PORTFOLIO MANAGEMENT IN THE PHILIPPINE STOCK MARKET USING THE CAPITAL ASSET PRICING MODEL (CAMP)

A Thesis Presented to the
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In Partial Fulfillment of the
Requirements for the Degree of Master in
Business Administration

by

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This piece of work is dedicated to:
My Mother: **Hj. Rahimah Binti H. Ghazaly**
My Father: **H. Gazali**
my brother and my sisters.

Acknowledgment

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65 A. C. Salvador Street
Loyola Heights, February 1994
MG

THESIS ABSTRACT

Title	:	Portfolio Management in the Philippine Stock Market Using the Capital Asset Pricing Model (CAPM)
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Statement of the Problem

The primary purpose of this study is to test the capital assets pricing model (CAPM) using Philippine stock market data. Under certain assumptions, the model hypothesizes a linear relationship between the return and risk (beta) of capital assets.

More specifically, this study using the econometric will seek to answer the two following problems:

1. How is the portfolio selected in terms of :
   - 1.1. Rates of return of security (r_j;)
   - 1.2. Market rate of return (r_M;)
   - 1.3. Beta Risk (β_j;)
   - 1.4. Mean rate of return ($\bar{r}_j = \hat{\mu}_j$ and $\bar{r}_M$;)
2. How is portfolio theory and CAPM being utilized in the

Philippine stock market in terms of the following variables:

2.1. monthly rates of return (r_{jt};)

2.2. variance of the rate of return [($\hat{\sigma}_{ij}$) or $\hat{\sigma}^2_j$;]

2.3. covariance of the rate of return of security j with market rate of return ($\hat{\sigma}_{jM}$;)

2.4. the weight of each security in market portfolio (w_j)

3. What are the perception of the respondents as to the effectiveness of the portfolio management in managing securities ?

4. Is there a significant difference on the perceptions of respondents as to the effectiveness of portfolio management in Philippine stock market.

5. What is the future of the Philippine stock markets using portfolio management.

Null Hypothesis

Specifically, the hypotheses address the objectives stated above using the CAPM, by stating the explanatory variables as follows:

(1) rate of return of security.

(2) market rate of return.

(3) mean rate of return or average rate of return.

(4) variance of the rate of return.

(5) beta risk.

(6) covariance of the rate of return.

(7) systematic risk.

These variables will explain the determinants of the portfolio in Philippines stock market. Therefore, we come to the main hypothesis:

1. There is positive correlation between risk and return and diversification of portfolio by using CAPM is the solution for reducing the risk.

2. Based on a regression equation of the form

$$r_j = \alpha_o + \alpha_1 \beta_j + e_j$$

can be fitted and the testable hypothesis are whether the following relationships hold or not:

$$\alpha_o \stackrel{?}{=} R_F \text{ and } \alpha_1 \stackrel{?}{=} (r_M + R_F).$$

Significance of the Study

This study attemps to test the capital asset pricing model (CAPM) using Philippines stock market data.

The researcher believes that the findings to be generated from this study will be helpful for investor to choose the best return of their investment after considering the risk factor.

And also it is very helpful as guide for brokerage firm and securities house in advicing of their clients.

Furthermore, this study might be helpful as

reference material to the readers in increasing their knowledge particularly in invesment field.

Finally, the study will be of benefit to the researcher through a clearer understanding of investor and market behavior when the face return and risk at the same time. This will, hopefully place him in good stead when similar or related field in the future are encountered.

Scope and Limitation

In the Philippines, during period 1991 and 1992 no test of the model has ever been undertaken. That is why in this study, the simple model has to be tested.

Tests conducted in the U.S. have some limitations. First, the tests assume equal proportions of each security in the market portfolio. Second, the beta risks are indirectly estimated. And third, stationarity of the beta risks is implicitly assumed. The first assumption can be avoided. The second can be overcome due to the relatively small size of the stock market and availability of data. The third requires investigation into the underlying probability distributions of securities rates of return as well as the underlying processes which generate stock prices.

At the theoretical level, the simple CAPM assumes a

perfect capital market, i.e., perfectly liquid and divisible assets, zero transaction costs and taxes, homogenous expectations among investors on the joint probability distribution of securities rates of return over a single-period and common time horizon, and the existence of an unlimited borrowing-lending opportunity at a given risk-free rate. These assumptions induce two related properties of the CAPM: (a) all investors hold all available securities in their portfolio, and (b) these securities are held in the same proportion as the market portfolio.

The monthly data on security prices, the number and values of outstanding shares traded, and cash and stock dividends are computer validated prior to estimating monthly rates of return. The weight of each security is computed based on its outstanding value relative to the total value of all securities. The variance-covariance matrices are computed for the annual and the two year periods, and, based on the weights of each security, direct estimates of the beta risk of each security for the annual as well as the two year periods are made. The simple CAPM is tested using annual and two year estimates of rates of return and beta risks.

Research Design and Methodology

The quantitative method of descriptive research is applied in this research. The purpose of such method according to Good and Scates is normally to describe and, to give a quantitative picture of the group or area in terms of the number of uses in different categories. The use of secondary data is employed in this study to examine the portfolio and capital asset pricing model in the Philippine stock market.

Data is obtained from questionaires given to the officers of different brokerage firms. Secondary data was taken from the different monthly reports distributed by these two major exchanges on their performance during period 1991 and 1992.

Sampling Procedure

Questionnaires were distributed to the respondents. Purposive sampling was employed. The respondents were selected based on very specific criteria. They should be professional stockbrokers who are directly involved in stocks trading for at least 3 years and with research capabilities including the use of Capital Asset Pricing Model as their tool of prediction in market behaviour.

According to the Securities Exchange Commission

only 100 brokerages are allowed for each of the Manila and Makati Stock Exchanges. In the Manila Stock Exchange only 85 brokerages are active in trading, out of these only 46 brokerages are with in-research house while in the Makati Stock Exchange only 81 are active and 46 have in-research house. For the purposes of this study, 12 brokerage firms were chosen as samples. They were 1) Citicorp Vickers Phill. Inc; 2) Peregrine Securities; 3) Sapphire Securities, Inc; 4) Sun Hung Kai Securities; 5) EBC Sec Corp; 6) Philippine Asia Equity Securities; 7) I. Ackerman & Co. Inc; 8) Morgan Greenfell Phils Sec. Inc; 9) B.H Chua Sec. Corp; 10) Public Securities Corporation; 11) Century Securities Corp; 12) H.G. Asia Securities (Phils) Inc.

Profile of Respondents

Two or 25 percent of the respondents are presidents who have more than 20 years experience in the stock market; three or 25 percent, vice-presidents with 6-10 years experience; two or 16.67 percent analysts; four or 33.33 percent, trader. The analysts and the trader have been in the stock market only for the past 1 to 5 years.

SUMMARY OF FINDING AND CONCLUSION

SUB PROBLEM 1

How is portfolio selected in terms of:

1.1. Rate of return of security (r_j);

1.2. Market rate of return (r_M);

1.3. Beta risk (β_j);

1.4. Mean rate of return ($\bar{r}_j = \hat{\mu}_j$ and $\bar{r}_M$);

FINDINGS 1.1. Rate of return of security (r_j);

During the two-year period (1991 and 1992) the highest rate of return of security in market porfolio was PT&T's 63.95891 and the lowest was KPPI's -1.62483. The range of return is from 63 to -1.62. The second highest rate of return of security is that of FPHC which is 59.38059, followed by AC's 22.57651, RFM's 18.62430 and REG's 14.15200.

In the other hand, the lowest rate of return during that period was KPPI's -1.62483, followed by LC's -1.59231 CHINB's -1.57566, FLC's -0.60448, and AT's -0.55352.

CONCLUSION 1.1

The average rate of return of Commercial and Industrial share is relatively higher compared to Mining and Oil; while between Mining and Oil, the difference is

insignificant. When data are grouped according to industrial classification, we can conclude that Investment and Finance/Holding Firms group and Communication group give the highest rate of return, followed by Food, Beverages and Tobacco Products; Cement; Oil and Mining.

FINDINGS 1.2. Market rate of return (r_M);

The highest market rate of return is PT&T 13.79256 and the lowest is GLO -0.40924. The range between the highest market rate of return and the lowest is 13.70 to -0.40924. The second highest was FPHC 4.45871; the third, PX 1.06646; while the fourth and fifth were AC 1.05671 and BP 1.02689 respectively.

Aside from GLO -0.40924, the other low market rates of return was these of APX, OPM, LC and IRC, with returns of -0.04590; -0.09528; -0.09092 and -0.0737, respectively.

CONCLUSION 1. 2

The pattern of the rate of return of securities is also followed by market rate of return. This could be seen from the portfolio return. During the 1991 and 1992 period, PTT had very good performance although GLO from the same group had lowest.

FINDINGS 1.3. Beta risk (b_j);

Most of the beta in portfolio asset in this study is greater than 1. The five highest beta in this study, are: CHINB 54.78261, SJO 26.67788, AC 20.45894, MER 18.73404 and KPPI 15.80596. The lowest, on the other hand, are BCI 0.81432, SWM 0.59842, REG 0.52357, FPHC 1.47194 and URBAN 1.50113. The range between the highest and the lowest beta is 54.7 to 0.81. It means that all of the assets in market portfolio are risky.

CONCLUSION 1. 3

Most of the assets in market portfolio are risky, since most of the beta risks are greater than one, except for BCI 0.81432, SWM 0.59842, and REG 0.52357. In accordance with the grouped data, average beta risks for Banks, Real Estate and Mining are relatively higher compare to the others.

FINDINGS 1.4. Mean rate of return ($\bar{r}_j = \hat{m}_j$ and $\bar{r}_M$);

The highest mean rate of return of portfolio in this study is PT&T 6.83162; followed by those of FPHC, AC, APMC and RFM, with rates of 2.47419; 0.94069; 0.85614 and 0.77601 respectively. The lowest is ILI's -0.00770.

CONCLUSION. 1.4

The pattern of mean rate of return is the same as pattern of rate of return and market rate of return.

SUB PROBLEM 2

How is portfolio theory and CAPM being utilized in the Philippine stock market in terms of the following variables:

2.1. Monthly rates of return (r_{jt});

2.2. Variance of the rate of return [($\hat{\sigma}_{ij}$) or ($\hat{\sigma}^2_j$)];

2.3. Covariance of the rate of return of security j with market rate of return ($\hat{\sigma}_{jM}$);

2.4. Weight of each security in market portfolio (w_j)

FINDINGS 2.1. Monthly rates of return (r_{jt});

Monthly rate of return is another confirmation for rate of return in security (r_j) in sub-problem 1 and mean rate of return ($\bar{r}_j = \hat{m}_j$ and $\hat{r}_m$) in sub-problem 2. In this study, researcher find there is no contradiction among these variables.

CONCLUSION. 2.1

The monthly rate of return of securities in market portfolio follows the previous finding for rate of

return, market rate of return and mean rate of return. But it should be borne in mind that good rate of return does not necessarily mean good monthly rate of return. Infact, during during monthly period, there were fluctuations of the price of shares affecting the total rate of return in the entire period (24 months).

FINDINGS 2.2. Variance of the rate of return [($\hat{\sigma}_{ij}$) or ($\hat{\sigma}^2_j$)];

The variance of the market return is the expected squared deviation from the expected return. It is a measure of variability. In general the highest variance of market return, as shown in Table 4.1, is PT&T 4.94994, followed by URBAN 1.61249, AC 1.21470, BP 0.87450 and FPHC 0.49287. The lowest is KPSI 0.00009, followed by CHINB 0.00055; SOLID 0.00258; AT 0.00289 and POPI 0.00393.

CONCLUSION 2. 2

High variances are seen in Commercial and Industrial shares, followed by Mining and Oil. As for Bank and Communication, variances of URBAN and PTT are relatively bigger, in contrast with those of Oil and Mining which are smaller.

Communication has the highest variance according to

group, followed by Investment and and Finance/Holding Firms group, Banks, Food, Beverages and Tobacco Products and Oil group.

FINDINGS 2.3. Covariance of the rate of return of security j with market rate of return ($\hat{\sigma}_{jM}$);

As to the finding by group, Investment and Finance/Holding Firms has the highest covariance which is 6.39661, followed by Communication, 4.94962. Banks; Food, Beveages and Tobacco Products; Oil and Share have covariances of 0.59919, 0.11978, 0.93887 and 0.10540, respectively.

The biggest covariance in Bank is that of URBAN, while the smallest is that of SOLID. In Communication, PTT has the biggest covariance; in Investment and Finance/Holding Firms, AC; and in Food, Beverages and Tobacco Products, RFM. For Mining and Oil, BP and PX have the biggest covariances, while VUL and AT have the smallest.

CONCLUSION 2. 3

In this study, all of the covariances are positive. It means that security returns tend to move together with strong relation with one another.

FINDINGS 2.4. The weight of each security in market portfolio (w_j)

The weight of security in market portfolio can be a measure of the wealth invested in market portfolio at a certain time. In general, the investor prefers to invest more in commercial and industrial venture. It is indicated by the weight of Commercial and Industrial share which is 0.89200 as well as the average weight which is 0.89386. For Oil share and Mining share, the weights are only 0.09809 and 0.00991 respectively.

CONCLUSION 2. 4

Most of investors invest in Commercial and Industrial share rather than in mining and oil during the period 1991 and 1992. In addition, more investments were made on the Real Estate and Communication. Such could be attributed to changes in several variables like economy, politics, among others.

SUB-PROBLEM 3

What are the perceptions of the respondents as to the effectiveness of the portfolio management in managing securities ?

The perception of the respondents as to the effectiveness of the portfolio in managing secutities

could be classified in the following criterion:

FINDINGS:3

1. The way they manage portfolio in the Philippines stock market.

All respondents answered (YES), when researcher asked the effectiveness of the way they manage the portfolio. Some of the reasons given are the following:

a. Our approach assumes the fund as inverted for long time; the performance has been fairly good;

b. Our porfolio has outperformaned the market by 8.42 % and 4.79 % ;

c. Most of stock selected have established good earning track record (except for mines and C-IS) and deep management bench;

d. We can not say it is really effective because there are many reasons or factors why these issues are going up and down.

2. The way they select combination of portfolio in the stock market in terms of rate of return and risk involved.

Based on the above answers, 7 out of 12 respondents or 58.33 % selected the portfolio with highest return and moderate risk; and 41.67 % or 5 respondents selected the portfolio with the moderate

return and moderate risk.

3. The way they predict the high or low return as well as the high or low risk of share in the market.

All of the respondents have done the same by looking at combination of (a), (b), (c), and (d), plus several additional factors, like management style, vision, price-earning (P/E) ratio, cash flow, debt equity ratio, earning forecast and historical fund.

4. The combination of portfolio the investors would like to choose to reduce risk can be seen in Table 4.48.

CONCLUSION.3

As far as how the respondents manage their portfolio effectively, 7 out of 12 respondents or 58.33 % selected the portfolio with highest return and moderate risk and 41.67 % or 5 respondents selected their portfolio with the moderate return and moderate risk. The way the respondents predict return and risk, consideration is made on the demand and supply of share, price of share, certain economic and political factors. Most of the investors invested the biggest part of their wealth in Commercial and Industrial to reduce risk and to gain higher returns.

SUB-PROBLEM 4

Is there a significant difference on the perceptions of respondents as to the effectiveness of portfolio management in Philippine stock market ?

FINDINGS 4

Based on Tables 4.1; 4.2; 4.46; 4.47; 4.48; 4.49 and 4.50, it can be concluded that there was no significant difference on the perceptions of the respondents as to the effectiveness of portfolio management in the Philippines stock market. From the Table 4.46, as the response to the question of the way they select the combination of portfolio, all of the respondents answer was "highest return and moderate risk" and "moderate return and moderate risk". The difference between the former and the latter is very slight (16.66 %) with or only two respondents answering more on "hihgest return and moderate risk".

This perception was supported by the other facts on Table 4.47 which the respondents would predict risk and return based on combination of several factors, namely: by looking at demand and supply of the share, by looking at price of the share, and by looking at the certain economic factor. All of respondents (100 %) preferred the combination of several factors the researchers mentioned

above.

CONCLUSION.4

There are no significant differences on the perceptions of the respondents as to the effectiveness of portfolio in the Philippines stock market.

SUB-PROBLEM 5

What is the future of the Philippine stock markets using portfolio management ?

FINDINGS.5

To answer this problem reseacher provided 4 possible answers in the questionnaire:

1. will be better due to economic and political stability
2. for the first 3 years there would not be much change due to brown out problem, but after this problem is overcome, it would be better
3. CAMP and APT will be much employed
4. combination of (1), (2) and (3).

Most of respondents (67 percent) answered (4) combination of (1); (2) and (3). The next (34 percent) (1). But some of them added several answers. For instance, one said that "management portfolio in the future of the Philippines stock market has big potential; this is

especially true during the times when interest rates are going down". Another opened that "the stock market develops and introduces more stocks (other products) into the market, more inventible funds will find its way into it. This will prvide a broader orientation for portfolio managers into equity investments".

CONCLUSION.5

Most of respondents (67 percent) answered (4) or combination of (1); (2) and (3), e.i., will be better due to economic and political stability; for the first years there would not be much changes due to brown out problem, but after this problem is overcome it would be better; CAMP and APT will be much employed.

6. Results of the Tests of the CAPM

Initially, the CAPM was tested using the data over 24 month period for the total of 42 securities. The result of the regression analysing using ordinary least squares is insignificant.

The observation made regarding a highly volatile market indicates the possibility of significant differences in market behaviour between calendar years. Besides, the parameters of the probability distributions of the rates of return of securities may not be

stationary over the 24 month period. To be able to take into account these possibilities, tests were made for the annual periods.

The results of the tests using annual data show some level of improvement over the results of the test of the 2 year period. For instance, the variations explained by the beta increased from 0.4 % to 1 % up to 14 %.

On the whole, however, the results of the tests for the annual periods do not confirm the hypothesized positive linear relationship between r_j dan β_j. However, only 11 percent of the variation is explained by the regression. For the years 1991 the hypothesis is rejected at 0.10 level. For the year 1992, though the result is significant, the relationship is perverse in the sense that the sign of $\hat{\alpha}_1$ is negative. For ease in making comparison, the results of the tests for the 1991 and 1992 period as well as the annual periods are shown in Table 4.50.

Also, the values of the estimates of the intercept α_0 and R_F are seen to be different from each other. Row (7) of the Table 4.50 shows the ratio of $\hat{\alpha}_o$ to $\hat{R}_F$ which range from -0.04 to 2.5. The prediction of the model is that the ratio should be equal to 1.0. Row (8) of Table 4.50 shows the estimates of the t statistic for the tests of equality between $\hat{\alpha}_1$ and $(\hat{r}_M - \hat{r}_F)$. The null hypothesis

of equality is rejected for all periods.

Thus, the hypothesized relationship (3.6a) and (3.6b) cannot be accepted and the theoretical predictions of the CAPM are not substantiated by the data.

CONCLUSION. 6

The hypothesized relationship (3.6a) and (3.6b) cannot be accepted and the theoretical predictions of the CAPM are not substantiated by the data.

RECOMMENDATIONS

RECOMMENDATION 1.1.

It is recommended more investment should be made in commercial and industrial issues since the return of investment in the same is high. Investing should spread their portfolio in several securities to reduce risk. It should be noted that share like BCI, BP and PX more often than not give good return.

RECOMMENDATION 1. 2

It is strongly recommended to investor to invest in shares with high market rate of return, most of which are in Bank, Communication, and Investment and Finance/Holding Firms. Several shares, like PTT, AC, and

FPHC, have very good market rate of return.

RECOMMENDATION 1. 3

It is recommended that investors invest their porfolio in high rate return and relatively low risk. Several shares are strongly recommended like PTT, FPHC, and REG, since these shares give good return, and low risks. Shares with low return and high risk like CHINB should be avoided.

Investors must always be aware of the risk and return if they are going to invest their wealth in market portfolio. Since most of the investors don't know the behaviour of the market due to imperfect information, the researcher recommends that they consult professional broker(s) to gain more and avoid losses.

It is also recommended that investors should look at possible risk before contemplating on the return. Investors should be reminded that good return does not necessarily mean low risk.

RECOMMENDATION 1.4.

It is recommended to invest in high market rate of return with low risk. For risk-aversed investors, to spread their portfolios in blue chips share, where they are safe and have good returns, is strongly recommended.

RECOMMENDATION 2.1.

It is also recommended that investors spread their portfolio in the shares with good monthly return. It should be borne in mind that good rate of return does not necessarily mean good monthly rate of return.

RECOMMENDATION 2. 2

For investors it is recommended that they invest in shares with small variance, for such reflect the variability of the securities.

RECOMMENDATION 2. 3

For investors, it is recommended that they invest and diversify their portfolio in the postive covariance. However, awareness on the fluctuation of market should be closely observed. Positive covariance indicates that securities tend to move together.

RECOMMENDATION 2. 4

It is also recommended that they invest more in commercial and industrial issues since the return of investment in them are much higher, and they should spread their portfolio in several securities to reduce risk.

RECOMMENDATION 3

Is is suggested that investors should always observerisk and return if they are to invest in market portfolio; that they don't forget several variables like political and economy fluctuation.

RECOMMENDATION 4

It is also recommended that the investors maintain their effective management of their portfolio.

RECOMMENDATION 5

CAPM will be much employed in the future. However, due to the lack of understanding about the same nowadays. The researcher recommends that more studies about CAPM should be done so it will be more appreciated.

And if the investors use CAPM, they must pay more attention to beta risk and covariance to see the risk involved as well as return of their porfolio.

This recomendation is supported by the results of the tests for annual periods which do not confirm the hypothesized positive linear relationship between r_j and β_j. For the year 1991, the hypothesis is rejected at .01 level and for the year 1992, though the result is significant, the relationship is perverse in the sense that the sign of $\hat{\alpha}_i$ is negative.

RECOMMENDATION 6

If investors are going to use CAPM to predict return and risk of their portfolio, they must be accompanied by other types of prediction since CAPM does not give a total or satisfactory answer, and that the CAPM test regression analysis, using Ordinary Least Squares (OLS), produced insignificant result.

This recomendation is supported by the results of the tests for annual periods which do not confirm the hypothesized positive linear relationship between r_j and β_j. For the year 1991, the hypothesis is rejected at .01 level and for the year 1992, though the result is significant, the relationship is perverse in the sense that the sign of $\hat{\alpha}_i$ is negative.

Researcher also recomends that investor or broker who has research capabilities should always update his estimation about risk and return of the portfolio by using CAPM among others, since market behaviour is always changing due to changes in ceratin environment, like economy, political and interest rate, in order to make hsi estimation and prediction much closer. So far there is no tool or method or any instrument in the world that can be used to predict exactly what will happen in the stock market in the future.

Furthermore the researcher recommends that further

studies using CAPM should relax the assumption that investor are price taker and have homogenous expectation about asset returns; investor may borrow and lend unlimited amount at the risk free rate; quantity of assets are fixed; all assets are marketable; asset markets are frictionless and information is costless and available to all investors; and there are no market imperfections such as taxes, regulations, or restrictions on short selling; to come up with better and more accurate prediction.

Also recommended are several titles for further studies:

1. Testing the CAPM with Time-Varying Risks and Returns in Philippine Setting.
2. CAPM, Market Behaviour and Portfolio Analysis, Test in the Philippine Stock Market.
3. An Alternative Test of the CAPM for Philippine Stock Exchange.

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CHAPTER I

THE PROBLEM AND ITS BACKGROUND

I. 1. Introduction

Capital Asset Pricing Model (CAPM) is the economic model used to solve the market price for risk and appropriate measure of risk for a single asset. The essence of the CAPM is the relationship between expected return and avoidable risk, and the valuation of securities that follows. This model was developed almost simultanously by Sharpe[1] and Treynor while Mossin[2], Lintner[3] and Black[4] developed it further[5].

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[1] William F. Sharpe, "A Simplified Model for Portfolio Analysis," Management Science, (January 1963), p 277-293 and "Capital Assets Prices: A Theory of Market Equilibrium Under Conditions of Risk", Journal of Finance, Vol 29, No 3 (September 1964), p 119-138.

[2] Jan Mossin, "Equilibrium in a Capital Asset Market", Econometrica, Vol 34 No 4 (October 1966), p 768-783.

[3] John Lintner, "The Valuation of Risk Assets and the Selection of Risky Investment in Stock Portfolios and Capital Budgets", Review of Economic and Statistics, Vol 47. No 1 (February 1965), p 13-17. And "The Aggregation of Investor's Diverse Judgments and Preferences in Purely Competitive Security Markets', Journal of Financial and Quantitative Analysis, (December 1969), p 347-400.

[4] Fisher Black, "Capital Market Equilibrium and Restricted Borrowing," Journal of Business, (July 1972), p. 444-455.

[5] Hal Varian, Microeconomic Analysis, 3rd Edition (W.W. Norton Company, Inc, 1992) p. 372.

The CAPM is developed in a hypothetical world where the following assumptions are made about investor and the opportunity set:[6]

1. Investors are risk-averse individuals who maximize the expected utility of their end-of-period wealth.

2. Investor are price takers and have homogeneous expectations about asset returns which have a joint normal distribution.

3. There exists a risk-free asset such that investors may borrow or lend unlimited amounts at the risk-free rate.

4. The quantities of assets are fixed. Also, all assets are marketable and perfectly divisible.

5. Asset markets are frictionless and information is costless and simultaneously available to all investors.

6. There are no market imperfections such as taxes, regulations, or restrictions on short selling.

Although not all these assumptions conform to reality, they are simplifications which permit the development of the CAPM, which is extremely useful for financial decision-making because it quantifies and prices risk.

We know these portfolios differ from each other, not

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[6]Thomas E. Copeland and J. Fred Weston, Financial Theory and Corporate Policy, (Addison Wesley Publishing Company, Inc, 1988), p. 160-161.

just in the number and type of securities held, but also in the combination of risk and return they offer. Consequently, all we need to know to represent the investor's choice is to consider the investor's willingness to exchange expected return [$E(\tilde{R}_p)$] and standard deviation [$\sigma(\tilde{R}_p)$]. That is, we need to consider the effect of the investor's utility of $E(\tilde{R}_p)$ and $\sigma(\tilde{R}_p)$. How would the investor choose from among the available portfolios on the efficient set? Which portfolio will give highest return and lower risk? How will β test influence investor behaviour in choosing their investment decision?

In theory, we can identify three possible attitudes toward risk: a desire for risk, an aversion to risk, and an indifference to risk. A risk seeker is one who prefers risk. Given a choice between more and less risky investments with identical expected monetary returns, this person would prefer the riskier investment. Faced with the same choice, the risk averter would select the less risky investment. The person who is indifferent to risk would not care which investment he or she received. There undoubtedly are individuals who prefer risk and others who are indifferent to it, but both logic and observation suggest that business managers and stockholders are predominantly risk averters.

The Capital Asset Pricing Model (CAPM) is the answer

of the above question. CAPM is a set of principles describing how people behave in the stock market. These principles lead to an explicit statement of what equilibrium prices, returns, and risks will be for securities. There are other theories that attempt to do this, but CAPM is particularly useful for two reasons:[7]

First, it is relatively simple and intuitive can be developed through a direct application of portfolio theory. Second, its implications have been widely explored with actual data and found to be substantially consistent with most of the theory's predictions. While the theory does not always predict correctly, its implications generally conform to what we observe on security markets. Thus, at the very least, it can be used as an appropriate basis for further adjustments and refinements -- which is exactly how it is used by many corporate financial officers, investment bankers, and professional money managers.

The concept of market equilibrium plays such a key role in the CAPM. The price of a security, like the price of any commodity in a competitive market, is generated through the interaction of supply and demand. If a sufficient number of investors increase their demand for a security at the current market price (or expected

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[7]Nancy L. Jacob and R. Richardson Pettit, Investments, Second Edition, (Richard D. Irwin, Inc., 1989), p. 226.

return offered), the total quantity of the security demanded will exceed the quantity supplied. In a freely competitive market, this excess demand is eliminated through an increase in the price of the security. The increase in price will cause more of the security to be supplied and less of it to be demanded. The process continues until a price is achieved that causes the quantity demanded and supplied to be equal. This price is termed the equilibrium price. At this price there will be no further tendency for any price changes to occur, and excess demand and excess supply are zero.

Precisely the same effect occur if there is an increase in supply, although the effect on the security supplied by some investors desiring to liquidate their investment positions creates an exess supply at the current market price, forcing the price down to a new equilibrium level.

All of the transaction of these securities is done in stock market. Stock market (securities markets) have much in common with markets of all kinds. A market is a means whereby buyers and sellers are brought together to aid in the transfer of goods and/or services. Several aspects of this general definition seem worthy of

emphasis:[8]

1. It is not necessary that a market have a physical location.

2. The market does not necessarily own the goods or services involved.

3. A market can deal in any variety of goods and services -- from fish and vegetables to stock and bonds. Any commodity with a diverse clientele, however, will develop a market to aid in its transfer.

4. Typically, both buyers and sellers benefit from the existence of a market.

The markets for securities -- stocks and bonds -- are classified two ways according to whether they deal in (1) new or (2) outstanding securities.

The Primary market is one in which new issues are sold by companies to acquire new capital for the corporation, through the sale of either corporate bonds, preferred stock, or common stock.

Secondary market occur where there is trading in outstanding issues. In this market, the issue has already been sold to the public and is traded between current and potential owners of the outstanding securities.

This study attempts to test the capital asset

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[8] Lester Robert Bittel (Editor), Encyclopedia of International Management, Vol 2, (McGraw-Hill - USA, 1988), p. 724-725.

pricing model (CAPM) using Philippine stock market data. The traditional CAPM hypothesizes that if certain assumptions are met, there is a linear relationship between the rate of return and risk (beta) of capital assets. Evidences in the United State against the traditional CAPM have been noted to be ambiguous due to the use of indirect estimates of the betas (which further implicitly assumes stationarity) and the use of equal proportion of each security in the market portfolio. Theoretically, the traditional CAPM is criticized due to its property that all investors hold the market portfolio.

I. 2. Theoretical Framework

Portfolio selection is essentially based on the two parameter, static and normative theory of choice developed by Markowitz[9] and Tobin.[10] Based on this theory of portfolio choice, a model for determining equilibrium prices of assets was developed by Sharpe and Lintner. This model is referred to as the Capital Asset Pricing Model (CAPM). The terms "assets" and "securities"

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[9]Harry M. Markowitz, "Portfolio Selection," Journal of Finance, (March 1952), p. 77-91. and Portfolio Selection Efficient Diversification of Investments, (Yale University Press, 1959).

[10]James Tobin, "Liquidity Preference as Behavior Toward Risk," Review of Economics Studies, (February 1958), p. 85-85.

are interchangeably used. The former is generic and is more appropriate since the CAPM in general applies to all assets. However, securities are commonly used to test the model. Besides, Markowitz and Tobin based their contributions on this special class of assets.

The first section develop and discussess Markowitz's portfolio selection model. The second section deals with the basic structure of the CAPM and some related theoretical issues.

Portfolio Selection Model

The seminal works of Markowitz on portfolio selection deal primarily with the special case in which investor's preferences are assumed to be defined over two parameters (mean and variance) of the probability distribution of single-period rates of return of securities.

The process of portfolio selection as Markowitz points out may be divided into two stages. The first stage starts with observations and experiences and ends with beliefs about the future performances of available securities. This is the security-analysis stage. The second stage starts with the relevant probability beliefs about future performances of available securities and ends with the choice of portfolio. Most of the works on portfolio selection deal with the second stage.

Markowitz's (1952, 1959) model is only concerned with the second stage.

Let $r_1, r_2, \ldots, r_n$ be the one-period rates of return of n securities. These n securities comprise the opportunity set of an individual investor in the market. Further, let σ_{kj} 1,...,n, be the covariance (variance if k=j) of the rate of return of security k with that of security j. The individual's portfolio selection problem is to maximize his expected utility over this opportunity set of n available securities given his perceptions, wealth and preferences. The individual's perceptions are embodied in his relevant probability beliefs about the future performance of each security, i.e., on the values of r_k and σ_{kj}.

Suppose that an individual i, i=1,...,m invests an initial amount of wealth W_{Ii} on one security, i.e., the individual has a one-security portfolio. If W_{Ti}, a random variable, represents the individual's terminal wealth for the period and r_{pi}, the (portfolio) rate of return to investment, then one may write

$$r_{pi} = \frac{W_{Ti} - W_{Ii}}{W_{Ii}} \quad \text{or} \quad W_{Ti} = r_{pi}\, W_{Ii} + W_{Ii} \qquad (1.1)$$

Taking the expected value of both sides gives,

$$E(W_{Ti}) = W_{Ii}\, E(r_{pi}) + W_{Ii}$$

Since terminal wealth is a function of $E(r_{pi})$, the investor's utility can be expressed either in terms of

total return or rate of return. In terms of rate of return

$$U_i = U_i(E(r_{pi}), \sigma_{pi}), \qquad (1.2)$$

where σ_{pi} is the portfolio standard deviation of r_{pi} and a measure of portfolio risk.

Suppose the individual invests W_{Ii} on more than one security. Define w_{ji} as the proportion of W_{Ii} invested on security j, i.e., $w_{ji} = W_{Iji}/W_{Ii}$, where W_{Iji} is the portion of W_{Ii} invested on security j. The allocation of W_{Ii} among the n or a sub-set of the n securities is such that

$$w_{1i} W_{Ii} + \ldots + w_{ni} W_{Ii} = W_{Ii} \Sigma w_{ji} = W_{Ii}, \qquad (1.3)$$

which implies that

$$\sum_j W_{ji} = 1, \quad i = 1, \ldots, m. \qquad (1.4)$$

If W_{Tji} is the portion of his random terminal wealth that comes from his investment of W_{Iji}, then

$$W_{Ti} = W_{T1i} + \ldots + W_{Tni} \qquad (1.5)$$

By (1.3), it follows that

$$W_{Tji} = r_j W_{Iji} + W_{Iji}$$

so that (1.5) becomes

$$W_{Ti} = ((r_1 W_{I1i} + W_{I1i}) + \ldots + (r_n W_{Ini} + W_{Ini})),$$

$$\text{or } W_{Ti} = (r_1 W_{I1i} + \ldots + r_n W_{Ini}) + (W_{I1i} + \ldots + W_{Ini}). \qquad (1.6)$$

The second term of RHS of (1.6) is equal to W_{Ii}. Substituting for W_{Ii}, re-arranging terms and dividing both sides by W_{Ii} results in

$$\frac{W_{Ti} - W_{Ii}}{W_{Ii}} = r_1 \frac{W_{I1i}}{W_{Ii}} + \ldots + r_n \frac{W_{Ini}}{W_{Ii}},$$

or $r_{pi} = r_1 w_{1i} + \ldots + r_n w_{ni}$. (1.7)

Thus, the expected portfolio rate of return for an n-security portfolio is

$$E(r_{pi})_j = \sum w_{ji} E(r_j). \quad (1.8)$$

Also, it can be shown that the portfolio variance is

$$\sigma^2_{pi} = \sum_k \sum_j w_{ki} w_{ji} \sigma \quad (1.9)$$

Suppose there are m investors in the market, then

$$\sum_i W_{Ii} = W_I, \text{ and} \quad (1.10)$$

$$\sum_i W_{Ti} = W_T, \quad (1.11)$$

where W_I and W_T are the total initial and total random terminal wealth respectively of the m investors in the market. Summing up each term of (1.6) over all i yields

$$W_T = (r_1 W_{I1} + \ldots + r_n W_{In}) + (W_{I1} + \ldots + W_{In}) \quad (1.12)$$

Substituting (1.12), re-arranging terms and dividing through by W_I,

$$\frac{W_T - W_I}{W_I} = r_1 \frac{W_{Ii}}{W_I} + \ldots + r_n \frac{W_{In}}{W_I},$$

or $r_M \equiv r_1 w_1 + \ldots + r_n w_n$ (1.13)

where r_M is the random market portfolio rate of return and w_j is the proportion of W_I invested on security j. Taking expectation on both sides yields

$$E(r_M) = \sum_j w_j E(r_j) \quad (1.14)$$

The market portfolio variance can be derived in a similar manner as in (1.9). Thus,

$$\sigma^2_{r_M} = \sum_k \sum_j w_k \; w_j \; \sigma_{kj} \qquad (1.15)$$

The portfolio selection model views the individual's choice among several risky assets as a two-step process. First, given some general properties of his preferences, the individual chooses an efficient set of portfolios independent of his specific preference assessment. Second, an optimal porfolio is chosen from the efficient set given the specific preferences of the individual.

Capital Asset Pricing Model

In brief, the underlying assumptions of the traditional CAPM as derived by Sharpe and Lintner are:

1. All investors are risk-averse, single-period expected utility of terminal wealth maximizers who choose among alternative portfolios on the basis of mean and variance of return;

2. All investors have the same decision horizon and, over this common horizon period, the joint (normal) probability distribution of one-period rates of securities exists;

3. All assets are perfectly liquid and divisible (i.e., all assets are marketable), and there are no transaction costs and taxes;

4. Portfolio opportunities and expectations are

"homogeneous" throughout the market, i.e., all investors have the same set of portfolio opportunities and have identical subjective estimates of the means, variances, and covariances of returns among all assets;

5. All investors can borrow or lend an unlimited amount at an exogenously given risk-free rate R_F.

Suppose all investors have the same horizon and they all agree on the prospects of various investments, i.e., they have homogeneous expectations. If for a given period each of these individuals constructs his own efficient set, then all these sets will look alike. Aggregating over them investors in the market poses no problem.

It is here where Sharpe's (1964) insights in noting that the equilibrium condition implies both a measure of risk of asset j and an equilibrium relationship between risk and return of an asset made him arrive at the capital asset pricing model. More specifically, by chain rule

$$\frac{d\sigma_C}{dr_C} = \frac{d\sigma_C}{d\alpha} \cdot \frac{d_\alpha}{dr_C} \quad \text{and,} \quad \frac{d\alpha_D}{dr_D} = \frac{d\sigma_D}{d\alpha} \cdot \frac{d\alpha}{dr_D}$$

Since,

$$\sigma_C = (\alpha^2\sigma_j^2 + (1-\alpha)^2\sigma_M^2 + 2\alpha(1-\alpha)\gamma_{jM}\sigma_j\sigma_M)^{1/2}, \text{ and}$$

$$\sigma_D = (\alpha^2\sigma_f^2 + (1-\alpha)^2\sigma_M^2 + 2\alpha(1-\alpha)\gamma_{FM}\sigma_F\sigma_M)^{1/2}$$

one can solve for the required values. Thas is,

$$\frac{d\sigma_C}{d\alpha} = 1/2(\alpha^2\sigma_j^2 + (1-\alpha)^2\sigma_M^2 + 2\alpha(1-\alpha)\gamma_{jM}\sigma_j\sigma_M)^{-1/2} \cdot 2\alpha\sigma_j^2 + 2(1-\alpha)(-1)\sigma_M^2 + 2(1-2\alpha)\gamma_{jM}\sigma_j\sigma_M \quad (1.16)$$

At $\alpha = 0$,

$$\frac{d\sigma_C}{d\alpha} = 1/2\,(\sigma_M^2)^{-1/2}\,(-2\sigma_M^2 + 2\gamma_{jM}\sigma_j\sigma_M)$$

$$= \gamma_{jM}\sigma_j\sigma_{4M} - \sigma^2_M \;/_M\sigma \qquad (1.17)$$

Also, $dr_C/d\alpha = r_j - r_M$, so that

$$d\sigma_C/dr_C = d\sigma_C/d\alpha \;.\; d\alpha/dr_C = \frac{\gamma_{jM}\sigma_j\sigma_M - \sigma_M^2}{\sigma_M\,(r_j - r_M)} \;. \qquad (1.18)$$

Since,

$\sigma_F^2 = 0$ and $\gamma_{FM} = 0$, σ_D becomes

$$\sigma_D = ((1-\alpha)^2\sigma_M^2)^{1/2} = (1-\alpha)\,\sigma_M$$

Thus, $d\sigma_D/d\alpha = -\sigma_M$.

Also $d\alpha/dr_D = d\sigma_D/d\alpha \;.\; d\alpha/dr_D = \sigma_M/r_M - R_F$.

The equilibrium relationship becomes

$$\frac{\gamma_{jM}\sigma_j\sigma_M - \sigma_M^2}{\sigma_M\,(r_j - r_M)} = \frac{\sigma_M}{r_M - R_F} \;. \qquad (1.19)$$

By definition, $\gamma_{jM}\sigma_j\sigma_M = \text{cov}\,(r_j, r_M)$.

Solving for the equilibrium rate of return of asset j yields

$$r_j = R_F + \frac{(r_M - R_F)\,\text{cov}\,(r_j, r_M)}{\sigma_M^2} \;. \qquad (1.20a)$$

Alternatively

$$r_j - R_F = \frac{(r_M - R_F)\,\text{cov}\,(r_j, r_M)}{\sigma_M^2} \qquad (1.20b)$$

A number of economic interpretations can be made from this relationship. For any asset j, the quantity $(r_M - R_F)$ which is the risk-premium on the market portfolio return is the same. Thus, the risk premium $(r_j - R_F)$ on the rate of return of asset j entirely depends on the covariance term $\text{cov}\,(r_j, r_M)$ weighted by the market

portfolio variance σ_M^2. Here cov (r_j, r_M) is the contribution to the total market portfolio variance of the rate of return on asset j. This is the variance that cannot be diversified away. It is therefore reasonable to state that it is the appropriate measure of risk of the rate of return to an asset.

In the literature, the weighted covariance is the one used to measure the systematic risk. This is the beta risk. Thus,

Beta risk,

$$\beta_j = \frac{\text{cov}(r_j, r_M)}{\sigma_M^2} \qquad (1.21)$$

The equilibrium relationship (1.20b) becomes

$$r_j = R_F + (r_M - R_F)\beta_j \qquad (1.22)$$

which is the simple capital asset pricing model due to Sharpe and Lintner.

During period 1991 and 1992 no direct test of the simple or traditional CAPM has been done yet for the Philippine capital market.

I. 3. Statement of the Problem

The primary purpose of this study is to test the capital assets pricing model (CAPM) using Philippine stock market data. Under certain assumptions, the model hypothesizes a linear relationship between the return and risk (beta) of capital assets.

More specifically, this study using the econometric will seek to answer the two following problems:

1. How is the portfolio selected in terms of :

   1.1. Rates of return of security (r_j;)

   1.2. Market rate of return (r_M;)

   1.3. Beta Risk (β_j;)

   1.4. Mean rate of return ($\bar{r}_j = \hat{\mu}_j$ and $\bar{r}_M$;)

2. How is portfolio theory and CAPM being utilized in the Philippine stock market in terms of the following variables:

   2.1. monthly rates of return (r_{jt};)

   2.2. variance of the rate of return [($\hat{\sigma}_{ij}$) or $\hat{\sigma}^2_j$;]

   2.3. covariance of the rate of return of security j with market rate of return ($\hat{\sigma}_{jM}$;)

   2.4. the weight of each security in market portfolio (w_j)

3. What are the perception of the respondents as to the effectiveness of the portfolio management in managing securities ?

4. Is there a significant difference on the perceptions of respondents as to the effectiveness of portfolio management in Philippine stock market.

5. What is the future of the Philippine stock markets using portfolio management.

I. 4. Null Hypothesis

Specifically, the hypotheses address the objectives stated above using the CAPM, by stating the explanatory variables as follows:

(1) rate of return of security.

(2) market rate of return.

(3) mean rate of return or average rate of return.

(4) variance of the rate of return.

(5) beta risk.

(6) covariance of the rate of return.

(7) systematic risk.

These variables will explain the determinants of the portfolio in Philippines stock market. Therefore, we come to the main hypothesis:

1. There is positive correlation between risk and return and diversification of portfolio by using CAPM is the solution for reducing the risk.

2. Based on a regression equation of the form

$$r_j = \alpha_o + \alpha_1 \beta_j + e_j$$

can be fitted and the testable hypothesis are whether the following relationships hold or not:

$\alpha_o \stackrel{?}{=} R_F$ and $\alpha_1 \stackrel{?}{=} (r_M + R_F)$.

I. 5. Significance of the Study

This study attemps to test the capital asset pricing model (CAPM) using Philippines stock market data.

The researcher believes that the findings to be generated from this study will be helpful for investor to choose the best return of their investment after considering the risk factor.

And also it is very helpful as guide for brokerage firm and securities house in advicing of their clients.

Furthermore, this study might be helpful as reference material to the readers in increasing their knowledge particularly in invesment field.

Finally, the study will be of benefit to the researcher through a clearer understanding of investor and market behavior when the face return and risk at the same time. This will, hopefully place him in good stead when similar or related field in the future are encountered.

I. 6. Scope and Limitation

The traditional CAPM was formulated sometime in the mid-sixties' in the United State. The first test of the model was undertaken four years later. The following decade saw a tremendous expansion of related theoretical and empirical works. Several writers refer to this body of literature as the development of the modern capital market theory.

In the Philippines, during period 1991 and 1992 no test of the model has ever been undertaken. That is why

in this study, the simple model has to be tested. Tests conducted in the U.S. have some limitations. First, the tests assume equal proportions of each security in the market portfolio. Second, the beta risks are indirectly estimated. And third, stationarity of the beta risks is implicitly assumed. The first assumption can be avoided. The second can be overcome due to the relatively small size of the stock market and availability of data. The third requires investigation into the underlying probability distributions of securities rates of return as well as the underlying processes which generate stock prices.

At the theoretical level, the simple CAPM assumes a perfect capital market, i.e., perfectly liquid and divisible assets, zero transaction costs and taxes, homogenous expectations among investors on the joint probability distribution of securities rates of return over a single-period and common time horizon, and the existence of an unlimited borrowing-lending opportunity at a given risk-free rate. These assumptions induce two related properties of the CAPM: (a) all investors hold all available securities in their portfolio, and (b) these securities are held in the same proportion as the market portfolio.

The monthly data on security prices, the number and values of outstanding shares traded, and cash and stock

dividends are computer validated prior to estimating monthly rates of return. The weight of each security is computed based on its outstanding value relative to the total value of all securities. The variance-covariance matrices are computed for the annual and the two year periods, and, based on the weights of each security, direct estimates of the beta risk of each security for the annual as well as the two year periods are made. The simple CAPM is tested using annual and two year estimates of rates of return and beta risks.

Definition of Terms

To enhance the reader's understanding, the definitions of the terms used in this study hereby outlined. The definitions are taken from Weston and Copeland[11], Elton and Gruber[12], Brealey and Myers[13], and Sharpe and Alexander[14].

Adjusted Beta - An estimate of a security's future

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[11] J. Fred Weston and Thomas E. Copeland, Managerial Finance, Eighth Edition, (The Dryden Press, 1986).

[12] Edwin J. Elton and Martin J. Gruber, Modern Portfolio Theory and Investment Analysis, 3rd Edition, (John Wiley and Sons, 1987).

[13] Richard Brealey and Steward Myers, Principles of Corporate Finance, 3rd Edition, (McGraw-Hill Book Co, 1990).

[14] William F. Sharpe and Gordon J. Alexander, Investment, Fourth Edition, (Prentice-Hall International Inc., 1990).

beta, derived initially from historical data, but modified by the assumption that the security's "true" beta has a tendency over time to move toward the market average of 1.0.

Alpha - The difference between a security's expected return and its equilibrium expected return.

Alpha Risk (systematic risk) - those forces that are uncontrollable, external, and broad in their effect.

Asset Allocation - The process of determining the optimal division of an investor's portfolio among available asset classes.

Asymmetric Information - A situation in which one party has more information than another party.

Beta (β) - Measure of Market Risk.

Beta Coefficient - (Alternatively, Market Beta). A relative measure of the sensitivity of an asset's return to changes in the return on the market porfolio. Mathematically, the beta coefficient of a security is the security's covariance with the market portfolio divided by the variance of the market portfolio.

Blue Chips - Common stock of a company that has acknowledged reputation for the quality of its goods and services and its ability to make money in lean years as well as when business is booming. Usually, these well-seasoned shares sell at relatively high prices and has a high price earning ratio.

Beta Risk (Unsystematic Risk) - is controlable, internal factors somewhat peculiar to industries and/or firms.

Broker - An agent, or middlement, who facilitates the buying and selling of securities for investors.

CAPM (Capital Asset Pricing Model) - An equilibrium model of asset pricing which states the expected return in a security is a positive linear function of the security's sensitivity to changes in the market porfolio's return. Or theory of how risky assets are priced in market equilibrium. It provides decision makers with useful estimates of the required rates of return on risky securities and on capital budgeting projects.

Capital Gain (or Loss) - the difference between the current market value of an asset and the original cost of the asset, with the cost adjusted for any improvement or depreciation in the asset.

Capital Markets - financial markets in which financial assets with a term to maturity of typically more than one year are traded.

Capital Market Line - the set of portfolios obtainable by combining the market portfolio with riskfree borrowing or lending. Assuming homogeneous expectations and perfect markets, the Capital Market Line represents the efficient set.

Closing Price - (Alternatively, Close) - the price at which the last trade of the day took place in a particular stock.

Commission - the fee an investor pays to a brokerage firm for services rendered in the trading of securities.

Common Stock - Legal representation of an equity (or ownership) position in a corporation.

Correlation Coefficient - A statistical measure similar to covariance, in that it measures the degree of mutual variation between two random variables. The correlation coefficient rescales covariance to facilitate comparison among pairs of random variables. The correlation coefficient is bounded by the values -1and + 1.

Covariance - Measure of the comovement between two variables. Or a statistical measure of the relationship between two random variables. It measures the extent of mutual variation between two random variables.

Diversification - the process of adding securities to a portfolio in order to reduce the portfolio's unique risk and, thereby, the portfolio's total risk.

Dividents - Cash payments made to stockholders by the corporation.

Dividend Decision - the process of determining the amount of dividents that a corporation will pay its shareholders.

Dividend Yield - the current annualized dividend paid on a share of common stock, expressed as percentage of the current market price of the corporation's common stock.

Earnings Per Share - a corporation's accounting earnings divided by the number of its common shares outstanding.

Earnings Price Ratio - the reciprocal of the price earning ratio.

Econometric Model - A statistical model designed to explain and forecast certain economic phenomena.

Efficient Market - a market for securities in which every security's price equals its investment value at all times, implying that a set of information is fully and immediately reflected in market return.

Efficient Portfolio - a portfolio within the feasible set which offers investors both maximum expected return for varying levels of risk and minimum risk for varying levels of expected return.

Efficient Set (Frontier) - the set of efficient portfolios.

Endogenous Variable - in the context of an econometric model, an economic variable which represents the economic phenomena explained by the model.

Ex Ante - before the fact; furture.

Ex Post - after the fact; historical.

Exogenous Variables - in the context of an econometric model, an economic variable taken as given and used in the model to explain the model's endogenous variables.

Expected Return - the return on a security (or portfolio) over a holding period that an investor anticipates receiving.

Expected Value - a measure of central tendency of the probability distribution of random variable. Equivalently, the mean of the random variable.

Factor Risk - that part of security's total risk which is related to moves in various common factors and, hence, cannot be diversified away.

Feasible Set - the set of all portfolios that can be formed from the group of securities being considered by an investor.

Homogenous Expectations - a situation in which all investors posses the same perceptions with regard to the expected returns, standard deviations, and covariances of securities.

Indifference Curve - all combinations of portfolios, considered in terms of expected returns and risk, that provide an investor with an equal amount of satisfaction.

Initial Wealth - the value of an investor's portfolio at the beginning of a holding period.

Liquidity - the ability of investors to convert

securities to cash at a price similar to the price of the previous trade in the security, assuming no significant new information has arrived since the previous trade. Equivalently, the ability to sell an asset quickly without having to make a substantial price concession.

Liquidity Preference (Premium) Theory - the explanation of the term structure is a result of the preference of investors for short term securities. Investors can only be induced to hold longer-term securities if they expected to received a higher return.

Marginal Return on Investment - the additional income, expressed as a percentage, earned on each additional dollar invested in an asset.

Market Capilization - the aggregate market value of a security equal to the market price per unit of the security multiplied times the total number of outstanding units of the security.

Market Portfolio - a portfolio consisting of an investment in all securities. The proportion invested in each security equals the percentage of the total market capitalization represented by the security.

Market Risk - a part of a security's total risk that is related to moves in the market portfolio and, hence, cannot be diversified away.

Optimal Portfolio - the feasible portfolio that offers an investor the maximum level of satisfaction.

This portfolio represents the tangency between the efficient set and an indifference curve of the investor.

Portfolio - a combination of assets.

Portfolio Theory - deals with the selection of optimal portfolios; i.e., portfolios that provide the highest possible return for any specified degree of risk or the lowest possible risk for any specified rate of return.

Preferred Stock - a hybrid form of security that has characteristics of both common stocks and bonds.

Price Earning Ratio - a corporation's current stock price divided by its earnings per share.

Random Error Term - the difference between the actual value of a random variable and the predicted value based on some model. For a security, the difference between its actual excess return and the excess return calculated from the security's characteristic line.

Random Variable - a variable that takes on alternative values according to chance.

Rate of Return - the percentage change in the value of an investment in a financial asset (or portfolio of financial assets) over a specified time period.

Real Return - the percentage change in the value of an investment in a financial asset, where the begining and ending values of the asset are adjusted for inflation over the time of the investment.

Risk - the uncertainty associated with the end of period value of an investment in an asset or portfolio of assets.

Risk Adjusted Return - the return on an asset or portfolio, modified to explicitly account for the risk to which the asset or portfolio is exposed.

Risk Averse Investor - an investor who prefers an investment with less risk over one with more risk, assuming that both investments offer the same expected return.

Risk Free Asset - an asset whose return over a given holding period is certain and known at the beginning of the holding period.

Risk Neutral Investor - an investor who has no preference between investments with varying levels of risk, assuming that the investments offer the same expected return.

Risk Premium - the difference between the expected yield to maturity of a risky bond and the expected yield-to-maturity of a similar default free bond.

Risk Seeking Investor - an investor who prefers an invesment with more risk over one with less risk, assuming that both investments offer the same expected return.

Risk Structure - the set of yields-to-maturity across bonds that posses different degrees of default

risk, but are similar with respect to other attributes.

Risk Tolerance - the trade off between risk and expected return demanded by a particular investor.

Security Market Line - derived from the CAPM, a linear relationship between the expected returns on securities and the risk of those securities, with risk expressed as the security's beta (or equivalently, the security's covariance with the market portfolio).

Separation Theorem - a feature of the Capital Asset Pricing Model which states that the optimal combination of risky assets for an investor can be determined without any knowledge about the investor's preferences toward risk and return.

Simple Linear Regression (Alternatively, Ordinary Least Squares) - a statistical model of the relationship between two random variables in which one variable is hypothesized to be linearly related to the other. This relationship is depicted by a regression line which is a stright line, "fitted" to pairs of values of the two varibles, so that the sum of the squared random error terms in minimized.

Standard Deviation - a measure of the dispersion of possible outcomes around the expected outcome of a random variable.

Standard Error of Alpha - the standard deviation of a security's estimated alpha, as derived from ex post

characteristic line.

Standard Error of Beta - the standard deviation of a security's estimated beta, as derived from ex post characteristic line.

Stock Dividend - an accounting transaction that distributes stock to existing shareholders in proportion to the number of shares currently owned by the shareholders. A stock dividend entails a transfer from retained earnings to the capital stock account of a dollar amount that is equal to the market value of the distributed stock.

Stock Market - a means whereby buyers and sellers are brought together to aid in the transfer of securities.

Variance - Mean squared deviation from the expected value--a measure of variability.

CHAPTER II

REVIEW OF RELATED LITERATURE AND STUDIES

The writer, after an extensive research on books, journals and periodicals, found several extensive related literature to the research he undertooke. He also believed that there are some other materials which may help and assist the reader appreciate and understand the problems he has presented.

II. 1. Foreign Studies

Many observers trace the beginnings of modern financial investment theory to the pioneering article of Markowitz [1]. This is not surprising in view of the dominant position that the mean-variance approach to portfolio choice analysed by Markowitz has attained in the last three decades, particularly in emperical studies. Financial investment theory under uncertainty goes beyond this particular model, however, and somewhat further back in time as well.

In this chapter the pure portfolio model, both the single-period and the intertemporal variaties, will first be examined followed by consumption-investment

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[1] Harry Markowitz, "Portfolio Selection," Journal of Finance, (March 1952), p. 77-99.

formulation, then by an examination of the Capital Assets Pricing Model (CAPMD.

II. 1. 1. Portfolio Analysis

II. 1. 1. 1. Pure Portfolio Analysis

II. 1. 1. 1. A. Single-Period Models

Even though the mean-variance model 'dominates' single-period analysis, it will be expedient to begin with the approach which is a direct application of the theory of rational choice, also known as expected utility portfolio models.

II. 1. 1. 1. A. 1. The expected utility approach

The investor, starting the period with initial capital $w_o>0$, is assumed to have preferences that are rational (in the von Neumann-Morgenstern sense)[2] with respect to end-of-period distributions of wealth and therefore representable by a utility function, u, defined on end-of-period wealth w. Thus, the investor's problem is to maximize $E[u(w)]$, where E denotes the expectation operator. Letting r_i denote the (general random) return per unit of investment in opportunity i and z_i the amount (to be) invested in opportunity (asset, security) i, i =

[2]John von Newman and Oscar Morgenstern, Theory of Games and Economic Behavior, (Princeton: Princeton University Press, 1944).

1, ...,m, we obtain

$$w = \sum_i z_i (1+r_i), \quad \sum z_i = w_o,$$

where the second expression is the budget constraint. Solving the second expression for z_1 and inserting the result in the first equality, the investor's problem becomes

$$\text{P1:} \quad \max_{z2,\ldots,zm} E\{u[\sum_{i=2}^{m} (r_i - r_1) z_i + w_o (1 + r_1)]\} \qquad (2.1)$$

subject to

miscellaneous constraints. (2.2)

At this point, several remarks are in order. First, in the expression for w, a perfect market has been implicitly assumed, i.e., an absence of transaction costs and taxes, perfect divisibility, a competitive securities market, constant returns to scale, abd that the investor has full use of the proceeds from short sales (negative holdings). These assumptions are standard and will be maintained throughout. Second, when some security is risk free over the holding period, it carries the subscript i = 1 above; in this case, the first m-1 term in (2.1) represents the excess earned (over and above what an entirely risk-free portfolio would have provided) on the risky holdings (this excess may of course be negative). Third, it is usually assumed (quite inocuosly from an empirical viewpoint) that the investor prefers more to

less and is averse to risk, that is that

$u'>0,\ u''<0.$ (2.3)

Finally, the constraint (2) usually represents institutional and/or self-imposed barriers on borrowing (e.g.,margin requirements), on short positions, and on solvency (such as Pr (w > 0) = 1).

The solution to P1 is usually denoted $z^*(w_o) = z^*_2(w_o),\ldots,z^*_m(w_o)$. It exists under various innocent conditions: one set imposes bounded returns on the available securities, 'no-easy-money', and a solvency constraint. The no-arbitrage or no-easy-money condition precludes both a payoff $w \geq 0$, where Pr (w > 0) > 0, from a nonpositive net investment, as well as a payoff w = 0 from anegative net investment. Given existence, the second part of (2.3) (strict concavity of u) implies that the optimal payoff distribution w^* (though not necessarily the optimal portfolio z^*) will be unique.

Define a(w) (the absolute risk aversion function) and r(w) (the relative risk aversion function) by

$$a(w) \equiv - u''(w)/u'(w), \quad r(w) \equiv wa(w).$$

Arrow[3] demonstrated that if $E[r_2]>r$,

$$a'(w) \gtrless 0 \Rightarrow \frac{dz^*_2}{dw_o} \gtrless 0$$

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[3]Kenneth J. Arrow, Aspects of Theory of Risk Bearing, (Helsinki: Yrjo Johsson Saatio, 1965).

when there are only two assets available, one risky and the othe rrisk-free. While the result does not extend in general to the case of many risky assets (Cass and Stiglitz),[4] the empirical observation that a given portfolio of risky assets is overwhelmingly treated as a normal (as opposed to inferior) good lends strong support to the notion that the preferences of the great majority of investors have the property

$$a'(w) < 0 \qquad (2.4)$$

in addition to those given in (2.3). Beyond this, however, we have little to say about investors' preference functions with respect to wealth.

Since properties (2.3) and (2.4) leave much room for individuality, there is rather little one can say in general about the solution to P1 -- except that the optimal portfolio will be well diversified. This observation was probably first made in a scholarly context by Bernoulli (1738) in his advocacy of the logarithmic measure of welfare.

There are, however, two cases of special interest. One is the case in which the optimal investment policy is proportional to initial capital. This occurs if and only

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[4] D. Cass and Joseph Stiglitz, "Risk Aversion and Wealth Effects on Portfolios with many Assets," Review of Economics Studies, (July 1972), p. 331-354.

if utility is a member of the family of power functions (the isoelastic family), that is

$$u(w) = \begin{cases} -w^{\gamma}, & \gamma < 0 \\ \ln w, & (\gamma = 0) \\ w^{\gamma}, & 0 < \gamma < 1 \end{cases}, \qquad (2.5)$$

which in turn implies, and is implied by, constant relative risk aversion. [For the family above, $r(w) = 1 - \gamma$]. The optimal policy is now of the form

$$z_i^*(w_o) = x^*_{i\gamma}\, w_o, \qquad \forall\, i, \gamma \qquad (2.7)$$

where the $x^*_{i\gamma}$s are constants corresponding to the proportions to be invested in the various assets.

A second special case is that of linear optimal investment policies (of which (2.6) is obviously a special case). This occurs, assuming a risk-free asset or portfolio is available, if and only if prferences exhibit linear risk tolerance [$a(w)^{-1}$ is linear] or, equivalently, hyperbolic absolute risk aversion, that is

$$u(w) = \begin{cases} \gamma^{-1}(w + \phi)^{\gamma} & \gamma < 0 & a' < 0 & (2.7a) \\ -(\phi - w)^{\gamma} & \gamma > 1,\ \phi \text{ large} & a' > 0 & (2.7b) \\ -\exp(\phi w) & \phi < 0 & a' = 0 & (2.7c) \end{cases}$$

The optimal policies are given, in the three cases, by

$$z_i^*(w_o) = \begin{cases} x^*_{i\gamma}\left(w_o + \dfrac{\phi}{1 + r_i}\right) & (2.8a) \\ x^*_{i\gamma}\left(\dfrac{\phi}{1 + r_1} - w_o\right) & i = 2, \ldots, m \quad (2.8b) \\ \text{a constant } (\phi) & (2.8c) \end{cases}$$

and are said to exhibit the separation property. This name derives from the fact that the mix of risky assets (the ratio of $z_i^*(w_o)/z_j^*(w_o)$, any $i, j \geq 2$) is independent of initial wealth w_o (it is also independent of the preference parameter ϕ). In the absence of a risk-free asset or portfolio, separation obtains only for quadratic utility, or when $\gamma = 2$ in (2.7). Thus we have the remarkable observation that, for arbitrary return distributions, two individuals of differing initial wealth levels would be willing to delegate the choice of risky assets proportions to the same mutual fund only if they share probability beliefs and either a risk-free portfolio is available and both individuals' preference functions belong to either (2.7a) or (2.7b) with a common γ or to (2.7c), or both investors have quadratic utility. When it comes to risky investments, individuality runs strong indeed.

Separation based on return distributions rather than preferences can also occur but only under highly restrictive assumptions (Ross).[5] The most noteworthly case is when returns are normally distributed, which is discussed in the next section.

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[5] S. Ross, "Mutual Fund Seperation in Financial Theory: The Separating Distribution," Journal of Economic Theory, (April 1978), p. 254-286.

II. 1. 1. 1. A. 2. The mean-variance approach

The essence of the mean-variance (MV) model is that more expected return is preferred to less, *ceteris paribus*. In addition, it is usually assumed that indifference curves in standard deviation-mean space are convex. Since the return r on a portfolio is $w/w_o - 1$, we obtained, defining x_i as the fraction of w_o invested in opportunity i or $x_i \equiv z_i/w_o$ and using (2.1),

$$r(x) = \sum_{i=2}^{m} (r_i - r_1) x_i + 1 + r_1.$$

More formally, the mean-variance approach can thus be viewed as postulating a preference function $f(E[r], V[r])$, where $V[r]$ is the

variance of r, such that

$$\frac{\partial f}{\partial E} > 0, \frac{\partial f}{\partial V} < 0, \left.\frac{d^2E}{d(\sqrt{V})^2}\right|_{f=fo} > 0. \qquad (2.9)$$

The first two properties of (2.9) provide the basis for the central notion of mean-variance dominance: return distribution r_i is said to MV-dominate distribution r_k if and only if

$E_i \geq E_k$, $V_i \leq V_k$

and at least one inequality is strict. Given the set of feasible portfolios, dominated portfolios are referred to as inefficient and nondominated portfolios as efficient.

The first two properties of (2.9) thus generate a partial ordering of payoff distributions in a manner similar to that of the various stochastic dominance criteria.

In the absence of a risk-free asset or portfolio, E[r] is (except in pathological cases) a strictly concave function of $\sigma[r]$ (= $\sqrt{V[r]}$) for the set of efficient portfolios. In the presence of a risk-free asset, the by the linear equation

$$E[r_p] = r_1 + \frac{E[A] - r_1}{\sigma[A]} \sigma[r_p],$$

where A is the one portfolio composed solely of risky assets that is efficient. In other words, all efficient portfolios are combinations of the risk-free asset and portfolio A, that is the separation property holds.

As noted, Markowitz is viewed as the originator of mean-variance portfolio theory, although Tobin[6] also made important early contributions. However, the mean variance approach itself has three other independent and rather interesting origins. Marschack (1951), using a Taylor series expansion as an approximation to the expected utility of return, obtained, on the basis of the first three terms, the expression

$$E[r] - b(E[r])^2 - bV[r], \qquad b>0,$$

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[6]James Tobin, "Liquidity Preference as Behavior Toward Risk," Review of Economic Studies, (February 1958), p. 65-86.

which is an eligible form of the mean-variance function f(E,V). Roy[7] argued for maximizing the probability of exceeding some disaster level d, or the criterion

$$\max \Pr \langle r > d \rangle.$$

Applying Chebychev's inequality, he obtained the operational expression

$$\max \frac{E[r(x)] - d}{\sigma[r(x)]},$$

which clearly captures the essence of the mean variance framework. Finally, Freund[8] assuming negative exponential utility [see (2.7c)] and normally distributed returns, obtained

$$E[u(w)] = -\exp\left\{k\left[E[w] + \frac{k}{2} V[w]\right]\right\}, \qquad k < 0,$$

where, upon optimization, each permissible value of k implies a mean-variance efficient solution.

The mean-variance model is consistent with the expected utility criterion in two principal cases. First, under arbitrary return distributions, utility must be quadratic [$u(w) = w - bw^2$, $b > 0$], which unfortunately

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[7] A. Roy, "Safety First and Holding of Assets," Econometrica, (July 1952), p. 431-439.

[8] R. Freund, "The Introduction of Risk into a Prgramming Model," Econometrica, (July 1956), p. 253-263.

implies $u' \leq 0$ for $w \geq b/2$ and that risky assets are inferior goods (see 2.8b). Second, when returns are normally distributed, consistency occurs for that subset of preferences for which the expected utility integral exists (a necessary condition for this is that u(w) is defined on the whole real line - this excludes the family (2.7a), for example).

Although normally distributed returns are a poor approximation of actual returns in a world of limited liability, and quadratic utility leaves much to be desired, the mean-variance model is by far the most widely used. This appears to be attributable to three principal properties. First, MV-efficient portfolios are (like the portfolios of risk-averse expected utility maximizers) well diversified. Second, the MV-model makes more modest input demands and is computationally much simpler than the (non-quadratic) expected utility models. (What business person would appreciate the advice that (s)he maximize expected utility ?). Finally, the normality assumption appears to provide a reasonable approximation of the returns for well diversified portfolios in many cases, and the quadratic function, over a limited range, is often a satisfactory approximation to an arbitrary utility function.

II. 1. 1. 1. B. Multi-Period Models

This section addresses the type of models in which a large number of sequential portfolio choices is of the essence. We shall therefore employ the subscript t to denote period t; w_t represents wealth at the end of period t. The returns r_{it} will be assumed to be independent with respect to t (but not i).

II. 1. 1. 1. B. 1. The long-run growth model

Let $R_t(x_t) \equiv 1 + r_t(x_t)$; R_t is now called the wealth relative for period t. Thus, under full reinvestment of the previous period's payoffs,

$$w_t = w_o R_1(x_1)\ldots R_t(x_t)$$
$$= w_o \exp\left\{ \sum_{n=1}^{t} \ln R_n(x_n) \right\},$$

where we assume that $R_t(x_t) \geq 0$, all t. Letting

$$G_t(\langle w_t \rangle) \equiv \sum_{n=1}^{t} \ln R_n(x_n)/t \qquad (2.10)$$

and observing that the variates $\ln R_1$, $\ln R_2$, ...(under mild restrictions) obey the law of large numbers, we obtain

$$w_t \to \begin{cases} 0 & \text{if } E[G_t] \leq \delta < 0 \\ \infty & \text{if } E[G_t] \geq \delta > 0 \end{cases} \quad t \geq T,\ T \text{ large.} \qquad \ldots\ldots\ldots(2.11)$$

Thus, it is the expectations of the logs of the wealth relatives which are the principal determinants of what heppens to one's capital over the long haul.

In view of (2.11), it is natural to think of maximizing the expectation of G since this almost surely leads to more capital in the long run than any other (significantly different) strategy. To do this, it is necessary and sufficient to

$$\max_{x_t} E[\ln R_t(x_t)], \quad \text{each } t, \tag{2.12}$$

that is to solve (2.12) one period at a time. Note that (2.12) is equivalent to maximizing the geometric mean of R_t in each period. This model appears to have been independently discovered by Williams (1936), Kelly (1936), Latane (1959), and Breiman (1960).

The long run growth model has several noteworthy properties. First, the decision rule (2.12) implies, and is implied by, logarithmic utility of wealth in each period. Thus, it is inconsistent with all (significantly) different preferences (including the mean variance model). In other words, almost surely having more capital does not imply higher expected utility (or conversely). Various writers have on occasion been confused on this point.

Second, the 'growth-optimal' investment policy is not only proportional to initial wealth but (2.12) implies that it is *myopic*, that is independent of the return distributions beyond the current period (this is

true even under returns that are weakly dependent over time). Finally, with relative risk-aversion equal to 1, the model tells us that to do well in the long run in terms of capital accumulation, one must be averse to risk. Furthermore, both greater and smaller risk aversion almost surely leave one with less capital than logarithmic risk aversion.

II. 1. 1. 1. B. 2. Terminal utility models

Now consider the case in which the investor's preferences for wealth w at some (distant) terminal point in time w are represented by the utility function $U_h(w_h)$. Letting w_n be the investor's wealth with n periods to go, we obtain, under full reinvestment of each period's proceeds,

$$w_{n-1}(z_n) = \sum_{i=2}^{m} (r_{in} - r_{1n})\, z_{in} + w_n(1 + r_{1n}), n = 1,2, \ldots$$

where, for convenience, we set $h = 0$. Defining $U_n(w_n)$ as the maximum. expected utility obtainable with w_n, we obtain the recursive equation

$$U_n(w_n) \equiv \max_{z_n} E\{U_{n-1}[w_{n-1}(Z_n)]\},\ n = 1, 2, \ldots \quad (2.13)$$

Consequently, $U_n(w_n)$ is the derived or induced utility of wealth with n periods to go.

The conditions for the existence of a solution to system (2.13) are the same as for the single-period

model. When U_o has properties (2.3), so do the induced functions $U_1,\ldots,U_n$. In general, $U_n(w_n)$ depends on all of the inputs: U_o, the joint distribution functions $F_1(r_1)$, ..., $F_n(r_n)$, and the interest rates r_{11}, ...,r_{1n}. There are, however, two special cases. First, when $U_o(w_o)$ belongs to class (2.5), U_n becomes a positive linear transformation of U_o so that in effect

$$U_n(w) = U_o(w), \qquad n = 1, 2, \ldots$$

Consequently, the optimal investment policy $z_n^*(w_n)$ depends in this case only on the current periods inputs, $F_n(r_n)$ and r_{1n}, and is thus *myopic*. This was first shown by Mossin.[9]

The second special case occurs when interest rates follow a deterministic process. Then, when U_o belongs to class (2.7a) with $\phi \leq 0$. U_n depends only on U_o and r_{11}, ... , r_{1n}, which is called

partial myopia. U_n and z_n^* are now given by

$$U_n(w_n) = \gamma^{-1}(w_n + A_n)^\gamma, \qquad \gamma < 1$$

$$z_{in}^*(w_n) = x_{in\gamma}(w_n + A_n), \qquad i = 2,\ldots,m,$$

where $A_n = \phi\,[(1+r_{11})\ldots(1+r_{1n})]^{-1}$. In the other cases of family (2.7), partial myopia occurs locally, that is for w_n greater than or equal to a (positive) lower bound.

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[9] J. Mossin, "Optimal Multiperiod Portfolio Policies," Journal of Business, (April 1968), p. 215-229.

The most interesting aspect of the terminal utility model, however, is a strong set of convergence results (see, e.g. Hakansson).[10] Under very general conditions, we obtain from (2.13) that U_n converges to a member of the isoelastic family

(2.15), that is

$$U_n(w_n) \to \frac{1}{\gamma} - w_n^{\gamma}, \quad \text{some } \gamma < 1.$$

In addition, $z_n^*(w_n) \to x_{n\gamma}^* w_n$.

Thus, we have the remarkable result that reinvesting individuals with distant horizons should follow an isoelastic investment policy independently of their terminal preferences as long as their horizon remains distant.

II. 1. 1. 1. B. 3. The continuous-time model

Since transaction costs are zero under the perfect market assumption, it is natural to consider shorter periods between reinvestment decisions. In the limit, reinvestment takes place continuously. Assuming that the returns on risky assets can be described by diffusion processes, we obtain that optimal portfolios are mean-variance efficient in that the instantaneous variance is minimized for a given instantaneous expected

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[10] N. Hakansson, "Optimal enterprenurial Decision in a Completely Stochastic Environment," Management Science, (March 1971), p. 587-607.

return. The intuitive reason for this is that as the trading interval is shortened, the first two moments of the change in a security's price become more and more dominant (see Samuelson).[11] The optimal portfolios also exhibit the separation property -- as if returns over very short periods were normally distributed. Over any fixed interval, however, payoff distributions are, due to the compounding effect, usully lognormal.

II. 1. 1. 2. Consumption-Investment Analysis

In consumption-investment models, investment is merely a means to an end - future consumption and bequests. Thus, preferences are defined on consumption and bequest programmes, $c_1, c_2, \ldots, c_n, b_n$, where c_t is the level of consumption in period t and b_n the bequest at the end of the last period, assuming death occurs in period n. The utility of wealth is therefore not a primitive but must be induced or derived. Preferences may of course be conditional on n and depend on the environment s, in which case they may be written

$$U_{ns}(c_1, \ldots, c_n, b_n). \qquad (2.14)$$

where it is usually assumed that the functions U_{ns}

[11] Paul A. Samuelson, "The Fundamental Approximation Theorem of Portfolio Analysis in terms of Means, Variances and Hihger Moments," Review of Economics Studies, (October 1970), p. 537-542.

reflect a preference for more to less and are strictly concave. Commonly studied forms of (2.14) are those in which (2.14) is additive or multiplicative. When additive and state-independent, (2.14) may be written

$$u_1(c_1) + u_2(c_2) + \ldots + u_n(c_n) + g_n(b_n).$$

Wealth is now governed by the difference equation

$$w_{t+1} = \sum_{i=2}^{m} (r_{its} - r_{1ts})z_{it} + (w_t - c_t)(1 + r_{1ts}) + y_{ts},$$

where y_{ts} is employment income.

The simplest consumption-investment model is based on just two periods and can profitably be used to study such questions as 'How does the investor respond to increasing investment risk?' Answer: any which way -- see, e.g. Rothschild and Stiglitz.[12] In multi-period formulations, additional issues that must be addressed are the probabilistic nature of the investor's life span and the stochastic process obeyed by returns. Dynamic programming formulations of this problem become rather lengthy [see, e.g. Hakansson].[13] The most general models posit a state-contingent opportunity set where the state

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[12] M. Rothchild and J. Stiglitz, "Increasing Risk II: Its Economics Consequences," Journal of Economic Theory, (March 1971), p. 66-84.

[13] N. Hakansson, "Optimal Investment and Consumption Strategies Under Risk for a Class of Utility Functions," Econometrica, (September 1970), p. 587-607. and "Covergence to Isoelastic Utility and Policy in Multiperiod Portfolio Choice," Journal Financial Economics, (September 1974), p. 20-24.

obeys a Markov process.

When preferences are either additive or multiplicative and $u_t(c_t)$ belongs to the family (2.7a) with $\phi \leq 0$, the separation property is preserved. When $\phi < 0$, $-\phi$ assumes the role of subsistence level. For the family (2.7b) and (2.7c), on the other hand, the non-negativity constraint on consumption is generally binding and poses insurmountable problems for the mean-variance model. However, as in the pure reinvestment model, mean-variance efficiency is restored by moving to a continuous time formulation (Merton, 1971).[14]

II. 1. 2. Capital Asset Pricing Model (CAPM)

Two general approaches to the problem of valuing assets under uncertainty may be distinguished. The first approach relies on arbitrage arguments of one kind or another, while under the second approach equilibrium asset prices are obtained by equating endogenously determined asset demands to asset supplies, which are typically taken as exogenous. Examples of the former range from the static arbitrage arguments which underlie the Modigliani-Miller theorem to the dynamic arbritrage

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[14] R. Merton, "Optimum Consumption and Portfolio Rules in a Continous Time Model," Journal of Economic Theory, (August 1971), p. 373-413.

strategies which are the basis for the Option Pricing Model. Such arbitrage based models can only yield the price of one asset relative to the prices of other assets. The Capital Asset Pricing Model (CAPMD is an example of an equilibrium model in which asset prices are related to the exogenous data, the tastes and endowments of investors although, as we shall see below, the CAPM is often presented as a relative pricing model.

If they are to be of practical use, equilibrium assets pricing models must be parsimonious in their parameterization of asset demands. To date, this parsimony has been achieved only by a choice of assumptions which leads to universal portfolio separation: this is the property that the asset demand vector of every agent can be expressed as a linear combination of a set of basis vectors which may be thought of as portfolios or mutual funds. The distinguishing feature of the set of models which is collectively known as the CAPM is that each of these basic portfolios can be interpreted as the solution to a particular constrained portfolio variance minimization problem.

II. 1. 2. 1. Historical Perspective

The assumption that uncertainty about future asset

returns can be described in terms of a probability distribution is at least as old as Irving Fisher[15] although Hicks[16] appears to have been the first to suggest that preferences for investments could be represented as preferences for the moments of the probability distributions of their returns, and to propose that, as a first approximation, preferences could be represented by indifference curves in mean-variance space. Other writers such as J.Marschak[17] adopted a similar view, but it remained for von Neumann and Morgenstern[18] to place the theory of choice under uncertainty on a rigorous axiomatic basis, and their expected utility theory is now an essential element of the financial economics paradigm.

The story of modern portfolio theory really begins, however, with the classic contributions of Markowitz (1952, 1958) who assumed explicitly that investor preferences were defined over the mean and variance of the aggregrate portfolio return, related these parameters

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[15] Irving Fisher, The Nature of Capital and Income, (New York Macmillan, 1906).

[16] John R. Hick, "Application of Mathematical Methods to the Theory of Risk," Econometrica, (April 1934), p. 194-195.

[17] J. Marschack, "Money and Theory of Assets," Econometrica, (October 1938), p. 311-325.

[18] von Newman and Morgenstern, op.cit., p. 215.

to the portfolio composition and the parameters of the joint distribution of security returns, and for the first time applied the principles of marginal analysis to the choice of optimal portfolios.

Both Markowitz and Tobin (1958) showed that mean variance preferences could be reconciled with the von Neumann/Morgenstern axioms if the utility function is quadratic in return of wealth. This assumption is objectionable since it implies negative marginal utility at high wealth levels. Tobin also showed, however, that mean variance preferences could be derived by restricting the probability distributions over which choices are made to a two parameter family. After some initial confusion it was recognized that since portfolio returns are weighted sums of securities returns, the two parameter family must be stable under addition, and the only member of the stable class with a finite variance is in the normal distribution. Subsequently Merton (1969) and Samuelson (1970) showed that mean-variance analysis is applicable for a broad class of continuous asset price processes if the trading interval is infinitesimal.

The major part of Tobin's analysis deals with the choice between a single risky asset and cash, but he demonstrated that nothing essential is changed if there are many risky assets, for they will always be held in

the same proportions and can be treated as a single composite asset. This, the first separation theorem in portfolio theory, is illustrated in Figure 2.1 which plots mean returns, μ, against the standard deviation, σ. In this figure the curve locus AMOVB corresponds to the set of portfolios offering the lowest standard deviation for each level of mean returns: the positively sloped segment is referred to as the efficient frontier, for points along it offer the highest μ for a given σ. In the absence of any riskless investment opportunities, risk averse mean-variance investors will select portfolios corresponding to the points at which their indifference curves in (μ, σ) space are tangent to the efficient frontier (Tobin shows that the indiference curves of risk averters will have the requisite curvature). Point C represents cash which has zero risk and return. By combining cash with the portfolio of risky assets corresponding to the tangency portfolio O, investors are able to attain the (μ, σ) combinations along the line segment CO, and all investors who find it optimal to hold cash will find it optimal to combine their cash with the same risky portfolio O. Their portfolio decisions can be separated into the choice of the optimal combination of risky asset (O) and the choice of the cash/risky asset ratio.

Six years elapsed before the equilibrium implications of the Tobin Separation Theorem were exploited by Sharpe[19] and Lintner.[20] The reason for the delay was undoubtedly the boldness of the assumption required for progress, i.e., that all investors hold the same beliefs about the joint distribution of security returns. Nevertheless, this assumption of homogenous beliefs, combined with the further assumption that all investors can borrow as well as lend at the riskless rate, r, leads to the powerful conclusion that all investors hold the same portfolio of risky assets, denoted by M in the figure. Then the only risky assets that will be held by investors in equilibrium are those contained in portfolio M, and M must be the market portfolio of all risky assets in the economy. This identification of the tangency portfolio M with the aggregate market portfolio is the essence

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[19] Williem F. Sharpe, "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk," Journal of Finance, (September 1964), p. 425-442.

[20] J. Lintner, "The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets," Review of Economics and Statistics, (February 1965), p. 13-37.

of the Sharpe-Lintner CAPM.

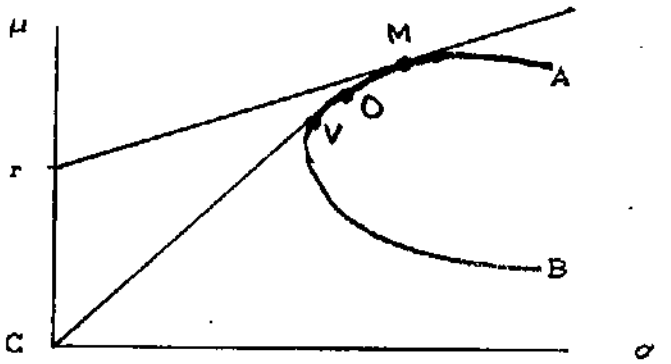

Figure 2.1 The efficient frontier and the CAPM

The interest of this result derives from the restriction that it imposes on expected asset returns: the excess of μ_j, the expected return on any security j, over the risk-free rate r, must be proportional to the covariance of the security return with the return on the market portfolio, σ_{jM}:

$$\mu_j - r = \theta_M \sigma_{jM} \qquad \forall\ j \qquad (2.15)$$

where θ_M is a measure of aggregate risk aversion. The intuition behind this important result is that if investors are content to hold portfolio M, the marginal rate of transformation between risk and return obtained by borrowing to invest in a risky security must be the same for all risky securities. Frequently the unknown riak aversion parameter, θ_M, is eliminated and the relative pricing result is obtained:

$$\mu_j - r = \beta_j(\mu_M - r) \qquad \forall\ j \qquad (2.16)$$

where μ_M is the expected return on the market porfolio

and $\beta_j \equiv \sigma_{jM}/\sigma_{MM}$ is the 'beta' coefficient, which corresponds to the slope of the regression line relating the return on the security to the return on the market portfolio.

During the first half of the 1970s extensive progress was made in relaxing the strong assumptions underlying the original model, and new separation theorems and models were obtained. At the same time, extensive empirical investigations made possible by the development of new stock price data bases found results which were interpreted as favourable to the model. The model also has an influence on practical investment management and corporate finance.

A turning point was reached by the publication of a paper by Roll.[21] He argued that the market portfolio of the theory, which includes all assets, could never be empirically identified, and that therefore the CAPM, which simply asserts the efficiency properties of this portfolio, could never be empirically tested. This argument had substantial influence, and played a major role in shifting attention away from the CAPM to the

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[21] R. Roll, "A Critique of the Asset Pricing Theory's Test; Part I: On Past and Potential Testability of the Theory," Journal of Financial Economics, (March 1977), p. 129-176.

newly emerging Arbitrage Pricing Theory of Ross (1976).[22]

The CAPM is of great historical significance not only because it was the first equilibrium model of asset pricing under uncertainty, but also because it showed the importance of portfolio separation for tractable equilibrium models. And, being derivable from assumptions of either quadratic utility or normal distributions, it revealed that the requisite separation properties could be obtained by restrictions either on preferences or on distributions. Cass and Stiglitz (1970) clarified the rather restrictive assumptions necessary for preference based separation, and equilibrium models based on this have been constructed, for example, by Rubinstein.[23] Ross[24] has identified the distributional assumptions required for separation in the absence of restrictions on preference, and the Arbitrage Pricing Theory is based on a generalization of his 'Separating Distributions'. Thus, both preference-based and distribution-based models of

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[22]S. Ross, "The Arbitrage Theory of Capital Asset Pricing," Journal of Economics Theory, (December 1976), p. 341-360.

[23]M. Rubinstein, "The Valuation of Uncertainty Income Streams and The Pricing of Option," Bell Journal of Economics, (Autumn 1976), p. 407-425.

[24]S. Ross, "Mutual Fund Separation in Financial Theory: The Separating Distributions," Journal of Economic Theory, (April 1978), p. 254-286.

capital market equilibrium are lineal descendants of the CAPM.

An unfortunate consequence of the one period nature of the CAPM was a concentration of attention on equilibrium rates of return, rather than on prices, which are the fundamental variables of interest. However, Merton[25] placed the CAPM in an intertemporal context, and his necessary condition for equilibrium rates of return forms one cornerstone (the other being an assumption of rational expectations) for the Cox, Ingersoll and Ross[26] partial differential equation for asset prices.

II. 1. 2. 2. Formal Models

While a complete asset pricing model endogenizes the riskless interest rate as well as the prices of risky securities, the CAPM adds nothing new to the theory of interest rate and current consumption decisions as given, concentrating our attention on portfolio decisions and the pricing of risky securities.

In considering the various versions of the CAPM, we

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[25] R. Merton, "An Intertemporal Capital Asset Pricing Model," Econometrica, (September 1973), p. 867-887.

[26] J. Cox, J. Ingersoll and S. Ross, "An Intertemporal General Equilibrium Model of Asset Prices," Econometrica, (March 1985), p. 363-384.

shall pay particular attention to the implied demands of investors. It will be seen that, in all cases in which risks are freely traded, asset demands exhibit the separation property. And even when there are restrictions on trading as in the Mayers (1972) asset pricing model, an approximate separation property obtains.

II. 1. 2. 2. A. The Sharpe-Lintner Model

Consider a setting in which each investor i ($i = 1,\ldots,m$) is endowed with a fraction $\bar{z}_{ij}$ of security j ($j = 1,\ldots,n$) and (a) investor utility is defined over the mean and variance of end of period wealth; (b) securities are traded in a competitive market with no taxes or transactions costs; (c) investors share homogeneous beliefs or assessments of the joint distribution of payoffs on the securities; there are no dividends; (d) there is an exogenously determined interest rate $r = R - 1$ at which investors may borrow or lend without default; (e) there are no restrictions on short sales.

Then define:

$\bar{P}_{j1}$ expected end of period value of security j;

$\bar{P}_{jo}$ initial value of security j;

ω_{jk} covariance between end of period value of j and k;

$\bar{W}_i, S_i^2$ expectation and variance of end of period wealth of investor i;

$V_i^2(\bar{W}_i, S_i)$ utility of investor i with $V_{i1} \equiv \partial V_i / \partial \bar{W}_i > 0$,

$$V_{i2} \equiv \partial V_i / \partial S_i^2 < 0.$$

The investor's decision problem may be written as

$$\max_{z_{ij}} V_i(\bar{W}_i, S_i^2) \qquad (2.17)$$

$$\text{s.t. } \bar{W}_i = \sum_j z_{ij} \bar{P}_{j1} - R \sum_j (z_{ij} - \bar{z}_{ij}) P_{jo} \qquad (2.18)$$

$$S_i^2 = \sum_j \sum_k z_{ij} z_{ik} \omega_{jk} . \qquad (2.19)$$

The first order conditions for an optimum are

$$V_{i1}(\bar{P}_{j1} - RP_{jo}) + 2V_{i2} \sum_k z_{ik} \omega_{jk} = 0, \quad (j = 1, \ldots, n) \qquad (2.20)$$

and the second conditions are satisfied by virtue of the assumption of risk aversion. Defining Ω^* as the variance covariance matrix $[\omega_{jk}]$ and using boldface type to denote vectors,

the vector of fractional asset demands may be written

$$z_i = \theta_i^{-1} \Omega^{*-1} (P_1 - RP_o) \qquad (2.21)$$

where $\theta_i^{-1} \equiv -V_{i1}/2V_{i2}$ is a measure of the investor's risk tolerance. Equation (2.21) is a statement of the Tobin Separation Theorem, that investor demands for risky assets differ only by a scalar multiple.

Market clearing requires that $\sum_i z_i = 1$ where 1 is a vector of units. Then the equilibrium initial price vector is obtained by summing (2.21) over i and imposing the market clearing

condition:

$$P_o = \frac{1}{R}\langle \bar{P}_i - \theta_m \Omega^* 1\rangle \qquad (2.22)$$

where $\theta_m \equiv (\Sigma_i \theta_i^{-1})^{-1}$. In this form the CAPM expresses equilibrium asset prices in terms of the exogenous variables, the distribution of end of period prices, investor risk aversion parameters and the interest rate, although it should be noted that in general the market risk aversion parameter θ_m will depend upon the endogenously determined distribution of wealth. This formulation corresponds to that of Lintner (1965) and emphasizes the one period nature of the model and the exogeneity of the end of period prices. However, the CAPM is most often written as a necessary condition for the equilibrium rates of return, although this obscures the distinction between endogenous and exogenous variables.

In what follows we shall work with the rate of return formulation; thus define $x_{ij} \equiv z_{ij} P_{jo}$, the amount invested in security j; $\mu_j \equiv \bar{P}_{j1}/P_{jo} - 1$, the expected rate of return between and $\sigma_{jk} \equiv \omega_{jk}/P_{jo}P_{ko}$, the covariance of the rates of return between securities j and k. Making these substitutions in (2.18) and (2.19), the first order conditions (2.20) become

$$V_{i1}(\mu_j - r) + 2V_{i2} \Sigma_k x_{ik}\sigma_{jk} = 0, \quad (j = 1,\ldots,n). \qquad (2.23)$$

Then, defining Ω as the variance covariance matrix of rates of return, the vector of asset demands x_i may be

expressed as

$$x_i = \theta_i^{-1}\Omega^{-1}(\mu - r1) \qquad (2.24)$$

This is an alternative statement of the Tobin Separation Theorem and the portfolio $\Omega^{-1}(\mu - r1)$□ corresponds to the point of tangency in figure 2.1. This portfolio itself may be decomposed into the two portfolios $\Omega^{-1}\mu$ and $\Omega^{-1}1$. The former is the solution to the problem of finding the minimum variance portfolio of risky assets with a given expected payoff, and the latter is the solution to the problem of finding the global minimum variance portfolio of risky assets. These two portfolios plot at points O and V in the figure. As Merton (1972) has shown, the whole locus may be contructed from just these two portfolios.

Let V_m denote the aggregate market value of all assets in the market portfolio and let V_m denote the vector of market proportions. Combining the market clearing condition $\Sigma_i x_i = V_m V_m$ with (2.24) yields

$$\mu - r1 = \theta_m V_m \Omega\, v_m \qquad (2.25)$$

This form of the CAPM expresses asset risk premia as proportional to the covariances of their returns with the returns on the market portfolio. This of course is no more than the condition for the market portfolio to correspond to the tangency point in figure 2.1. Equation

(2.25) contains the market risk aversion parameter θ_m. This can be elminated by premultiplying (2.25) by v_m and solving for $\theta_m = (\mu_m - r)/\sigma_m^2$, where μ_m and σ_m^2 are the expected return on the market portfolio respectively. Then, substituting for θ_m in (2.25) we have the equation of the 'security market line':

$$\mu_j - r = \beta_j(\mu_m - r) \qquad (2.26)$$

where $\beta_j \equiv \sigma_{jm}/\sigma_m^2$. In this form of CAPM is a relative pricing model which relates the risk premium on individual securities to the risk premium on the market portfolio. The proportionality factor, β_j, often referred to as the 'beta coefficient', is the coefficient from the regression of $\tilde{R}_j$, the return on security j, on $\tilde{R}_m$, the return on the market portfolio:

$$\tilde{R}_j = \alpha_j + \beta_j \tilde{R}_m + \tilde{e}_j \qquad (2.27)$$

where $\tilde{e}_j$ is an orthogonal error term. Taking expectations in the market model equation (2.27), the asset pricing equation (2.26) is seen to imply the restriction $\alpha_j = (1 - \beta_j) r$. This restriction, and the existence of a positive risk premium on the market portfolio, are the major empirical predictions of the Sharpe-Lintner model. They have been the subject of extensive emperical tests.

II. 1. 2. 2. B. Taxes and restrictions on riskless transactions

The absence of short sales restrictions is not critical to the Sharpe-Litner model since in equilibrium all investors hold the market portfolio, which does not involve short sales. The assumption is critical, however, for all the remaining models we shall consider which involve more than a single basis fund of risky securities.

Thus, following Black[27] and Brennan[28] assume that there are no opportunities for riskless borrowing or lending, and that each security pays pre-determined dividends which are taxed in the hands of the investor at the rate t_i $(i = 1,\ldots,m)$. Denoting the devidend yield by δ_j, and assuming that investor preferences are defined over the moments of after tax wealth, the first order conditons corresponding to (2.22) are:

$$V_{i1}(\mu_j - t_i\delta_j - \lambda_i) + 2V_{i2}\sum_k x_{ik}\sigma_{jk} = 0, \qquad (j=1,\ldots,n) \qquad (2.28)$$

where λ_i is the Lagrange multiplier associated with the constraint that all wealth be invested in risky

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[27] F. Black, "Capital Market Equilibrium with Restricted Borrowing," Journal of Business, (July 1972), p. 444-455.

[28] M. Brennan, "Taxes, Market Valuation and Corporate Financial Policy," National Tax Journal, (December 1970), p. 417-427.

securities. The vector of asset demands may be written as:

$$x_i = \theta^{-1}\Omega^{-1}\mu - (\theta_i^{-1}\lambda_i)\Omega^{-1} - (\theta_i^{-1}t_i)\Omega^{-1}\delta \qquad (2.29)$$

Note first that if $t_i = 0$ the optimal portfolio for any preferences can be constructed from the two mutual funds $\Omega^{-1}\mu$ and Ω^{-1}. Heterogenous taxation of dividends introduces the third mutual fund, which can be interpreted as the solution to the problem of finding the minimum variance portfolio with a given total devidend. Aggregating the demand vectors, and imposing the market clearing conditions, yields an asset pricing equation which contains three utility dependent parameters, λ_m, θ_m, and t_m, corresponding to the three funds in (2.29):

$$\mu - \lambda_m 1 = \theta_m V_m \Omega v_m + t_m \delta \qquad (2.30)$$

t_m, the market tax rate, is a weighted average of the personal tax rates, and λ_m, the market shadow interest rate, is referred to for historical reasons as the zero beta return. When $t_m = 0$ (2.30) is just the condition for the market portfolio to be the tangency portfolio when the interest rate is λ_m. Thus the Black model, which does not include taxes, differs from the Sharpe-Lintner model only in leaving unspecified the relevant (shadow) riskless interest rate.

II. 1. 2. 2. C. Non-Marketable assets

Mayers[29] has considered the effect of introducing an extreme form of market imperfection, namely an absolute prohibition on trading certain assets. This is important, for a substantial part of total wealth is not held as part of well diversified portfolios, on account either of prohibitions on trade (human capital), or of market imperfections such as transactions costs and information asymmetries. Thus let $\bar{h}_i$ denote the expected payoff on the non-marketable wealth (human capital) of investor i, and let σ^i_{jh} denote the covariance between the return on marketable security j and the human capital of investor i. Then the expression for $\bar{W}_i$ must be increased by $\bar{h}_i$ and the variance of end of period wealth becomes $S_i^2 = \Sigma_j \Sigma_k x_{ij} x_{ik} \sigma_{jk} + 2 \Sigma_j x_{ij} \sigma^i_{jh} + \sigma^i_{hh}$. The asset demand vector can then be wrtten as

$$x_i = \theta_i^{-1} \Omega^{-1} (\mu - r1) - b_i \qquad (2.31)$$

where $b_i = \Omega^{-1} \sigma^i_n$ is the vector of coefficients from the regression of the return on human wealth on the marketable security returns. Defining $x^e_i \equiv x_i + b_i$ as the vector of effective asset demands, we see from (2.31) that the effective aaset demands exhibit the standard

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[29] D. Mayers, "Non-Marketable Assets and Capital Market Equilibrium Under Uncertainty,". In "Studies in the Theory of Capital Markets", ed. M. Jensen, (New York: Praeger 1972).

separation property. This reflects the fact that, while the returns on human capital are not directly marketable, the component of the return which is linearly related to the returns on the marketable securities is indirectly appropriate by appropriate offsetting positions in the marketable securities. The asset holdings of the individual may be represented as the sum of effective asset holdings x_i^e and an investment in the component of human wealth whose return is orthogonal to the returns of marketable assets. We refer to this as approximate portfolio separation, and the second component has no effect on the relative demands for marketable assets.

The Mayers model leads to an asset pricing equation which is identical to that of the Sharpe-Lintner model if the market porfolio is defined as the sum of the effective investment vectors x_i^e.

II. 1. 2. 2. D. Inflation and international asset pricing

Stochastic inflation has no effect on the foregoing results, provided that a common inflation rate can be defined for all investors and returns are restated in real terms. However, the international asset pricing

models of Solnik[30] and Stulz[31] distinguish between nationalities precisely on the basis of their price indices, which may differ on account of either a violation of commodity price parity or differences in tastes and consumption baskets (see Adler and Dumas, 1983).[32]

Define $\tilde{\Pi}_i$ as the inflation rate in the numeraire currency for investor i. Then, to a high order of approximation, which becomes exact as the time interval approaches zero, the mean and variance of real wealth can be written as

$$W_i = \sum_j x_{ij}(\mu - r) + W_{oi}(1 + r - \tilde{\Pi}_i + \sigma^i_{\pi\pi}) - \sum_j x_{ij}\sigma^i_{j\pi} \qquad (2.32)$$

$$S_i^2 = \sum_{jk}\sum x_{ij}x_{ik}\sigma_{jk} - 2W_{oi}\sigma^i_{k\pi} + W^2_{oi}\,\sigma^i_{\pi\pi} \qquad (2.33)$$

where W_{oi} is the investor's initial wealth.

The asset demand vector is then

$$x_i = \theta_i^{-1}\Omega^{-1}(\mu - r1) + b_i \qquad (2.34)$$

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[30] B. Solnik, "An Equilibrium Model of International Capital Markets," Journal of Economic Theory, (August 1974), p. 500-524.

[31] R. Stulz, "A Model of International Asset Pricing," Journal of Financial Economics, (December 1981), p. 383-406.

[32] M. Adler and B. Dumas, "International Porfolio Choice and Corporation Finance: A Synthesis," Journal of Finance, (June 1983), p. 925-984.

where $b_i \equiv W_{oi}\Omega^{-1}\sigma_x^i$ is the vector coefficients from the regression at the individual's aggregate inflation risk, $W_{oi}\tilde{\pi}_i$, on security returns. Comparing (2.34) with (2.31), it is apparent that this international asset pricing model is isomorphic to Mayers' non-marketable wealth model with individual inflation risks playing the same role as human capital.

Black (1974) has modelled segmentation in international capital markets by introducing a tax on foreign security holdings for residents of one country. This model is isomorphic to Brennan's (1970) tax model, if the foreign securities are thought of as paying dividends on which only domestic residents are taxable. Stulz (1981) extends Black's model by prohibiting negative taxes on short sales. As one might expect, this causes some indeterminacy in the pricing relations since the marginal conditions of portfolio optimality are no longer always satisfied.

II. 1. 2. 2. E. Intertemporal models

Merton[33] has shown that the classical one period CAPM may be extended to anintertemporal setting in which investors maximize the expected utility of lifetime consumption. With continuous trading and suitable

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[33] R. Merton, loc.cit., p. 867-887.

restrictions on the stochastic process of asset prices, the essential mena-variance analysis is retained, the major innovation being that at each instant the individual may be represented as maximizing the expected utility of a derived utility function, defined over wealth and a set of S state variables describing the future investment and consumption opportunity sets. The state dependent derived utility function induces (S + 1) fund separation in the risky asset portfolio, and the vector of risky asset demands may be written

$$x_i = e_i^{-1}\Omega^{-1}(\mu - r1) - \sum_{s=1}^{s} \gamma_{is}\Omega^{-1}\xi_s \qquad (2.35)$$

where ξ_s is the vector of covariances of asset returns with the change in state variable S and γ_{is} depends on the utility function. Aggregation of asset demands and the imposition of the market clearing condition leads to an asset pricing equation in which asset risk premia are a linear function of covariances with aggregate wealth and covariances with the state variables. In the absence of prior information about the relevant state variables this model is empirically indistinguishable from the Arbitrage Pricing Theory. Breeden[34] has shown that this

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[34]D. Breeden, "An Intertemporal Asset Pricing Model with Stochastic consumption and Investment Opportunities," Journal of Financial Economics, (September 1979), p. 265-296.

'multi-beta' pricing model may be collapsed to a single beta measured with respect to changes in aggregate consumption if consumption preferences are time separable. Cornell[35] has shown that unfortunately, the relevant betas will be stochastic while Bergman[36] has shown that the Breeden result does not generalize to non time-separable preferences.

Merton[37] has employed the interest rate as a possible example of a relevant state variable. Since this obviously does vary stochastically over time, it is of interest to enquire under what conditions the classic CAPM model will hold even with a stochastic interest rate. Constantinides[38] has identified two sets of sufficient conditions. In his models the social investment opportunity set is stationary and consists

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[35] B. Cornell, "The Consumption Based Asset Pricing Model: A Note on Potential Tests and Applications," Journal of Financial Economics, (March 1981), p. 103-108.

[36] Y. Bergman, "Time Preference and Capital Asset Pricing Models," Journal of Financial Economics, (March 1985), p. 145-149.

[37] R. Merton, op.cit., p. 867-887.

[38] G. Constantinides, "Admissible Uncertainty in the Intertemporal Asset Pricing Model," Journal of Financial Economics, (March 1980), p. 253-267. And "Intertempotal Asset Pricing with Heterogenous Consumers and Without Demand Aggregation," Journal of Business, (April 1982), p. 253-267.

only of risky investments: stochastic variation in the interest rate then does not affect the CAPM relation if either there is demand aggregation or full Pareto efficiency of asset markets. The intuition behind the result is that either condition is sufficient for prices to be determined as though there existed a single representative individual. For such an individual stochastic variation in the interest rate is irrelevant since the interest rate only represents a shadow price and not a real investment opportunity.

Finally, the single period nature of the CAPM is retained if individuals behave myopically, ignoring stochastic variation in the investment opportunity set in their portfolio choices. This occurs if and only if the utility function is logarithmic.

The feregoing models place restrictions on the joint distribution of security terms. As already mentioned, Cox, Ingersoll and Ross[39] combine the Merton intertemporal model of returns with production and the assumption of rational expectations to yield a partial differential equation for asset prices. Stapleton and

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[39] J. Cox, J. Ingersoll and S. Ross, op.cit., p. 363-384.

Subrahmanyam[40] derive the only pure exchange discrete time intertemporal asset pricing model which is consistent with mean variance analysis. Their model assumes that investors have exponential utility functions and that asset cash flows follow a joint normal distribution. It is implicitly assumed that aggregate consumption follows a random walk.

II. 1. 2. 2. F. Distribution assumptions

Comparatively little effort has been expended in relaxing the assumption of homogeneity of investor beliefs underlying the CAPM. However, progress has been made in generalizing the version of the model which is based on the normal distribution. As we have mentioned, Merton[41] has shown that the model obtains as the decision making horizon shrinks to zero if asset returns belong to the family of *compact distributions*.

In a discrete time setting Ross[42] has shown that the assumption of normality can be relaxed slightly to that of a two fund separating distribution. Dybvig and

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[40] R. Stapleton and M. Subrahmanyam, "A Multiperiod Equilibrium Asset Pricing Model," Econometrica, (September 1978), p. 1077-1096.

[41] R. Merton, loc.cit., p. 867-872.

[42] S. Ross, loc.cit., p. 341-360.

Ingersoll[43] emphasize the critical nature of the distributional assumption since the CAPM results for all securities is vulnerable to the introduction of even a single security whose returns do not satisfy it. This would significantly reduce the usefulness of the model in capital markets which contain securities like options with truncated returns, except that if the market is fully Pareto efficient and return on the market portfolio is normally distributed, then those assets whose returns are jointly normal with the market portfolio will satisfy the CAPM. The reason for this is that Pareto efficiency permits the fiction of the representative investor who holds the market portfolio.

Sharpe[44] in positing a factor model of returns, derived a multibeta version of the CAPM which is close in spirit to the equilibrium factor models developed more recently from antecedents in the Arbitrge Pricing Theory by Connor[45] and others.

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[43] P. Dybvig and J. Ingersoll, loc.cit., p. 233-251.

[44] Williem Sharpe, "The Capital Asset Pricing Model: A Multi-Beta Interpretation," in "Financial Decision Making Under Uncertainty", ed. H. Levy and M. Sarnat," (New York: Harcourt Brace Javanovich, Academic Press, 1977).

[45] G. Connor, "A Unified Beta Pricing Theory," Journal of Economic Theory, (April 1984), p. 13-31.

II. 2. The Differences of the Present Study with the Previous Studies

Briefly the following are the studies which were found somehow relevent to the present study.

So far we have seen some very interesting things about the CAPM. Some of the earliest work tested realized data (history) against data generated from simulated portfolio. Early studies by Daouglas and Lintner showed discrepancies between what was expected on the basis of the CAPM and the actual relationships that were apparent in the capital markets. Theoretically, they expected the minimal rate of return from the portfolios (the intercept) and the actual risk-free rate for period would be equal. They were not.

These early results caused some concern. Many analysts suggested that the tests were faulty and were thus not giving accurate results.[46] However, the Douglas and Lintner results could have been caused by either of two things: the CAPM could have been wrong or the test procedures, and these new procedures were used on different data in the hope that more accurate results would follow.

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[46]Merton Miller and M. Scholes, Rate of Return in Relation to Risk: A Reexamination of Some Recent Findings, in Studies in the Theory of Capital Markets, ed. M. Jensen (New York: Praeger, 1972), pp. 47-78.

Miller and Scholes[47] reformulated the test procedures to deal with other problems. They asked, was the form of the model accurate (that is, were risk and return linearly related)? Was beta the best risk measure? Could the choice of the index change the results? Was the beta correlated with unsystematic risk? Any of these problems might have caused Lintner's results. In typically academic jargon, Miller and Scholes reported that they did not find good reason to reject Lintner's results.

Another study, now more famous than Lintner's, was done by Black, Jensen and Scholes.[48] Lintner had used what is called a cross sectional method, whereas Black, Jensen, and Scholes used a time series method. to make their test. Black, Jensen, and Scholes assumed that what had happended in the past was a good proxy for investor epectation.

Based on the relationships developed in the CAPM, Black, Jensen and Scholes expected to find:

1. That the intercept was equal to the risk free rate.
2. That the capital market line had a positive slope and that riskieer (higher beta) securities provided hihger

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[47] I b i d, pp. 47-78.

[48] I b i d, pp. 79-121.

return.

Instead, they found

1. That the intercept was different from the risk-free rate.
2. That high-risk securities earned less and low risk securities earned more than prodected by the model.
3. That the intercept seemed to depend on the beta of any asset high beta stock had a different intercepts than low beta stocks.

Fama and MacBeth[49] criticized the BJS study. In a reformulation of the study, they supported the first of the BJS findings. They found that the intercept exceeded the risk free proxy, but they did not find evidence to support the other BJS conclusions.

The other test using multivariate analysis is by MacBeth; however, Gibbons[50] presented the first extensive treatment. Further work containing both emperical and theoretical results includes Stamburg[51], Jobson and

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[49] loc.cit. pp.607-636.

[50] M. Gibbons, Multivariate Tests of Financial Models: A new Approach, Journal of Financial Economics 10, (1982), pp.3-27.

[51] R. Stambugh, On the Exclusion of Assets from Tests of the two Parameter Model: A Sensitivity Analysis, Journal of Financial Economics, 10 (1982), pp 237-268.

Korkie,[52] Shanken[53] and Amsler and Schmidt[54]. Work providing some theoretical results includes Kandel,[55] Roll, Gibbons, Ross and Shanken and MacKinlay[56].

There are several tests using the other models,

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[52]J. D. Jobson and R. Korkie, Potential Performance and Tests of Portfolio Efficiency, Journal of Financial Economics, 10 (1982), pp. 433-466.

[53]J. Shanken, Multivariate Tests of the Zero-beta CAPM, Journal of Financial Economics, 14 (1985), pp. 269-276. And Testing of Portfolio Efficiency when the Zero Beta Rate is Unknown: A Note, Journal of Finance, 41 (1986), pp. 269-276.

[54]C. Amsler and P. Schmidt, A Monten Carlo Investigation of the Accuracy of Multivariate CAPM Tests, Journal of Financial Economics, 14 (1985), pp. 359-376.

[55]S. Kandel, The Likelihood Ratio Test statistic of Mean-Variance Efficiency Without a Riskless Asset, Journal of Financial Economics, 13 (1984), pp. 575-592. And, On the Exclusion of Assets From Tests of the Mean Variance Efficiency of the Market Portfolio, Journal of Finance, 39 (1984), pp. 63-75.

[56]A. Craig MacKinlay, On Multivariate Tests of The CAPM, Journal of Financial Economics 18 (1987), pp. 341-371.

like Bodurtha and Nelson,[57] Boyle,[58] Cecchetti and Nelson[59] and also Chan.[60]

This study does not duplicate any study on CAPM but this could have identical thrusts of the studies cited.

II. 3. Local Studies

So far there is no single study about portfolio theory and test of CAPM in the Philippine. But, several studies were conducted about return of stock market and financial market in the Phillipines.[61] The other studies was conducted by Samson was principally a cross section

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[57] James N. Bodutha Jr, and Nelson C. Mark, Testing of the CAPM with Time-Varying Risks and Returns, Journal of Finance 44, (September 1991).

[58] Glenn W. Boyle, Money Demand and Stock Market in a General Equilibrium Model with Variable Velocity, Journal of Political Economy, vol 98, 1990

[59] Stephen G. Cecchetti and Nelson J. Mark, Evaluating Emperical Tests of Asset Pricing Models: Alternative Interpreatations, American Economic Review, vol. 80. June 1990.

[60] Louis K. C. Chan and Josef Lakonishok, Robust Measurement of Beta Risk, Journal of Financial and Quantitative Analysis, Vol. 51. (June 1992).

[61] See, for example, Erlinda S. Echanis, "Accounting Rates of Return and Stock Return", Accountants Journal (1st semester, 1985). And, Edita Tan, "The Structure and Growth of the Philippine Financial Markets and the Behaviour of its major components", Working Paper 81-06, Philippine Institute for Development Studies, 1981.

study of individual stockholders in the Philippines.[62] It attempted to approximate the distribution of the individual stock holders population among various socio-economic characteristic such as sex, age, occupation, marital status, income geographical location, and so forth. With respect therefore to providing characteristic profile of investors. The Samson study and the study by Soleimani are similar.[63]

A study of the characteristics and circumstances of initial investors in common stocks made by Sumulong,[64] sought to: (1) draw a profile of initial investors in terms of selected characteristics such as sex, civil status, age occupation, and income: (2) determine the time; the stimuli; and the influences which effectively induce initiation; and (3) set forth the motives and patterns of initial investors. He concluded that:

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[62] Elizabeth D. Samson, "The Distribution of the Individual Stockholders in the Philipppines by Selected Socio-Economic Characteristics," The Philippine Review of Business Economics, IV, November 1967.

[63] Hossein Soleimani, "The Makati and Manila Stock Exchanges: Their Operations and Contributions to the Philippine Economy", (Unpublished PhD Disertation, Graduate School University of Santo Tomas, 1992).

[64] Daniel R. Sumulong, " A Study of Characteristics and Circumstances of Initial Investors in Common Stocks", (Unpublished Master's Thesis, Ateneo de Manila University, 1986).

1. The amount of initial investment was inversely related to the number number of individuals making such investments, i.e., higher amounts accounts accounted for less individuals and lower amounts accounted for more. On the other hand, the amount of initial investment, in general, varied directly with the individual's income.

2. The amount set aside for the first purchase generally came from personal sources and constituted no more than half of the individual's personal savings.

3. The initial investment on the average consisted of the purchase of two types of common stocks. Of the four general types, the more popular or frequently purchased ones were blue chip mining and oil. Invesments in blue chip mining and commercial/industrial issues, however, generally accounted for larger portions of the common stock portfolio; while investments in speculative issues (speculative mining and oil) generally accounted for smaller portions.

4. The majority of the investors were covered by life insurance at the time of initiation. Coverage was more frequent among those who were married and/or those who had dependents.

5. The maximum limit for possible losses which the invegstors deemed as financially and emotionally acceptable to them generally ranged from one-half or less

of the investment.

6. The majority of the individuals first invested in saving/time deposits and/or insurance (of any type) prior to the first purchase of common stocks.

Salak,[65] in his research on the proposed merger of the two operating of the stock exchanges, deplored the fact that despite several years of existence the securities industries has failed to develop a market making mechanism, a vital force in endowing the market with the desired liquidity. Little has taken place since then to resolve the issues.

A study on the liquidity mechanisms in the secondary market for the equities was undertaken by the Alegre.[66] In her study, she attemp to gauge its effectiveness in acting as aliquidity mechanism for Philippine securities, which are principally common and preferred stock issued by the private corporations.

Repuyan,[67] in her study of an overall analysis of

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[65] Jose R. Salak, "The Implications of the Proposed Merger of the Manila and Makati Stock Exchanges as Perceived by Their Members," (Masteral Thesis, Ateneo Graduate School of Business, 1983).

[66] Emma P. Alegre, "Liquidity Mechanism in the Secondary Market for Equities," (Unpublished Masteral Thesis, School of Business, Ateneo de Manila University, 1987).

[67] Aurora T. Repuyan, "An Overall Analysis of Money Market Investment in the Philippines From the Time of Inception Up to 1976," (Unpublished Disertation, University of Santo Tomas, 1979).

money market investment in the Philippines, summarized her finding as:

1. The funds generated by the financial institutions in the market are unstable and volatile. Most companies are induced to invest in commercial papers primarily because of the high-interest feature. The money market institutions and the investors have undue concentration only on short term investment.

2. Personal relations between borrower and lenders are of negligible importance. However, personal relations between the dealer and the borrower/lender are of prime importance. Money market investments by some corporations are not always done on a competitive basis but are influenced by certain factors existing between the issuing company and the lending company.

3. The money market has not yet attained the level of sophistication comparable with other financial centers in development countries like the United States. The principal inadequacy rests in the absence of secondary market papers other than treasury bills.

4. The money market is the cause of slower increments on savings and time deposits due to its emphasis on deposit substitutes. Given the checks between depositing and making placements, investors prefer to make palcements in the money market due to the greater

yield they get in money market placements. This was, however, minimized through the issuence of the Central Bank circular which sets the minimum trading lot to P 200, 000.00 and so those unable to meet the minimum amount will be forced to just settle for savings and time deposits.

Igbokwe[68] in his study of the operations of Manila and Makati Stock Exchanges, found the following:

1. The organizational and management of the Manila and Makati Stock Exchange were identified as similar in terms of structure, number of officers, numbers and composition of standing committees, tenure of officers and number of each courses representatives to the joint listing committee.

2. There were significant differences between teh effects of the rules of the SEC on the performance of the Manila and Makati Stock Market Exchanges as perceived by the respondents.

3. There were no significant differences between the capital mobilization of the Manila and Makati Stock Exchange as perceived by the respondents.

4. The present system of trading (the board system)

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[68]John M. O. Igbokwe, "A Comparative Study of the Operations of the Manila and Makati Stock Exchange from 1977-1987," (Unpublished Master's Thesis, University of Santo Tomas).

would not sufficiently serve the needs of livestock during very active periods.

5. The was a dearth of incentives initiated by the goverment to encourage profitable privately owned but close corporations to open up to public ownership.

Ukaigwe[69] in his study of changing financial environment in Money Market Operations in the Philippines, revealed that:

1. The role of money market has changed significantly when we compare the number of corporate borrowers previously to existing number now. Thsi made the floatation of commercial paper available only to prime corporations and only prime corporations with interlocking directorates can borrow from money market institutions presently.

2. The bureaucratic regulations of the CB/SEC has helped to hinder normal operations in the market. This debt equity ratio and 20 % bank guarantee, among others, scares even prime corporate issuers with genuine business innovations.

3. The present financial environment had clearly exposed the fragile and unstable structures of a number

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[69]Okwuchi J. Ukaigwe, "The Changing Financial Environment on Money Market Operation in the Philippines, 1979-1987," (Unpublished Masteral Thesis, Univeraity of Santo Tomas, 1988).

of financial intermediaries. Since the management capability of a company stumble or is tested in the period of economic crisis, hence, the innovative ideas and the ability to make good plan and efficient portfolio management of most money market institutions is tested in this period.

4. That the key problem areaa for improvement to boost normal or increased market operation cannot yet be attained unless restoration of a healthy investment climate and political and economic stability.

CHAPTER III
RESEARCH DESIGN AND METHODOLOGY

This chapter discusses the research methodology, estimation techniques and data.

III. 1. Research Techniques

The quantitative method of descriptive research is applied in this research. The purpose of such method according to Good and Scates is normally to describe and, to give a quantitative picture of the group or area in terms of the number of uses in different categories.[1] The use of secondary data is employed in this study to examine the portfolio and capital asset pricing model in the Philippine stock market.

Data is obtained from questionaires given to the officers of different brokerage firms. Secondary data was taken from the different monthly reports distributed by these two major exchanges on their performance during period 1991 and 1992.

III. 2. Research Instrument

This study is concerned with secondary data

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[1] Carter V. Good and Douglas E. Scates, Methods of Research, (New York: Appleton-Century-Crofts, Meredeth Corporation, 1988) pp. 493-509.

gathered from the Manila and the Makati Stock Exchanges. Questionaires were pre-tested to two brokerage firms, the Anscor-Hagedorn Securities Corporation and the PNB Securitie Inc. Thereafter, similar questionaires were distributed to several brokerage firms; from which questionaires analysis was done. To this end, several computer solfwares were used. For computation, Lotus 123 was applied. LIMDEP was employed to determine the correlation and multiple coefficient of multiple regression model of the study.

III. 3. Sampling Procedure

To answer the problem numbers 3, 4 and 5, questionnaires were distributed to the respondents. Purposive sampling was employed. The respondents were selected based on very specific criteria. They should be professional stockbrokers who are directly involved in stocks trading for at least 3 years and with research capabilities including the use of Capital Asset Pricing Model as their tool of prediction in market behaviour.

According to the Securities Exchange Commission only 100 brokerages are allowed for each of the Manila and Makati Stock Exchanges. In the Manila Stock Exchange[2]

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[2]The Manila Stock Exchange, Investor's Information Guide, 1990.

only 85 brokerages are active in trading, out of these only 46 brokerages are with in-research house while in the Makati Stock Exchange[3] only 81 are active and 46 have in-research house. For the purposes of this study, 12 brokerage firms were chosen as samples. They were 1) Citicorp Vickers Phill. Inc; 2) Peregrine Securities; 3) Sapphire Securities, Inc; 4) Sun Hung Kai Securities; 5) EBC Sec Corp; 6) Philippine Asia Equity Securities; 7) I. Ackerman & Co. Inc; 8) Morgan Greenfell Phils Sec. Inc; 9) B.H Chua Sec. Corp; 10) Public Securities Corporation; 11) Century Securities Corp; 12) H.G. Asia Securities (Phils) Inc.

III. 4. Profile of Respondents

Table 3.1 presents distribution of respondents according to position and years are engage in the stock market. These data give information of the respondent's professional qualifications vis-a-vis the quality and validity of their answer to the questionaire.

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[3]The Makati Stock Exchange, INC., The Securities Market Handbook, 1990.

Table 3.1

Distribution of Respondents According to Position Level and Years are Engage in the Stock Market

Position Level	Number	%	Years in Stock Market	%
President	3	25.00	> 20	25.00
Vice-President	3	25.00	6 - 10	25.00
Analyst	2	16.67	1 - 5	50.00
Trader	4	33.33	1 - 5	
T o t a l	12	100.00		100.00

Two or 25 percent of the respondents are presidents who have more than 20 years experience in the stock market; three or 25 percent, vice-presidents with 6-10 years experience; two or 16.67 percent analysts; four or 33.33 percent, trader. The analysts and the trader have been in the stock market only for the past 1 to 5 years.

III. 5. Statistical Treatment of The Data

The following statistical methods were employed for accurate in depth analysis and interpretation of data.

Percentage (P) was used for the demographic profile of the respondents and the profile of the exchanges.

The formula is: $P = f/n \times 100\ \%$ (3.1)

where, f = frequency of respondents

n = number of respondents

Ranking was used to supplement percentages to show the order of priorities of the items. For instance, the volume as value turnover, the highest value is ranked first and the lowest is ranked last.

Mean ($\bar{X}$) as the best measure of central tendency is used to the average and value turnover in 1991 and 1992. The formula is:

$$\bar{X} = \Sigma X/n \qquad (3.2)$$

where ΣX = sum of all volume or value turnover

n = number of years

The standard deviation (s) showed the variations, or the homogenity or heterogenity of the volume or value turnover. The formula is

$$S = \sqrt{\frac{\Sigma (X - \bar{X})^2}{n - 1}} \qquad (3.3)$$

where, X = annual volume or value turnover each year

$\bar{X}$ = mean

n = number of years

III. 6. Estimation Techniques and Computation Procedure

During period 1991 and 1992 no direct test of the CAPM has yet been done for the Philippine capital market. In this chapter, tests of the model are

undertaken. These tests try to eliminate two empirical limitations of the many empirical works on the CAPM, i.e., the use of indirect estimates of the betas and the use of equal proportions of each security in the market portfolio.

III. 6. 1. Empirical Testable Hypothesis

As discussed in the preceding chapter, an ex post relationship that can be used to test the simple CAPM is

$$r_j = R_F + (r_M - R_F)\,\beta_j + e_j$$

A regression equation of the form

$$r_j = \alpha_o + \alpha_1 \beta_j + e_j \qquad (3.4)$$

can be fitted and the testable hypotheses are whether the following relationships hold or not:

$$\hat{\alpha}_o \stackrel{?}{=} R_F \,, \qquad (3.4a)$$

and $$\hat{\alpha}_1 \stackrel{?}{=} (r_M - R_F). \qquad (3.4b)$$

All the variables in (3.4) are potentially measurable. The succeeding sections discuss how these variables are measured.

III. 6. 2. The Measures for the Rates of Return

III. 6. 2. A. The Rate of Return r_j

The one-period rate of return for a given security j is the random variable r_j given by the "price relative"

$$r_j = ((p_{j1} + d_{j1}) - p_{jo}) / p_{jo} \,, \qquad (3.5)$$

where

p_{jo} is the beginning-of-period price of security j;

p_{j1} is the random end-of-period price of security j;

d_{j1} is the random dividend per share for the period.

It can be seen that the rate of return r_j is the discount rate which equates the present value of cash flows to the unit cost of investment. That is,

$$P_{jo} = (p_{j1} + d_{j1}) / (1 + r_j). \qquad (3.6)$$

The rate of return r_j can also be expressed in terms of the "value relative", that is,

$$r_j = (V_{j1} - P_{jo}) / P_{jo}, \qquad (3.7)$$

where P_{jo} and V_{j1} are the beginning-of-period and the random end-of-period total market value of security j, respectively.

For the case of continuous compounding, the rate of return is

$$r_{jt} = \ln ((p_{jt+1} + d_{jt+1}) / p_{jt})$$
$$= \ln ((V_{t+1} + D_{t+1}) / p_t). \qquad (3.8)$$

III. 6. 2. B. The Market Rate of Return r_M

The one-period market rate of return is the random variable r_M defined as (see equation (1.16)) the weighted rate of return of all the securities' one-period rates of return, the weight of each security being given by its total market value relative to the over-all market value

of all securities.

More specifically, recall that $r_M = \sum_j w_j r_j$, (3.9)

where $w_j = P_j / P_M$, $P_M = \sum_j P_j$

and p_j is the total market value of security j.

III. 6. 3. Measures for the First Two Moments

III. 6. 3. A. The Mean Rate of Return

The expected value of r_j for each security is given by

$$E(r_j) \equiv \mu_j. \qquad (3.10)$$

An unbiased estimator for μ_j, assuming that the probability distribution of r_j is stationary, is

$$\bar{r}_j = \sum_{t=1}^{T} r_{jt} / T = \hat{\mu}_j \qquad (3.11)$$

where T is the number of periods.

The estimator for the expected value of the market rate of return is $\bar{r}_M = \sum_j w_j \bar{r}_j$. (3.12)

III. 6. 3. B. The Variance of the Rate of Return

The second moment used for the random variable r_j is given by

$\sigma_{kj} \equiv$ variance of r_j if $k = j$,

$\sigma_{kj} \equiv$ covariance of r_k with r_j if $k \neq j$.

estimates for the betas. More specifically,

$$\beta_j = \text{cov}(r_j, r_M) / \sigma^2_{r_M}, \qquad (3.16)$$

where

$$\text{cov}(r_j, r_M) = \sum_{k=1} w_k \sigma_{jk};$$

so that

$$\hat{\beta}_j = \sum_{k=1}^{n} w_k \hat{\sigma}_{jk} / \sum_{k=1}^{n} \sum_{j=1}^{n} w_k w_j \hat{\sigma}_{kj}. \qquad (3.17)$$

III. 7. The Data

Monthly data published by the Manila and Makati Stock Exchange are available for a total of 168 and 169 securities for the entire period 1991 and 1992[4]. If the time period is further extended into the past, the number of securities that can be included is reduced since some securities are newly listed. Other securities are also delisted through time so that this further reduces the

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[4]In this study we are not using the questionnaire method of gathering data because it will cause bias [see J. Johnston, Econometric Method, 4th Edition, (McGraw Hill Book Co,.1990), Jan Kmenta, Element of Econometrics, 2nd Edition, (Macmillan Co New York 1982) and Geoge G. Judge. et.al.,Introduction to Theory and Practice of Econometrics, 2nd Edition, (John Wiley and Son, 1990)]. That is why ever since this theory was developed in 1951 there had been no single study done using questionnaires rather, studies always dealt with publish time series and cross sectional data. However, to answer statement of the problems number (3), (4) and (5) researcher employed questionaires.

total number of securities that can be included for the 24 month period.

There are several notable characteristics about this period: a) the new democratric goverment which replaced the 20-year old regime was committed to removing goverment's presence in key economic sectors; b) significant financial liberalization had been achieved, particularly the deregulation of interest rates; c) a comprehensive economic program was substantially in place, which set the framework for long-term growth and the management of the foreign debt problem.

In general, it was a period of economic and political liberalization. But it was also a period which experienced a series of serious destabilizing political and economic events such as the seven coup attempts, the pullout of the US bases, the Middle East war, and natural calamities in major producing areas.

Hence, the rates of return presented in the study are particularly significant in that they record the perfomance of financial assets in a relatively unrestrained market, in a period which experienced both economic growth and decline, and episodes of stability and instability.

According to the Manila and Makati Stock Exchange classfication, the 168 and 169 securities included in the

data, but in this study the securities will select based on trading during January 1991 to December 1992 are as follows:

Classification	No. of Securities
1. Bank, Commercial and Industrial (BCI)	54
2. Mining	13
3. Oil	23
T o t a l	90

The monthly data consist of the following:

a. the number of outstanding shares;

b. the highest and lowest prices registered for each month;

c. the number of shares traded;

d. the total value of shares traded; and,

e. cash and stock dividend issued.

Unfortunately due to incomplete of data, this study will addres to only 42 securities were traded in Philippines Stock Market.

III. 7. 1. The Case of No Trading for a Given Month

If no trading occurs for month t for, say, security j, the average price of the previous month is used. If there is no dividend issued, then the rate of return r_{jt} is zero. However, even if there is no trading and there are dividends issued, i.e., $d_{jt} > 0$, then $r_{jt} > 0$. More

specifically,

$$r_{jt} = ((p_{jt+1} + d_{jt+1}) - p_{jt}) / p_{jt}. \quad (3.18)$$

If $p_{jt+1} = p_{jt}$, then

$$r_{jt} = (d_{jt+1} / p_{jt}) > 0, \text{ if } d_{jt+1} > 0. \quad (3.19)$$

III. 7. 2. Calculations Required to Test the Simple CAPM

The preceding sections indicate that the following variables have to be computed to be able to test equation (3.4). They are:

r_{jt}, w_j, $\bar{r}_j$, $\bar{r}_M$, $(\hat{\sigma}_{ij})$, $\hat{\sigma}_{jM}$, $\hat{\sigma}^2_M$, and $\hat{\beta}_j$ for i, j = 1,...,42. To provide information on the statistical properties of the rates of return estimated, trading statistics are also computed. Two periods were considered, i.e., 1991, and 1992.

III. 7. 3. The Weight of Each Security in Market Portfolio

The weight of each security is

$$w_j = P_j / P_M \quad (3.20)$$

This is used to calculate the market rate of return $\hat{r}_M$, $\hat{\sigma}_{jM}$ and $\hat{\sigma}^2_{rM}$ for the period under consideration. It is recalled that P_j is the total market value of security j and $P_M = \sum_j P_j$.

CHAPTER IV

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

This chapter deals with the analysis and interpretation of data the researcher used in conducting, as well as answering, the sub-problems posted in Chapter I.

IV. 1. SUB-PROBLEM 1

How is portfolio selected in terms of:

1.1. Rate of return of security (r_j);

1.2. Market rate of return (r_M);

1.3. Beta risk (β_j);

1.4. Mean rate of return ($\bar{r}_j = \hat{\mu}_j$ and $\bar{r}_M$)

Modern portfolio theory is no mystical concept. It relies on simple and basic idea that returns are measured in an intuitively logical way. They are simply the returns expected from an investment or portfolio (see equation 3.5).

Since forecasts of returns are rarely perfectly accurate, there is a need to find means to measure "upside" potential and "downside" danger -- that is, the potential that returns may exceed what is estimated and the danger that returns may be less than what is

anticipated. In other words, there is a need to measure how wrong forecast might be.

One such measure of forecast uncertainty is variance. Variance measures the breadth of the distribution of expected returns from an investment. It is calculated on the basis of the squared deviations from the mean forecast. Another, and more widely used, measure of forecast uncertainty is the square root of variance, called the standard deviation. Variance and standard deviation are used in modern portfolio theory to estimate the potential risk of making an investment.

As for the stocks, the researcher gathered the data for 1991 and 1992 from Manila and Makati Stock Exchange. Said data was computed using the LIMDEP software. The final result could be seen in the Table 4.1; 4.2 and table 4.3 to table 4.45.

Table 4.1 presents the results of the computation of the rate of return of security (r_j) in column (3); market rate of return (r_M) in column (4); beta risk (β_j) in column (7); and mean rate of return ($\bar{r}_j = \bar{\mu}_j$ and $\bar{r}_M$) in columns (8) and (9).

1.1. Rate of return of security (r_j);

During the two-year period (1991 and 1992) the range of return is from 63.95891. The highest rate of

return of security in market porfolio was PT&T's 63.95891 and the lowest was KPPI's -1.62483. The second highest was FPHC's 59.38059 and the third, fourth and fifth were AC's 22.57651, RFM's 18.62430 and REG's 14.15200 respectively.

Next to KPPI's -1.62483 the lowest rate was LC's -1.59231, followed by CHINB's -1.57566, FLC's -0.60448, and AT's -0.55352, in that order.

As shown in Table 4.1, the average rate of return of Commercial and Industrial security is relatively higher compared to Mining and Oil. And between Mining and Oil the difference is insignificant.

For the blue chip share[1] returns during the period 1991 and 1992 were 2.96657 for PNB; PLDT 2.81610; AC 22.57651; SMC 11.22294 and MER 0.36864. When we compare these returns with those of the other shares, we find their returns much higher although the returns of some shares like FPHC, REG, RFM and BP were also high.

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[1]Blue Chips is common stock of a company that has acknowledged reputation for the quality of its goods and services and its ability to make money in lean years as well as when business is booming. Usually, these well-seasoned shares sell at relatively high price earning ratio (Philippine Securities Exchange Commission, 1993).

TABLE 4.1
PORTFOLIO AND CAPM MODEL
January 1991 - December 1992

COMMERCIAL AND INDUSTRIAL SHARE

No	STOCK SYMBOL	r_j	rM	$cov(r_j, rM)$ $(\hat{\sigma}_{jM})$	$Var(rM)$ $(\hat{\sigma}^2_j)$	β_j
(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Banks			
1	BPI	0.24630	0.39998	0.48218	0.21209	2.27343
2	PNB	2.96657	0.21485	0.04763	0.00828	5.55171
3	URBAN	1.19587	0.43321	2.42056	1.61249	1.50113
4	SOLID	0.57254	0.07386	0.01540	0.00258	5.96569
5	CHINB	-1.57566	-0.01277	0.03019	0.00055	54.78261
	Average	**0.68112**	**0.22181**	**0.59919**	**0.36719**	**14.01491**
			Communication			
6	GLO	0.26042	-0.40924	0.12910	0.04919	2.62439
7	PTT	63.95891	13.79256	19.51348	4.94994	3.94216
8	PLDT	2.81610	0.21202	0.01275	0.00151	8.45809
9	MB	7.09451	0.57509	0.14316	0.02339	6.12167
	Average	**18.53248**	**3.54260**	**4.94962**	**1.25600**	**5.28657**
			Investment and Finance/Holding Firms			
10	AC	22.57651	1.05671	24.85156	1.21470	20.45894
11	FPHC	59.38059	4.45871	0.69592	0.49287	1.41197
12	REG	14.15220	0.66397	0.00802	0.01533	0.52357
13	SMFI-B	0.57636	0.18160	0.03095	0.01114	2.77903
	Average	**24.17141**	**1.59024**	**6.39661**	**0.43351**	**6.29337**
			Food, Beverages and Tobacco Products			
14	RFM	18.62430	1.42197	1.17335	0.27343	4.29116
15	SMC	11.22294	0.90536	0.52050	0.06908	7.53502
	Average	**14.92362**	**1.16366**	**0.84692**	**0.17125**	**5.91309**

		Real Estate				
16	ALI-B	3.29273	0.13430	0.06767	0.00624	10.84003
17	FLC	-0.60448	0.03386	0.05535	0.00424	13.04744
18	KPPI	-1.62483	-0.03128	0.10273	0.00650	15.80596
19	POPI	1.19050	0.07758	0.03746	0.00393	9.53479
20	RLC-B	2.78080	-0.06533	0.08835	0.00699	12.63119
21	RLTY	0.65137	0.06398	0.36717	0.06391	5.74495
	Average	**0.48421**	**0.03568**	**0.11978**	**0.01530**	**11.26739**
		Utility				
22	MER	0.36864	0.00708	0.03101	0.00166	18.73404
		Cements				
23	BCI	8.21037	0.53165	0.04441	0.05454	0.81432
		Ceramics, Tiles, Glass & Allied Products				
24	SWM	-0.38109	0.10133	0.10990	0.18366	0.59842
		Chemicals and Allied Products				
25	ILI	-0.18473	-0.03188	0.00643	0.00643	6.85172
		Construction				
26	EEI	1.13747	0.35368	0.24423	0.10055	2.42882
		Rubber and Allied Products				
27	SD-TIRE	0.34212	0.00126	0.00399	0.00149	42.68816
		Shipbuilding & Repair				
28	KPSI	1.24608	0.01960	0.00015	0.00009	1.57244
		Trading				
29	MDI	0.82248	0.08308	0.02495	0.00721	3.46247

OIL SHARE

1	BP	13.40111	1.02689	6.35955	0.87450	7.27219
2	IRC	0.31335	-0.07367	0.12700	0.01861	6.82392
3	OPM	-0.29582	-0.09528	0.17933	0.02647	6.77388
4	APMC	0.93614	0.17587	0.05396	0.01271	4.17505
5	PETRO	1.68774	-0.06833	0.07287	0.01376	5.29725
6	SJO	2.75184	-0.04211	0.61672	0.02312	26.67788
7	U-OIL	1.66559	0.15342	0.06263	0.01686	3.71472
8	VUL	0.79700	0.17226	0.03890	0.01939	2.00634
	Average	**2.65711**	**0.15613**	**0.93887**	**0.12567**	**7.84265**

MINING SHARE

1	APX	0.95411	-0.10648	0.06138	0.02143	2.86386
2	AT	-0.55352	-0.04590	0.01021	0.00289	3.53392
3	LC	-1.59231	-0.09092	0.05592	0.00481	11.63259
4	PX	12.20218	1.06646	0.27502	0.05260	5.22841
5	OM	3.01102	0.10128	0.12448	0.02963	4.20074
	Average	**2.80429**	**0.18488**	**0.10540**	**0.02227**	**5.49190**

COMMERCIAL AND INDUSTRIAL SHARE

No	STOCK SYMBOL	$\bar{r}_j$	$\bar{r}_M$
(1)	(2)	(8)	(9)
		Banks	
1	BPI	0.01026	0.01667
2	PNB	0.12361	0.00895
3	URBAN	0.49828	0.18051
4	SOLID	0.02386	0.00308
5	CHINB	-0.06565	-0.00053
	Average	**0.11807**	**0.04172**
		Communication	
6	GLO	0.01085	-0.01705
7	PTT	6.83162	0.57469
8	PLDT	0.61173	0.00883
9	MB	0.29560	0.02394
	Average	**1.93745**	**0.14760**

		Investment and Finance/Holding Firms	
10	AC	0.94069	0.04403
11	FPHC	2.47419	0.18578
12	REG	0.58967	0.02767
13	SMFI-B	0.02402	0.00757
	Average	**1.00714**	**0.06626**
		Food, Beverages and Tobacco Products	
14	RFM	0.77601	0.05924
15	SMC	0.46762	0.03772
	Average	**0.62181**	**0.04848**
		Real Estate	
16	ALI-B	0.13720	0.00560
17	FLC	-0.02519	-0.00141
18	KPPI	-0.06770	-0.00130
19	POPI	0.04940	0.00323
20	RLC-B	0.11587	-0.00272
21	RLTY	0.02714	0.00267
	Average	**0.03945**	**0.00010**
		Utility	
22	MER	0.01536	0.00029
		Cements	
23	BCI	0.34210	0.02215
		Ceramics, Tiles, Glass & Allied Products	
24	SWM	-0.01588	0.00422
		Chemicals and Allied Products	
25	ILI	-0.00770	-0.00133
		Construction	
26	EEI	0.04739	0.01474
		Rubber and Allied Products	
27	SD-TIRE	0.01426	0.00005

Shipbuilding & Repair

28	KPSI	0.05192	0.00082

Trading

29	MDI	0.03427	0.00346

OIL SHARE

1	BP	0.55838	0.04279
2	IRC	0.01306	-0.00307
3	OPM	-0.01233	-0.00397
4	APMC	0.85614	0.00738
5	PETRO	0.07032	-0.00285
6	SJO	0.11466	-0.00175
7	U-OIL	0.06940	0.00639
8	VUL	0.03321	0.00718
	Average	**0.21285**	**0.00065**

MINING SHARE

1	APX	0.03975	-0.00444
2	AT	-0.02306	-0.00191
3	LC	-0.06635	-0.00379
4	PX	0.50845	0.04444
5	OM	0.12546	0.00422
	Average	**0.11685**	**0.00077**

THE NAME OF STOCK

COMMERCIAL AND INDUSTRIAL SHARE

Banks

1	BPI	Bank of Philippines Island
2	PNB	Philippines National Bank
3	URBAN	Urban Bank
4	SOLID	Solid Bank
5	CHINB	China Bank

Communication

6	GLO	Globe Mackey
7	PTT	PT&T
8	PLDT	PLDT
9	MB	Manila Bulletin

Investment and Finance/Holding Firms

10	AC	Ayala Corporation
11	FPHC	First Holding
12	REG	Republic Glass
13	SMFI-B	SM Fund Inc

Food, Beverages and Tobacco Products

14	RFM	RFM
15	SMC	San Miquel Corp

Real Estate

16	ALI-B	Ayala Land Corp
17	FLC	First Lepanto Corp
18	KPPI	Kuok Properties
19	POPI	Philippines Orion
20	RLC-B	Robinson Land
21	RLTY	Phil Realty

Utility

22	MER	Meralco

Cements

23	BCI	Bacnotan Cons

Ceramics, Tiles, Glass & Allied Products

24	SWM	Saniwares Mgf Corp

Chemical and Allied Products

25	ILI	Interphil Lab

Construction

26	EEI	Engineering Equipment

Rubber and Allied Products

27	SD-TIRE	Sime Darby

Shipbuilding & Repair

28	KPSI	Keppel Phils

Trading

29	MDI	Metro Drug Inc

OIL SHARE

1	BP	Basic Petroleum
2	IRC	Interport Res
3	OPM	Oriental Pet
4	APMC	Alcorn Petro
5	PETRO	Petrofields
6	SJO	San Jose Oil
7	U-OIL	Union Explo
8	VUL	Vulcan Ind'l & Mining

MINING SHARE

1	APX	Apex Mining
2	AT	Atlas Cons
3	LC	Lepanto Cons
4	PX	Philex Mining
5	OM	Omico

Note: Rf 1991 = 11.24 and 1992 = 10.65
Standard Deviation = 12.29
Portfolio Beta = 0.782
Unsystematic/Total Risk = 41.5 %

Table 4.1 also reveals that the average rate of return of each group of portfolio differs from the other. For Banks, for example, the average rate of return (0.68112) is very much lower compared to Communication (18.53248), Investment and Finance/Holding Firms, on the other hand, has a higher average rate of return (24.17141) than Food, Beverages and Tobacco Product (14.92362). It is interesting to note, however, that there is not that much difference between mining and oil; the former has an average rate of return of 2.80429 while the latter has 2.65111.

And when we break down the portfolio according to industry classification we find as follows:

For **Banks**, PNB has the highest rate of return 2.96657 and the lowest is CHINB with -1.57566. BPI, URBAN, and SOLID have 0.24630, 1.19587 and 0.57254 respectively.

For **Communication**, PTT has the highest rate of return 63.95891 and followed by MB with 7.09451, then

PLDT with 2.81610 and GLO with 0.26042.

The rates of return for **Investment and Finance/Holding Firms** are high enough, except for SMFI-B with 0.57636. The highest is that of FPHC which is 59.38059, followed by AC with 22.57651 and REG with 14.15220.

For **Food, Beverages and Tobacco Products**, the highest rates of return are those of RFM's 18.62430, and SMC's 11.22294.

ALI-B's 3.29273, RLC-B's 2.78080 and POPI's 1.19050 are the highest for Real Estate group. The lowest are that of FLC's -0.60448 and KPPI's -1.62480.

For **Utility; Cements; Ceramics, Tiles, Glass & Allied Products; Chemicals and Allied Products; Construction; Rubber and Allied Products; Shipbuilding & Repair and Trading**, comparison could'nt be done since the total share for each classification in this study is only one. Nevertheless, the highest rates of return among these classification are those of BCI's 8.21037, KPSI's 1.24608 and EEI's 1.13747; and the lowest is SWM's -0.18473.

For **Oil**, the highest rates of return include BP's 13.40111, SJO's 2.75184, PETRO's 1.68774 and U-OIL's 1.66559; the lowest are OPM's -0.29582, IRC's 0.31335 and VUL's 0.79700.

For **Mining**, the highest are PX's 12.20218 and OM's

3.01102; the lowest are AT's -0.55352 and LC's -1.59231.

1.2. Market rate of return (r_M);

The market rate of return is the weighted rate of return of all of the securities in one period, the weight of each security being given by its total market value relative to the over-all market value of all securities.

As shown in Table 4.1, PT&T has the highest market rate of return which is 13.79256 while the lowest is GLO which is -0.40924. The range between the highest market rate of return and the lowest is 13.70 to -0.40924. FPHC has the second highest market rate of return which is 4.45871; the third is PX with 1.06646; while the fourth and fifth are AC and BP with 1.05671 and 1.02689 respectively.

Other establishments with low market rates of return are APX, OPM, LC and IRC, with returns of -0.04590; -0.09528; -0.09092 and -0.0737, respectively.

Both rate of return and market rate of return of securities are very important factors in enabling the investorS to diversify their portfolio in the stock market. Rational investor will always try to invest in the highest rate of return as well as with lower risk. Such behavior confirms the beta risk of portfolio and weight of asset of investments in market portfolio.

An investment with a high rate of return usually

results in a highest beta risk. Hence, a trade off between return and risk, and in general, there is not much difference between market returns of the blue chips and those of the other shares.

A closer look at the average market rate of return, group by group, of these portfolio, reveals that the market rate of return for Communication (3.54260) is a little bit higher compared to the other groups. Even compared to certain groups of portfolio which have negative market rate of return, communication returns is much higher. However, comparing Investment and Finance/Holding Firms and Food, Beverages and Tobacco Products the market rate of return of each group is not so much different from the other.

The break down for Market Rate of Return is as follows:

For **Banks**, URBAN has the highest market rate of return with 0.43321 followed by BPI with 0.39998 and PNB with 0.21485; the lowest is CHINB with -0.01277 and then SOLID with 0.07386.

For **Communication**, PTT and MB have the highest market rate of return with 13.79256 and 0.57509 respectively. On the other hand, GLO and PTT have the lowest rate with -0.40924 and 0.21202 respectively.

For **Investment and Finance/Holding Firms** FPHC has the highest market rate of return with 4.45871, followed

by AC with 1.05671. SMFI-B and REG have the lowest with 0.18160 and 0.66397 respectively.

The market rate of return for **Food, Beverages and Tobacco Products** is little bit lower compared to Investment and Finance/Holding Firms. As we can see from Table 4.1, the highest market rate of return is RFM that of with 1.42197; and then SMC 0.90535.

In the Real Estate group, those with lowest market rate of return are KPPI's -0.03128 and RLC's -0.06533; ALI-B's 0.13430, FLC's 0.03385, POPI's 0.07758 and RLTY's 0.06398 have higher rate.

MER has the highest market rate of return in **Utility** though with 0.00708; BCI for **Cements** with 0.53165; SWM in **Ceramics, Tiles, Glass & Allied Products** with 0.10133; ILI in **Chemicals and Allied Products** with -0.03188; EEI in **Construction** 0.35368; SD-TIRE in **Rubber and Allied Products** with 0.00126; KPSI in **Shipbuilding & Repair** with 0.01960; and MDI in **Trading** with 0.08308 respectively.

The highest market rate of return for **Oil Share** is that BP's 1.02689. There are four shares that have negative market rate of return, they are: IRC -0.07367, OPM -0.09528, PETRO -0.06833 and SJO -0.04211.

For **Mining** group, the highest market rate of return is PX's 1.06646; the lowest include the -0.10648; -0.04590 and -0.09092 of PX, AT and LC respectively.

1.3. Beta risk (b_j);

There are several important properties of the CAPM. First, in equilibrium, every asset must be priced so that its risk-adjusted required rate of return falls exactly on the straight line of the security market line. This is true because not all of the variance of an asset's return is of concern to risk-averse investors. In other words, investors can diversify away all risk except the risk of the economy as a whole, which is inescapable (undiversifiable). Consequently, the only risk which investors will pay a premium to avoid is covariance risk.

Therefore, the total risk of any individual asset can be partitioned into two parts: systematic risk (beta risk) which is a measure of how the asset covaries with the economy; and, unsystematic risk, which is independent of the economy. Thus, in mathematical precision:

Total risk = Systematic risk + unsystematic risk,
(nondiversiable or unavoidable) (diversifiable or or avoidable)

From this precision, the equation 1.22 as well as equation 3.4, is derived.

The CAPM designates systematic risk as beta (β). The beta of the market is 1.0. Assets with less systematic risk (less volatility) than that of the market would have betas of less than 1.0; more risky assets would have betas in excess of 1.0.

Most of the beta in portfolio asset in this study

is greater than 1. The five highest beta in this study found are: CHINB 54.78261, SJO 26.67788, AC 20.45894, MER 18.73404 and KPPI 15.80596. The lowest and less than 1, on the other hand are BCI 0.81432, SWM 0.59842, REG 0.52357, FPHC 1.47194 and URBAN 1.50113. The range between the highest and the lowest beta is 54.7 to 0.81. It mean that most of the assets in market portfolio are risky.

The beta risk for blue chips does not, therefore, support hyphothesis 1, i.e., that high return has, at the same time, a high risk, since several non blue chips shares with low rate of return, like CHINA, SOLID, KPPI and FLC have very high beta risk.

Looking at the beta risk by group, we can see that Banking (14.01491) and Real Estate (11.26379) have the highest beta risk. It means that investment in these portfolio are very risky. Communication (5.28657); Investment and Finance/Holding Firms (6.29337); Food, Beverages and Tobacco Products (5.91309); Oil (7.84265) and Mining (5.49190), likewise have relatively high beta risk, though lower compared to the first two.

For Banks, the highest beta is CHINB's 54.78261 and SOLID's 5.96569. PNB, one of blue chips, has a beta of only 5.55171. URBAN has the lowest beta 1.50113 along with BPI with 2.27343. PLDT in Communication has the highest beta risk with 8.45809, followed by MB, PTT and

GLO with 6.12167, 3.94216 and 2.62439, respectively.

For **Investment and Finance/Holding Firms** the highest beta is that of AC's 20.45894, followed by SMFI-B's 2.77903, FPHC's 1.41197 and REG's 0.52357.

From among the **Food, Beverages and Tobacco Products** group, the highest beta is that of SMC 7.53502 and RFM 4.29110.

Among the Real Estate group, the highest beta is that of KPPI's 15.80596, followed by FLC's 13.04744, RLC-B's 12.63119 and ALI-B's 10.84003; the lowest is that of RLTY's 5.74495.

The highest beta risk in **Utility** group is that of MER's 18.73404; in **Cements** group BCI's 0.81432; in **Chemicals and Allied Products**; ILI; in Trading MDI; and in **Rubber and Allied Products**, SD-TIRE with 2.68816. Except for MER, all of beta risks in these groups are little bit lower compared to **Food, Beverages and Tobacco Products.**

For **Oil**, the highest beta risk is SJO's 26.67788, followed by BP's 7.27219, IRC's 6.82392 and OPM's 6.77383. On the other hand, the VUL and U-OIL have the lowest beta with 2.00634 and 3.71472 respectively.

1.4. Mean rate of return ($\bar{r}_j = \hat{m}_j$ and $\bar{r}_M$);

The highest mean rate of return of portfolio in this study is PT&T 6.83162, and the followed by FPHC, AC,

APMC and RFM, with is 2.47419, 0.94069, 0.85614 and 0.77601 respectively. The lowest is ILI -0.00770.

The mean rate of return, as such, is like "the rate of return" in sub problem 1. The differences are taken from average of return during 24-month period to confirm the accurate rate of returns in sub-problem 1.

Accordingly, the highest mean rate of return is that of Communication (1.93745), and followed by Invesment and Finance/Holding Firms 1.00714. The remaining groups are relatively lower.

For Banks group, URBAN and PNB have the highest mean rate of return with 0.49828 and 0.12361 respectively. The lowest are CHINB's -0.06565, BPI's 0.01026 and SOLID's 0.02386. In Communication the highest mean rate of return is PTT's 6.83162 and the lowest is GLO's 0.01085. It is intersting to note that PLDT and MB have 0.61173 and 0.29560 respectively.

In Investment and Finance/Holding Firms have FPHC has the highest mean rate market of return with 2.47419. AC, REG and SMFI-B have relatively lower mean rate of return compared to FPHC.

As to the mean rate of return among shares in Food, Beverages and Tobacco Products, RFM and SMC have the highest with 0.77601 and 0.46762, respectively.

On the other hand, among the shares in Real Estate, FLC and KPPI have the lowest with -0.02519 and -0.06770,

respectively. The remaining shares are below 0.46762 but still positive.

MER in Utility, BCI in Cements, and EEI in Construction, have positive market rates of return although relatively small. This is also true with SD-TIRE in Rubber and Allied Products, KPSI in Shipbuilding & Repair and MDI in Trading. SWM in Ceramics, Tiles, Glass and Allied Products and ILI in Chemicals and Allied Products however, have negative market rate of returns with -0.01588 and -0.00770 respectively.

Among the Oil shares only OPM has -0.01233 mean rate of return. The remaining shares are positive, APMC as the highest with 0.85614, followed by BP with 0.55838 and SJO with 0.11466. But the average mean rate of return of Oil is relatively higher than Mining. In Mining there are two shares that have minus mean rates of return. They are AT with -0.02306 and LC with -0.6635.

IV. 2. SUB-PROBLEM 2

How are portfolio theory and CAPM utilized in the Philippine stock market in terms of the following variables:

2.1. Monthly rates of return (r_{jt});

2.2. Variance of the rate of return $[(\hat{\sigma}_{ij})$ or $(\hat{\sigma}^2_j)]$;

2.3. Covariance of the rate of return of security j with market rate of return $(\hat{\sigma}_{jM})$;

2.4. The weight of each security in market portfolio (w_j).

As to portfolio theory and CAPM are being utilized in the Philippine stock market will be reflected from several variables in problems 1 and 2 above. That is why the computation of said variables is very crucial in this study.

The mechanical complexity of the Markowitz portfolio model kept both practitioners and academicians from adopting the concept for practical uses. Its intuitive logic, however, spurred the creativity of a number of people. Several simplified versions were developed. The most practical version is the capital asset pricing model (CAPM). The CAPM is a logical extension of modern portfolio theory, both intuitively and mathematically. In addition, the CAPM is a testable theory.

Knowing how portfolio theory and CAPM are being utilized in the Philippine stock market and to understand the relationship between the two consideration should be made as far as the process one must go through using modern portfolio techniques to calculate the risk of a portfolio. To do so, it is necessary to have standard deviation of every asset's expected returns, the correlation between the expected returns for every pair of assets, and the amount of each asset being held.

One way to simplify the process is to correlate

each asset's expected return with the expected returns of weighted average or index of all the assets under consideration. If for example, the universe of assets consist only of 20 stocks, to calculate the portfolio risk, what is needed is to estimate 20 standard deviation and 20 correlation of the expected returns from each asset with expected returns from this new (20-stock) index -- 40 calculations in all. The Markowitz model would have required 20 standard deviations and 190 correlations, a total of 210 estimates.

The beauty of this simplified process is that it gives us the same risk rankings as the Markowitz method. The absolute risk, the portfolio variance, would, of course, depend upon the universe chosen. Note that both methods are concerned only with risk and return.

The capital asset pricing model actually takes this simplification of the Markowitz method even further. The CAPM uses a weighted average as the benchmark for calculating correlation, defining this benchmark as an index of the market value weighted portfolio of all possible risky investments. This market value weighted portfolio or index is called the market portfolio. In addition to defining the index as the market portfolio, the CAPM's second adaptation of the Markowitz model is the addition of another asset to the universe of assets under consideration. This additional asset is known as

the risk-free asset.

2.1. Monthly rates of return (r_{jt});

In the Table 4.3 to table 4.45 whereby the monthly rates of return for 42 securities are shown, the existence of zero entries in column rj is due to the absence of monthly trading, no dividends issued and/or no change in prices.

Monthly rate of return is another confirmation for rate of return in security (r_j) in sub-problem 1 and mean rate of return ($\bar{r}_j = \hat{m}_j$ and $\hat{r}_m$) in sub-problem 2. In this study, researcher find there is no contradiction among these variables.

2.2. Variance of the rate of return [($\hat{\sigma}_{ij}$) or ($\hat{\sigma}^2_j$)];

The variance of the market return is the expected squared deviation from the expected return. It is a measure of variability. The highest variance of market return, as shown in Table 4.1, is PT&T 4.94994, followed by URBAN 1.61249, AC 1.21470, BP 0.87450 and FPHC 0.49287. The lowest is KPSI 0.00009, followed by CHINB 0.00055; SOLID 0.00258; AT 0.00289 and POPI 0.00393.

Looking at each group, we find that Communication has the highest variance with 1.25600, followed by the Investment and Finance/Holding Firms group (0.43351);

TABLE 4.3 TO 4.45

PORTFOLIO SELECTION AND CAPM

I. COMMERCIAL AND INDUSTRIAL

Table 4.3

BPI

rj	rM	Rf	rj-rjbar	rm-rmbar	Cov(rj,rm
0.05561	0.00592	11.24000	0.04535	0.02259	0.00102
0.03048	0.00010	11.24000	0.02022	0.01677	0.00034
0.03048	0.00017	11.24000	0.02022	0.01684	0.00034
0.03048	0.00017	11.24000	0.02022	0.01684	0.00034
0.04952	0.00004	11.24000	0.03926	0.01671	0.00066
0.06495	0.00013	11.24000	0.05469	0.01680	0.00092
0.00406	0.00342	11.24000	(0.00620)	0.02009	(0.00012)
0.03889	0.00043	11.24000	0.02863	0.01710	0.00049
0.02936	0.00081	11.24000	0.01910	0.01748	0.00033
0.03853	0.00107	11.24000	0.02827	0.01774	0.00050
0.02909	0.00003	11.24000	0.01883	0.01670	0.00031
0.10182	0.00011	11.24000	0.09156	0.01678	0.00154
0.17220	0.02885	10.65000	0.16194	0.04552	0.00737
0.06400	0.00003	10.65000	0.05374	0.01670	0.00090
0.00246	0.00001	10.65000	(0.00780)	0.01668	(0.00013)
0.08869	0.00534	10.65000	0.07843	0.02201	0.00173
0.09092	0.00513	10.65000	0.08066	0.02180	0.00176
(0.21485)	(0.00888)	10.65000	(0.22511)	0.00779	(0.00175)
0.08208	0.00627	10.65000	0.07182	0.02294	0.00165
0.19582	0.00456	10.65000	0.18556	0.02123	0.00394
0.12756	0.00514	10.65000	0.11730	0.02181	0.00256
0.15781	0.00794	10.65000	0.14755	0.02461	0.00363
(0.02366)	(0.00031)	10.65000	(0.03392)	0.01636	(0.00056)
(1.00000)	(0.46647)	10.65000	(1.01026)	(0.44980)	0.45441

0.24630	(0.39998)	SUM	0.48218
0.01026	(0.01667)	AVERAGE	0.02009

B 2.27343

Table 4.4

PHILIPPINES NATIONAL BANK

rj	rM	rf	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
0.53002	0.01670	11.24000	0.40642	0.00775	0.00315	0.00006
0.28822	0.03090	11.24000	0.28822	0.03090	0.00891	0.00095
0.14781	0.01025	11.24000	0.14781	0.01025	0.00152	0.00011
0.17926	0.00007	11.24000	0.17926	0.00007	0.00001	0.00000
0.13639	0.01514	11.24000	0.13639	0.01514	0.00206	0.00023
(0.11916)	(0.02421)	11.24000	(0.11916)	(0.02421)	0.00288	0.00059
0.02661	0.00491	11.24000	0.02661	0.00491	0.00013	0.00002
0.00230	0.00018	11.24000	0.00230	0.00018	0.00000	0.00000
0.03220	0.00409	11.24000	0.03220	0.00409	0.00013	0.00002
0.15413	0.01641	11.24000	0.15413	0.01641	0.00253	0.00027
0.13540	0.01474	11.24000	0.13540	0.01474	0.00200	0.00022
0.19654	0.01491	11.24000	0.19654	0.01491	0.00293	0.00022
0.10574	0.00467	10.65000	0.10574	0.00467	0.00049	0.00002
0.03966	0.00078	10.65000	0.03966	0.00078	0.00003	0.00000
0.21161	0.00420	10.65000	0.21161	0.00420	0.00089	0.00002
0.20265	0.07295	10.65000	0.20265	0.07295	0.01478	0.00532
0.28368	0.01273	10.65000	0.28368	0.01273	0.00361	0.00016
0.08686	0.00574	10.65000	0.08686	0.00574	0.00050	0.00003
(0.00075)	(0.00002)	10.65000	(0.00075)	(0.00002)	0.00000	0.00000
0.08534	0.00198	10.65000	0.08534	0.00198	0.00017	0.00000
0.08219	0.00313	10.65000	0.08219	0.00313	0.00026	0.00001
0.14594	0.00441	10.65000	0.14594	0.00441	0.00064	0.00002
0.01392	0.00020	10.65000	0.01392	0.00020	0.00000	0.00000
0.00000	0.00000	10.65000	0.00000	0.00000	0.00000	0.00000
2.96657	0.21485		SUM		0.04763	0.00828
0.12361	0.00895		AVERAGE		0.00858	0.00034

B 5.55171

Table 4.5

URBAN BANK

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
0.07500	0.00047	(0.42328)	(0.18004)	0.07621	0.03241
0.26661	0.12633	(0.23167)	(0.05418)	0.01255	0.00294
0.48775	0.13841	(0.01053)	(0.04210)	0.00044	0.00177
0.30329	0.00958	(0.19499)	(0.17093)	0.03333	0.02922
0.17917	0.00827	(0.31911)	(0.17224)	0.05496	0.02967
0.15536	0.00994	(0.34292)	(0.17057)	0.05849	0.02910
0.09817	0.00014	(0.40011)	(0.18037)	0.07217	0.03253
0.26200	0.00966	(0.23628)	(0.17085)	0.04037	0.02919
0.19410	0.00961	(0.30418)	(0.17090)	0.05198	0.02921
0.11313	0.00011	(0.38516)	(0.18040)	0.06948	0.03254
0.24392	0.00127	(0.25436)	(0.17924)	0.04559	0.03213
0.00000	0.00000	(0.49828)	(0.18051)	0.08994	0.03258
4.66168	0.03359	4.16340	(0.14692)	(0.61170)	0.02159
(0.79560)	(0.04353)	(1.29388)	(0.22404)	0.28988	0.05019
0.12902	0.00177	(0.36926)	(0.17874)	0.06600	0.03195
0.08019	0.00129	(0.41809)	(0.17922)	0.07493	0.03212
(0.65024)	(0.03629)	(1.14852)	(0.21680)	0.24899	0.04700
6.32706	4.10638	5.82878	3.92587	22.88306	15.41248
(0.79790)	(0.06562)	(1.29618)	(0.24613)	0.31903	0.06058
0.00000	0.00000	(0.49828)	(0.18051)	0.08994	0.03258
0.23335	0.00192	(0.26493)	(0.17859)	0.04732	0.03190
0.16567	0.01836	(0.33261)	(0.16215)	0.05393	0.02629
0.22710	0.00046	(0.27118)	(0.18005)	0.04883	0.03242
0.00000	0.00000	(0.49828)	(0.18051)	0.08994	0.03258
11.95879	4.33214		SUM	24.20569	16.12497
0.49828	0.18051		AVERAGE	1.00857	0.67187

B 1.50113

Table 4.6

SOLID BANK

rj	rM	rj-rjbar	ra-rmbar	Cov(rj,ra	Var ra
0.01626	0.00296	(0.00760)	(0.00012)	0.00000	0.00000
0.01626	0.00296	(0.00760)	(0.00012)	0.00000	0.00000
0.25610	0.04667	0.23224	0.04359	0.01012	0.00190
0.06230	0.00075	0.03844	(0.00233)	(0.00009)	0.00001
0.01250	0.00055	(0.01136)	(0.00253)	0.00003	0.00001
0.00000	0.00000	(0.02386)	(0.00308)	0.00007	0.00001
0.01266	0.00069	(0.01120)	(0.00239)	0.00003	0.00001
0.01266	0.00136	(0.01120)	(0.00172)	0.00002	0.00000
0.00000	0.00000	(0.02386)	(0.00308)	0.00007	0.00001
0.01282	0.00085	(0.01104)	(0.00223)	0.00002	0.00000
(0.03205)	(0.00332)	(0.05591)	(0.00640)	0.00036	0.00004
0.00000	0.00000	(0.02386)	(0.00308)	0.00007	0.00001
0.02857	0.00028	0.00471	(0.00280)	(0.00001)	0.00001
0.02857	0.00028	0.00471	(0.00280)	(0.00001)	0.00001
(0.11429)	(0.00111)	(0.13815)	(0.00419)	0.00058	0.00002
0.03333	0.00064	0.00947	(0.00244)	(0.00002)	0.00001
0.20000	0.00385	0.17614	0.00077	0.00014	0.00000
(0.21429)	(0.01258)	(0.23815)	(0.01566)	0.00373	0.00025
0.03774	0.00064	0.01388	(0.00244)	(0.00003)	0.00001
0.03774	0.00064	0.01388	(0.00244)	(0.00003)	0.00001
0.08491	0.00143	0.06105	(0.00165)	(0.00010)	0.00000
0.04505	0.01926	0.02119	0.01618	0.00034	0.00026
0.03571	0.00706	0.01185	0.00398	0.00005	0.00002
0.00000	0.00000	(0.02386)	(0.00308)	0.00007	0.00001
0.57254	0.07386		SUM	0.01540	0.00258
0.02386	0.00308		AVERAGE	0.00064	0.00011
			B	5.96569	

Table 4.7

CHINA BANK

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
(1.00000)	(0.01488)	(0.93435)	(0.01435)	0.01341	0.00021
0.00000	0.00000	0.06565	0.00053	0.00003	0.00000
0.00000	0.00000	0.06565	0.00053	0.00003	0.00000
0.00000	0.00000	0.06565	0.00053	0.00003	0.00000
0.01887	0.00010	0.08452	0.00063	0.00005	0.00000
0.02099	0.00001	0.08664	0.00054	0.00005	0.00000
0.02086	0.00014	0.08651	0.00067	0.00006	0.00000
0.04512	0.00059	0.11077	0.00112	0.00012	0.00000
0.01420	0.00015	0.07985	0.00068	0.00005	0.00000
0.05562	0.00117	0.12127	0.00170	0.00021	0.00000
(0.02898)	(0.00005)	0.03667	0.00048	0.00002	0.00000
0.00000	0.00000	0.06565	0.00053	0.00003	0.00000
0.00000	0.00000	0.06565	0.00053	0.00003	0.00000
0.00000	0.00000	0.06565	0.00053	0.00003	0.00000
0.00000	0.00000	0.06565	0.00053	0.00003	0.00000
0.00000	0.00000	0.06565	0.00053	0.00003	0.00000
0.00000	0.00000	0.06565	0.00053	0.00003	0.00000
0.06524	0.00671	0.13089	0.00724	0.00095	0.00005
0.02969	0.00345	0.09534	0.00398	0.00038	0.00002
0.05617	0.00012	0.12182	0.00065	0.00008	0.00000
0.05773	0.00543	0.12338	0.00596	0.00073	0.00004
(0.96364)	(0.01576)	(0.89799)	(0.01523)	0.01367	0.00023
0.00000	0.00000	0.06565	0.00053	0.00003	0.00000
0.00000	0.00000	0.06565	0.00053	0.00003	0.00000
(1.60813)	(0.01282)	SUM		0.03017	0.00055
(0.06701)	(0.00053)	AVERAGE		0.00126	0.00002

B 54.74791

Table 4.8

GLOBE MACKAY

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	var rm
1.42424	0.00036	1.41339	0.01741	0.02460	0.00030
0.09375	0.00134	0.08290	0.01839	0.00152	0.00034
(0.00571)	(0.00007)	(0.01656)	0.01698	(0.00028)	0.00029
(0.10345)	(0.00062)	(0.11430)	0.01643	(0.00188)	0.00027
(0.07692)	(0.00010)	(0.08777)	0.01695	(0.00149)	0.00029
0.04167	0.00007	0.03082	0.01712	0.00053	0.00029
0.02000	0.00022	0.00915	0.01727	0.00016	0.00030
0.01307	0.00010	0.00222	0.01715	0.00004	0.00029
(0.21290)	(0.09846)	(0.22375)	(0.08141)	0.01822	0.00663
(0.34426)	(0.16571)	(0.35511)	(0.14866)	0.05279	0.02210
(0.03000)	(0.00000)	(0.04085)	0.01705	(0.00070)	0.00029
0.00000	0.00000	(0.01085)	0.01705	(0.00018)	0.00029
(0.31902)	(0.00284)	(0.32987)	0.01421	(0.00469)	0.00020
(0.24324)	(0.12286)	(0.25409)	(0.10581)	0.02688	0.01120
(0.03571)	(0.01546)	(0.04656)	0.00159	(0.00007)	0.00000
0.19753	0.04198	0.18668	0.05903	0.01102	0.00349
0.09278	0.00415	0.08193	0.02120	0.00174	0.00045
(0.14151)	(0.00870)	(0.15236)	0.00835	(0.00127)	0.00007
(0.10989)	(0.04264)	(0.12074)	(0.02559)	0.00309	0.00065
0.00000	0.00000	(0.01085)	0.01705	(0.00018)	0.00029
0.00000	0.00000	(0.01085)	0.01705	(0.00018)	0.00029
0.00000	0.00000	(0.01085)	0.01705	(0.00018)	0.00029
0.00000	0.00000	(0.01085)	0.01705	(0.00018)	0.00029
0.00000	0.00000	(0.01085)	0.01705	(0.00018)	0.00029
0.26042	(0.40924)		SUM	0.12910	0.04919
0.01085	(0.01705)		AVERAGE	0.00538	0.00205

B 2.62439

Table 4.9

PT&T-A

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	var rm
6.04819	0.11505	(0.78343)	(0.45964)	0.36009	0.21127
4.57143	0.77661	(2.26019)	0.20192	-0.45637	0.04077
4.60952	0.78308	(2.22210)	0.20839	-0.46306	0.04343
4.40367	0.89710	(2.42795)	0.32241	-0.78279	0.10395
4.31651	0.87934	(2.51511)	0.30465	-0.76623	0.09281
4.74874	0.76637	(2.08288)	0.19168	-0.39925	0.03674
5.23370	0.20388	(1.59792)	(0.37081)	0.59253	0.13750
5.04278	0.04556	(1.78884)	(0.52913)	0.94653	0.27998
5.67059	0.02692	(1.16103)	(0.54777)	0.63598	0.30006
5.54598	0.04362	(1.28564)	(0.53107)	0.68276	0.28203
5.24022	0.04554	(1.59140)	(0.52915)	0.84209	0.28000
0.00000	0.00000	(6.83162)	(0.57469)	3.92606	0.33027
8.08570	0	1.25408	(0.37214)	-0.46670	0.13849
8.36177	2	1.53015	0.95598	1.46280	0.91390
9.15290	0	2.32128	(0.20572)	-0.47753	0.04232
9.11065	0	2.27903	(0.20742)	-0.47272	0.04302
9.52730	1	2.69568	0.31849	0.85854	0.10143
9.84631	1	3.01469	0.51391	1.54928	0.26410
9.75540	1	2.92378	0.01736	0.05076	0.00030
10.79760	1	3.96598	0.70523	2.79691	0.49734
11.19580	1	4.36418	0.45324	1.97804	0.20543
11.29315	1	4.46153	0.46218	2.06204	0.21361
11.40099	1	4.56937	0.24679	1.12767	0.06091
0.00000	0	(6.83162)	(0.57469)	3.92606	0.33027
163.95891	13.79256		SUM	19.51348	4.94994
6.83162	0.57469		AVERAGE	0.81306	0.20625

B 3.94216

Table 4.10

PLDT-COM

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
0.22475	0.00598	0.10741	(0.00285)	(0.00031)	0.00001
0.13844	0.00702	0.02110	(0.00181)	(0.00004)	0.00000
0.17422	0.01099	0.05688	0.00216	0.00012	0.00000
0.14984	0.01489	0.03250	0.00606	0.00020	0.00004
0.02464	0.00275	(0.09270)	(0.00608)	0.00056	0.00004
(0.07195)	(0.00734)	(0.18929)	(0.01617)	0.00306	0.00026
0.07990	0.00625	(0.03744)	(0.00258)	0.00010	0.00001
(0.00945)	(0.00093)	(0.12679)	(0.00976)	0.00124	0.00010
0.12463	0.00927	0.00729	0.00044	0.00000	0.00000
0.19469	0.02325	0.07735	0.01442	0.00112	0.00021
0.11510	0.01157	(0.00224)	0.00274	(0.00001)	0.00001
0.00000	0.00000	(0.11734)	(0.00883)	0.00104	0.00008
0.11047	0.01143	(0.00687)	0.00260	(0.00002)	0.00001
0.15348	0.01335	0.03614	0.00452	0.00016	0.00002
0.19673	0.01540	0.07939	0.00657	0.00052	0.00004
0.38491	0.02162	0.26757	0.01279	0.00342	0.00016
0.13734	0.02282	0.02000	0.01399	0.00028	0.00020
0.11875	0.02008	0.00141	0.01125	0.00002	0.00013
0.10471	0.00000	(0.01263)	(0.00883)	0.00011	0.00008
0.09398	0.00725	(0.02336)	(0.00158)	0.00004	0.00000
0.18339	0.00676	0.06605	(0.00207)	(0.00014)	0.00000
0.10453	0.00700	(0.01281)	(0.00183)	0.00002	0.00000
0.08299	0.00262	(0.03435)	(0.00621)	0.00021	0.00004
0.00000	0.00000	(0.11734)	(0.00883)	0.00104	0.00008
2.81610	0.21202		SUM	0.01275	0.00151
0.11734	0.00883		AVERAGE	0.00053	0.00006
			B	0.45809	

Table 4.11

MANILA BULLETIN

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	var rm
0.78222	0.00864	0.48662	(0.01532)	(0.00746)	0.00023
0.52438	0.00199	0.22878	(0.02197)	(0.00503)	0.00048
0.64358	0.00928	0.34798	(0.01468)	(0.00511)	0.00022
0.73698	0.10377	0.44138	0.07981	0.03523	0.00637
0.45614	0.04246	0.16054	0.01850	0.00297	0.00034
0.45287	0.04730	0.15727	0.02334	0.00367	0.00054
0.41571	0.01646	0.12011	(0.00750)	(0.00090)	0.00006
0.59289	0.08930	0.29729	0.06534	0.01943	0.00427
0.45041	0.05229	0.15481	0.02833	0.00439	0.00080
0.58360	0.07306	0.28800	0.04910	0.01414	0.00241
0.57895	0.05875	0.28335	0.03479	0.00986	0.00121
0.00000	0.00000	(0.29560)	(0.02396)	0.00708	0.00057
0.04571	0.00393	(0.24989)	(0.02003)	0.00500	0.00040
(0.20231)	(0.01023)	(0.49791)	(0.03419)	0.01702	0.00117
0.00000	0.00000	(0.29560)	(0.02396)	0.00708	0.00057
0.05932	0.00117	(0.23628)	(0.02279)	0.00538	0.00052
0.08696	0.00225	(0.20864)	(0.02171)	0.00453	0.00047
0.20870	0.04093	(0.08690)	0.01697	(0.00147)	0.00029
0.45736	0.02246	0.16176	(0.00150)	(0.00024)	0.00000
0.03933	0.01038	(0.25627)	(0.01358)	0.00348	0.00018
0.02857	0.00242	(0.26703)	(0.02154)	0.00575	0.00046
(0.08824)	(0.00209)	(0.38384)	(0.02605)	0.01000	0.00068
0.24138	0.00058	(0.05422)	(0.02338)	0.00127	0.00055
0.00000	0.00000	(0.29560)	(0.02396)	0.00708	0.00057
7.09451	0.57509			0.14316	0.02339
0.29560	0.02396			0.00596	0.00097

B 6.12167

Table 4.12

AYALA CORPORATION A

rj	rM	rj (Mean)	rj-rjbar	rm-rmbar	Cov(rj,rm
0.36577	0.01090	0.04224	(0.57492)	(0.03313)	0.01905
0.20818	0.03223	(0.04081)	(0.73251)	(0.01180)	0.00864
0.01560	0.00139	(0.04081)	(0.92509)	(0.04264)	0.03944
0.06509	0.00717	(0.04081)	(0.87560)	(0.03686)	0.03227
(0.09076)	(0.01214)	(0.04081)	(1.03145)	(0.05617)	0.05794
(0.06787)	(0.00822)	(0.04081)	(1.00856)	(0.05225)	0.05269
(0.11472)	(0.00671)	(0.04081)	(1.05541)	(0.05074)	0.05355
(0.04346)	(0.00254)	(0.04081)	(0.98415)	(0.04657)	0.04583
0.08661	0.00635	(0.04081)	(0.85408)	(0.03768)	0.03218
0.02656	0.00228	(0.04081)	(0.91413)	(0.04175)	0.03816
0.05582	0.00294	(0.04081)	(0.88487)	(0.04109)	0.03636
0.00000	0.00000	(0.04081)	(0.94069)	(0.04403)	0.04142
0.00000	0.00000	1.83914	(0.94069)	(0.04403)	0.04142
(0.11467)	(0.01575)	1.75604	(1.05536)	(0.05978)	0.06309
0.07774	0.00343	1.75604	(0.86295)	(0.04060)	0.03503
0.09860	0.00749	1.75604	(0.84209)	(0.03654)	0.03077
0.05792	0.00873	1.75604	(0.88277)	(0.03530)	0.03116
(0.11939)	(0.02585)	1.75604	(1.06008)	(0.06988)	0.07408
0.20034	0.01832	1.75604	(0.74035)	(0.02571)	0.01904
(0.96734)	(0.08210)	1.75604	(1.90803)	(0.12613)	0.24066
23.00930	1.11871	1.75604	22.06861	1.07468	23.71668
(0.07534)	(0.00373)	1.75604	(1.01603)	(0.04776)	0.04853
(0.09747)	(0.00621)	1.75604	(1.03816)	(0.05024)	0.05215
0.00000	0.00000	1.75604	(0.94069)	(0.04403)	0.04142
22.57651	1.05671		SUM		24.85156
0.94069	0.04403		AVERAGE		1.03548

B 20.45894

Table 4.13

FIRST HOLDING A

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
5.53820	0.15306	3.06401	(0.03272)	(0.10025)	0.00107
4.29660	0.25938	1.82241	0.07360	0.13414	0.00542
3.38800	0.28944	0.91381	0.10366	0.09472	0.01074
3.21899	0.12252	0.74480	(0.06326)	(0.04712)	0.00400
2.92542	0.25697	0.45123	0.07119	0.03212	0.00507
2.36407	0.35086	(0.11012)	0.16508	(0.01818)	0.02725
2.56976	0.23110	0.09557	0.04532	0.00433	0.00205
2.78208	0.16547	0.30789	(0.02031)	(0.00625)	0.00041
2.98967	0.17758	0.51548	(0.00820)	(0.00422)	0.00007
2.48211	0.55997	0.00792	0.37419	0.00296	0.14002
2.63073	0.25666	0.15654	0.07088	0.01110	0.00502
0.00000	0.00000	(2.47419)	(0.18578)	0.45966	0.03451
2.93497	0.02564	0.46078	(0.16014)	(0.07379)	0.02564
2.73769	0.02392	0.26350	(0.16186)	(0.04265)	0.02620
3.80881	0.03242	1.33462	(0.15336)	(0.20467)	0.02352
3.62824	0.05069	1.15405	(0.13509)	(0.15590)	0.01825
2.63354	0.45697	0.15935	0.27119	0.04321	0.07354
1.44250	0.35740	(1.03169)	0.17162	(0.17706)	0.02945
1.70382	0.12491	(0.77037)	(0.06087)	0.04689	0.00371
1.41921	0.17378	(1.05498)	(0.01200)	0.01266	0.00014
1.63632	0.20036	(0.83787)	0.01458	(0.01222)	0.00021
1.04173	0.14721	(1.43246)	(0.03857)	0.05525	0.00149
1.20815	0.04240	(1.26604)	(0.14338)	0.18153	0.02056
0.00000	0.00000	(2.47419)	(0.18578)	0.45966	0.03451
59.38059	4.45871		SUM	0.69592	0.49287
2.47419	0.18578		AVERAGE	0.02900	0.02054

B 1.41197

Table 4.14

REPUBLIC GLASS A

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	VAr rm
0.87609	0.01494	0.28642	(0.01273)	(0.00365)	0.00016
0.51421	0.00841	(0.07546)	(0.01926)	0.00145	0.00037
0.67849	0.07864	0.08882	0.05097	0.00453	0.00260
0.42851	0.03827	(0.16116)	0.01060	(0.00171)	0.00011
0.51171	0.04888	(0.07796)	0.02121	(0.00165)	0.00045
0.05566	0.01372	(0.53401)	(0.01395)	0.00745	0.00019
0.58185	0.01742	(0.00782)	(0.01025)	0.00008	0.00011
0.53665	0.02082	(0.05302)	(0.00685)	0.00036	0.00005
0.53665	0.05190	(0.05302)	0.02423	(0.00128)	0.00059
0.49379	0.04930	(0.09588)	0.02163	(0.00207)	0.00047
0.53083	0.08096	(0.05884)	0.05329	(0.00314)	0.00284
0.00000	0.00000	(0.58967)	(0.02767)	0.01632	0.00077
0.45943	0.01693	(0.13024)	(0.01074)	0.00140	0.00012
0.75131	0.02254	0.16164	(0.00513)	(0.00083)	0.00003
0.77131	0.07265	0.18164	0.04498	0.00817	0.00202
0.39540	0.00489	(0.19427)	(0.02278)	0.00443	0.00052
1.15969	0.01680	0.57002	(0.01087)	(0.00619)	0.00012
1.04473	0.00507	0.45506	(0.02260)	(0.01029)	0.00051
1.01664	0.03008	0.42697	0.00241	0.00103	0.00001
0.21179	0.05721	(0.37788)	0.02954	(0.01116)	0.00087
0.00000	0.00000	(0.58967)	(0.02767)	0.01632	0.00077
1.39132	0.01317	0.80165	(0.01450)	(0.01162)	0.00021
1.20613	0.00135	0.61646	(0.02632)	(0.01622)	0.00069
0.00000	0.00000	(0.58967)	(0.02767)	0.01632	0.00077
14.15220	0.66397		SUM	0.00802	0.01533
0.58967	0.02767		AVERAGE	0.00033	0.00064

B 0.52357

Table 4.15

SM FUND INC B

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
0.29808	0.09109	0.27406	0.08352	0.02289	0.00697
0.08491	0.05769	0.06089	0.05012	0.00305	0.00251
0.01770	0.00023	(0.00632)	(0.00734)	0.00005	0.00005
0.00000	0.00000	(0.02402)	(0.00757)	0.00018	0.00006
0.00000	0.00000	(0.02402)	(0.00757)	0.00018	0.00006
0.02000	0.00001	(0.00402)	(0.00756)	0.00003	0.00006
0.00000	0.00000	(0.02402)	(0.00757)	0.00018	0.00006
0.00000	0.00000	(0.02402)	(0.00757)	0.00018	0.00006
0.00000	0.00000	(0.02402)	(0.00757)	0.00018	0.00006
0.02500	0.00001	0.00098	(0.00756)	(0.00001)	0.00006
0.00000	0.00000	(0.02402)	(0.00757)	0.00018	0.00006
0.00000	0.00000	(0.02402)	(0.00757)	0.00018	0.00006
0.09011	0.02158	0.06609	0.01401	0.00093	0.00020
0.00000	0.00000	(0.02402)	(0.00757)	0.00018	0.00006
0.00000	0.00000	(0.02402)	(0.00757)	0.00018	0.00006
0.00000	0.00000	(0.02402)	(0.00757)	0.00018	0.00006
0.00000	0.00000	(0.02402)	(0.00757)	0.00018	0.00006
0.00000	0.00000	(0.02402)	(0.00757)	0.00018	0.00006
(0.00722)	(0.00044)	(0.03124)	(0.00801)	0.00025	0.00006
(0.06164)	(0.00869)	(0.08566)	(0.01626)	0.00139	0.00026
0.03953	0.01854	0.01551	0.01097	0.00017	0.00012
0.05324	0.00045	0.02922	(0.00712)	(0.00021)	0.00005
0.01667	0.00115	(0.00735)	(0.00642)	0.00005	0.00004
0.00000	0.00000	(0.02402)	(0.00757)	0.00018	0.00006
0.57636	0.18160		SUM	0.03095	0.01114
0.02402	0.00757		AVERAGE	0.00129	0.00046

B 2.77903

Table 4.16

RFM

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
1.23998	0.00970	0.46397	(0.04955)	(0.02299)	0.00246
1.23998	0.00970	0.46397	(0.04955)	(0.02299)	0.00246
1.23998	0.01042	0.46397	(0.04883)	(0.02266)	0.00238
1.33229	0.25689	0.55628	0.19764	0.10995	0.03906
1.10703	0.27261	0.33102	0.21336	0.07063	0.04552
1.16810	0.02619	0.39209	(0.03306)	(0.01296)	0.00109
0.72122	0.18651	(0.05479)	0.12726	(0.00697)	0.01620
1.89137	0.31226	1.11536	0.25301	0.28220	0.06402
2.62518	0.28708	1.84917	0.22783	0.42129	0.05191
2.85226	0.02861	2.07625	(0.03064)	(0.06362)	0.00094
3.23996	0.00000	2.46395	(0.05925)	(0.14599)	0.00351
0.00000	0.00000	(0.77601)	(0.05925)	0.04598	0.00351
0.06000	0.01145	(0.71601)	(0.04780)	0.03423	0.00228
(0.12641)	(0.00124)	(0.90242)	(0.06049)	0.05459	0.00366
0.03895	0.00150	(0.73706)	(0.05775)	0.04257	0.00334
(0.11492)	(0.01308)	(0.89093)	(0.07233)	0.06444	0.00523
0.04269	0.00000	(0.73332)	(0.05925)	0.04345	0.00351
(0.03296)	(0.00062)	(0.80897)	(0.05987)	0.04844	0.00358
0.02346	0.00276	(0.75255)	(0.05649)	0.04251	0.00319
0.00415	0.00008	(0.77186)	(0.05917)	0.04567	0.00350
(0.01472)	(0.00139)	(0.79073)	(0.06064)	0.04795	0.00368
0.10038	0.02342	(0.67563)	(0.03583)	0.02420	0.00128
(0.01368)	(0.00087)	(0.78969)	(0.06012)	0.04748	0.00361
0.00000	0.00000	(0.77601)	(0.05925)	0.04598	0.00351
18.62430	1.42197		SUM	1.17335	0.27343
0.77601	0.05925		AVERAGE	0.04889	0.01139

B 4.29116

Table 4.17

SAN MIGUEL CORP A

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
0.47360	0.00922	0.00598	(0.02850)	(0.00017)	0.00081
0.13370	0.01145	(0.33392)	(0.02627)	0.00877	0.00069
0.17921	0.01296	(0.28841)	(0.02476)	0.00714	0.00061
(0.08000)	(0.01132)	(0.54762)	(0.04904)	0.02685	0.00240
0.14648	0.00385	(0.32114)	(0.03387)	0.01088	0.00115
(0.00332)	(0.00030)	(0.47094)	(0.03802)	0.01791	0.00145
(0.04979)	(0.00314)	(0.51741)	(0.04086)	0.02114	0.00167
(0.42252)	(0.01893)	(0.89014)	(0.05665)	0.05043	0.00321
0.85760	0.04406	0.38998	0.00634	0.00247	0.00004
0.09694	0.02587	(0.37068)	(0.01185)	0.00439	0.00014
0.00484	0.00043	(0.46278)	(0.03729)	0.01726	0.00139
0.00000	0.00000	(0.46762)	(0.03772)	0.01764	0.00142
1.04197	0.21455	0.57435	0.17683	0.10156	0.03127
1.03267	0.13810	0.56505	0.10038	0.05672	0.01008
1.29403	0.09659	0.82641	0.05887	0.04865	0.00347
1.08061	0.07200	0.61299	0.03428	0.02101	0.00117
0.28850	0.00142	(0.17912)	(0.03630)	0.00650	0.00132
0.00000	0.00000	(0.46762)	(0.03772)	0.01764	0.00142
1.00636	0.06514	0.53874	0.02742	0.01477	0.00075
0.99639	0.08487	0.52877	0.04715	0.02493	0.00222
1.05145	0.04310	0.58383	0.00538	0.00314	0.00003
1.04486	0.04942	0.57724	0.01170	0.00676	0.00014
1.04936	0.06601	0.58174	0.02829	0.01646	0.00080
0.00000	0.00000	(0.46762)	(0.03772)	0.01764	0.00142
11.22294	0.90536		SUM	0.52050	0.06908
0.46762	0.03772		AVERAGE	0.02169	0.00288

B 7.53502

Table 4.18

AYALA LAND INC B

rj	rM	rj (Mean)	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
0.00186	0.00025	0.16090	(0.13534)	(0.00535)	0.00072	0.00003
0.00186	0.00025	0.16090	(0.13534)	(0.00535)	0.00072	0.00003
0.00186	0.00025	0.16090	(0.13534)	(0.00535)	0.00072	0.00003
0.00186	0.00025	0.16090	(0.13534)	(0.00535)	0.00072	0.00003
0.00186	0.00025	0.16090	(0.13534)	(0.00535)	0.00072	0.00003
0.00186	0.00025	0.16090	(0.13534)	(0.00535)	0.00072	0.00003
(0.13906)	(0.01891)	0.16090	(0.27626)	(0.02451)	0.00677	0.00060
2.00000	0.01977	0.16090	1.86280	0.01417	0.02639	0.00020
(0.03033)	(0.00036)	0.16090	(0.16753)	(0.00596)	0.00100	0.00004
0.07491	0.00056	0.16090	(0.06229)	(0.00504)	0.00031	0.00003
0.01413	0.00014	0.16090	(0.12307)	(0.00546)	0.00067	0.00003
0.00000	0.00000	0.16090	(0.13720)	(0.00560)	0.00077	0.00003
0.34611	0.06030	0.11349	0.20891	0.05470	0.01143	0.00299
(0.06272)	(0.00234)	0.16278	(0.19992)	(0.00794)	0.00159	0.00006
0.00000	0.00000	0.16278	(0.13720)	(0.00560)	0.00077	0.00003
0.00000	0.00000	0.16278	(0.13720)	(0.00560)	0.00077	0.00003
0.29135	0.03821	0.16278	0.15415	0.03261	0.00503	0.00106
(0.05457)	(0.01595)	0.16278	(0.19177)	(0.02155)	0.00413	0.00046
0.26149	0.01698	0.16278	0.12429	0.01138	0.00141	0.00013
0.18989	0.02304	0.16278	0.05269	0.01744	0.00092	0.00030
0.05630	0.00000	0.16278	(0.08090)	(0.00560)	0.00045	0.00003
0.20857	0.00728	0.16278	0.07137	0.00168	0.00012	0.00000
0.12552	0.00407	0.16278	(0.01168)	(0.00153)	0.00002	0.00000
0.00000	0.00000	0.16278	(0.13720)	(0.00560)	0.00077	0.00003
3.29273	0.13430		SUM		0.06767	0.00624
0.13720	0.00560		AVERAGE		0.00282	0.00026

B 10.84003

Table 4.19

FIRST LEPANTO CORP A

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	var rm
0.04306	0.00481	0.06825	0.00622	0.00042	0.00004
(0.11163)	(0.03072)	(0.08644)	(0.02931)	0.00253	0.00086
(0.07447)	(0.00395)	(0.04928)	(0.00254)	0.00013	0.00001
0.02339	0.00233	0.04858	0.00374	0.00018	0.00001
(0.01744)	(0.00040)	0.00775	0.00101	0.00001	0.00000
0.04217	0.00068	0.06736	0.00149	0.00010	0.00000
0.10588	0.00196	0.13107	0.00337	0.00044	0.00001
0.01081	0.00029	0.03600	0.00170	0.00006	0.00000
(0.01630)	(0.00112)	0.00889	0.00029	0.00000	0.00000
0.01685	0.00270	0.04204	0.00411	0.00017	0.00002
0.03933	0.00630	0.06452	0.00771	0.00050	0.00006
0.00000	0.00000	0.02519	0.00141	0.00004	0.00000
0.00000	0.00000	0.02519	0.00141	0.00004	0.00000
0.21547	0.00042	0.24066	0.00183	0.00044	0.00000
0.01382	0.00295	0.03901	0.00436	0.00017	0.00002
0.01382	0.00295	0.03901	0.00436	0.00017	0.00002
0.14747	0.03148	0.17266	0.03289	0.00568	0.00108
(0.98780)	(0.04706)	(0.96261)	(0.04565)	0.04394	0.00208
0.00000	0.00000	0.02519	0.00141	0.00004	0.00000
(0.03043)	(0.00267)	(0.00524)	(0.00126)	0.00001	0.00000
(0.06818)	(0.00440)	(0.04299)	(0.00299)	0.00013	0.00001
0.01485	0.00009	0.04004	0.00150	0.00006	0.00000
0.01485	0.00009	0.04004	0.00150	0.00006	0.00000
0.00000	0.00000	0.02519	0.00141	0.00004	0.00000
(0.60448)	(0.03386)		SUM	0.05535	0.00424
(0.02519)	(0.00141)		AVERAGE	0.00231	0.00018

B 13.04744

Table 4.20

KUOK PROPERTIES A

rj	rM	rj-rjbar	ra-rabar	Cov(rj,ra	var ra
0.43137	0.02285	0.49907	0.02415	0.01205	0.00058
0.14384	0.03836	0.21154	0.03966	0.00839	0.00157
(0.05389)	(0.00584)	0.01381	(0.00454)	(0.00006)	0.00002
(0.01266)	(0.00110)	0.05504	0.00020	0.00001	0.00000
(0.12179)	(0.00894)	(0.05409)	(0.00764)	0.00041	0.00006
(0.08759)	(0.00315)	(0.01989)	(0.00185)	0.00004	0.00000
(0.00800)	(0.00044)	0.05970	0.00086	0.00005	0.00000
(0.00806)	(0.00043)	0.05964	0.00087	0.00005	0.00000
0.06504	0.00425	0.13274	0.00555	0.00074	0.00003
0.03053	0.00233	0.09823	0.00363	0.00036	0.00001
(0.02963)	(0.00320)	0.03807	(0.00190)	(0.00007)	0.00000
0.00000	0.00000	0.06770	0.00130	0.00009	0.00000
0.00000	0.00000	0.06770	0.00130	0.00009	0.00000
0.00000	0.00000	0.06770	0.00130	0.00009	0.00000
0.00000	0.00000	0.06770	0.00130	0.00009	0.00000
0.00000	0.00000	0.06770	0.00130	0.00009	0.00000
0.10180	0.02334	0.16950	0.02464	0.00418	0.00061
(0.06522)	(0.01376)	0.00248	(0.01246)	(0.00003)	0.00016
(0.01163)	(0.00048)	0.05607	0.00082	0.00005	0.00000
(1.00000)	(0.04777)	(0.93230)	(0.04647)	0.04332	0.00216
0.00000	0.00000	0.06770	0.00130	0.00009	0.00000
(0.97971)	(0.03703)	(0.91201)	(0.03573)	0.03258	0.00128
(0.01923)	(0.00026)	0.04847	0.00104	0.00005	0.00000
0.00000	0.00000	0.06770	0.00130	0.00009	0.00000
(1.62483)	(0.03128)			0.10273	0.00650
(0.06770)	(0.00130)			0.00428	0.00027

B 15.80597

Table 4.21

PHIL ORION A

rj	rM	rj-rjbar	rm-rmbar	Cov(r),rm	var rm
0.43293	0.00330	0.38333	0.00007	0.00003	0.00000
0.24255	0.03287	0.19295	0.02964	0.00572	0.00088
0.26027	0.03281	0.21067	0.02958	0.00623	0.00088
(0.01087)	(0.00252)	(0.06047)	(0.00575)	0.00035	0.00003
(0.05495)	(0.00774)	(0.10455)	(0.01097)	0.00115	0.00012
(0.10465)	(0.00760)	(0.15425)	(0.01083)	0.00167	0.00012
(0.11688)	(0.00804)	(0.16648)	(0.01127)	0.00188	0.00013
(0.03676)	(0.00373)	(0.08636)	(0.00696)	0.00060	0.00005
(0.02290)	(0.00069)	(0.07250)	(0.00392)	0.00028	0.00002
0.03125	0.00066	(0.01835)	(0.00257)	0.00005	0.00001
0.09091	0.00245	0.04131	(0.00078)	(0.00003)	0.00000
0.00000	0.00000	(0.04960)	(0.00323)	0.00016	0.00001
0.03846	0.00365	(0.01114)	0.00042	(0.00000)	0.00000
(0.05556)	(0.00267)	(0.10516)	(0.00590)	0.00062	0.00003
0.05882	0.00110	0.00922	(0.00213)	(0.00002)	0.00000
0.10494	0.00668	0.05534	0.00345	0.00019	0.00001
0.16201	0.03641	0.11241	0.03318	0.00373	0.00110
0.01923	0.00700	(0.03037)	0.00377	(0.00011)	0.00001
(0.02830)	(0.00307)	(0.07790)	(0.00630)	0.00049	0.00004
(0.49029)	(0.01776)	(0.53989)	(0.02099)	0.01133	0.00044
0.80000	0.00599	0.75040	0.00276	0.00207	0.00001
(0.02646)	(0.00058)	(0.07606)	(0.00381)	0.00029	0.00001
(0.10326)	(0.00095)	(0.15286)	(0.00418)	0.00064	0.00002
0.00000	0.00000	(0.04960)	(0.00323)	0.00016	0.00001
1.19050	0.07758		SUM	0.03746	0.00393
0.04960	0.00323		AVERAGE	0.00156	0.00016

B 9.53479

Table 4.22

ROBINSON'S LAND B

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
0.31164	0.02399	0.19577	0.02671	0.00523	0.00071
0.06767	0.01096	(0.04820)	0.01368	(0.00066)	0.00019
(0.11268)	(0.02138)	(0.22855)	(0.01866)	0.00426	0.00035
(0.11111)	(0.01068)	(0.22698)	(0.00796)	0.00181	0.00006
(0.08214)	(0.00729)	(0.19801)	(0.00457)	0.00090	0.00002
(0.09339)	(0.00354)	(0.20926)	(0.00082)	0.00017	0.00000
(0.04721)	(0.00020)	(0.16308)	0.00252	(0.00041)	0.00001
(0.18018)	(0.00921)	(0.29605)	(0.00649)	0.00192	0.00004
0.09341	0.00085	(0.02246)	0.00357	(0.00008)	0.00001
0.08040	0.00309	(0.03547)	0.00581	(0.00021)	0.00003
(0.02791)	(0.00613)	(0.14378)	(0.00341)	0.00049	0.00001
0.00000	0.00000	(0.11587)	0.00272	(0.00032)	0.00001
0.17159	0.03323	0.05572	0.03595	0.00200	0.00129
(0.11024)	(0.01678)	(0.22611)	(0.01406)	0.00318	0.00020
0.13274	0.00373	0.01687	0.00645	0.00011	0.00004
0.07031	0.00428	(0.04556)	0.00700	(0.00032)	0.00005
0.10949	0.01168	(0.00638)	0.01440	(0.00009)	0.00021
(0.09868)	(0.02113)	(0.21455)	(0.01841)	0.00395	0.00034
0.08029	0.00420	(0.03558)	0.00692	(0.00025)	0.00005
(0.77027)	(0.06053)	(0.88614)	(0.05781)	0.05123	0.00334
3.44118	0.00196	3.32531	0.00468	0.01557	0.00002
(0.05960)	(0.00382)	(0.17547)	(0.00110)	0.00019	0.00000
(0.08451)	(0.00262)	(0.20038)	0.00010	(0.00002)	0.00000
0.00000	0.00000	(0.11587)	0.00272	(0.00032)	0.00001
2.78080	(0.06533)		SUM	0.08835	0.00699
0.11587	(0.00272)		AVERAGE	0.00368	0.00029

B 12.63119

Table 4.23

PHIL REALTY A

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
0.15455	0.00042	0.12741	(0.00225)	(0.00029)	0.00001
0.16535	0.00126	0.13821	(0.00141)	(0.00020)	0.00000
(0.12162)	(0.00123)	(0.14876)	(0.00390)	0.00058	0.00002
(0.01538)	(0.00003)	(0.04252)	(0.00270)	0.00011	0.00001
(0.03906)	(0.00018)	(0.06620)	(0.00285)	0.00019	0.00001
(0.14634)	(0.09864)	(0.17348)	(0.10131)	0.01758	0.01026
(0.10000)	(0.00005)	(0.12714)	(0.00272)	0.00035	0.00001
(0.08995)	(0.00001)	(0.11709)	(0.00268)	0.00031	0.00001
0.05814	0.00002	0.03100	(0.00265)	(0.00008)	0.00001
(0.09890)	(0.02935)	(0.12604)	(0.03202)	0.00404	0.00103
(0.03049)	(0.00003)	(0.05763)	(0.00270)	0.00016	0.00001
0.00000	0.00000	(0.02714)	(0.00267)	0.00007	0.00001
(0.10326)	(0.00139)	(0.13040)	(0.00406)	0.00053	0.00002
(0.09091)	(0.00118)	(0.11805)	(0.00385)	0.00045	0.00001
(0.09333)	(0.00045)	(0.12047)	(0.00312)	0.00038	0.00001
0.16176	0.00099	0.13462	(0.00168)	(0.00023)	0.00000
0.29747	0.00201	0.27033	(0.00066)	(0.00018)	0.00000
0.00000	0.00000	(0.02714)	(0.00267)	0.00007	0.00001
0.00488	0.00031	(0.02226)	(0.00236)	0.00005	0.00001
1.42718	0.22781	1.40004	0.22514	0.31520	0.05069
(0.62400)	(0.03953)	(0.65114)	(0.04220)	0.02748	0.00178
(0.10638)	(0.00100)	(0.13352)	(0.00367)	0.00049	0.00001
0.04167	0.00424	0.01453	0.00157	0.00002	0.00000
0.00000	0.00000	(0.02714)	(0.00267)	0.00007	0.00001
0.65137	0.06398		SUM	0.36717	0.06391
0.02714	0.00267		AVERAGE	0.01530	0.00266

B 5.74495

Table 4.24

MERALCO A

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
(0.01634)	(0.01064)	(0.03170)	(0.01093)	0.00035	0.00012
(0.00997)	(0.00021)	(0.02533)	(0.00050)	0.00001	0.00000
0.10738	0.00228	0.09202	0.00199	0.00018	0.00000
(0.32467)	(0.00984)	(0.34003)	(0.01013)	0.00345	0.00010
0.47178	0.02448	0.45642	0.02419	0.01104	0.00059
(0.03963)	(0.00231)	(0.05499)	(0.00260)	0.00014	0.00001
0.03175	0.00076	0.01639	0.00047	0.00001	0.00000
(0.00308)	(0.00015)	(0.01844)	(0.00044)	0.00001	0.00000
0.06790	0.00200	0.05254	0.00171	0.00009	0.00000
(0.05202)	(0.00183)	(0.06738)	(0.00212)	0.00014	0.00000
(0.04878)	(0.00100)	(0.06414)	(0.00129)	0.00008	0.00000
0.00000	0.00000	(0.01536)	(0.00029)	0.00000	0.00000
(0.01634)	(0.01064)	(0.03170)	(0.01093)	0.00035	0.00012
(0.00997)	(0.00021)	(0.02533)	(0.00050)	0.00001	0.00000
0.10738	0.00228	0.09202	0.00199	0.00018	0.00000
(0.32467)	(0.00984)	(0.34003)	(0.01013)	0.00345	0.00010
0.47178	0.02448	0.45642	0.02419	0.01104	0.00059
(0.03963)	(0.00231)	(0.05499)	(0.00260)	0.00014	0.00001
0.03175	0.00076	0.01639	0.00047	0.00001	0.00000
(0.00308)	(0.00015)	(0.01844)	(0.00044)	0.00001	0.00000
0.06790	0.00200	0.05254	0.00171	0.00009	0.00000
(0.05202)	(0.00183)	(0.06738)	(0.00212)	0.00014	0.00000
(0.04878)	(0.00100)	(0.06414)	(0.00129)	0.00008	0.00000
0.00000	0.00000	(0.01536)	(0.00029)	0.00000	0.00000
0.36864	0.00708		SUM	0.03101	0.00166
0.01536	0.00029		AVERAGE	0.00129	0.00007

B 18.73404

Table 4.25

BACNOTAN CONS

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
0.23582	0.00063	(0.10628)	(0.02152)	0.00229	0.00046
0.34159	0.00117	(0.00051)	(0.02098)	0.00001	0.00044
0.34370	0.01131	0.00160	(0.01084)	(0.00002)	0.00012
0.34250	0.00511	0.00040	(0.01704)	(0.00001)	0.00029
0.43017	0.00161	0.08807	(0.02054)	(0.00181)	0.00042
(0.02882)	(0.00748)	(0.37092)	(0.02963)	0.01099	0.00088
0.10953	0.04387	(0.23257)	0.02172	(0.00505)	0.00047
0.17337	0.00763	(0.16873)	(0.01452)	0.00245	0.00021
0.22274	0.01594	(0.11936)	(0.00621)	0.00074	0.00004
(0.00288)	(0.00023)	(0.34498)	(0.02238)	0.00772	0.00050
0.17518	0.01286	(0.16692)	(0.00929)	0.00155	0.00009
0.00000	0.00000	(0.34210)	(0.02215)	0.00758	0.00049
0.63576	0.02654	0.29366	0.00439	0.00129	0.00002
0.58599	0.00899	0.24389	(0.01316)	(0.00321)	0.00017
0.57233	0.00425	0.23023	(0.01790)	(0.00412)	0.00032
0.65625	0.00025	0.31415	(0.02190)	(0.00688)	0.00048
0.51429	0.00838	0.17219	(0.01377)	(0.00237)	0.00019
0.57143	0.00932	0.22933	(0.01283)	(0.00294)	0.00016
0.54054	0.12689	0.19844	0.10474	0.02079	0.01097
0.50256	0.01248	0.16046	(0.00967)	(0.00155)	0.00009
0.37931	0.00638	0.03721	(0.01577)	(0.00059)	0.00025
0.39474	0.21444	0.05264	0.19229	0.01012	0.03697
0.51429	0.02131	0.17219	(0.00084)	(0.00015)	0.00000
0.00000	0.00000	(0.34210)	(0.02215)	0.00758	0.00049
8.21037	0.53165		SUM	0.04441	0.05454
0.34210	0.02215		AVERAGE	0.00185	0.00227
			B	0.81432	

Table 4.26

SANIWARES MGF CORP

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
0.19107	0.39529	0.20695	0.39107	0.08093	0.15294
0.02083	0.03140	0.03671	0.02718	0.00100	0.00074
(0.05102)	(0.06913)	(0.03514)	(0.07335)	0.00258	0.00538
0.04301	0.03234	0.05889	0.02812	0.00166	0.00079
(0.09278)	(0.09130)	(0.07690)	(0.09552)	0.00735	0.00912
(0.09091)	(0.07834)	(0.07503)	(0.08256)	0.00619	0.00682
(0.08000)	(0.06966)	(0.06412)	(0.07388)	0.00474	0.00546
(0.10326)	(0.02286)	(0.08738)	(0.02708)	0.00237	0.00073
(0.01818)	(0.02216)	(0.00230)	(0.02638)	0.00006	0.00070
0.00617	0.00039	0.02205	(0.00383)	(0.00008)	0.00001
(0.04908)	(0.00865)	(0.03320)	(0.01287)	0.00043	0.00017
0.00000	0.00000	0.01588	(0.00422)	(0.00007)	0.00002
(0.00667)	(0.00022)	0.00921	(0.00444)	(0.00004)	0.00002
(0.04027)	(0.00405)	(0.02439)	(0.00827)	0.00020	0.00007
(0.03497)	(0.00078)	(0.01909)	(0.00500)	0.00010	0.00002
0.07971	0.02190	0.09559	0.01768	0.00169	0.00031
(0.03356)	(0.00102)	(0.01768)	(0.00524)	0.00009	0.00003
0.00000	0.00000	0.01588	(0.00422)	(0.00007)	0.00002
(0.06944)	(0.00432)	(0.05356)	(0.00854)	0.00046	0.00007
0.00000	0.00000	0.01588	(0.00422)	(0.00007)	0.00002
0.02239	0.00323	0.03827	(0.00099)	(0.00004)	0.00000
(0.02190)	(0.00216)	(0.00602)	(0.00638)	0.00004	0.00004
(0.05224)	(0.00860)	(0.03636)	(0.01282)	0.00047	0.00016
0.00000	0.00000	0.01588	(0.00422)	(0.00007)	0.00002
(0.38109)	0.10133		SUM	0.10990	0.18366
(0.01588)	0.00422		AVERAGE	0.00458	0.00765

B 0.59842

Table 4.27

INTERPHIL LAB A

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
(0.02542)	(0.00897)	(0.01772)	(0.00764)	0.00014	0.00006
(0.12000)	(0.02454)	(0.11230)	(0.02321)	0.00261	0.00054
(0.05138)	(0.00377)	(0.04368)	(0.00244)	0.00011	0.00001
(0.02917)	(0.00088)	(0.02147)	0.00045	(0.00001)	0.00000
(0.07725)	(0.00290)	(0.06955)	(0.00157)	0.00011	0.00000
0.01860	0.00139	0.02630	0.00272	0.00007	0.00001
(0.06393)	(0.00221)	(0.05623)	(0.00088)	0.00005	0.00000
0.00000	0.00000	0.00770	0.00133	0.00001	0.00000
0.00000	0.00000	0.00770	0.00133	0.00001	0.00000
0.00000	0.00000	0.00770	0.00133	0.00001	0.00000
0.00000	0.00000	0.00770	0.00133	0.00001	0.00000
0.00000	0.00000	0.00770	0.00133	0.00001	0.00000
(0.01456)	(0.00172)	(0.00686)	(0.00039)	0.00000	0.00000
(0.05419)	(0.00529)	(0.04649)	(0.00396)	0.00018	0.00002
(0.01042)	(0.00048)	(0.00272)	0.00085	(0.00000)	0.00000
0.15789	0.00047	0.16559	0.00180	0.00030	0.00000
(0.04545)	(0.00189)	(0.03775)	(0.00056)	0.00002	0.00000
(0.09524)	(0.00414)	(0.08754)	(0.00281)	0.00025	0.00001
0.11053	0.01242	0.11823	0.01375	0.00163	0.00019
0.07583	0.00711	0.08353	0.00844	0.00070	0.00007
0.01322	0.00163	0.02092	0.00296	0.00006	0.00001
0.03043	0.00278	0.03813	0.00411	0.00016	0.00002
(0.00422)	(0.00091)	0.00348	0.00042	0.00000	0.00000
0.00000	0.00000	0.00770	0.00133	0.00001	0.00000
(0.18473)	(0.03188)		SUM	0.00643	0.00094
(0.00770)	(0.00133)		AVERAGE	0.00027	0.00004

B 6.85172

Table 4.28

ENGINEERING EQUIPMENT

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
0.22222	0.00060	0.17483	(0.01414)	(0.00247)	0.00020
0.00000	0.00000	(0.04739)	(0.01474)	0.00070	0.00022
0.72727	0.32109	0.67988	0.30635	0.20828	0.09385
(0.07895)	(0.00527)	(0.12634)	(0.02001)	0.00253	0.00040
(0.17857)	(0.01594)	(0.22596)	(0.03068)	0.00693	0.00094
(0.06087)	(0.00210)	(0.10826)	(0.01684)	0.00182	0.00028
(0.10185)	(0.00228)	(0.14924)	(0.01702)	0.00254	0.00029
(0.03093)	(0.00044)	(0.07832)	(0.01518)	0.00119	0.00023
0.12766	0.00270	0.08027	(0.01204)	(0.00097)	0.00014
(0.09434)	(0.00659)	(0.14173)	(0.02133)	0.00302	0.00046
(0.15625)	(0.01245)	(0.20364)	(0.02719)	0.00554	0.00074
0.00000	0.00000	(0.04739)	(0.01474)	0.00070	0.00022
0.15957	0.02567	0.11218	0.01093	0.00123	0.00012
(0.05505)	(0.00081)	(0.10244)	(0.01555)	0.00159	0.00024
0.27184	0.00158	0.22445	(0.01316)	(0.00295)	0.00017
0.18321	0.02461	0.13582	0.00987	0.00134	0.00010
0.32903	0.01419	0.28164	(0.00055)	(0.00015)	0.00000
0.15534	0.01795	0.10795	0.00321	0.00035	0.00001
0.07563	0.01275	0.02824	(0.00199)	(0.00006)	0.00000
0.01563	0.00211	(0.03176)	(0.01263)	0.00040	0.00016
(0.06923)	(0.00507)	(0.11662)	(0.01981)	0.00231	0.00039
(0.16529)	(0.01208)	(0.21268)	(0.02682)	0.00570	0.00072
(0.13861)	(0.00656)	(0.18600)	(0.02130)	0.00396	0.00045
0.00000	0.00000	(0.04739)	(0.01474)	0.00070	0.00022
1.13747	0.35368		SUM	0.24423	0.10055
0.04739	0.01474		AVERAGE	0.01018	0.00419
			B	2.42882	

Table 4.29

SIME DARBY PHILIPPINES

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
(0.03750)	(0.02647)	(0.05176)	(0.02652)	0.00137	0.00070
0.02667	0.00190	0.01241	0.00185	0.00002	0.00000
0.05333	0.00012	0.03907	0.00007	0.00000	0.00000
(0.06494)	(0.00001)	(0.07920)	(0.00006)	0.00000	0.00000
0.02857	0.00000	0.01431	(0.00005)	(0.00000)	0.00000
0.02857	0.00000	0.01431	(0.00005)	(0.00000)	0.00000
0.02857	0.00010	0.01431	0.00005	0.00000	0.00000
0.00000	0.00000	(0.01426)	(0.00005)	0.00000	0.00000
0.15888	0.00333	0.14462	0.00328	0.00047	0.00001
(0.04167)	(0.00430)	(0.05593)	(0.00435)	0.00024	0.00002
0.00901	0.00029	(0.00525)	0.00024	(0.00000)	0.00000
0.00000	0.00000	(0.01426)	(0.00005)	0.00000	0.00000
0.03333	0.00044	0.01907	0.00039	0.00001	0.00000
0.00000	0.00000	(0.01426)	(0.00005)	0.00000	0.00000
0.03200	0.00101	0.01774	0.00096	0.00002	0.00000
0.00000	0.00000	(0.01426)	(0.00005)	0.00000	0.00000
(0.08571)	(0.00711)	(0.09997)	(0.00716)	0.00072	0.00005
0.13710	0.00139	0.12284	0.00134	0.00016	0.00000
(0.06569)	(0.00161)	(0.07995)	(0.00166)	0.00013	0.00000
0.03226	0.00128	0.01800	0.00123	0.00002	0.00000
0.00000	0.00000	(0.01426)	(0.00005)	0.00000	0.00000
0.02586	0.00505	0.01160	0.00500	0.00006	0.00002
0.04348	0.02586	0.02922	0.02581	0.00075	0.00067
0.00000	0.00000	(0.01426)	(0.00005)	0.00000	0.00000
0.34212	0.00126		SUM	0.00399	0.00149
0.01426	0.00005		AVERAGE	0.00017	0.00006

B 2.68816

Table 4.30

KEPPEL PHILS A

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
0.06402	0.00860	0.01210	0.00778	0.00009	0.00006
0.03963	0.00533	(0.01229)	0.00451	(0.00006)	0.00002
0.09063	0.00023	0.03871	(0.00059)	(0.00002)	0.00000
0.07622	0.00030	0.02430	(0.00052)	(0.00001)	0.00000
0.03916	0.00003	(0.01276)	(0.00079)	0.00001	0.00000
0.07716	0.00193	0.02524	0.00111	0.00003	0.00000
0.06402	0.00021	0.01210	(0.00061)	(0.00001)	0.00000
0.06402	0.00056	0.01210	(0.00026)	(0.00000)	0.00000
0.06402	0.00056	0.01210	(0.00026)	(0.00000)	0.00000
0.00305	0.00002	(0.04887)	(0.00080)	0.00004	0.00000
0.06818	0.00183	0.01626	0.00101	0.00002	0.00000
0.00000	0.00000	(0.05192)	(0.00082)	0.00004	0.00000
0.12197	0.00000	0.07005	(0.00082)	(0.00006)	0.00000
0.04590	0.00000	(0.00602)	(0.00082)	0.00000	0.00000
0.04590	0.00000	(0.00602)	(0.00082)	0.00000	0.00000
0.04025	0.00000	(0.01167)	(0.00082)	0.00001	0.00000
(0.02202)	0.00000	(0.07394)	(0.00082)	0.00006	0.00000
0.04954	0.00000	(0.00238)	(0.00082)	0.00000	0.00000
0.25686	0.00000	0.20494	(0.00082)	(0.00017)	0.00000
0.04104	0.00000	(0.01088)	(0.00082)	0.00001	0.00000
0.04104	0.00000	(0.01088)	(0.00082)	0.00001	0.00000
(0.13573)	0.00000	(0.18765)	(0.00082)	0.00015	0.00000
0.11120	0.00000	0.05928	(0.00082)	(0.00005)	0.00000
0.00000	0.00000	(0.05192)	(0.00082)	0.00004	0.00000
1.24608	0.01960		SUM	0.00015	0.00009
0.05192	0.00082		AVERAGE	0.00001	0.00000

B 1.57244

Table 4.31

METRO DRUG INC A

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	var rm
0.11892	0.00039	0.08465	(0.00307)	(0.00026)	0.00001
0.24500	0.00650	0.21073	0.00304	0.00064	0.00001
(0.06198)	(0.00428)	(0.09625)	(0.00774)	0.00074	0.00006
(0.05000)	(0.01956)	(0.08427)	(0.02302)	0.00194	0.00053
(0.12376)	(0.02146)	(0.15803)	(0.02492)	0.00394	0.00062
0.00588	0.00002	(0.02839)	(0.00344)	0.00010	0.00001
(0.00610)	(0.00011)	(0.04037)	(0.00357)	0.00014	0.00001
0.01923	0.00002	(0.01504)	(0.00344)	0.00005	0.00001
0.02632	0.00609	(0.00795)	0.00263	(0.00002)	0.00001
0.02013	0.00044	(0.01414)	(0.00302)	0.00004	0.00001
0.01379	0.00082	(0.02048)	(0.00264)	0.00005	0.00001
0.00000	0.00000	(0.03427)	(0.00346)	0.00012	0.00001
0.00000	0.00000	(0.03427)	(0.00346)	0.00012	0.00001
0.00000	0.00000	(0.03427)	(0.00346)	0.00012	0.00001
(0.02609)	(0.00182)	(0.06036)	(0.00528)	0.00032	0.00003
0.20536	0.00557	0.17109	0.00211	0.00036	0.00000
0.04444	0.00134	0.01017	(0.00212)	(0.00002)	0.00000
(0.10638)	(0.00048)	(0.14065)	(0.00394)	0.00055	0.00002
(0.03175)	(0.00172)	(0.06602)	(0.00518)	0.00034	0.00003
0.03279	0.00012	(0.00148)	(0.00334)	0.00000	0.00001
0.24603	0.01923	0.21176	0.01577	0.00334	0.00025
0.19745	0.07692	0.16318	0.07346	0.01199	0.00540
0.05319	0.01505	0.01892	0.01159	0.00022	0.00013
0.00000	0.00000	(0.03427)	(0.00346)	0.00012	0.00001
0.82248	0.08308		SUM	0.02495	0.00721
0.03427	0.00346		AVERAGE	0.00104	0.00030

B 3.46247

TABLE 4.3 TO 4.45

PORTFOLIO SELECTION AND CAPM

II. MINING SHARE

Table 4.32

APEX MINING A

rM	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
0.04167	0.00759	0.00192	0.01203	0.00002	0.00014
0.16000	0.02694	0.12025	0.03138	0.00377	0.00098
(0.06897)	(0.01686)	(0.10872)	(0.01242)	0.00135	0.00015
(0.03704)	(0.01202)	(0.07679)	(0.00758)	0.00058	0.00006
(0.23077)	(0.00309)	(0.27052)	0.00135	(0.00037)	0.00000
(0.16000)	(0.00067)	(0.19975)	0.00377	(0.00075)	0.00001
0.11905	0.00072	0.07930	0.00516	0.00041	0.00003
0.00000	0.00000	(0.03975)	0.00444	(0.00018)	0.00002
0.06383	0.00101	0.02408	0.00545	0.00013	0.00003
0.00000	0.00000	(0.03975)	0.00444	(0.00018)	0.00002
(0.20000)	(0.00083)	(0.23975)	0.00361	(0.00086)	0.00001
0.00000	0.00000	(0.03975)	0.00444	(0.00018)	0.00002
0.09524	0.00011	0.05549	0.00455	0.00025	0.00002
0.00000	0.00000	(0.03975)	0.00444	(0.00018)	0.00002
0.00000	0.00000	(0.03975)	0.00444	(0.00018)	0.00002
0.00000	0.00000	(0.03975)	0.00444	(0.00018)	0.00002
0.46739	0.00011	0.42764	0.00455	0.00194	0.00002
0.03704	0.00029	(0.00271)	0.00473	(0.00001)	0.00002
(0.28571)	(0.00672)	(0.32546)	(0.00228)	0.00074	0.00001
1.10000	0.00145	1.06025	0.00589	0.00625	0.00003
0.16667	0.03963	0.12692	0.04407	0.00559	0.00194
(0.28571)	(0.13793)	(0.32546)	(0.13349)	0.04345	0.01782
(0.02857)	(0.00619)	(0.06832)	(0.00175)	0.00012	0.00000
0.00000	0.00000	(0.03975)	0.00444	(0.00018)	0.00002
0.95411	(0.10648)		SUM	0.06138	0.02143
0.03975	(0.00444)		AVERAGE	0.00256	0.00089

B 2.86386

Table 4.33

ATLAS CONS A

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
0.03774	0.00446	0.06080	0.00637	0.00039	0.00004
0.09697	0.02948	0.12003	0.03139	0.00377	0.00099
(0.08287)	(0.01655)	(0.05981)	(0.01464)	0.00088	0.00021
(0.09036)	(0.00877)	(0.06730)	(0.00686)	0.00046	0.00005
(0.16556)	(0.01055)	(0.14250)	(0.00864)	0.00123	0.00007
0.03968	0.00272	0.06274	0.00463	0.00029	0.00002
(0.08397)	(0.00300)	(0.06091)	(0.00109)	0.00007	0.00000
(0.01667)	(0.00061)	0.00639	0.00130	0.00001	0.00000
(0.02542)	(0.00025)	(0.00236)	0.00166	(0.00000)	0.00000
(0.11304)	(0.00163)	(0.08998)	0.00028	(0.00003)	0.00000
(0.03922)	(0.00087)	(0.01616)	0.00104	(0.00002)	0.00000
0.00000	0.00000	0.02306	0.00191	0.00004	0.00000
0.10784	0.00476	0.13090	0.00667	0.00087	0.00004
(0.04425)	(0.00145)	(0.02119)	0.00046	(0.00001)	0.00000
(0.05556)	(0.00059)	(0.03250)	0.00132	(0.00004)	0.00000
0.04902	0.00036	0.07208	0.00227	0.00016	0.00001
0.09346	0.00233	0.11652	0.00424	0.00049	0.00002
0.00000	0.00000	0.02306	0.00191	0.00004	0.00000
(0.11111)	(0.00419)	(0.08805)	(0.00228)	0.00020	0.00001
(0.05769)	(0.03942)	(0.03463)	(0.03751)	0.00130	0.00141
0.02041	0.00009	0.04347	0.00200	0.00009	0.00000
(0.04000)	(0.00040)	(0.01694)	0.00151	(0.00003)	0.00000
(0.07292)	(0.00183)	(0.04986)	0.00008	(0.00000)	0.00000
0.00000	0.00000	0.02306	0.00191	0.00004	0.00000
(0.55352)	(0.04590)		SUM	0.01021	0.00289
(0.02306)	(0.00191)		AVERAGE	0.00043	0.00012

B 3.53392

Table 4.34

LEPANTO CONS A

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	var rm
0.13846	0.01392	0.20481	0.01771	0.00363	0.00031
0.02703	0.00854	0.09338	0.01233	0.00115	0.00015
(0.09211)	(0.02166)	(0.02576)	(0.01787)	0.00046	0.00032
(0.14493)	(0.01559)	(0.07858)	(0.01180)	0.00093	0.00014
(0.11864)	(0.00699)	(0.05229)	(0.00320)	0.00017	0.00001
(0.01923)	(0.00118)	0.04712	0.00261	0.00012	0.00001
0.00000	0.00000	0.06635	0.00379	0.00025	0.00001
0.01961	0.00040	0.08596	0.00419	0.00036	0.00002
0.00000	0.00000	0.06635	0.00379	0.00025	0.00001
(0.03846)	(0.00106)	0.02789	0.00273	0.00008	0.00001
(0.17000)	(0.00206)	(0.10365)	0.00173	(0.00018)	0.00000
0.00000	0.00000	0.06635	0.00379	0.00025	0.00001
0.09756	0.00856	0.16391	0.01235	0.00202	0.00015
(0.20000)	(0.01383)	(0.13365)	(0.01004)	0.00134	0.00010
0.02778	0.00035	0.09413	0.00414	0.00039	0.00002
0.02703	0.00051	0.09338	0.00430	0.00040	0.00002
0.06579	0.00056	0.13214	0.00435	0.00058	0.00002
0.07407	0.02461	0.14042	0.02840	0.00399	0.00081
(0.24138)	(0.04155)	(0.17503)	(0.03776)	0.00661	0.00143
(1.00000)	(0.03806)	(0.93365)	(0.03427)	0.03200	0.00117
0.00000	0.00000	0.06635	0.00379	0.00025	0.00001
(0.07937)	(0.00822)	(0.01302)	(0.00443)	0.00006	0.00002
0.03448	0.00182	0.10083	0.00561	0.00057	0.00003
0.00000	0.00000	0.06635	0.00379	0.00025	0.00001
(1.59231)	(0.09092)		SUM	0.05592	0.00481
(0.06635)	(0.00379)		AVERAGE	0.00233	0.00020

B 11.63259

Table 4.35

PHILEX MINING A

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	var rm
0.64563	0.02137	0.13721	(0.02307)	(0.00317)	0.00053
0.50816	0.04862	(0.00026)	0.00418	(0.00000)	0.00002
0.27363	0.02749	(0.23479)	(0.01695)	0.00398	0.00029
0.39027	0.05443	(0.11815)	0.00999	(0.00118)	0.00010
0.09267	0.01111	(0.41575)	(0.03333)	0.01386	0.00111
0.56183	0.03372	0.05341	(0.01072)	(0.00057)	0.00011
0.72926	0.05084	0.22084	0.00640	0.00141	0.00004
0.96633	0.20902	0.45791	0.16458	0.07536	0.02709
0.96633	0.02967	0.45791	(0.01477)	(0.00677)	0.00022
0.94214	0.03711	0.43372	(0.00733)	(0.00318)	0.00005
0.95723	0.06948	0.44881	0.02504	0.01124	0.00063
0.00000	0.00000	(0.50842)	(0.04444)	0.02259	0.00197
0.91971	0.08039	0.41129	0.03595	0.01479	0.00129
0.44172	0.03158	(0.06670)	(0.01286)	0.00086	0.00017
0.89630	0.02269	0.38788	(0.02175)	(0.00844)	0.00047
0.64103	0.03684	0.13261	(0.00760)	(0.00101)	0.00006
0.94872	0.09833	0.44030	0.05389	0.02373	0.00290
0.59804	0.09969	0.08962	0.05525	0.00495	0.00305
0.37168	0.07797	(0.13674)	0.03353	(0.00458)	0.00112
(0.52381)	(0.03756)	(1.03223)	(0.08200)	0.08464	0.00672
0.00000	0.00000	(0.50842)	(0.04444)	0.02259	0.00197
0.42079	0.04557	(0.08763)	0.00113	(0.00010)	0.00000
0.45455	0.01811	(0.05387)	(0.02633)	0.00142	0.00069
0.00000	0.00000	(0.50842)	(0.04444)	0.02259	0.00197
12.20218	1.06646		SUM	0.27502	0.05260
0.50842	0.04444		AVERAGE	0.01146	0.00219

B 5.22841

Table 4.36

UNICO

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
0.13043	0.00455	0.00497	0.00033	0.00000	0.00000
0.30769	0.00691	0.18223	0.00269	0.00049	0.00001
0.02941	0.00844	(0.09605)	0.00422	(0.00041)	0.00002
(0.17143)	(0.01491)	(0.29689)	(0.01913)	0.00568	0.00037
(0.27586)	(0.00234)	(0.40132)	(0.00656)	0.00263	0.00004
0.00000	0.00000	(0.12546)	(0.00422)	0.00053	0.00002
0.04762	0.00102	(0.07784)	(0.00320)	0.00025	0.00001
(0.04545)	(0.00003)	(0.17091)	(0.00425)	0.00073	0.00002
0.33333	0.00437	0.20787	0.00015	0.00003	0.00000
0.66071	0.02757	0.53525	0.02335	0.01250	0.00055
(0.11828)	(0.05359)	(0.24374)	(0.05781)	0.01409	0.00334
0.00000	0.00000	(0.12546)	(0.00422)	0.00053	0.00002
0.08333	0.00001	(0.04213)	(0.00421)	0.00018	0.00002
(0.23077)	(0.00075)	(0.35623)	(0.00497)	0.00177	0.00002
0.00000	0.00000	(0.12546)	(0.00422)	0.00053	0.00002
0.00000	0.00000	(0.12546)	(0.00422)	0.00053	0.00002
1.33333	0.00062	1.20787	(0.00360)	(0.00435)	0.00001
0.85714	0.08213	0.73168	0.07791	0.05701	0.00607
0.11538	0.08210	(0.01008)	0.07788	(0.00078)	0.00607
0.00000	0.00000	(0.12546)	(0.00422)	0.00053	0.00002
0.10345	0.05170	(0.02201)	0.04748	(0.00105)	0.00225
(0.18750)	(0.09935)	(0.31296)	(0.10357)	0.03241	0.01073
0.03846	0.00285	(0.08700)	(0.00137)	0.00012	0.00000
0.00000	0.00000	(0.12546)	(0.00422)	0.00053	0.00002
3.01102	0.10128		SUM	0.12448	0.02963
0.12546	0.00422		AVERAGE	0.00519	0.00123

B 4.20074

TABLE 4.3 TO 4.45

PORTFOLIO SELECTION AND CAPM

III. OIL SHARE

Table 4.37

BASIC PETROLEUM A

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
0.12000	0.00667	(0.43838)	(0.03612)	0.01583	0.00130
0.07143	0.00428	(0.48695)	(0.03851)	0.01875	0.00148
0.13333	0.01776	(0.42505)	(0.02503)	0.01064	0.00063
0.00000	0.00000	(0.55838)	(0.04279)	0.02389	0.00183
(0.17647)	(0.02159)	(0.73485)	(0.06438)	0.04731	0.00414
(0.07143)	(0.00197)	(0.62981)	(0.04476)	0.02819	0.00200
0.00000	0.00000	(0.55838)	(0.04279)	0.02389	0.00183
0.15385	0.00393	(0.40453)	(0.03886)	0.01572	0.00151
0.13333	0.01107	(0.42505)	(0.03172)	0.01348	0.00101
0.14706	0.01220	(0.41132)	(0.03059)	0.01258	0.00094
0.05128	0.00889	(0.50710)	(0.03390)	0.01719	0.00115
0.00000	0.00000	(0.55838)	(0.04279)	0.02389	0.00183
0.52275	0.01376	(0.03563)	(0.02903)	0.00103	0.00084
0.30239	0.01588	(0.25599)	(0.02691)	0.00689	0.00072
5.37578	0.03991	4.81740	(0.00288)	(0.01387)	0.00001
(0.72460)	(0.04577)	(1.28298)	(0.08856)	0.11363	0.00784
0.44850	0.04158	(0.10988)	(0.00121)	0.00013	0.00000
0.17931	0.02620	(0.37907)	(0.01659)	0.00629	0.00028
0.34157	0.01964	(0.21681)	(0.02315)	0.00502	0.00054
0.31532	0.02550	(0.24306)	(0.01729)	0.00420	0.00030
(0.03472)	(0.00295)	(0.59310)	(0.04574)	0.02713	0.00209
6.90014	0.94881	6.34176	0.90602	5.74578	0.82088
(0.78771)	(0.09690)	(1.34609)	(0.13969)	0.18804	0.01951
0.00000	0.00000	(0.55838)	(0.04279)	0.02389	0.00183
13.40111	1.02689		SUM	6.35955	0.87450
0.55838	0.04279		AVERAGE	0.26498	0.03644

B 7.27219

Table 4.38

INTERPORT RES A

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	var rm
0.23077	0.00829	0.20710	0.01181	0.00245	0.00014
0.21875	0.02241	0.19508	0.02593	0.00506	0.00067
(0.02564)	(0.00223)	(0.04931)	0.00129	(0.00006)	0.00000
(0.02632)	(0.00088)	(0.04999)	0.00264	(0.00013)	0.00001
(0.10811)	(0.00165)	(0.13178)	0.00187	(0.00025)	0.00000
0.03030	0.00036	0.00663	0.00388	0.00003	0.00002
0.38235	0.00660	0.35868	0.01012	0.00363	0.00010
0.25532	0.03422	0.23165	0.03774	0.00874	0.00142
0.22034	0.03525	0.19667	0.03877	0.00763	0.00150
0.13889	0.01909	0.11522	0.02261	0.00261	0.00051
(0.26829)	(0.05159)	(0.29196)	(0.04807)	0.01403	0.00231
0.00000	0.00000	(0.02367)	0.00352	(0.00008)	0.00001
(0.17647)	(0.02590)	(0.20014)	(0.02238)	0.00448	0.00050
(0.40476)	(0.13275)	(0.42843)	(0.12923)	0.05536	0.01670
(0.04000)	(0.00333)	(0.06367)	0.00019	(0.00001)	0.00000
0.12500	0.00342	0.10133	0.00694	0.00070	0.00005
0.11111	0.00905	0.08744	0.01257	0.00110	0.00016
0.03333	0.00350	0.00966	0.00702	0.00007	0.00005
(0.09677)	(0.00868)	(0.12044)	(0.00516)	0.00062	0.00003
(0.07143)	(0.00198)	(0.09510)	0.00154	(0.00015)	0.00000
0.03846	0.00124	0.01479	0.00476	0.00007	0.00002
0.03704	0.00160	0.01337	0.00512	0.00007	0.00003
(0.03571)	(0.00061)	(0.05938)	0.00291	(0.00017)	0.00001
0.00000	0.00000	(0.02367)	0.00352	(0.00008)	0.00001
0.56816	(0.08454)		SUM	0.10570	0.02426
0.02367	(0.00352)		AVERAGE	0.00440	0.00101

B 4.35743

Table 4.39

ORIENTAL PET A

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
0.22500	0.02088	0.23733	0.02485	0.00590	0.00062
0.12755	0.01241	0.13988	0.01638	0.00229	0.00027
0.13122	0.01654	0.14355	0.02051	0.00294	0.00042
(1.00000)	(0.15626)	(0.98767)	(0.15229)	0.15041	0.02319
0.00000	0.00000	0.01233	0.00397	0.00005	0.00002
(0.20000)	(0.01348)	(0.18767)	(0.00951)	0.00178	0.00009
(0.15476)	(0.00811)	(0.14243)	(0.00414)	0.00059	0.00002
0.11268	0.00356	0.12501	0.00753	0.00094	0.00006
0.06329	0.00390	0.07562	0.00787	0.00060	0.00006
0.15476	0.01186	0.16709	0.01583	0.00264	0.00025
0.01546	0.00216	0.02779	0.00613	0.00017	0.00004
0.00000	0.00000	0.01233	0.00397	0.00005	0.00002
(0.01389)	(0.00182)	(0.00156)	0.00215	(0.00000)	0.00000
(0.03756)	(0.00279)	(0.02523)	0.00118	(0.00003)	0.00000
0.00000	0.00000	0.01233	0.00397	0.00005	0.00002
0.17073	0.00483	0.18306	0.00880	0.00161	0.00008
0.22917	0.02876	0.24150	0.03273	0.00790	0.00107
(0.08475)	(0.01609)	(0.07242)	(0.01212)	0.00088	0.00015
0.01852	0.00167	0.03085	0.00564	0.00017	0.00003
0.01818	0.00165	0.03051	0.00562	0.00017	0.00003
0.00000	0.00000	0.01233	0.00397	0.00005	0.00002
(0.07143)	(0.00497)	(0.05910)	(0.00100)	0.00006	0.00000
0.00000	0.00000	0.01233	0.00397	0.00005	0.00002
0.00000	0.00000	0.01233	0.00397	0.00005	0.00002
(0.29582)	(0.09528)		SUM	0.17933	0.02647
(0.01233)	(0.00397)		AVERAGE	0.00747	0.00110

B 6.77388

Table 4.40

ALCORN PETRO A

rj	rM	rj (Mean)	rj-rjbar	rm-rmbar	cov(rj,rm	var rm
0.08000	0.00622	0.07099	(0.77614)	(0.00116)	0.00090	0.00000
0.07407	0.00292	(0.03943)	(0.78207)	(0.00446)	0.00349	0.00002
0.03448	0.00216	(0.03943)	(0.82166)	(0.00522)	0.00429	0.00003
(0.10000)	(0.00197)	(0.03943)	(0.95614)	(0.00935)	0.00894	0.00009
(0.07407)	(0.00087)	(0.03943)	(0.93021)	(0.00825)	0.00767	0.00007
0.00000	0.00000	(0.03943)	(0.85614)	(0.00738)	0.00632	0.00005
(0.04000)	(0.00046)	(0.03943)	(0.89614)	(0.00784)	0.00703	0.00006
0.20833	0.00442	(0.03943)	(0.64781)	(0.00296)	0.00191	0.00001
0.03448	0.00112	(0.03943)	(0.82166)	(0.00626)	0.00515	0.00004
0.16667	0.01607	(0.03943)	(0.68947)	0.00869	(0.00599)	0.00008
0.14286	0.04549	(0.03943)	(0.71328)	0.03811	(0.02719)	0.00145
0.32500	0.09492	(0.03943)	(0.53114)	0.08754	(0.04650)	0.00766
0.00000	0.00000	0.00000	(0.85614)	(0.00738)	0.00632	0.00005
0.06000	0.00389	(0.05075)	(0.79614)	(0.00349)	0.00278	0.00001
0.00000	0.00000	(0.05075)	(0.85614)	(0.00738)	0.00632	0.00005
0.00000	0.00000	(0.05075)	(0.85614)	(0.00738)	0.00632	0.00005
0.27143	0.04072	(0.05075)	(0.58471)	0.03334	(0.01950)	0.00111
(0.13483)	(0.02668)	(0.05075)	(0.99097)	(0.03406)	0.03376	0.00116
(0.12987)	(0.01204)	(0.05075)	(0.98601)	(0.01942)	0.01914	0.00038
0.04478	0.00222	(0.05075)	(0.81136)	(0.00516)	0.00418	0.00003
0.04286	0.00154	(0.05075)	(0.81328)	(0.00584)	0.00475	0.00003
(0.15068)	(0.00620)	(0.05075)	(1.00682)	(0.01358)	0.01367	0.00018
0.08065	0.00239	(0.05075)	(0.77549)	(0.00499)	0.00387	0.00002
0.00000	0.00000	(0.05075)	(0.85614)	(0.00738)	0.00632	0.00005
0.93614	0.17587		SUM		0.05396	0.01271
0.85614	0.00738		AVERAGE		0.00231	0.00055

B 4.17505

Table 4.41

PETROFIELDS A

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
0.09091	0.00213	0.02059	0.00498	0.00010	0.00002
0.27778	0.00429	0.20746	0.00714	0.00148	0.00005
(0.13043)	(0.07888)	(0.20075)	(0.07603)	0.01526	0.00578
(0.22500)	(0.04211)	(0.29532)	(0.03926)	0.01159	0.00154
(0.09677)	(0.00529)	(0.16709)	(0.00244)	0.00041	0.00001
(0.07143)	(0.00007)	(0.14175)	0.00278	(0.00039)	0.00001
0.00000	0.00000	(0.07032)	0.00285	(0.00020)	0.00001
0.11538	0.00076	0.04506	0.00361	0.00016	0.00001
0.06897	0.00148	(0.00135)	0.00433	(0.00001)	0.00002
0.09677	0.00147	0.02645	0.00432	0.00011	0.00002
(0.02941)	(0.00159)	(0.09973)	0.00126	(0.00013)	0.00000
0.00000	0.00000	(0.07032)	0.00285	(0.00020)	0.00001
0.39394	0.00065	0.32362	0.00350	0.00113	0.00001
(0.04348)	(0.00142)	(0.11380)	0.00143	(0.00016)	0.00000
(0.04545)	(0.00015)	(0.11577)	0.00270	(0.00031)	0.00001
0.47619	0.00152	0.40587	0.00437	0.00178	0.00002
0.54839	0.04940	0.47807	0.05225	0.02498	0.00273
0.16667	0.02355	0.09635	0.02640	0.00254	0.00070
0.23214	0.02438	0.16182	0.02723	0.00441	0.00074
0.00000	0.00000	(0.07032)	0.00285	(0.00020)	0.00001
(0.04348)	(0.00320)	(0.11380)	(0.00035)	0.00004	0.00000
(0.16667)	(0.04781)	(0.23699)	(0.04496)	0.01065	0.00202
0.07273	0.00255	0.00241	0.00540	0.00001	0.00003
0.00000	0.00000	(0.07032)	0.00285	(0.00020)	0.00001
1.68774	(0.06833)		SUM	0.07287	0.01376
0.07032	(0.00285)		AVERAGE	0.00304	0.00057

B 5.29725

Table 4.42

SAN JOSE OIL

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
0.05882	0.01977	(0.05584)	0.02152	(0.00120)	0.00046
(0.05556)	(0.00704)	(0.17022)	(0.00529)	0.00090	0.00003
0.00000	0.00000	(0.11466)	0.00175	(0.00020)	0.00000
0.00000	0.00000	(0.11466)	0.00175	(0.00020)	0.00000
(0.20588)	(0.01327)	(0.32054)	(0.01152)	0.00369	0.00013
(1.00000)	(0.00150)	(1.11466)	0.00025	(0.00028)	0.00000
0.00000	0.00000	(0.11466)	0.00175	(0.00020)	0.00000
0.17241	0.01341	0.05775	0.01516	0.00088	0.00023
0.00000	0.00000	(0.11466)	0.00175	(0.00020)	0.00000
5.08824	0.09877	4.97358	0.10052	0.49997	0.01011
(0.83575)	(0.08891)	(0.95041)	(0.08716)	0.08284	0.00760
0.00000	0.00000	(0.11466)	0.00175	(0.00020)	0.00000
(0.03125)	(0.00054)	(0.14591)	0.00121	(0.00018)	0.00000
(0.00000)	(0.00000)	(0.11466)	0.00175	(0.00020)	0.00000
(1.00000)	(0.01020)	(1.11466)	(0.00845)	0.00942	0.00007
0.00000	0.00000	(0.11466)	0.00175	(0.00020)	0.00000
(0.03030)	(0.00095)	(0.14496)	0.00080	(0.00012)	0.00000
0.06250	0.00022	(0.05216)	0.00197	(0.00010)	0.00000
(0.17647)	(0.00087)	(0.29113)	0.00088	(0.00026)	0.00000
0.28571	0.00015	0.17105	0.00190	0.00032	0.00000
0.38889	0.01472	0.27423	0.01647	0.00452	0.00027
(0.16000)	(0.06639)	(0.27466)	(0.06464)	0.01776	0.00418
0.19048	0.00052	0.07582	0.00227	0.00017	0.00001
0.00000	0.00000	(0.11466)	0.00175	(0.00020)	0.00000
2.75184	(0.04211)		SUM	0.61672	0.02312
0.11466	(0.00175)		AVERAGE	0.02570	0.00096

B 26.67788

Table 4.43

UNIOIL EXPLO A

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
0.23529	0.05307	0.16589	0.04668	0.00774	0.00218
(0.07143)	(0.02967)	(0.14083)	(0.03606)	0.00508	0.00130
(0.02564)	(0.00357)	(0.09504)	(0.00996)	0.00095	0.00010
(0.10526)	(0.01499)	(0.17466)	(0.02138)	0.00373	0.00046
(0.14706)	(0.00371)	(0.21646)	(0.01010)	0.00219	0.00010
(0.06897)	(0.00060)	(0.13837)	(0.00699)	0.00097	0.00005
0.00000	0.00000	(0.06940)	(0.00639)	0.00044	0.00004
0.00000	0.00000	(0.06940)	(0.00639)	0.00044	0.00004
0.00000	0.00000	(0.06940)	(0.00639)	0.00044	0.00004
0.00000	0.00000	(0.06940)	(0.00639)	0.00044	0.00004
0.00000	0.00000	(0.06940)	(0.00639)	0.00044	0.00004
0.00000	0.00000	(0.06940)	(0.00639)	0.00044	0.00004
0.00000	0.00000	(0.06940)	(0.00639)	0.00044	0.00004
0.00000	0.00000	(0.06940)	(0.00639)	0.00044	0.00004
0.00000	0.00000	(0.06940)	(0.00639)	0.00044	0.00004
0.00000	0.00000	(0.06940)	(0.00639)	0.00044	0.00004
0.29630	0.00003	0.22690	(0.00636)	(0.00144)	0.00004
0.11429	0.00008	0.04489	(0.00631)	(0.00028)	0.00004
0.58974	0.00075	0.52034	(0.00564)	(0.00294)	0.00003
0.48387	0.03413	0.41447	0.02774	0.01150	0.00077
0.34783	0.11239	0.27843	0.10600	0.02951	0.01124
0.03226	0.00915	(0.03714)	0.00276	(0.00010)	0.00001
(0.01563)	(0.00365)	(0.08503)	(0.01004)	0.00085	0.00010
0.00000	0.00000	(0.06940)	(0.00639)	0.00044	0.00004
1.66559	0.15342		SUM	0.06263	0.01686
0.06940	0.00639		AVERAGE	0.00261	0.00070
			B	3.71472	

Table 4.44

VULCAN IND'L & MINING

rj	rM	rj-rjbar	rm-rmbar	Cov(rj,rm	Var rm
0.09091	0.00726	0.05770	0.00008	0.00000	0.00000
0.11111	0.00813	0.07790	0.00095	0.00007	0.00000
0.00000	0.00000	(0.03321)	(0.00718)	0.00024	0.00005
(0.15000)	(0.03575)	(0.18321)	(0.04293)	0.00786	0.00184
(0.17647)	(0.00062)	(0.20968)	(0.00780)	0.00163	0.00006
(0.10714)	(0.00277)	(0.14035)	(0.00995)	0.00140	0.00010
0.04000	0.00117	0.00679	(0.00601)	(0.00004)	0.00004
0.07692	0.00455	0.04371	(0.00263)	(0.00011)	0.00001
(0.03571)	(0.00194)	(0.06892)	(0.00912)	0.00063	0.00008
0.11111	0.00230	0.07790	(0.00488)	(0.00038)	0.00002
(0.06667)	(0.00507)	(0.09988)	(0.01225)	0.00122	0.00015
0.00000	0.00000	(0.03321)	(0.00718)	0.00024	0.00005
0.14815	0.00367	0.11494	(0.00351)	(0.00040)	0.00001
(0.09677)	(0.04381)	(0.12998)	(0.05099)	0.00663	0.00260
(0.07143)	(0.00132)	(0.10464)	(0.00850)	0.00089	0.00007
0.11538	0.00028	0.08217	(0.00690)	(0.00057)	0.00005
0.10345	0.00868	0.07024	0.00150	0.00011	0.00000
0.15625	0.02349	0.12304	0.01631	0.00201	0.00027
(0.02703)	(0.00571)	(0.06024)	(0.01289)	0.00078	0.00017
0.13889	0.00780	0.10568	0.00062	0.00007	0.00000
0.36585	0.05558	0.33264	0.04840	0.01610	0.00234
0.03571	0.11000	0.00250	0.10282	0.00026	0.01057
0.03448	0.03634	0.00127	0.02916	0.00004	0.00085
0.00000	0.00000	(0.03321)	(0.00718)	0.00024	0.00005
0.79700	0.17226		SUM	0.03890	0.01939
0.03321	0.00718		AVERAGE	0.00162	0.00081

B 2.00634

Banks (0.36719); Food, Beverages and Tobacco Products (0.17125) and Oil group 0.12567. According to industry classification the variance of each security is as follows:

For Banks, almost all the variances are less than 1 except for URBAN which is 1.61249. The lowest is CHINB 0.00055, followed by SOLID 0.00258. For PNB, one of the blue chips shares, the variance is only 0.00828.

The highest variance in Communication is PTT 4.94994followed by GLO 0.04919. Variance for MB and PLDT are 0.02339 and 0.00151 respectively.

Variance for Investment and Finance/Holding Firms group is not so high. The highest is AC 1.21470; which the lowest is SMFI-B 0.01114 followed by REG 0.01533 and FPHC 0.49287.

The same pattern is true for Food, Beverages and Tobacco Products, and also for Real Estate although a little bit lower.

In Utility variance of MER is 0.00166; SWM, in Ceramics, Tiles, Glass & Allied Products, 0.18366 which is by for the highest, compared to BCI 0.05454, ILI 0.00643, EEI 0.10055, KPSI 0.00009 and MDI 0.00721.

For Oil shares the highest is BP 0.87450. The remaining shares are little bit lower. Mining shares follow the same trend.

2.3. Covariance of the rate of return of security j with market rate of return ($\hat{\sigma}_{jM}$);

Covariance is a statistical measure of how two random variables, such as the returns on securities i and j, "move together". A positive value for covariance indicates that the securities return tend to go together. A negative covariance indicates a tendency for the returns to offset one another. A relatively small or zero value for the covariance indicates that there is little or no relationship between the returns for the two securities. In this study, all of covariance are positive, and the highest and the lowest are AC 24.85156 and KPSI 0.00015 respectively. It also mean that the movement of one security will influence the others (see Table 4.1).

Examining the groups, we find that Investment and Finance/Holding Firms has the highest covariance (6.39661), followed by Communication 4.94962; While Banks; Food, Beveages and Tobacco Products; Oil and Share have covariances of 0.59919; 0.11978; 0.93887 and 0.10540, respectively.

The highest covariance among Banks is URBAN 2.42056, followed by BPI 0.48218. For PNB, SOLID and CHINB the covariance are 0.04763; 0.01540 and 0.03019 respectively.

For Communication, PTT has the highest covariance

with 19.51348, MB has 0.14316 while GLO has 0.12910. The lowest covariance is that of with PLDT 0.01275.

For **Investment and Finance/Holding Firms** the highest covariance is AC 24.85156, followed by FPHC 0.69592. SMFI-B 0.03095 REG and 0.00802. The difference among the covariance in **Food, Beverages and Tobacco Products** is not that great. Except for RFM which has a covariance of 1.17335, the remaining shares have coavariances smaller than one.

The same pattern is found in the Real Estate group.

EEI in **Construction** has covariance 0.24423; MER, in **Utility**, 0.03101; BCI, in **Cements**, 0.04441; KPSI, ILI, and SD-TIRE have covariances 0.00015, 0.0064, and 0.00399 respectively; and MDI, in **Trading** 0.02495.

For **Oil and Mining**, the highest covariance is BP 6.35955 which is the only share with covariance higher than one.

2.4. The weight of each security in market portfolio (w_j)

The weight of security in market portfolio can be a measure of the wealth invested in market portfolio at a certain time. In general, the investor prefers to invest more in commercial and industrial venture. It is indicated by the weight of Commercial and Industrial share which is 0.89200 as well as the average weight

TABEL 4.2
THE WEIGHT OF EACH SECURITY
IN MARKET PORTFOLIO (Wj) 1991-1992

NO	PORTFOLIO	TOTAL VALUE 1991-1992	AVERAGE VALUE 1991-1992	WEIGHT 3	WEIGHT 4
1	2	3	4	5	6
	COMMERCIAL AND INDUSTRIAL SHARE				
			BANKS		
1	BPI	48,760,368.00000	2,031,682.00000	0.00098	0.00096
2	PNB	9,047,969,634.00000	376,998,734.75000	0.18136	0.17823
3	URBAN	177,634,328.00000	7,401,430.33333	0.00356	0.00350
4	SOLID	3,219,395.00000	134,141.45833	0.00006	0.00006
5	CHINB	300,442,988.00000	12,518,457.83333	0.00602	0.00592
	AVERAGE			0.03840	0.03773
			COMMUNICATION		
6	GLO	172,868,115.00000	7,202,838.12500	0.00346	0.00341
7	PTT	18,955,751.00000	789,822.92833	0.00038	0.00037
8	PLDT	7,750,026,336.00000	322,917,764.00000	0.15534	0.15267
9	MB	68,002,525.00000	2,833,438.54167	0.00136	0.00134
	AVERAGE			0.04014	0.03945
			INVESTMENT AND FINANCE/HOLDING FIRMS		
10	AC	1,332,989,524.00000	55,541,230.16667	0.02672	0.02626
11	FPHC	1,108,113,399.00000	46,171,391.62500	0.02221	0.02183
12	REG	101,266,144.00000	4,219,422.66667	0.00203	0.00199
13	SMFI-B	21,434,720.00000	893,113.33333	0.00043	0.00042
	AVERAGE			0.01285	0.01263
			FOOD, BEVERAGES AND TOBACCO PRODUCTS		
14	RFM	658,994,398.00000	27,458,099.91667	0.01321	0.01298
15	SMC	2,029,058,919.00000	84,544,121.62500	0.04067	0.03997
	AVERAGE			0.02694	0.02648
			REAL ESTATE		
16	ALI-B	11,875,041,160.00000	494,793,391.66667	0.23802	0.23392
17	FLC	1,519,847.50000	36,476,340.00000	0.00003	0.01724
18	KPPI	681,125,482.00000	28,388,228.41667	0.01365	0.01342
19	POPI	458,173,930.00000	19,090,580.41667	0.00918	0.00903
20	RLC-B	1,086,785,810.00000	45,282,742.08333	0.02178	0.02141
21	RLTY	782,162,600.00000	32,590,108.33333	0.01568	0.01541
	AVERAGE			0.04972	0.05174

			UTILITY		
22	MER	5,481,721,330.00000	228,405,055.41667	0.10987	0.10798
			CEMENTS		
23	BCI	121,066.83000	5,044.45125	0.00000	0.00000
			CERAMICS, TILES, GLASS & ALLIED PRODUCTS		
24	GWM	181,271,654.00000	7,552,985.58333	0.00363	0.00357
			CHEMICALS AND ALLIED PRODUCTS		
25	ILI	16,624,155.00000	692,673.12500	0.00033	0.00033
			CONSTRUCTION		
26	EEI	894,536,827.00000	37,272,367.79167	0.01793	0.01762
			RUBBER AND ALLIED PRODUCTS		
27	SD-TIRE	94,524,502.00000	3,938,520.91667	0.00189	0.00186
			SHIPBUILDING & REPAIR		
28	KPSI	47,658,432.00000	1,985,768.00000	0.00096	0.00094
			TRADING		
29	MDI	61,494,304.00000	2,562,262.66667	0.00123	0.00121
	SUB-TOTAL	44,502,497,644.33001	1,890,691,758.17125	0.89200	0.89386
	OIL SHARE				
30	BP	1,075,267,129.00000	44,802,797.04167	0.02155	0.02118
31	IRC	922,953,630.00000	38,456,401.25000	0.01850	0.01818
32	OPM	1,398,024,981.00000	58,251,040.87500	0.02802	0.02754
33	APMC	391,523,800.00000	16,313,491.66667	0.00785	0.00771
34	PETRO	552,660,210.00000	23,027,508.75000	0.01108	0.01089
35	SJO	20,018,150.00000	834,089.58333	0.00040	0.00039
36	U-OIL	314,881,650.00000	13,120,068.75000	0.00631	0.00620
37	VUL	218,541,395.00000	9,105,891.45833	0.00438	0.00430
	AVERAGE			0.01226	0.01205
	SUB-TOTAL	4,893,870,945.00000	203,911,289.37500	0.09809	0.09640
	MINING SHARE				
38	APX	16,341,093.00000	680,878.87500	0.00033	0.00032
39	AT	82,693,164.00000	3,445,548.50000	0.00166	0.00163
40	LC	49,011,644.00000	2,042,151.83333	0.00098	0.00097
41	PX	231,366,197.00000	9,640,258.20833	0.00464	0.00456
42	OM	115,013,590.00000	4,792,232.91667	0.00231	0.00227
	AVERAGE			0.00198	0.00195
	SUB-TOTAL	494,425,688.00000	20,601,070.33333	0.00991	0.00974
	TOTAL	49,890,794,277.33001	2,115,204,117.87959	1.00000	1.00000

which is 0.89386. For Oil share and Mining share, the weights are only 0.09809 and 0.00991 respectively.

Grouping the data based on industry classification reveals that Real Estate and Communication have higher average weights, 0.04972 and 0.04014 respectively. As for the Banks; Investment and Finance/Holding Firms; Food, Beverages and Tobacco Products; Oil and Mining the average weight are 0.03840, 0.01285, 0.02689, 0.01226 and 0.00991, respectively.

This data supports the finding in problems (1.1), (1.2), and (2.1) that the return on Commercial and Industrial share is much higher compared to Oil and Mining shares. That is why more investors are willing to invest and diversify their portfolio on commercial and industrial share. For more detail refer to Table 4.2.

IV. 3. SUB-PROBLEM 3

What are the perceptions of the respondents as to the effectiveness of the portfolio management in managing securities ?

The perception of the respondents as to the effectiveness of the portfolio in managing secutities could be classified in the following criterion:

1. The way they manage portfolio in the Philippines stock market.

All respondents answered (YES), when researcher

asked the effectiveness of the way they manage the portfolio. Some of the reasons given are as the following:

a. Our approach assumes the fund as invested for long time; the performance has been fairly good;

b. Our porfolio has outperformed the market by 8.42 % and 4.79 % in 1991 and 1992 respectively.

c. Most of stock selected have established good earning track record (except for mines and oil) and deep management bench;

d. We can not say it is really effective because there are many reasons or factors why these issues are going up and down.

2. The way they select combination of portfolio in the stock market in terms of rate of return and risk involved.

Based on the above answers, 7 out of 12 respondents or 58.33 % selected the portfolio with highest return and moderate risk; and 41.67 % or 5 respondents selected the portfolio with the moderate return and moderate risk.

Table 4.46

Portfolio Selection

Types	No. rspd	Per-cent
a. highest return and moderate risk	7	58.33
b. moderate return and moderate risk	5	41.67
c. lower return and lowest risk	0	0
d. spread among (a), (b) and (c)	0	0
Total	12	100

3. The way they predict the high or low return as well as the high or low risk of share in the market.

All of the respondents have done the same by looking at combination of (a), (b), (c), and (d), plus several additional factors, like management style, vision, price-earning (P/E) ratio, cash flow, debt equity ratio, earning forecast and historical trend.

Table 4.47

Prediction of Return and Risk

Types	No Respondt	Per cent
a). by looking at demand and supply of the share	12	100
b). by looking at price of the share	12	100
c). by looking at the certain economic fluctuation	12	100
d). by looking at certain political situation	-	-
e). by looking at combination of (a), (b), (c) and (d): - (a), (b) and (c) - (a), (b), (c) and (d)	(12)	100
f). others factor (management style vision, P/E ratio, cash flow, debt equity ratio, earning forecast, historical trend)	(12)	100
Total	12	100

4. The combination of portfolio the investors would like

TABLE 4.48
COMBINATION OF PORTFOLIO

RESPONDENS	1991			1992		
	COMMERCIAL AND INDUSTRIAL	MINING	OIL	COMMERCIAL AND INDUSTRIAL	MINING	OIL
	PERCENT			PERCENT		
1	60	15	25	65	10	25
2	50	10	40	70	5	25
3	65	25	10	65	25	10
4	90	2	8	90	2	8
5	80	10	10	80	10	10
6	90	3	7	90	3	7
7	80	7	3	80	7	3
8	90	3	7	90	3	7
9	90	3	7	90	3	7
10	70	10	20	70	10	20
11	75	15	10	75	15	10
12	75	10	25	75	10	25

TABLE 4.49
BREAKDOWN OF COMBINATION OF PORTFOLIO 1991

	RESPONDENTS											
	1	2	3	4	5	6	7	8	9	10	11	12
BANKS												
BPI	0	0	0	0	0	0	0	0	0	0	0	0
CITY TRUST BANK	0	2.5	2	0	2.5	0	2.5	0	0	0	0	0
PNB	15	4	3	0	4	5	4	0	0	0	0	0
SOLID BANK	0	0	0	0	0	0	0	0	0	0	0	0
UNION BANK	5	3.5	3	0	3.5	5	3.5	0	0	0	0	0
CHINA BANK	0	0	0	0	0	5	0	0	0	0	0	0
COMMUNICATION												
ABS-CBN	2	0	3	20	0	5	0	0	0	0	0	0
GLOBE MADKEY	5	0	0	10	0	5	0	0	0	0	0	0
PT&T	0	0	0	0	0	0	0	0	0	0	0	0
PLDT	10	15	8	0	15	5	15	0	0	0	0	0
MANILA BULLETIN	0	0	0	0	0	0	0	0	0	0	0	0
INVESTMENT AND FINANCE/HOLDINGS FIRM												
AYALA CORPORATION	0	7	0	0	7	5	7	0	0	0	0	0
AGPI	0	0	0	0	0	0	0	0	0	0	0	0
ANSCOR	0	0	2	0	0	0	0	0	0	0	0	0
FIRST HOLDING	10	4	3	0	4	5	4	0	0	0	0	0
REPUBLIC GLASS	0	0	0	0	0	0	0	0	0	0	0	0
SM FUND INC	0	0	0	0	0	0	0	0	0	0	0	0
HOUSE OF INVESTMENT	0	0	0	0	0	0	0	0	0	0	0	0
FOOD, BEVERAGES & TOBACCO PRODUCTS												
RFM CORPORATION	0	0	0	0	0	5	0	0	0	0	0	0
SAN MIGUEL	15	17	15	0	17	5	17	0	0	0	0	0
REAL ESTATE												
AYALA LAND	5	5	3	0	5	5	5	0	0	0	0	0
CEBU PROPERTY	0	0	0	0	0	0	0	0	0	0	0	0
FIRST LEPANTO CORP	0	0	0	0	0	0	0	0	0	0	0	0
KUOK PROPERTIES	0	2	0	0	2	0	2	0	0	0	0	0
PHIL ORION	0	0	4	0	0	0	0	0	0	0	0	0
ROBINSON LAND	0	2	2	0	2	0	2	0	0	0	0	0
PHIL REALTY	0	0	0	0	0	0	0	0	0	0	0	0
SHANGRILLA PROPERTIES	0	0	0	0	0	0	0	0	0	0	0	0
BELLE RESOURCES	0	0	0	0	0	0	0	0	0	0	0	0
UTILITY												
Meralco	8	4	16	20	4	5	4	0	0	0	0	0

CEMENT												
Bacnotan	0	2.5	0	0	2.5	0	2.5	0	0	0	0	0
Saniwares	0	2	0	0	2	0	2	0	0	0	0	0
Interphil	5	0	0	0	0	0	0	0	0	0	0	0
Engineering Equipment	0	3.5	3	0	3.5	0	3.5	0	0	0	0	0
Sazlec Phils	0	0	0	0	0	0	0	0	0	0	0	0
Nepco	0	0	0	0	0	0	0	0	0	0	0	0
Grand Plaza Hotel	0	0	0	0	0	0	0	0	0	0	0	0
Picop	0	0	0	0	0	0	0	0	0	0	0	0
Sime Darby	0	0	0	0	0	0	0	0	0	0	0	0
Keppel Phil	0	0	0	0	0	0	0	0	0	0	0	0
Filsyn Corp	0	0	0	0	0	0	0	0	0	0	0	0
Metro Drug	0	3	5	0	3	0	3	0	0	0	0	0
International Container	0	8	3	20	8	0	8	0	0	0	0	0
MINING -- BIG BOARD												
Apex Mining	0	0	0	0	0	3	0	0	0	0	0	0
Benguet Corp	0	0	0	0	0	3	0	0	0	0	0	0
Atlas Cons	0	0	0	0	0	3	0	0	0	0	0	0
Dizon Mines	0	0	0	0	0	0	0	0	0	0	0	0
Lepanto Cons	0	0	0	0	0	0	0	0	0	0	0	0
Philex Mining	0	3	0	10	3	0	3	0	0	0	0	0
Surigao Cons	0	0	0	0	0	0	0	0	0	0	0	0
OIL												
Basic Petroleum	0	1.5	1	10	1.5	2	1.5	0	0	0	0	0
Oriental Pet	0	2.5	0	0	2.5	2	2.5	0	0	0	0	0
Philodrill	0	0	1	0	0	2	0	0	0	0	0	0
Seafront Pet	0	0	0	0	0	2	0	0	0	0	0	0
Trans Asia Oil	0	0	0	0	0	0	0	0	0	0	0	0
MINING SMALL BOARD												
Manila Mining	5	0	5	0	0	2	0	0	0	0	0	0
Omico Mining	0	0	0	0	0	2	0	0	0	0	0	0
Alcorn Petro	0	1.5	0	0	1.5	0	1.5	0	0	0	0	0
Anglo Phil Oil	0	0	0	0	0	0	0	0	0	0	0	0
Balabac Oil	0	0	0	0	0	0	0	0	0	0	0	0
Interport Rest	0	0	0	0	0	0	0	0	0	0	0	0
Palawan Oil	0	1.5	0	0	1.5	2	1.5	0	0	0	0	0
Petrofields	0	0	1	0	0	0	0	0	0	0	0	0
Republic Resources	0	0	0	0	0	0	0	0	0	0	0	0
San Jose Oil	0	0	0	0	0	0	0	0	0	0	0	0
Terra Grande Oil	5	0	0	0	0	0	0	0	0	0	0	0
Unioil Explo	0	0	0	0	0	0	0	0	0	0	0	0
Vulcan Ind & Mining	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	100	100	100	100	100	100	100	100	100	100	100	100

BREAKDOWN OF COMBINATION OF PORTFOLIO 1992

	RESPONDENTS											
	1	2	3	4	5	6	7	8	9	10	11	12
BANKS												
BPI	0	0	0	0	0	0	0	0	0	0	0	0
CITY TRUST BANK	0	2.5	2	0	2.5	0	2.5	0	0	0	0	0
PNB	15	4	3	0	4	5	4	0	0	0	0	0
SOLID BANK	0	0	0	0	0	0	0	0	0	0	0	0
UNION BANK	5	3.5	3	0	3.5	5	3.5	0	0	0	0	0
CHINA BANK	0	0	0	0	0	5	0	0	0	0	0	0
COMMUNICATION												
ABS-CBN	2	0	3	20	0	5	0	0	0	0	0	0
GLOBE MADKEY	5	0	0	10	0	5	0	0	0	0	0	0
PT&T	0	0	0	0	0	0	0	0	0	0	0	0
PLDT	10	15	8	0	15	5	15	0	0	0	0	0
MANILA BULLETIN	0	0	0	0	0	0	0	0	0	0	0	0
INVESTMENT AND FINANCE/HOLDINGS FIRM												
AYALA CORPORATION	0	7	0	0	7	5	7	0	0	0	0	0
AGPI	0	0	0	0	0	0	0	0	0	0	0	0
ANSCOR	0	0	2	0	0	0	0	0	0	0	0	0
FIRST HOLDING	10	4	3	0	4	5	4	0	0	0	0	0
REPUBLIC GLASS	0	0	0	0	0	0	0	0	0	0	0	0
SM FUND INC	0	0	0	0	0	0	0	0	0	0	0	0
HOUSE OF INVESTMENT	0	0	0	0	0	0	0	0	0	0	0	0
FOOD, BEVERAGES & TOBACCO PRODUCTS												
RFM CORPORATION	0	0	0	0	0	5	0	0	0	0	0	0
SAN MIGUEL	15	17	15	0	17	5	17	0	0	0	0	0
REAL ESTATE												
AYALA LAND	5	5	3	0	5	5	5	0	0	0	0	0
CEBU PROPERTY	0	0	0	0	0	0	0	0	0	0	0	0
FIRST LEPANTO CORP	0	0	0	0	0	0	0	0	0	0	0	0
KUOK PROPERTIES	0	2	0	0	2	0	2	0	0	0	0	0
PHIL ORION	0	0	4	0	0	0	0	0	0	0	0	0
ROBINSON LAND	0	2	2	0	2	0	2	0	0	0	0	0
PHIL REALTY	0	0	0	0	0	0	0	0	0	0	0	0
SHANGRILLA PROPERTIES	0	0	0	0	0	0	0	0	0	0	0	0
BELLE RESOURCES	0	0	0	0	0	0	0	0	0	0	0	0
UTILITY												
Meralco	8	4	16	20	4	5	4	0	0	0	0	0

CEMENT												
Bacnotan	0	2.5	0	0	2.5	0	2.5	0	0	0	0	0
Saniwares	0	2	0	0	2	0	2	0	0	0	0	0
Interphil	5	0	0	0	0	0	0	0	0	0	0	0
Engineering Equipment	0	3.5	3	0	3.5	0	3.5	0	0	0	0	0
Sazlec Phils	0	0	0	0	0	0	0	0	0	0	0	0
Mepco	0	0	0	0	0	0	0	0	0	0	0	0
Grand Plaza Hotel	0	0	0	0	0	0	0	0	0	0	0	0
Picop	0	0	0	0	0	0	0	0	0	0	0	0
Sime Darby	0	0	0	0	0	0	0	0	0	0	0	0
Keppel Phil	0	0	0	0	0	0	0	0	0	0	0	0
Filsyn Corp	0	0	0	0	0	0	0	0	0	0	0	0
Metro Drug	0	3	5	0	3	0	3	0	0	0	0	0
International Container	0	8	3	20	8	0	8	0	0	0	0	0
MINING -- BIG BOARD												
Apex Mining	0	0	0	0	0	3	0	0	0	0	0	0
Benguet Corp	0	0	0	0	0	3	0	0	0	0	0	0
Atlas Cons	0	0	0	0	0	3	0	0	0	0	0	0
Dizon Mines	0	0	0	0	0	0	0	0	0	0	0	0
Lepanto Cons	0	0	0	0	0	0	0	0	0	0	0	0
Philex Mining	0	3	0	10	3	0	3	0	0	0	0	0
Surigao Cons	0	0	0	0	0	0	0	0	0	0	0	0
OIL												
Basic Petroleum	0	1.5	1	10	1.5	2	1.5	0	0	0	0	0
Oriental Pet	0	2.5	0	0	2.5	2	2.5	0	0	0	0	0
Philodrill	0	0	1	0	0	2	0	0	0	0	0	0
Seafront Pet	0	0	0	0	0	2	0	0	0	0	0	0
Trans Asia Oil	0	0	0	0	0	0	0	0	0	0	0	0
MINING SMALL BOARD												
Manila Mining	5	0	5	0	0	2	0	0	0	0	0	0
Omico Mining	0	0	0	0	0	2	0	0	0	0	0	0
Alcorn Petro	0	1.5	0	0	1.5	0	1.5	0	0	0	0	0
Anglo Phil Oil	0	0	0	0	0	0	0	0	0	0	0	0
Balabac Oil	0	0	0	0	0	0	0	0	0	0	0	0
Interport Rest	0	0	0	0	0	0	0	0	0	0	0	0
Palawan Oil	0	1.5	0	0	1.5	2	1.5	0	0	0	0	0
Petrofields	0	0	1	0	0	0	0	0	0	0	0	0
Republic Resources	0	0	0	0	0	0	0	0	0	0	0	0
San Jose Oil	0	0	0	0	0	0	0	0	0	0	0	0
Terra Grande Oil	5	0	0	0	0	0	0	0	0	0	0	0
Unioil Explo	0	0	0	0	0	0	0	0	0	0	0	0
Vulcan Ind & Mining	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	100	100	100	100	100	100	100	100	100	100	100	100

to choose to reduce risk is shown in Table 4.48. The break down of these portfolio is shown on Table 4.49.

IV. 4. SUB-PROBLEM 4

Is there a significant difference on the perceptions of respondents as to the effectiveness of portfolio management in Philippine stock market ?

Based on Tables 4.1; 4.2; 4.46; 4.47; 4.48; and 4.49, it can be concluded that there was no significant difference on the perceptions of the respondents as to the effectiveness of portfolio management in the Philippines stock market. From Table 4.46, as the response to the question of the way they select the combination of portfolio, all of the respondents answer was either "highest return and moderate risk" and "moderate return and moderate risk". The difference between the former and the later is very slight (16.66 %) with only two respondents answering more on "hihgest return and moderate risk".

This perception was supported by the other facts on Table 3.2 which the respondents would predict risk and return based on combination of several factors, namely: by looking at demand and supply of the share, by looking at price of the share, and by looking at the certain economic fluctuation. All of respondents (100 %) preferred the combination of several factors the researchers mention above.

Another important fact can be concluded from Table 3.3., as to the percentages of combination of portfolio the investors would like to choose to reduce risk in the stock market. Most of them gave more weight on commercial and industrial share, followed by "oil share" and "mining share", respectively.

IV. 5. SUB-PROBLEM 5

What is the future of the Philippine stock markets using portfolio management ?

To answer this problem reseacher provided 4 possible answers in the questionnaire.

1. will be better due to economic and political stability
2. for the first 3 years there would not be much change due to brown out problem, but after this problem is overcome, it would be better
3. CAMP and APT will be much employed
4. combination of (1), (2) and (3).

Most of respondents (67 percent) answered (4) or combination of (1); (2) and (3). The next (34 percent) answered (1). But some of them added several answers. For instance, one said that "management portfolio in the future of the Philippines stock market has big potential; this is especially true during the times when interest rates are going down". Another opened that "the stock market develops and introduces more stocks (other

products) into the market, more inventible funds will find its way into it. This will provide a broader orientation for portfolio managers into equity investments".

Effort is extended to arrive at the result of the tests of the CAPM, the most important part in this study. The result we be seen in Tabel 4.50.

IV. 6. Results of the Tests of the CAPM

Initially, the CAPM was tested using the data over 24-month period for the total of 42 securities. The result of the regression analysis using ordinary least squares (OLS) is insignificant (please see Table 4.50).

Tabel 4.50

Results of Tests the CAPM (OLS)

		Period		
		1991	1992	1991 and 1992
(1)	$\hat{\alpha}_o$	0.26000	0.02260	-0.00450
(2)	$\hat{\alpha}_1$	0.06280[a] (t=0.87673) (s=0.15270)	-0.22720[b] (t=-3.38960) (s=0.24880)	0.652999[a] (t=0.52022) (s=0.06599)
(3)	R^2	0.01070	0.13931	0.00399
(4)	F-Value	0.76899	11.48961	0.28080
(5)	$\hat{r}_M$	0.49100	-0.05650	0.12297
(6)	$\hat{r}_F$[c]	0.10400	0.11940	0.10833
(7)	$\hat{\alpha}_o / \hat{R}_F$	2.50040	0.18910	-0.04165
(8)	$\hat{\alpha}_1 ? = (\hat{r}_M - \hat{R}_F)$ (t-Test)	5.24280	0.93921	6.01111

a) The average of the 2 years (1991 and 1992) Treasury Bill Rate
b) Insignificant at .10 level.
c) Significant at .005 level, but sign is perverse, i.e.,neg.

The observation made regarding a highly volatile market indicates the possibility of significant differences in market behaviour between calendar years. Besides, the parameters of the probability distributions of the rates of return of securities may not be stationary over the 24-month period. To be able to take into account these possibilities, tests were made for the

annual periods.

The results of the tests using annual data show some levels of improvement over the results of the test of the 2 year period. For instance, the variations explained by the beta increased from 0.4 % to 1 % up to 14 %.

As whole, however, the results of the tests for the annual periods do not confirm the hypothesized positive linear relationship between r_j dan β_j. However, only 11 percent of the variation is explained by the regression. For the year 1991, the hypothesis is rejected at 0.10 level. For the year 1992, though the result is significant, the relationship is perverse in the sense that the sign of $\hat{\alpha}_1$ is negative. For ease in making comparison, the results of the tests for the 1991 and 1992 period as well as the annual periods are shown in Table 4.50.

Furthermore, the values of the estimates of the intercept α_0 and R_F are seen to be different from each other. Row (7) of the Table 4.50 shows the ratio of $\hat{\alpha}_o$ to $\hat{R}_F$ which range from -0.04 to 2.5. The prediction of the model is that the ratio should be equal to 1.0. Row (8) of Table 4.50 shows the estimates of the t statistic for the tests of equality between $\hat{\alpha}_1$ and $(\hat{r}_M - \hat{r}_F)$. The null hypothesis of equality is rejected for all periods.

Thus, the hypothesized relationship (3.6a) and

(3.6b) cannot be accepted and the theoretical predictions of the CAPM are not substantiated by the data.

However, there is another source of ambiguity in the preceding test results which is not taken into account. This arises from the empirical assumption that the beta risks are stationary. Stationarity implies that the parameters of the probability distribution are constant at least for the time period covered by the data. Each β_j is a function of r_j and σ_{kj}. A stationary β_j therefore implies that the underlying probability distributions of securities rates of return are stationary.

For the Philippine stock market, this assumption of stationarity of the betas may not be valid. The test results of the CAPM may indirectly show the possible non-stationarity of the beta risks. For instance, in Table 4.50, the R^2 or F-values for the two-year period (1991 and 1992) are much smaller than those of the annual periods. For example, the lowest value of R^2 for the annual period is 0.01070.

Since the beta is a function of the probability distribution of securities' rates of return, the need to look into the stationarity assumption of the betas requires investigation into the nature of these probability distributions. Moreover, studies in the U.S. show that the behavior of the stock prices could be well

approximated by a random walk. This means that the market is efficient and current prices fully reflect available and relevant information. This may not be true in the case of the Philippne stock market. The random walk hypothesis is used as a convenient starting point of investigation of the processes which generate stock prices and the distribution of return, in particular, independence, stationarity and normality.

CHAPTER V

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

V. 1. Statement of the Problem

The primary purpose of this study is to test the capital assets pricing model (CAPM) using Philippine stock market data. Under certain assumptions, the model hypothesizes a linear relationship between the return and risk (beta) of capital assets.

More specifically, this study, using the econometric will seek to answer the two following problems:

1. How is the portfolio selected in terms of :
   - 1.1. Rates of return of security (r_j;)
   - 1.2. Market rate of return (r_M;)
   - 1.3. Beta Risk (β_j;)
   - 1.4. Mean rate of return ($\bar{r}_j = \hat{\mu}_j$ and $\bar{r}_M$;)
2. How is portfolio theory and CAPM being utilized in the Philippine stock market in terms of the following variables:
   - 2.1. Monthly rates of return (r_{jt};)
   - 2.2. Variance of the rate of return [($\hat{\sigma}_{ij}$) or $\hat{\sigma}^2_j$;]
   - 2.3. Covariance of the rate of return of

security j with market rate of return $(\hat{\sigma}_{jM};)$

2.4. Weight of each security in market portfolio (w_j)

3. What are the perception of the respondents as to the effectiveness of the portfolio management in managing securities ?

4. Is there a significant difference on the perceptions of respondents as to the effectiveness of portfolio management in Philippine stock market ?

5. What is the future of the Philippine stock markets using portfolio management ?

V. 2. Null Hypothesis

Specifically, the hypotheses address the objectives stated above using the CAPM, by stating the explanatory variables as follows:

(1) rate of return of security.

(2) market rate of return.

(3) mean rate of return or average rate of return.

(4) variance of the rate of return.

(5) beta risk.

(6) covariance of the rate of return.

(7) systematic risk.

These variables will explain the determinants of the portfolio in Philippines stock market. Hence, the

main hypothesis:

1. There is positive correlation between risk and return and diversification of portfolio by using CAPM as the solution for reducing the risk.

2. Based on regression, equation of the form

$$r_j = \alpha_o + \alpha_1\beta_j + e_j$$

can be fitted and the testable hypothesis are whether the following relationships hold or not:

$$\hat{\alpha}_o \stackrel{?}{=} R_F \quad \text{and} \quad \hat{\alpha}_1 \stackrel{?}{=} (r_M - R_F).$$

SUB PROBLEM 1

How is portfolio selected in terms of:

1.1. Rate of return of security (r_j);

1.2. Market rate of return (r_M);

1.3. Beta risk (β_j);

1.4. Mean rate of return ($\bar{r}_j = \hat{\mu}_j$ and $\bar{r}_M$);

Modern portfolio theory is no mystical concept. It relies on simple and basic idea. Returns are measured in an intuitively logical way. They are simply the returns expected from an investment or portfolio (see equation 3.5).

These forecasts of returns are rarely perfectly accurate. Consequently, we need a means to measure "upside" potential and "downside" danger -- that is, the potential that returns may exceed our estimate and the

danger that returns may be less than we anticipate. In other words, we need a measure of how wrong our forecast may be.

One measure of forecast uncertainty is called variance. Variance measures the breadth of the distribution of expected returns from an investment. It is calculated on the basis of the squared deviations from the mean forecast. A second and more widely used measures of forecast uncertainty is the square root of variance, called the standard deviation. Variance and standard deviation are widely used measures of risk, and they are the measures used in modern portfolio theory for estimating the potential risk of making and investment.

The researcher gathered the data of the stock for 1991 and 1992 from Manila and Makati Stock Exchanges. Said data was computed by using LIMDEP software. The final research of the data could be seen in the Table 4.1; 4.2; 4.46; and table 4.3 to table 4.45.

Table 4.1 presents the computation results for rate of return of security (r_j) in column (3); column (4) presents market rate of return (r_M); beta risk (β_j) is presented in column (7); and mean rate of return ($\bar{r}_j = \bar{\mu}_j$ and $\bar{r}_M$) is presented in columns (8) and (9).

FINDINGS 1.1. Rate of return of security (r_j);

During the two-year period (1991 and 1992) the

highest rate of return of security in market porfolio was PT&T's 63.95891 and the lowest was KPPI's -1.62483. The range of return is from 63 to -1.62. The second highest rate of return of security is that of FPHC which is 59.38059, followed by AC's 22.57651, RFM's 18.62430 and REG's 14.15200.

For the blue chip share, returns during the period 1991 and 1992 were 2.96657 for PNB; PLDT 2.81610; AC 22.57651; SMC 11.22294 and MER 0.36864. When we compare these returns with those of the other shares, we find their returns much higher although the returns of some shares like FPHC, REG, RFM and BP were also high.

In the other hand, the lowest rate of return during that period was KPPI's -1.62483, followed by LC's -1.59231 CHINB's -1.57566, FLC's -0.60448, and AT's -0.55352.

The average rate of return of each group of portfolio differ from the other For Banks, for example the average rate of return (0.68112) is very much lower compared to Communication (18.53248); Investment and Finance/Holding Firms (24.17141) as well as Food, Beverages and Tobacco Product (14.92362). Comparing mining (2.80429) with oil (2.65711), however,the differences aren't that much.

For Banks, the highest rate of return is PNB 2.96657 and the lowest is CHINB -1.57566. In

Communication, PTT has the highest rate of return with 63.95891, while the lowest is GLO with 0.26042. Communication group has a relatively high rate of return of compared to the other groups of portfolio because communication is necessary infrastructure for economic activity to materialize.

In Investment and Finance/Holding Firms, FPHC has the highest rate of return with 59.38059, as well as AC with 22.57651. The lowest is SMFI-B with 0.57636.

For Food, Beverages and Tobacco Products, RFM and SMC have the highest rates of return with 18.62430 and 11.22294 respectively. FLC and KPPI in the group of Real Estate, on the other hand have negative market rates of return.

ALI-B's 3.29273; RLC-B's 2.78080; and POPI's 1.19050 are the highest for Real Estate group. The lowest are that of FLC's -0.60448 and KPPI's -1.62480. As for Mining and Oil the highest rates of return BP 13.40111 and PX 12.20218, while the lowest are OPM -0.29582, AT -0.55352 and LC -1.59231.

CONCLUSION 1.1

The average rate of return of Commercial and Industrial share is relatively higher compared to Mining and Oil; while between Mining and Oil, the difference is insignificant. When data are grouped according to

industrial classification, we can conclude that Investment and Finance/Holding Firms group and Communication group give the highest rate of return, followed by Food, Beverages and Tobacco Products; Cement; Oil and Mining.

The returns of blue chip share are much higher when we compare these returns with those of the other shares. Some returns in Bank, Food, Beverages and Tobacco Products, Oil and Mining are negative. Nevertheless, these shares are higher than the average rate of return in Commmercial and Industrial.

RECOMENDATION 1. 1

It is recommended that more investment should be made in commercial and industrial endeavours since the return of investment in the same is high. More specifically, more investments should be made in the group of Investment and Finance/Holding Firms and Communication and then on Food, Beverages and Tobacco Products. Investors should spread their portfolio in several securities to reduce risk.

FINDINGS 1.2. Market rate of return (r_M);

The market rate of return is the weighted rate of return of all of the securities in one period's rates of return, the weight of each security being given by its

total market value relative to the over-all market value of all securities.

From Table 4.1, one can see that the highest market rate of return is PT&T 13.79256 and the lowest is GLO -0.40924. The range between the highest market rate of return and the lowest is 13.70 to -0.40924. The second highest was FPHC 4.45871; the third, PX 1.06646; while the fourth and fifth were AC 1.05671 and BP 1.02689 respectively.

Aside from GLO -0.40924, the other low market rates of return was these of APX, OPM, LC and IRC, with returns of -0.04590; -0.09528; -0.09092 and -0.0737, respectively.

In accordance with the average market rate of return of each group portfolio, the market rate of return for Communication (3.54260) is a little bit higher compared to the other groups. Even compared to certain groups of portfolio that have negative market rate of return, this return is much higher. Compared with the rates Investment and Finance/Holding Firms and Food, Beverages and Tobacco Products, however, said market rate of return is not that much different.

The market rate of return for PNB in Bank is relatively higher compared to other banks. CHINB has negative market rate of return. For Communication, PTT has very good market rate of return with 13.79256. Some

of the shares in Investment and Finance/Holding Firms also have good market rate of return.

Both rate of return and market rates of return of securities are very important factors to be considered by investors in diversifying their portfolio in the stock market. More often than not, rational investors will always try to invest in the highest rate of return with lower risk. This investor's behavior is confirmed by beta risk of portfolio and weight of asset of their investments in market portfolio.

When one invests in market portfolio with the high rate of return, it will always follow that he has to contend with the highest beta risk. That is why, there is always trade off between return and risk.

CONCLUSION 1. 2

The pattern of the rate of return of securities is also followed by market rate of return. This could be seen from the portfolio return. During the 1991 and 1992 period, PTT had very good performance although GLO from the same group had lowest.

RECOMENDATION 1. 2

It is strongly recommended to investor to invest in shares with high market rate of return, most of which are in Bank, Communication, as well as Investment and

Finance/Holding Firms. For group portfolio, it is recommended that investment be made in Communication, especially PTT since one can expect high return from the same unlike GLO which is still undervalued and needs to do a lot catching up with PTT. Investment should also be made in the other groups like Investment and Finance/Holding Firms, since they give good market rate of return. Several shares, like PTT, AC, and FPHC, have very good market rate of return for that matter.

FINDINGS 1.3. Beta risk (b_j);

There are several properties of the CAPM which are important. First, in equilibrium, every asset must be priced so that its risk-asdjusted required rate of return falls exactly on the straight line of the security market line. This is true because not all of the variance of an asset's return is of concern to risk averse investors. In other words, investors can diversify away all risk except the risk of the economy as a whole, which is inescapable (undiversifiable). Consequently, the only risk which investors will pay a premium to avoid is covariance risk.

Therefore, the total risk of any individual asset can be partitioned into two parts: systematic risk (beta risk) which is measure of how the asset covaries with the economy, and unsystematic risk, which is independent of the economy.

The CAPM designates systematic risk as beta (β). The beta of the market is 1.0. Assets with less systematic risk (less volatility) than that of the market would have betas of less than 1.0; more risky assets would have betas in excess of 1.0.

Most of the beta in portfolio asset in this study is greater than 1. The five highest beta in this study, are: CHINB 54.78261, SJO 26.67788, AC 20.45894, MER 18.73404 and KPPI 15.80596. The lowest, on the other hand, are BCI 0.81432, SWM 0.59842, REG 0.52357, FPHC 1.47194 and URBAN 1.50113. The range between the highest and the lowest beta is 54.7 to 0.81. It means that all of the assets in market portfolio are risky.

Taking into consideration the beta risk by group, Banking (14.01491) and Real Estate (11.26379) have the highest beta risk. It means that investment in these portfolios is very risky. Communication (5.28657); Investment and Finance/Holding Firms (6.29337); Food, Beverages and Tobacco Products (5.91309); Oil (7.84265) and Mining (5.49190), likewise, have relatively high beta risk, though lower compared to the first two.

In Bank, there is no one share has negative return. However, there is also a share (CHINB) which has very large beta 54.78261. In Communication beta risk is relatively higher. PLDT has the highest of such risk among this group. In Investment and Finance/holding

Firms, AC has the high beta risk while REG has the lowest.

Several shares in Food, Beverages and Tobacco Products have big beta risk: namely, ALI-B, FLC, KPPI, POPI and RLC-B. All shares in Mining and Oil have high beta risk; the highest of which are those of SJO and LC.

CONCLUSION 1. 3

Most of the assets in market portfolio are risky, since most of the beta risks are greater than one, except for BCI 0.81432, SWM 0.59842, and REG 0.52357. In accordance with the grouped data, average beta risks for Banks, Real Estate and Mining are relatively higher compare to the others.

RECOMENDATION 1. 3

It is recommended that investors invest their porfolio in high rate return and relatively low risk. Several shares are strongly recommended like PTT, FPHC, and REG, since these shares give good return, and low risks. Shares with low return and high risk like CHINB should be avoided.

Investors must always be aware of the risk and return if they are going to invest their wealth in market portfolio. Since most of the investors don't know the behaviour of the market due to imperfect information, the

researcher recommends that they consult professional broker(s) to gain more and avoid losses.

It is also recommended that investors should look at possible risk before contemplating on the return. Investors should be reminded that good return does not necessarily mean low risk.

FINDINGS 1.4. Mean rate of return ($\bar{r}_j = \hat{m}_j$ and $\bar{r}_M$);

The highest mean rate of return of portfolio in this study is PT&T 6.83162; followed by those of FPHC, AC, APMC and RFM, with rates of 2.47419; 0.94069; 0.85614 and 0.77601 respectively. The lowest is ILI's -0.00770.

As to the shares by group, the highest mean rate of return is that of Communication which is 1.93745, followed by Investment and Finance/Holding Firms 1.00714. The remain group are relatively lower.

The mean rate of return in this study is like "the rate of return" in sub-problem 1. The difference is taken from the average of return during the 24 months to confirm the accurate rate of returns in sub-problem 1.

CONCLUSION. 1.4

The pattern of mean rate of return is the same as pattern of rate of return and market rate of return.

RECOMENDATION 1. 4

It is recommended that investment be made industry with high market rate of return but with low risk. For risk-aversed investors, to spread their portfolios in Communication, and Investment and Finance/Holding Firms or in any particular blue chips share where they are safe and have good returns, is strongly recommended.

SUB PROBLEM 2

How is portfolio theory and CAPM being utilized in the Philippine stock market in terms of the following variables:

2.1. Monthly rates of return (r_{jt});

2.2. Variance of the rate of return $[(\hat{\sigma}_{ij})$ or $(\hat{\sigma}^2_j)]$;

2.3. Covariance of the rate of return of security j with market rate of return $(\hat{\sigma}_{jM})$;

2.4. Weight of each security in market portfolio (w_j)

As to how portfolio theory and CAPM are being utilized in the Philippine stock market will be reflected from several variables in problems 1 and 2 above. That is why the computation of those variables are very crucial in this study.

How is portfolio theory and CAPM being utilized in the Philippine stock market and to understand the relationship between modern portfolio theory and tha CAPM, let us consider the process we must go through to

use modern portfolio techniques to calculate the risk of a portfolio. To do so, we must have standard deviation of every asset's expected returns, the correlation between the expected returns for every pair of assets, and the amount of each asset being held.

FINDINGS 2.1. Monthly rates of return (r_{jt});

Table 4.3 to table 4.45 show the monthly rates of return for 42 securities. The existence of zero entries in column rj is due to the absence of monthly trading, no dividends issued and/or no change in prices.

Monthly rate of return is another confirmation for rate of return in security (r_j) in sub-problem 1 and mean rate of return ($\bar{r}_j = \hat{m}_j$ and $\hat{r}_m$) in sub-problem 2. In this study, researcher find there is no contradiction among these variables.

CONCLUSION. 2.1

The monthly rate of return of securities in market portfolio follows the previous finding for rate of return, market rate of return and mean rate of return. But it should be borne in mind that good rate of return does not necessarily mean good monthly rate of return. Infact, during during monthly period, there were fluctuations of the price of shares affecting the total rate of return in the entire period (24 months).

RECOMENDATION 2. 1

It is also recommended that investors spread their portfolio in the shares with good monthly return like PNB, PTT, MB, AC, FPHC, REG, RFM and SMC. And for investor to take adventage for fluctuation of monthly price of share and also to anticipate the future price, they should always monitor any fluctuation.

FINDINGS 2.2. Variance of the rate of return

$[(\hat{\sigma}_{ij})$ or $(\hat{\sigma}^2_j)]$;

The variance of the market return is the expected squared deviation from the expected return. It is a measure of variability. In general the highest variance of market return, as shown in Table 4.1, is PT&T 4.94994, followed by URBAN 1.61249, AC 1.21470, BP 0.87450 and FPHC 0.49287. The lowest is KPSI 0.00009, followed by CHINB 0.00055; SOLID 0.00258; AT 0.00289 and POPI 0.00393.

When we look each group, we find that Communication has the highest variance with 1.25600, followed by Investment and Finance/Holding Firms group, 0.43351; Banks 0.36719; Food, Beverages and Tobacco Products 0.17125; and Oil group, 0.12567. In Bank the highest variance is URBAN, while Communication it is PTT. In investment and Finance/Holding Firms, the highest variance is AC 1.21470 which the lowest is SMFI-B

0.01114. In Food, Beverages and Tobacco Products, RFM has the highest variance while POPI has the lowest.

In Oil and Mining, BP and PX have the highest variances with 0.87450 and 0.05260, respectively.

CONCLUSION 2. 2

High variances are seen in Commercial and Industrial shares, followed by Mining and Oil. As for Bank and Communication, variances of URBAN and PTT are relatively bigger, in contrast with those of Oil and Mining which are smaller.

Communication has the highest variance according to group, followed by Investment and and Finance/Holding Firms group, Banks, Food, Beverages and Tobacco Products and Oil group.

RECOMMENDATION 2. 2

For investors it is recommended that they invest in shares with small variance, for such reflect the variability of the securities.

FINDINGS 2.3. Covariance of the rate of return of security j with market rate of return ($\hat{\sigma}_{jM}$);

Covariance is a statistical measure of how two random variables, such as the returns on securities i and

j, "move together". A positive value for covariance indicates that the securities return tend to go together. A negative covariance indicates a tendency for the returns to offset one another. A relatively small or zero value for the covariance indicates that there is little or no relationship between the returns for the two securities. In this study, all of covariance are positive, and the highest and the lowest are AC 24.85156 and KPSI 0.00015 respectively. It also mean that the movement of one security will influence the others.

As to the finding by group, Investment and Finance/Holding Firms has the highest covariance which is 6.39661, followed by Communication, 4.94962. Banks; Food, Beveages and Tobacco Products; Oil and Share have covariances of 0.59919, 0.11978, 0.93887 and 0.10540, respectively.

The biggest covariance in Bank is that of URBAN, while the smallest is that of SOLID. In Communication, PTT has the biggest covariance; in Investment and Finance/Holding Firms, AC; and in Food, Beverages and Tobacco Products, RFM. For Mining and Oil, BP and PX have the biggest covariances, while VUL and AT have the smallest.

CONCLUSION 2. 3

In this study, all of the covariances are positive.

It means that security returns tend to move together with strong relation with one another.

RECOMENDATION 2. 3

For investors, it is recommended that they invest and diversify their portfolio in the positive covariance with high rate of return. However, awareness on the fluctuation of market should be closely observed. Positive covariance indicates that securities tend to move together. If they invest in positive covariance with good return, investors can expect that their portfolio will gain good return.

FINDINGS 2.4. The weight of each security in market portfolio (w_j)

The weight of security in market portfolio can be a measure of the wealth invested in market portfolio at a certain time. In general, the investor prefers to invest more in commercial and industrial venture. It is indicated by the weight of Commercial and Industrial share which is 0.89200 as well as the average weight which is 0.89386. For Oil share and Mining share, the weights are only 0.09809 and 0.00991 respectively.

And if look at average group of these shares we can see that the average weight of Real Estate is the highest 0.04972 and followed by Communication 0.03840. The other

group like Bank, Investment and Finance/Holding Firms, Food, bevewrages and Tobacco Product, Oil and Mining only give everage weight 0.03840, 0.01285, 0.02694, 0.01226 and 0.00991 respectively.

CONCLUSION 2. 4

Most of investors invest in Commercial and Industrial share rather than in mining and oil during the period 1991 and 1992. In addition, more investments were made on the Real Estate and Communication. Such could be attributed to changes in several variables like economy, politics, among others.

RECOMENDATION 2. 4

It is also recommended that investors invest more in commercial and industrial issues especially in Real Estate and Communication since the return of investment therewith are much higher. Investors should also spread their portfolio in several securities to reduce risk, preferably to Bank as well as Food, Beverages and Tobacco Products since these groups of shares give good return, as seen from the weights of average of these groups which are good enough though little bit lower compared to Real Estate and Communication.

SUB-PROBLEM 3

What are the perceptions of the respondents as to the effectiveness of the portfolio management in managing securities ?

The perception of the respondents as to the effectiveness of the portfolio in managing secutities could be classified in the following criterion:

FINDINGS.3

1. The way they manage portfolio in the Philippines stock market.

All respondents answered (YES), when researcher asked the effectiveness of the way they manage the portfolio. Some of the reasons given are the following:

a. Our approach assumes the fund as inverted for long time; the performance has been fairly good;

b. Our porfolio has outperformaned the market by 8.42 % and 4.79 % ;

c. Most of stock selected have established good earning track record (except for mines and C-IS) and deep management bench;

d. We can not say it is really effective because there are many reasons or factors why these issues are going up and down.

2. The way they select combination of portfolio in the stock market in terms of rate of return and risk

involved.

Based on the above answers, 7 out of 12 respondents or 58.33 % selected the portfolio with highest return and moderate risk; and 41.67 % or 5 respondents selected the portfolio with the moderate return and moderate risk.

3. The way they predict the high or low return as well as the high or low risk of share in the market.

All of the respondents have done the same by looking at combination of (a), (b), (c), and (d), plus several additional factors, like management style, vision, price-earning (P/E) ratio, cash flow, debt equity ratio, earning forecast and historical fund.

4. The combination of portfolio the investors would like to choose to reduce risk can be seen in Table 4.48.

CONCLUSION.3

As far as how the respondents manage their portfolio effectively, 7 out of 12 respondents or 58.33 % selected the portfolio with highest return and moderate risk and 41.67 % or 5 respondents selected their portfolio with the moderate return and moderate risk. The way the respondents predict return and risk, consideration is made on the demand and supply of share, price of share, certain economic and political factors.

Most of the investors invested the biggest part of their wealth in Commercial and Industrial to reduce risk and to gain higher returns.

RECOMENDATION 3

Is is suggested that investors should always observe risk and return if they are to invest in market portfolio; that they don't forget several variables like political and economic environment.

SUB-PROBLEM 4

Is there a significant difference on the perceptions of respondents as to the effectiveness of portfolio management in Philippine stock market ?

FINDINGS 4

Based on Tables 4.1; 4.2; 4.46; 4.47; 4.48; 4.49 and 4.50, it can be concluded that there was no significant difference on the perceptions of the respondents as to the effectiveness of portfolio management in the Philippines stock market. From the Table 4.46, as the response to the question of the way they select the combination of portfolio, all of the respondents answer was "highest return and moderate risk" and "moderate return and moderate risk". The difference between the former and the latter is very slight (16.66

% with or only two respondents answering more on "hihgest return and moderate risk".

This perception was supported by the other facts on Table 4.47. which the respondents would predict risk and return based on combination of several factors, namely: by looking at demand and supply of the share, by looking at price of the share, and by looking at the certain economic factor. All of respondents (100 % preferred the combination of several factors the researchers mentioned above.

Another important fact can be found from Table 4.48. as to the percentages of combination of portfolio the investors would like to choose to reduce risk in the stock market. Most of them gave more weight on commercial and industrial share, followed by "oil share" and "mining share," respectively.

CONCLUSION 4

There are no significant differences on the perceptions of the respondents as to the effectiveness of portfolio in the Philippines stock market.

RECOMENDATION 4

It is also recommended that the investors maintain effective management of their portfolio. They should always review and up date their information and ability

from time to time, in as much as the environment is changing very fast.

SUB-PROBLEM 5

What is the future of the Philippine stock markets using portfolio management ?

FINDINGS.5

To answer this problem reseacher provided 4 possible answers in the questionnaire:

1. will be better due to economic and political stability
2. for the first 3 years there would not be much change due to brown out problem, but after this problem is overcome, it would be better
3. CAMP and APT will be much employed
4. combination of (1), (2) and (3).

Most of respondents (67 percent) answered (4) combination of (1); (2) and (3). The next (34 percent) (1). But some of them added several answers. For instance, one said that "management portfolio in the future of the Philippines stock market has big potential; this is especially true during the times when interest rates are going down". Another opened that "the stock market develops and introduces more stocks (other products) into the market, more inventible funds will find its way into it. This will prvide a broader orientation for portfolio managers into equity

investments".

CONCLUSION. 5

Most of respondents (67 percent) answered (4) or combination of (1); (2) and (3), e.i., will be better due to economic and political stability; for the first years there would not be much changes due to brown out problem, but after this problem is overcome it would be better; CAMP and APT will be much employed.

RECOMENDATION 5

CAPM will be much employed in the future. In fact, this tool is already employed in the big markets in the USA. The Philippine market will expand greatly in the future. At this early, therefore, due to the lack of understanding about CAPM, the researcher recommends that more studies about the same should be done so it will be more appreciated.

And if the investors use CAPM, they must pay more attention to beta risk and covariance to see the risk involved as well as return of their porfolio.

This recomendation is supported by the results of the tests for annual periods which do not confirm the hypothesized positive linear relationship between r_j and β_j. For the year 1991, the hypothesis is rejected at .01 level and for the year 1992, though the result is

significant, the relationship is perverse in the sense that the sign of $\hat{\alpha}_1$ is negative.

6. Results of the Tests of the CAPM

Initially, the CAPM was tested using the data over 24 month period for the total of 42 securities. The result of the regression analysing using ordinary least squares is insignificant.

The observation made regarding a highly volatile market indicates the possibility of significant differences in market behaviour between calendar years. Besides, the parameters of the probability distributions of the rates of return of securities may not be stationary over the 24 month period. To be able to take into account these possibilities, tests were made for the annual periods.

The results of the tests using annual data show some level of improvement over the results of the test of the 2 year period. For instance, the variations explained by the beta increased from 0.4 % to 1 % up to 14 %.

On the whole, however, the results of the tests for the annual periods do not confirm the hypothesized positive linear relationship between r_j dan β_j. However, only 11 percent of the variation is explained by the regression. For the years 1991 the hypothesis is rejected at 0.10 level. For the year 1992, though the result is

significant, the relationship is perverse in the sense that the sign of $\hat{\alpha}_1$ is negative. For ease in making comparison, the results of the tests for the 1991 and 1992 period as well as the annual periods are shown in Table 4.50.

Also, the values of the estimates of the intercept α_0 and R_F are seen to be different from each other. Row (7) of the Tabel 4.50 shows the ratio of $\hat{\alpha}_o$ to $\hat{R}_F$ which range from -0.04 to 2.5. The prediction of the model is that the ratio should be equal to 1.0. Row (8) of Table 4.50 shows the estimates of the t statistic for the tests of equality between $\hat{\alpha}_1$ and $(\hat{r}_M - \hat{r}_F)$. The null hypothesis of equality is rejected for all periods.

Thus, the hypothesized relationship (3.6a) and (3.6b) cannot be accepted and the theoretical predictions of the CAPM are not substantiated by the data.

However, there is another source of ambiquity in the preceding test results which is not taken into account. This arises from the empirical assumption that the beta risks are stationary. Stationarity implies that the parameters of the probability distribution are constant at least for the time period covered by the data. Each β_j is a function of r_j and σ_{kj}. A stationary β_j therefore implies that the underlying probability distributions of securities rates of return are stationary.

For the Philippine stock market, this assumption of stationarity of the betas may not be valid. The test results of the CAPM may indirectly show the possible non-stationarity of the beta risks. For instance, in Table 4.50, the R^2 or F-values for the two-year period (1991 and 1992) are much smaller than those of the annual periods. For example, the lowest value of R^2 for the annual periods is 0.01071.

Since the beta is a function of the probability distribution of securities rates of return, the need to look into the stationarity assumption of the betas requires investigation into the nature of these probability distributions. Moreover, studies in the U.S. show that the behavior of the stock prices could be well approximated by a random walk. This means that the market is efficient and current prices fully reflect available and relevant information. This may not be true in the case of the Philippne stock market. The random walk hypothesis is used as a convenient starting point of investigation of the processes which generate stock prices and the distribution of return, in particular: independence, stationarity and normality.

CONCLUSION.6

The hypothesized relationship (3.6a) and (3.6b) cannot be accepted and the theoretical predictions of the

CAPM are not substantiated by the data.

RECOMENDATION 6

If investors are going to use CAPM to predict return and risk of their portfolio, they must be accompanied by other types of prediction since CAPM does not give a total or satisfactory answer, and that the CAPM test regression analysis, using Ordinary Least Squares (OLS), produced insignificant result.

This recomendation is supported by the results of the tests for annual periods which do not confirm the hypothesized positive linear relationship between r_j and β_j. For the year 1991, the hypothesis is rejected at .01 level and for the year 1992, though the result is significant, the relationship is perverse in the sense that the sign of $\hat{\alpha}_1$ is negative.

Researcher also recomends that investor or broker who has research capabilities should always update his estimation about risk and return of the portfolio by using CAPM among others, since market behaviour is always changing due to changes in ceratin environment, like economy, political and interest rate, in order to make hsi estimation and prediction much closer. So far there is no tool or method or any instrument in the world that can be used to predict exactly what will happen in the stock market in the future.

Furthermore the researcher recommends that further studies using CAPM should relax the assumption that investor are price taker and have homogenous expectation about asset returns; investor may borrow and lend unlimited amount at the risk free rate; quantity of assets are fixed; all assets are marketable; asset markets are frictionless and information is costless and available to all investors; and there are no market imperfections such as taxes, regulations, or restrictions on short selling; to come up with better and more accurate prediction.

Also recommended are several titles for further studies:

1. Testing the CAPM with Time-Varying Risks and Returns in Philippine Setting.
2. CAPM, Market Behaviour and Portfolio Analysis, Test in the Philippine Stock Market.
3. An Alternative Test of the CAPM for Philippine Stock Exchange.

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APPENDIX A

September 17, 1993

TO WHOM IT MAY CONCERN:

This is to certify that MR. MASFAR GAZALI is a student of the University of Santo Tomas Graduate School under the Master of Business Administration program. He/She is currently doing research work for his/her thesis/ dissertation proposal entitled "Evaluation Of Portfolio Theory And Tests Of Capital Asset Pricing Model (CAPM) - The Philippine Stock Markets - An Assessment".

He/She would like to seek your permission to allow him/her to distribute questionnaires and conduct interview in your institution/company.

We would appreciate very much whatever assistance you can extend to him/her in this regard.

MAGDALENA A. VILLABA, Ph.D.
D e a n

/cynthia

APPENDIX B
QUESTIONNAIRE

PORTFOLIO MANAGEMENT
IN THE PHILIPPINE STOCK MARKET USING
THE CAPITAL ASSET PRICING MODEL (CAPM)

Survey Questionnaire

Please answer all of these questions in this questionnaire by putting check mark in the space provide and fill up the blank space. All information gather through this question will be used for academic purpose only.

1. Name of the company: _____

2. Position of respondent in the company: _____

3. How many years you are engage in the stock market
   ( ) 1 - 5 years
   ( ) 6 - 10 years
   ( ) 11 - 15 years
   ( ) 16 - 20 years
   ( ) > 20 years

4. How do you select portfolio in the stock market in terms of rate of return and risk:

   a. will choose highest of return and moderate risk
   b. will choose moderate of return and moderate risk
   c. will choose lower return and lowest risk
   d. will spread among a, b, and c

if your answer is d, please specifyed your combination in term of percentage: _____

5. How do you predict the high or low of return and the high or low of risk of share in the market

   a. by looking at demand and supply of the share
   b. by looking at price of the share
   c. by looking at the certain economic fluctuation
   d. by looking at the certain political situation
   e. by looking at any combination of a, b, c, and d (please specify _____)
   f. others factor (please specify)

   _____

6. Regarding question number (4) and (5), what combination portfolio would you like to select to reduce risk in terms of the following listed share:

Share of Stock	Percentage		
	1991	1992	
a. Commercial and industrial shares	_____	_____	%
b. Mining share	_____	_____	%
c. Oil share	_____	_____	%
	100	100	%

For item (a) Commercial and industrial share:

	1991	1992	
Banks			
1. Bank of the P.I	_____	_____	%
2. City Trust Bank	_____	_____	%
3. PNB	_____	_____	%
4. Solid Bank	_____	_____	%
5. Union Bank	_____	_____	%
6. China Bank	_____	_____	%
Communication			
7. ABS-CBN Broadcasting	_____	_____	%
8. Globe Madkey A	_____	_____	%
9. PT&T A	_____	_____	%
10. PT&T B	_____	_____	%
11. PLDT. Com	_____	_____	%
12. Manila Bulletin	_____	_____	%

Investment and Finance/Holdings Firms

13. Ayala Corporation A _____ _____ %
14. Ayala Corporation B _____ _____ %
15. AGPI-A _____ _____ %
16. Anscor-A _____ _____ %
17. First Holding A _____ _____ %
18. First Holding B _____ _____ %
19. Republic Glass A _____ _____ %
20. SM Fund Inc B _____ _____ %
21. House of Investment xc _____ _____ %

Food, Beverages & Tobacco Products

22. RFM Corporation _____ %
23. San Miguel Corp A xs _____ _____ %
24. San Miguel Corp B xs _____ _____ %

Real Estate

25. Ayala Land Inc B _____ _____ %
26. Cebu Property A _____ _____ %
27. First Lepanto Corp A _____ _____ %
28. First Lepanto Corp B _____ _____ %
29. Kuok Properties A _____ _____ %
30. Phil Orion A _____ _____ %
31. Phil Orion B _____ _____ %
32. Robinson Land B _____ _____ %
33. Phil Realty A _____ _____ %
34. Shangrila Properties _____ _____ %
35. Belle Resources _____ _____ %
36. Belle Resources B _____ _____ %

Utility

37. Meralco A _____ _____ %
38. Meralco B _____ _____ %

Cement

39. Bacnotan Cons _____ _____ %

Ceramics, Tiles, Glass & Allied Products

40. Saniwares Mfg Corp _____ _____ %

Chemicals & Allied Products

41. Interphil Lab A _____ _____ %
42. Interphil Lab B _____ _____ %

Construction

43. Engineering Equipment _____ _____ %

Electronic & Allied Products

44. Sazlec Phils _____ _____ %
45. MEPCO _____ _____ %

Hotel, Recreation and other services

46. Grand Plaza Hotel Corp _____ _____ %

Paper and Allied Products

47. PICOP A _____ _____ %

Rubber and Allied Products

48. Sime Darby Pilippines _____ _____ %

Shipbuilding & Repair

49. Keppel Phils _____ _____ %
50. Keppel Phils B _____ _____ %

Textile and Other Product

51. Filsyn Corp _____ _____ %

Trading

52. Metro Drug Inc A _____ _____ %
53. Metro Drug Inc B _____ _____ %

Transfortation & Storage

54. Int'l Container xc _____ _____ %

For item (b) Mining Share

Mining --- Big Board

55. Apex Mining A _____ _____ %
56. Apex Mining B _____ _____ %
57. Benguet Corp A _____ _____ %
58. Atlas Cons A _____ _____ %
59. Dizon Mines _____ _____ %
60. Lepanto Cons A _____ _____ %
61. Lepanto Cons B _____ _____ %
62. Philex Mining A _____ _____ %
63. Philex Mining B _____ _____ %
64. Surigao Cons A _____ _____ %

Oil			
65. Basic Petroleum A	____	____	%
66. Basic Petroleum B	____	____	%
67. Oriental Pet A	____	____	%
68. Oriental Pet B	____	____	%
69. Philodrill Corp A	____	____	%
70. Philodrill Corp B	____	____	%
71. Seafront Pet A	____	____	%
72. Trans Asia Oil	____	____	%
Mining --- Small Board			
73. Manila Mining xc	____	____	%
74. Manila Mining B xc	____	____	%
75. Omico Mining	____	____	%
Oil			
76. Alcorn Petro A	____	____	%
77. Alcorn Petro B	____	____	%
78. Anglo Phil Oil	____	____	%
79. Balabac Oil A	____	____	%
80. Balabac Oil B	____	____	%
81. Interport Res A	____	____	%
82. Interport Res B	____	____	%
83. Palawan Oil	____	____	%
84. Petrofields A	____	____	%
85. Petrofields B	____	____	%
86. Republic Resources A	____	____	%
87. San Jose Oil	____	____	%
88. Terra Grande Oil	____	____	%
89. Unioil Explo A	____	____	%
90. Vulcan Ind'l & Mng	____	____	%
T o t a l	100 %	100 %	

7. Do you think the way you manage your portfolio in the Philippines stock market is effective:
   a. yes
   b. No

if your answer either (a) or (b), please give the reason:

_____

_____

_____

8. How do you think management portfolio in the future of the Philippines stock market (Please specify your answer):

1. ( ) will be better due to economic and political stability

2. ( ) for the first 3 years it would not much changing due to brown out problem, but after this problem is overcome it would be better

3. ( ) CAPM and APT will be much employed

4. ( ) combination of (1); (2); and (3)

End of Questionnaire

APPENDIX C

List of Respondents

No	Name of the Company	Position Level
1	B. H. Chua Sec. Corp	Trader
2	Century Securities. Corp	Trader
3	Citicorp Vickers Phils., Inc	Vice President
4	EBC Sec. Corp	Vice President
5	HG Asia Securities (Phils) Inc	Analyst
6	I. Ackerman & Co. Inc	President
7	Morgan Grenfell Phils Sec. Inc	Trader
8	Peregrine Securities	Analyst
9	Philippine Asia Equity Sec	President
10	Public Sec. Corp	Trader
11	Sapphire Securities, Inc	President
12	Sun Hung Kai Securities	Vice President

BIO-DATA

N a m e	:	Masfar Gazali
Sex	:	M a l e
Place/Date of Birth	:	Air Tiris, Riau, Indonesia July 31, 1964
Citizenship	:	Indonesia
R e l i g i o n	:	I s l a m
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EDUCATION

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Graduate School - University of Santo Tomas
MBA Program

1990 - 1992
School of Economics - University of the Philippines
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1988 - 1989
Department of Economics,
International Institute for Population and Sciences
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1987 - 1988
Department of Economics - Graduate
School - Uiversity of Indonesia -
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1981 - 1986
Department of Economics - University
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TRAINNING

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Financial Analysis - Ateneo-BAP
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Ateneo Graduate School of Business
-- Business Leadership Programs
Division - Manila

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The Philippine Stock Market -
Development Center for Finance and
FINEX - Manila

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Training in Stock Market - College of
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of the Philippines - Diliman

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Stock Market Fundamental Analysis -
Manila

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Mathematics for Financial Markets -
Euromoney Training Courses - Manila

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Internship in International Finance
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Training in Health Economics (Prof. Mark Phitt,
Dept of Economics, University of Minnesota, USA)
at the IUC University of Indonesia
Jakarta

September 1989
Training in Urban and Regional Economics
(Prof. T. John Kim, Dept ofEconomics, University of
Illinois,USA and Prof. Stan Szamansky, Dept ofEconomics,
Cornell University, USA)at the IUC University of
Indonesia -Jakarta

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Training in Demography at Demography
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WORKING EXPERIENCE

1987 - 1990
Lecturer, Dept of Economics,
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1986 - 1987
Lecturer, Dept of Economics, Lancang Kuning University, Pekanbaru - Riau

1984 - 1990
Research Associate, Center for Development Studies (CDS), Bangkinang, Riau - Indonesia

1978 - 1984
Enterpreneur, Managed family owned business

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The Role of regional Trade Blocs and Selected Asian Countries in World Trade (Dr. Jacques Pelkmans, Center for European Policy Studies)

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Labor Force and Education System in Indonesia - Indonesian Embassy, Manila

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International Trade and Philippine Development (Prof. Paul Krugman, Dept of Economics MIT, USA) - Manila

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Prospect of Indonesian Economy - IUC Jakarta

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Economy Growth and Labor Force in Indonesia - University of Indonesia Jakarta

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