets). Managers with higher incomes took more risks.

As for Bankers, the researchers found that they were much more risk-averse than any of the other industry groups (venture capital, primary, manufactering, and chemical/pharmaceutical).

Based on review of literature, one may conclude that there was no attempt to study the relationship between risk and a number of personal and financial characteristic in the lebanese community.

Moreover, this researcher believes that it is

important to conduct such study, and if this piece of research doesn't yield dramatic results, it will at least points to a more sophisticated approach to analysis of characteristics of risk attitude of managers.

CHAPTER III

Procedures & Methodology

Description of the population of the study and sample selection

The population of this study includes all"branch managers" in the banking sector in the regions of Cheka, Batroun and Tripoli in North Lebanon.

A list of the banks - currently in operation - in Cheka, Bartroun and Tripoliwas obtained from ALMANACH.[1] The list includes fourty seven banks - thirty six banks in Tripoli, seven banks in Cheka and four banks in Batroun. For the seek of our study we took the fourty seven banks as our sample. In each bank there is one branch manager, thus we have fourty seven managers. However, only fourty two managers replied.

The choise of North Lebanon was mainly for two reasons:

a. Due to the dramatic situation prevailing in the country.

b. A pilote study was first conducted on managers from the banking sector in West Beirut and the

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1. Association des banques du Liban, ALMANACH des banques au Liban, 1988-1989.

results were not satisfactory.

In the pilot study conducted by this researcher on managers in West Beirut, the willingness to take risk was measured by the percentage of assets held in risky categories. Two categories of assets were established:

a. Risk safe category: It included real estate, land, saving account.

b. Risky category: it included common stocks, business venture and involvement in exchange rate operations for capital gains purposes.

Nevertheless, the results were unsatisfactory.

Description of the selected variables and their measurement.

The variables include nine independent variables and two dependent variables.

The independent variables are:

1. Age: measured by the number of years.
2. Martial status: measured by the number of dependents.
3. Education: measured by the number of degrees the manager holds.

5. If the manager has a business degree or not.

6. Total income from employment and outside income, measured in amount of $; with 1 $ = 556 L.L..[2]

7. Wealth which is gross assets less liabilities measured in amount of $.

8. Religion.

9. Seniority: measured by number of years of experience.

The dependent variables are:

1. Multiple of net wealth. The manager is faced with a Personal investment Gamble (defined in appendix A). The standardized situation showed that the risk-neutral response for the personal gamble was 1.5 times net wealth.[3] If his answer (the manager's answer) is a number greater than 1.5 then he is a risk averter. If the number is less than 1.5 he is a risk taker.

2. Multiple of usual rate of return. The manager is faced with a Business investment Gamble

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2. 1$ = 556 L.L., An Nahar 2/4/1990 (Department of exchange and relations, banque du Liban)

3. MacCrimon R. Kenneth and Wehrung A. Donald, Taking risk, , p. 281).

(defined in appendix A). The standardized situation showed that the risk neutral response for the Business Gamble was 2.0 times the usual rate of return in the business gamble.[4]

Description of all measures used to collect data.

A questionnaire is designed (see appendix A) to collect all the required data. A meeting with each manager is held and a brief idea is presented to him about the purpose of the research study.

Instrumentation.

Through a review of literature, and informal discussions with different managers, the researcher constructed the instrument shown in appendix A.

Data analysis.

The relationship between the independent and dependent variables is analyzed by using the process of elaboration. Elaboration of variables is limited to cross-tabulation of two variables at a time. In addition, multipile discriminant functions and frequency variation methods were used for analysis of data.

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4. Ibid, p. 281.

CHAPTER IV

Findings of The Study

Description and interpretation of major findings. The findings of the study are presented and discussed in chapter IV under four sections. The first section describes the major characteristics of the selected sample. The second section analyzes the relationship between two variables using the Chi-square test for independence. It is important to mention at this stage that the preceeding two sections are the main interest of this research study. In the third section multiple discriminant function analysis is used to determine the relative importance of the independent variables to differentiate the groups of managers into risk takers and risk averters. In the last section the findings of this study are related to the findings of the previous research.

Major characteristics of the selected sample:

The selected sample of the study is described according to the following independent variables:

X_1 is age.

X_2 is number of dependents (# of Dep).

X_3 is Religion.

X_4 is education.

X_5 is majoring in business or not business (Bussn or not).

X_6 is income from employment (Income 1).

X_7 is income from sources other than employment (Income 2).

X_8 is Wealth.

X_9 is Seniority.

Dependent variables included in this study were two:

X_{10} is personal risk in a personal gamble situation (Perl gamble).

X_{11} is business risk in a business gamble situation (Bussn gamble).

Frequency distribution and various summary statistics will be relied upon to reveal the underlying distributional characteristics.

Examination of the frequency distribution was necessary for this researcher to ensure that each variable has sufficient variability to be used in subsequent relational analysis. Furthermore, it enabled this researcher to check the validity of the data to ensure that it has been coded and input in

the computer to the desired specification.

Age is divided into 3 categories:

- category 1 from "33 to 42" years.
- category 2 from" 43 to 49" years.
- category 3 from "50 to 58" years.

Table 1.1 reveals that the average age is around 47 years. The negative value for the measure of skewness indicates that the distribution is negtively skewed, i.e. The observations are clustered to the right of the mean with most of the

The age distribution of the banks managers

TABLE 1.1

AGE	VALUE	FREQUENCY	PERCENT
33 TO 42	1	13	31.0
43 TO 49	2	14	33.0
50 TO 58	3	15	35.7
TOTAL	-----	42	100

MEAN	MODE	KURTOSIS	SKEWNESS
46.262	40.00	- .869	- .175

exterem values to the left. The negative value for the Kurtosis indicates that the distribution is less peaked than would be true for the normal distribution.

Table 1.2 reveals that 13 managers (31.0%) of the fourty two had only a secondary education while tewnty nine managers (69.0%) had university

The education distribution of banks managers

TABLE 1.2

EDUCATION	VALUE	FREQUENCY	PERCENT
BACC.	0	13	31.0
BA & MS	1	29	69.0
TOTAL	-------	42	100

MEAN	MODE	KURTOSIS	SKEWNESS
.690	1.000	- 1.335	- .855

education. A distribution of the selected sample of managers by their specislization whether business or

otherwise is revealed in Table 1.3, twenty four of the fourty two managers or (57.1%) were specialized in a business major while eighteen (42.9%) were specialized in a field other than business.

The specialization distribution of banks managers

TABLE 1.3

BUSSN. OR NOT	VALUE	FREQUENCY	PERCENT
BUSSN.	0	24	57.1
NOT BUSSN.	1	18	42.9
TOTAL	-----	42	100

MEAN	MODE	KURTOSIS	SKEWNESS
.429	0.0	- 2.008	.299

Table 1.4 illsutrates that thirtenn managers out of fourty two (31.0%) had an income 1 that ranges between $ "270 and 320" per month while fourteen managers out of fourty two (33.3%) had an income 1

that ranges between $ "330 and 400" per month and fifteen managers out of fourty two (35.7%) had an income 1 that ranges between $ "410 to 450' per month.

TABLE 1.4

INCOME 1	VALUE	FREQUENCY	PERCENT
270 LT $ 320	1	13	31.0
320 LT $ 400	2	14	33.3
400 LT $ 450	3	15	35.7
TOTAL	------	42	100

MEAN	MODE	KURTOSIS	SKEWNESS
367.857	400.0	- 1.386	- .220

Table 1.5 reveals that twelve managers out of fourt two (28.6%) had an income 2 that ranges between $ "1000 and 1500" per year. Sixteen managers out of fourty two (38.1%) had an income 2 that ranges between $ "1600 to 2200" per year. Fourteen managers

out of fourty two (33.3%0 had an income 2 that ranges from $ "2300 to 3900".

The income 2 distribution of banks managers

TABLE 1.5

INCOME 2	VALUE	FREQUENCY	PERCENT
1000 LT $ 1500	1	12	28.6
1500 LT $ 2200	2	16	38.1
2200 LT $ 3900	3	14	33.3
TOTAL	------	42	100

MEAN	MODE	KURTOSIS	SKEWNESS
2066.667	1600.0	- .287	.872

Table 1.6 indicates that nine managers (21.4%) out of fourty two had a wealth that ranges between $ "35000 anf 42000" while sixteen managers out of fourty two (38.1%) had a wealth between $ "43000 and

55000" and seventeen managers out of fourty two (40.5%) had a wealth that ranges between $ "56000 and 78000".

The wealth distribution of banks managers

TABLE 1.6

WEALTH	VALUE	FREQUENCY	PERCENT
35000 LT $ 42000	1	9	21.4
42000 LT $ 55000	2	16	38.1
55000 LT $ 78000	3	17	40.5
TOTAL	-----	42	100

MEAN	MODE	KURTOSIS	SKEWNESS
53976.19	35000	- 1.089	.259

Table 1.7 reveals that fifteen managers (35.7%) out of fourty two had a work experience that ranges

between ten to fiftenn years; twenty seven managers out of fourty two (64.3%) had a work experience that ranges between sixteen and twenty four years.

The seniority distribution of banks managers

TABLE 1.7

SENIORITY	VALUE	FREQUENCY	PERCENT
10 TO 15	1	15	35.7
16 TO 24	2	27	64.7
TOTAL	------	42	100

MEAN	MODE	KURTOSIS	SKEWNESS
17.548	14.0	-.991	- .071

A distribution of the selected Bank Managers according to their sttitude toward taking personal risk is pointed out in Table 1.8.

The respondents were broken into three categories. Twelve managers out of fourty two (28.6%) were risk

takers in the personal gamble situation. Two managers (4.6%) were risk neutral and twenty eight managers (66.7%) were risk averters.

TABLE 1.8

PERL GAMBLE	VALUE	FREQUENCY	PERCENT
1.0 TO 1.4	1.0	12	28.6
1.5	2.0	2	4.8
1.6 TO 3.0	3.0	28	66.7
TOTAL	--------	42	100

MEAN	MODE	KURTOSIS	SKEWNESS
1.850	1.20	-.968	.287

With respect to the business gamble situation, Table 1.9 indicates that twenty four managers out of fourty two (57.1%) were risk takers while two

TABLE 1.9

BUSSN GAMBLE	VALUE	FREQUENCY	PERCENT
1.1 TO 1.9	1.0	24	57.1
2.0	2.0	2	4.8
2.1 TO 2.9	3.0	16	38.1
TOTAL	-------	42	100

MEAN	MODE	KURTOSIS	SKEWNESS
1.871	1.10	- 1.052	.236

mangers (4.8%) were risk neutral and sixteen managers out of fourty two (38.1%) were risk averters.

Table 1.10 reveals that 47.6% of the total number of managers (42) have a number of dependents that

ranges between 0 and 4 while 52.4% have a number of dependents that ranges between 5 and 9.

The # of dependents distribution of banks managers

TABLE 1.10

# OF DEPENDENTS	VALUE	FREQUENCY	PERCENT
0 TO 4	0	20	47.6
5 TO 9	1	22	52.4
TOTAL	------	42	100

MEAN	MODE	KURTOSIS	SKEWNESS
4.643	3.000	-.813	- .108

Table 1.11 shows that 19.0% out of 42 managers are Christain while 81.0% out of 42 managers are Muslem.

The religion distribution of banks managers

TABLE 1.11

RELIGION	VALUE	FREQUENCY	PERCENT
CHRISTIAN	0	8	19.0
MUSLEM	1	34	81.0
TOTAL	------	42	100

MEAN	MODE	KURTOSIS	SKEWNESS
.810	1.000	.706	- 1.635

In Chapter I, a research question was posed:

Do managers take more risk in their business decisions rather than in their personal ones?

It is clear that with reference to pages 106 and 107 of the PC output managers took more risk in their business gamble decision (57.1%) rather than in

their personal gamble decision (28.6%) One can argue in explaining this attitude that in a business decision the risk involved may be spread over a larger number of persons or units.

Analysis of the relationship between variables using Chi-square test for independence:

With respect to the relationship between age and attitude toward taking risk, a research question is posed:

> Does age exert influence on the managers attitude toward taking risk?

The research hypothesis formulated in chapter I was:

> the younger the manager is, the higher his attitude is toward taking risk.

To answer the research question posed above, the following null and alternative hypothesis were formulated:

> H^o: There is no difference between young and old managers toward taking risk.
>
> H^1: The observed difference between young and old managers towards taking personal risk was not due to chnance, but rather is influenced by age.

Table 2.1 shows that the relationship between age and the willingness to take risk is statistically

significant (.0001) suggesting that attitude toward risk depends to an extent on age; Moreover, ten out

The relationship between age and perlgamble

1/1/80

e 30 SPSS/PC+

sstabulation: X10 PERL GAMBLE
By X1 AGE

Table 2.1

X1-> Count / Col Pct	33 TO 42 (1)	43 TO 49 (2)	50 TO 58 (3)	Row Total
1.0 RISK TAKER	10 / 76.9	2 / 14.3	.	12 / 28.6
2.0 RISK NEUTRAL	1 / 7.7	1 / 7.1		2 / 4.8
3.0 RISK AVERTER	2 / 15.4	11 / 78.6	15 / 100.0	28 / 66.7
Column Total	13 / 31.0	14 / 33.3	15 / 35.7	42 / 100.0

hi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
24.96429	4	.0001	.619	6 OF 9 (66.7%)

mber of Missing Observations = 0

---

of thirteen managers that belong to the "young" category (33 to 42) are risk takers while 100% and 78.6% of the risk averters belong to the "old" and

"middle" age categories respectively.

With respect to income, the resaerch question addressed is :

Does the level of income affects the mangers' attitude towards taking risk?

The research hypothesis which was formulated in chapter I was that:

Managers with high income are more risk takers than managers with low income.

To answer the reseach hypothesis stemming from the research question, the following statistical hypothesis were formulated:

H^o: The decision to take personal risk is independent of the level of income.

H^1: The decision to take personal risk depends on level of income of managers.

To determine whether or not a relationship exists between the two variables, the Chi-Square test for independence was used. Tables 2.2 and 2.3 respectively are a two by two contingency tables because it accounts for combinations of the factors being investigated - in other words, for all contingencies. The data are calculated by percentages computed by column. The reason for this approach is the fact that the calculated percentages

Page 63 SPSS/PC+ 1/1/80

Crosstabulation: X11 BUSSN GAMBLE
By X6 INCOME1

Table 2.2

X11 / X6-›	Count / Col Pct	$270 LT 320 (1)	$320 LT 400 (2)	$400 LT 450 (3)	Row Total
1.0 RISK TAKER		13 / 100.0	10 / 71.4	1 / 6.7	24 / 57.1
2.0 RISK NEUTRAL			1 / 7.1	1 / 6.7	2 / 4.8
3.0 RISK AVERTER			3 / 21.4	13 / 86.7	16 / 38.1
Column Total		13 / 31.0	14 / 33.3	15 / 35.7	42 / 100.0

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
27.52917	4	.0000	.619	4 OF 9 (44.4%)

Number of Missing Observations = 0

Page 66 SPSS/PC+ 1/1/80

Crosstabulation: X10 PERL GAMBLE
By X7 INCOME2

Table 2.3

X10 / X7-›	Count / Col Pct	$1000 LT 1500 (1)	$1500 LT 2200 (2)	$2200 LT 3900 (3)	Row Total
1.0 RISK TAKER		9 / 75.0	3 / 18.8		12 / 28.6
2.0 RISK NEUTRAL		1 / 8.3	1 / 6.3		2 / 4.8
3.0 RISK AVERTER		2 / 16.7	12 / 75.0	14 / 100.0	28 / 66.7
Column Total		12 / 28.6	16 / 38.1	14 / 33.3	42 / 100.0

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
21.65625	4	.0002	.571	6 OF 9 (66.7%)

Number of Missing Observations = 0

are conditional probabilities, the correct statement of which are derived from the original research problem. The Chi-Square test of tables 2.2 and 2.3 indicated greater than chance relation between the dependent and independent variables, i.e between the willingness to take risk and the level of income respectively.

Table 2.2 shows that 100% and 71.4% of the managers belonging to the risk takers category have a "low" ($270 to $320) and "middle" ($330 to $400) level of income. While 86.7% of the risk averters have a "high" level of income; therefore table 2.2 -amd 2.3 - illustrates that managers with a low level of income take more risk than managers with higher level of income.

Taking education into account and its relation with risk taking, a research question is posed:

> Does education influence the willingness to take risk of managers ?

The research hypothesis formulated in chapter I was:

> The willingness to take risk is greater when managers have postgraduate education.

To answer the research question the following null and alternative hypothesis were formulated:

> H^o: The level of education has no influence on

the willingness to take risk.

H_1: The level of education exert some influence on the willingness to take risk.

Table 2.4 shows that the relationship between the

The relationship between education and Perl Gamble

Page 48 SPSS/PC+ 1/1/80

Crosstabulation: X10 PERL GAMBLE By X4 EDUCATION

Table 2.4

X4-> Count / Col Pct	BACC 0	BA&MS 1	Row Total
X10			
1.0 RISK TAKER		12 41.4	12 28.6
2.0 RISK NEUTRAL		2 6.9	2 4.8
3.0 RISK AVERTER	13 100.0	15 51.7	28 66.7
Column Total	13 31.0	29 69.0	42 100.0

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
9.41379	2	.0090	.619	3 OF 6 (50.0%)

Number of Missing Observations = 0

level of education and the willingness to take risk is statistically significant implying that risk

taking depends to some extent on the educational level; therefore, higher education seems to promote the willingness to take risk. However, this does not suggest that education is responsible for providing the spark for taking risks; Nevertheless, it does not seem to extinguish the flame.

With respect to business specialization and its relation with personal risk taking, the research question addrerssed is:

> Does business specialization of managers affect their attitude toward taking risk?

The Chi-Square test in table 2.5 shows that the relationship between business specialization and the willingness to take risk is not significant; therefore, the hypothesis presented in chapter I stating that:

> Managers with business specialization are more willing to take risk than managers with different specialization is not relevent.

As for the number of dependents, the Chi-Square in table 2.6 reveals that 22 managers out of 28 managers that are risk averter have a number of dependents that ranges between 5 and 9. Therefore, as the number of dependents increases, managers are becoming more risk averters.

Page 54 SPSS/PC+ 1/1/80

Crosstabulation: X10 PERL GAMBLE
By X5 BUSSN OR NOT

Table 2.5

X5-› Count / Col Pct	BUSSN 0	NOT BUSSN 1	Row Total
X10 1.0 RISK TAKER	9 / 39.1	3 / 15.8	12 / 28.6
2.0 RISK NEUTRAL	1 / 4.3	1 / 5.3	2 / 4.8
3.0 RISK AVERTER	13 / 56.5	15 / 78.9	28 / 66.7
Column Total	23 / 54.8	19 / 45.2	42 / 100.0

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
2.78718	2	.2482	.905	2 OF 6 (33.3%)

Number of Missing Observations = 0

Page 36 SPSS/PC+ 1/1/80

Crosstabulation: X10 PERL GAMBLE
By X2 # OF DEPENDENTS

Table 2.6

X2-› Count / Col Pct	0 TO 4 0	5 TO 9 1	Row Total
X10 1.0 RISK TAKER	12 / 60.0		12 / 28.6
2.0 RISK NEUTRAL	2 / 10.0		2 / 4.8
3.0 RISK AVERTER	6 / 30.0	22 / 100.0	28 / 66.7
Column Total	20 / 47.6	22 / 52.4	42 / 100.0

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
23.10000	2	.0000	.952	2 OF 6 (33.3%)

Number of Missing Observations = 0

With respect to religion, table 2.7 shows that 70.6% out of 28 managers that are risk averters are Muslem.

The relationship between religion and Perl Gamble

Table 2.7

e 42 SPSS/PC+ 1/1/80

stabulation: X10 PERL GAMBLE
By X3 RELIGION

X3-› Count / Col Pct	CHRISTIAN 0	MUSLEM 1	Row Total
1.0 ISK TAKER	3 / 37.5	9 / 26.5	12 / 28.6
2.0 ISK NEUTRAL	1 / 12.5	1 / 2.9	2 / 4.8
3.0 ISK AVERTER	4 / 50.0	24 / 70.6	28 / 66.7
Column Total	8 / 19.0	34 / 81.0	42 / 100.0

i-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
1.93015	2	.3810	.381	3 OF 6 (50.0%)

ber of Missing Observations = 0

Multivariate Analysis:

To answer the research question presented in chapter I: How can one classify the banks managers included

in this study and other banks mangers in general into risk averters and risk takers, it was decided to use multiple discriminant function.

Tables 4.1 and 4.2 show that two out of the fourty two managers belong to the risk neutral category.

[illegible] Table 4.1

Test of equality of group covariance matrices using Box's M

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The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

Group Label	Rank	Log Determinant
1 risk taker	6	(singular)
2 risk neutral	2	(too few cases to be non singular)
3 risk averter	6	13.012228
Pooled Within Groups Covariance Matrix	6	12.450901

[illegible] 11472
[illegible] NON-SINGULAR GROUP COVARIANCE MATRICES FOR DOC. At least two are required for a test to be performed.

[illegible] SPSS/ZPC+

[illegible] SPSS/ZPC+ Table 4.2

Test of equality of group covariance matrices using Box's M

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

Group Label	Rank	Log Determinant
1 risk taker	6	11.530032
2 risk neutral	2	(Too few cases to be non-singular)
3 risk averter	1	(singular)
Pooled Within Groups Covariance Matrix	6	11.071917

[illegible] 11472
[illegible] NON-SINGULAR GROUP COVARIANCE MATRICES FOR DOC. At least two are required for a test to be performed.

Pages 178 and 134 of the computer output indicate that these are too few cases and insufficient for the analysis; therefore, it was decided to use a two groups discriminant function after deleting the neutral category.

Tables 4.3 - 4.4 - 4.5 summarize the results of the stepwise procedure. Three variables out of nine explanatory variables were selected. Only the number of dependents, religion and income 1 were introduced in the equation these variables produced a very high degree of separation between the groups as indicated by Wilk's Lambda (.429, .391, .351) and the Canonical Correlation (.805) for the personal gamble situation. Page 59 of the computer output present the function coefficients showing that number of dependents, income 1 and religion respectively entered in the Cnonical discriminant function. A positive relation exists between number of dependent, income 1 and personal gamble situation while a negative relation exists between religion and the willingness to take risk in personal gamble situation.

on the VARIABLES= list will be entered at level 1.

This Discriminant Analysis requires 3672 (3.6K) BYTES of workspace.

- D I S C R I M I N A N T A N A L Y S I S - - - - - - - - -

On groups defined by X10 PERL GAMBLE

38 (unweighted) cases were processed.
0 of these were excluded from the analysis.
38 (unweighted) cases will be used in the analysis.

Number of Cases by Group

X10	Number of Cases Unweighted	Weighted	Label
1	12	12.0	RISK TAKER
2	26	26.0	RISK AVERTER
Total	38	38.0	

Table 4.4

Summary Table

Step	Action Entered	Removed	Vars In	Wilks' Lambda	Sig.	Label
1	X2		1	.42986	.0000	# OF DEPENDENTS
2	X3		2	.39142	.0000	RELIGION
3	X6		3	.35128	.0000	INCOME1

Canonical Discriminant Functions

Function	Eigenvalue	Percent of Variance	Cumulative Percent	Canonical Correlation	After Function	Wilks' Lambda	Chi-squared	D.F.	Significance
					0	.3512848	36.092	3	.0000
1*	1.84669	100.00	100.00	.8054286					

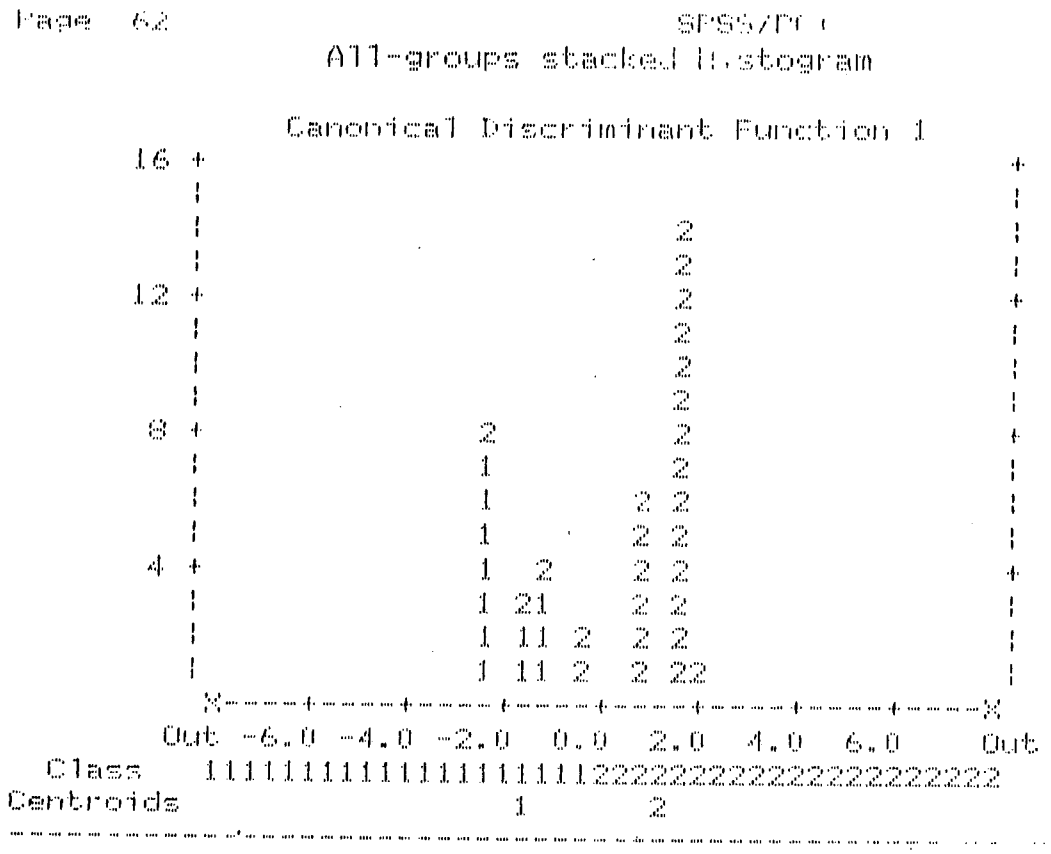
* marks the 1 canonical discriminant functions remaining in the analysis.

Table 4.5

Standardized Canonical Discriminant Function Coefficients

	FUNC 1
X2	.75440
X3	-.47451
X6	.51173

Table 4.6 presents a Histogram of the Canonical



discriminant function including both risk takers and risk averters.

Table 4.7 illustartes the classification results showing a 92.11% of grouped cases correctly classified into risk takers and risk averters.

The same analysis was followed for the willingness to take risk in business situation.

Page 63 SPSS/PC+

Classification Results -

Actual Group	No. of Cases	Predicted Group Membership 1	2
Group 1 RISK TAKER	12	12 100.0%	0 .0%
Group 2 RISK AVERTER	26	3 11.5%	23 88.5%

Percent of "grouped" cases correctly classified: 92.11%

Classification Processing Summary
38 Cases were processed.
0 Cases were excluded for missing or out-of-range group codes.
0 Cases had at least one missing discriminating variable.
38 Cases were used for printed output.

Table 4.9 show that five variables out of nine variables explaining the variation in risk taking were selected as indicated by Wilk's Lamdda and the Cannonical Correlation.

Table 4.9

Summary Table

Step	Action Entered	Action Removed	Vars In	Wilks' Lambda	Sig.	Label
1	X7		1	.29277	.0000	INCOME2
2	X3		2	.26673	0.0	RELIGION
3	X2		3	.25495	.0000	# OF DEPENDENTS
4	X9		4	.22180	.0000	SENIORITY
5		X3	3	.22263	.0000	RELIGION
6	X6		4	.21320	.0000	INCOME1
7	X5		5	.20366	.0000	BUSSN OR NOT

Canonical Discriminant Functions

Function	Eigenvalue	Percent of Variance	Cumulative Percent	Canonical Correlation	After Function	Wilks' Lambda	Chi-squared	D.F.	Significance
1*	3.91017	100.00	100.00	.8923794	0	.2036591	53.309	5	.0000

* marks the 1 canonical discriminant functions remaining in the analysis.

Table 4.10

Standardized Canonical Discriminant Function Coefficients

	FUNC 1
2	.82374
5	.25591
6	-.58110
7	1.45515
9	-.85968

Table 4.10 show that income, seniority, number of dependents and specialization highly explain the

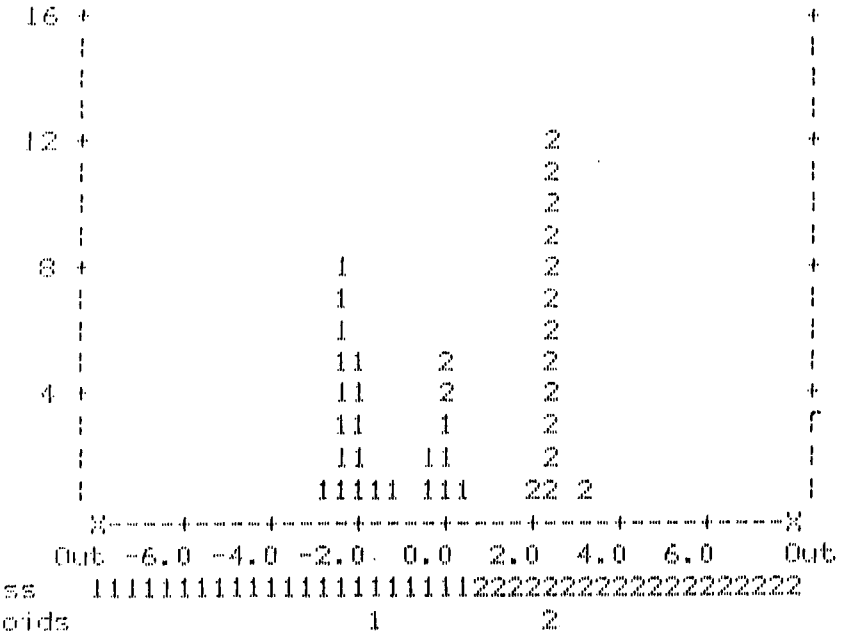
Table 4.10 show that income, seniority, number of dependents and specialization highly explain the variation in risk taking. A psoitive relation exist between specialization, number of dependents, income 2 and the willingness to take risk in business gamble situation while a negative relation exists between income 1, seniority and risk taking.

Tables 4.11 - 4.12 present the All-groups histogram and the classification results.

Page 88 SPSS/PC+

All-groups stacked Histogram

Canonical Discriminant Function 1



Page 89 SPSS/PC+

Classification Results -

Actual Group	No. of Cases	Predicted Group Membership 1	2
Group 1 RISK TAKER	22	21 95.5%	1 4.5%
Group 2 RISK AVERTER	16	2 12.5%	14 87.5%

Percent of "grouped" cases correctly classified: 92.11%

Classification Processing Summary
38 Cases were processed.
0 Cases were excluded for missing or out-of-range group code
0 Cases had at least one missing discriminating variable.
38 Cases were used for printed output.

Page 90 SPSS/PC+

Relating the major findings of the study to the findings of previous research:

In their study on the relation between risk and personal and financial characteristics, MacCrimon and Wehrung used the percentage of assets held in risky and safe categories as the measure of risk taking. The researchers found a negative relationship between age and risk taking. They also found that managers with fewer dependents took more risk. As for education MacCrimon and Wehrung found a positive relation between risk taking and education: Moreover, the study found that managers with higher wealth took more risk and a positive relation exists between income and risk taking. Finally the study of

MacCrimon and Wehrung found that managers with more seniority were more risk averters.

Although this researcher used a different measure - personal and business gamble situation - to assess the willingness to take risk of managers, a comparison between MacCrimon and Wehrung's study and this study could be useful.

This piece of research found a positive relation between number of dependents, income 1 (or from employment) and willingness to take risk in personal gamble situation; Moreover, this study found that managers with higher number of dependents were more risk averters. Furthermore, this study found that managers with higher education - or postgraduate education - took more risk; However, this piece of research found that mangers with a low level of income were more risk takers.

CHAPTER V

Summary and Conclusions

Summary of the answers to the research questions:

This researcher made an effort to illustrate the relationship between the willingness to take risk and several personal and financial characteristics. Different research questions and hypothesis were presented in chapter I and were tested throughout this study.

Managers took more risk in their business gamble decision rather than in their personal gamble one; Moreover, the younger the manager is the higer his willingness to take risk is. Furthermore, managers with lower income are more willing to take risk than managers with higher income. In addition, the willingness to take risk is greater when managers have higher education.

While MacCrimon and Wehrung found that as American managers grow older they become more risk averters, this study found also that Lebanese managers tend to be more risk averters as they grow up in age. Furthermore, this study and MacCrimon and Wehrung study found that managers with a higher number of

dependents tend to be more risk averters. In addition, both studies found that with respect to education managers with higher education seem to be more risk takers. However, MacCrimon and Wehrung found that managers with higher income and wealth are more risk takers, this study found that managers with lower income and wealth are more risk takers.

Recommendations

Although this study used a personal and a business gamble situation to assess the willingness to take risk, the researcher suggests that other measures could be used to evaluate the attitude towards risk taking of mangers.

Finally, the researcher encourages other researchers to conduct a study on managers in different industries and assess their attitude towards risk, the fruit of which may be useful.

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"AlManach", associations des banques du Liban.

Apendix A

QUESTIONNAIRE

Note: This questionnaire asks you for information about your personal and business status. We would appreciate your cooperation by answering the following questions accurately and sincerely. The answers you provide will be confidential and will only be used for the purpose of a research study for a degree of Master of Science in Business Management.

I - Personal Data:

A. Year of birth : _____

B. Number of dependents (wife, children and others): _____

C. Religion: ( ) Christian ( ) Muslem

D. Education:

1. Secondary (highest grade completed):

_____

2. Higher education:

Degree(s)	Specialization
_____	_____
_____	_____
_____	_____

II - Economic Data: 1$ = 556 L.P.

A.

1. Total income from employment (include only realized income from salary, bonuses, and profit sharing):

_____$/mth

2. Total outside income (director's fees, interest, capital gains or losses, etc..):

_____$/year

B.

Gross assets (current value of personal properties, real property, financial assets, insurance policies, etc..)

_____$

C.

Liabilities (mortgages, personal loans, etc..):

_____$

III- Job Information

A. How long have you been

- working? _____years
- with your present employer? _____years
- in your present position? _____years

1. Please estimate your total current wealth: Assume stable economical and political situation,
2. Suppose you are offered a chance to invest one-half your current net wealth in a new project-Assume stable situation- If the project is successful, you could end up with a very sizeable gain which could have a significant impact on your life style; if the venture is a failure, you could lose your investment and thus end up with only one-hlaf your current net wealth. Such a loss might require liquidating some of your assets, cutting back some activities, etc.

   The chances of winning or losing are 50-50. If the possible gain is too low, for example only a small fraction of the possible loss, you might be unwilling to invest one half your net wealth. You

might, hgowever, invest one-half your net wealth in such a project if the possible gain were 20 times larger than the possible loss. By picking numbers between these extremes, you can determine the smallest possible gain you would require in deciding to invest.

Question: For you to risk one-half your wealth in a new project having a 50-50 chance of succeeding, how large would the possible gain from an investment have to be?

Before writing this amount , in $, in the box at the bottom of the page, you may use the following diagram:

			Final position
(a)	Do not invest in the project	which means	retain your current net wealth
(b)	Invest in project	50% chance of	ending up with one-half your current net wealth
	resulting in a	50% chance of	ending up with a net wealth to be specified by you:

Answer: Smallest posiible final net wealth required by you to make the investment:

$

Note: If this amount is less that 150% of your total net wealth, please review your answer to be sure that it reflects your true preference. If this amount is many times larger than total wealth, please ask yourself whether you would take the project even if the possible gain were a lesser amount. If so, please revise your answer.

4. Imagine that you are a manager of a firm and controlled an annual capital budget of $100,000 which had an assumed expected after-tax annual rate of return of 15% - Assume stable political, economical situation-.

   Suppose that this year you can invest in standard projects that will yield your firm its expected rate of return (15%0, or you can invest one-half the budget i.e, ($50,000) in a major project that is subject to considerable uncertainty. The project may prove to be unsuccessful, in which case you would recoup your investment but would make no profit (hence, a zero rate of return). On the

other hand, the project may be very successful, yielding a rate of return considerably higher than 15%. The chances of success or failure are 50-50.

If the rate of return from the project (if it is successful) is only slightly higher than average, then you might be unwilling to invest- settling instead for the standard projects with certainty of getting the expected rate of return. However you might be very willing to invest if the possible yield from the project, if it is successfull, were 10 times the average rate of return. By picking rate of return figures between these extremes, you should be able to determine the smallest rate of return you would accept and still decide to invest in the uncertain project.

Question: For you to invest half your capital expenditure budget in the uncertain project, how large would the possible rate of reurn have to be?

Before writing this rate in the box at the bottom of the page, you may use the following

diagram:

You are being asked to specify the smallest rate of return on a successful project for which you will take action (b) over action (a):

			Final position
(a)	Invest in the standard projects	which means	ending up with the current average rate of return
(b)	Invest in the uncertain project which will result in a		ending up with a zero rate of return on the uncertain project and the usual rate of return on the other half of your capital expenditure.
			ending up with the usual rate of return on one half of your capital expenditures and a rate of return to be specified by you on the uncertain project

Answer: Smallest rate of return on the uncertain project you would accept in making the investment:

%