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RISK AND RETURN ANALYSIS OF STOCKS LISTED ON THE KUALA LUMPUR STOCK EXCHANGE'S (KLSE) SECOND BOARD.

AHMAD ZAIRIN BIN ISMAIL

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University Putra Malaysia

Abstract

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by

Ahmad Zainn Bin Ismail

Supervisor:

Associate Professor Dr. Shamsher Mohamad
Department of Accounting and Finance

Investors prefer to invest in securities or portfolios that can give them predictable expected return to their investment. Other than the average return, the standard deviation and the coefficient of variation measures how the values are spread out. This statistics indicate investment risk with respect to the portfolio formation method. The findings are consistent to previous findings which suggest that securities with higher risk tend to have higher returns as compared to the lower risk securities. The findings show that risk diversification is achieved through portfolio formation. Portfolio beta, average return, standard deviation and coefficient of variation are relatively constant , irrespective of the method of portfolio formation .

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CHAPTER 1

1.0 INTRODUCTION

Investing in a stock exchange's securities relates to the concept of risk and return. The investor always has to consider the degree of risk involved in an investment decision irrespective of its returns. The relationship between the risk and its related return in a security is an important guidance for the investor in his investment decision.

The expected return on an investment decision depend very much on the investor's tolerance towards risk itself. The return on the investment with respect to the risk involved also plays an important factor for an investor's decision.

Market risk factor or known as beta can be measured by regressing the returns of the stocks with respect to KLSE Composite Index (KLCI) representing the market. The risk and return relationship of the stocks in the second board and the market performance can be analyzed by using beta .

The ability to measure and predict risk and its related return will help potential investors to tailor their investment according to their expected return and tolerance towards risk.

Portfolio formation is a method used for diversifying unique risk. in an investment. Various strategies can be adopted for stocks selection for a portfolio. First the investor must identify his investment goals, then the selection of the stocks that fit his portfolio. This require the investors to establish his priorities and define his acceptable risk level. It all depend on the investment goals of the investor himself.

1.1 RETURNS

Return on an investment comprise the dividends and price changes. Dividends are periodic cash receipt on an investment. Price changes is capital gain or loss due to appreciation or depreciation in the value of stock's price.

1.2 RISK

Risk is the potential variability in future cash flows. The wider the range of possible events can occur, the greater the risk. Risk thus can be defined as the variability of anticipated returns as measured by the standard deviation.

Risk in an investment consists of two components: (1) unsystematic risk (firm specific or company unique risk) and (2) systematic risk (market related risk). It can be represented as follows:

Total Risk = Systematic Risk + Unsystematic Risk

Market related risk or systematic risk is very much dependence on the environmental factors that are affecting all the stocks. Changes in the general economy, major political events, and sociological changes are some examples that will influence the return on investment. Hence market related risk is a common risk for all the securities. However risk free assets securities such as government bonds are not affected by such risk.

Unsystematic risk also known as diversifiable risk. The reduction occurs because the unique variability of a single stocks tends to be countered by the uniqueness of another security. Thus the holding of a sufficient number of stock in a portfolio can eliminate such risk.

1.3 RISK PER UNIT OF RETURN

Risk per unit of return is defined as ratio of the standard deviation to the expected return. It is called a risk - to - reward ratio because it shows the amount of risk per unit of return.

The usage of this tool as a better risk statistics in comparing investments with different rate of return. This will help investors to choose investment that will fit their investment goals.

1.4 OBJECTIVE OF STUDY

Objectives of this project are:-

1) To measure the relationship between the risk and return of stocks on KLSE's Second Board.

2) To construct portfolios base on certain defined criteria and analyze the resulting risk and return as a result of the adopted strategy.

CHAPTER 2

2.0 LITERATURE REVIEW

Previous studies by researchers on the risk and return of an investment were base on the need of maximizing return with minimal risk for a given investment. The availability of the risk measuring tools have make the studies on stocks or portfolio performances possible.

Elton and Gruber (1977) investigated on the relationship between risk and the number of stocks in a portfolio. The findings shows that 51 percent of a portfolio standard deviation is eliminated as diversification increases from 1 to 10. Adding 10 more securities eliminates an additional 5 percent of the standard deviation. Increasing the number of securities to 30 eliminates only an additional 2 percent of the standard deviation.

Banz (1981) researched on empirical relationship between returns and market value of common stocks on the NYSE for period of 1926-1975. It was found that small firm has higher risk adjusted return compared to big size firms.

James and Edmister (1984) explores the relationship among common stock returns, market capitalization and trading activity. The results shows that differences in trading activity do not appear to fully explain the existence of a firm size effect.

Hsu's (1984) findings revealed the shift in market return variability and explain the possible causes and nature of the shifts. The empirical finding established shows that , stock market risk is not stationary. It reflect the general investment climate and the influences of special political-economic events.

Reichenstein's (1987) finding demonstrates that, for a given portfolio, traditional financial risk measures become less representative as the investment horizon increases. A corollary is that the riskiness of a portfolio depends upon the length of the investment horizon.

Speidell, Miller and Ullman (1989) study on the portfolio optimization. A procedure for measuring and controlling risk and expected return. The risk were measured relative to the index the client uses as a performance benchmark e.g. S&P 500. The degree to which the actual portfolio differs from the benchmark determines the portfolio's risk.

Shamsher and Anuar (1994) studied the stability of beta of 148 firms listed on the KLSE. The findings suggest that the beta of both individual securities and portfolios are quite stationary overtime. Hence investors can reliably utilise estimated individual security and portfolio betas for their portfolio selection and investment decisions.

CHAPTER 3

3.0 DATA ANALYSIS AND METHDOLOGY

The main data used in this study were the closing prices of the last day of the month. A total of 100 selected stocks traded on KLSE 2nd Board were selected for study from January 1995 up to December 1996.

The stocks were selected randomly. The criteria used is that the stocks should be free from discontinuous listing.

Monthly returns were calculated after adjustment for capitalization changes using the following formula:

$$R_i = (P_t - P_{t-1}) / (P_{t-1})$$

where: R_i is the return on the individual stock

P_t is the price in time period t

P_{t-1} is the price in time t-1

The risk measured for the individual stocks or portfolio shall be measured relative to the KLSE Commodity Index (CI) as a performance benchmark. It will be used for the computation of the individual stocks market beta. The returns on the CI were computed as follows:

$$R_{m,t} = (CI_t - CI_{t-1}) / CI_{t-1}$$

Where: $R_{m,t}$ is the return on the CI

C_{it} is the CI in time period t

C_{it-1} is the CI in period t-1

To measure for the expected return of the stocks or portfolio, Capital Asset pricing Model (CAPM) was used as a model. The relationship is as follows:

$$R_i = R_f + \beta_i (R_m - R_f)$$

Where: R_i is the return on the individual stocks

R_f is the risk free rate

R_m is the returns of the market

β_i is the market risk of the stock

The empirical model of the Capital Asset Pricing Model (CAPM) is use to analyze relationship between risk and return of stocks. Since returns do not depend on total risk, rather they depend only on market risk on a portfolio context. Thus the relationship between expected return and beta can be represented as follows:

$$R = \alpha + \beta (R_m)$$

where: R is expected return on each stocks or portfolio

α is the expected return at β equal to zero. It is the interception of Security Market Line at Y-axis

R_m is the returns of the market represented by the CI

β is the market risk of the stock or portfolio.

3.1 AVERAGE RETURN , R

The average return for each stocks or portfolio were calculated by summing up n number of returns with n number of data. The equation is follows:

$$R = (\Sigma R_t)\ t=1,2,\ldots n/n$$

Where: R_t is the return of stock

R is the average return of the stock

n is the number of months

3.2 BETA ,β

Market risk is price fluctuation caused by fluctuation in the overall market. The average movement in the stock price of a stock in response to a movement in the general market. The slope of the characteristics line , which is called Beta, is a measure of a stock's systematic or market risk. The beta for a stock or a portfolio measures the average change in the return on the stock for a unit change in the return on the CI. It reflects the volatility of a stock relative to the composite Index. It can be represented as follows:

From zero to 1.0: a stock/ portfolio with less return variability than the market; the lower the number, the less the variability and the less risky the stock

Equal to 1.0: a stock with variability and price risk equal to the market's.

Greater than 1.0: a stock with greater return variability than the market; the higher the number, the greater the variability and the riskier the stock

3.3 STANDARD DEVIATION, σ

The standard deviation is a measure of volatility of the returns. The smaller the value of the standard deviation, the smaller the risk associated for that particular stock or portfolio. In general diversification of portfolio will lead to a reduction in unsystematic risk.

The formula for standard deviation is as shown below:

$$\sigma_i = \sqrt{\{\sum_{t=1}^{n} (R_t - R_m)^2 \; t=1,2 \ldots .n. /(n-1)\}}$$

Where : σ_i is the standard deviation of the return of the stock

R_t is the return on the stock

R is the average return of the stock

n is the number of period t

Standard deviation of CI is a measure of volatility of the returns of CI with time. The formula is as follows:

$$\sigma_m = \sqrt{\{\sum_{t=i}^{n} (R_{m,t} - R) \; t=1,2 \ldots .n. /(n-1)\}}$$

Where : σ_m is the standard deviation of the return of the CI

$R_{m,t}$ is the return of CI

R_m is the average return of CI

n is the number of period

3.5 CORRELATION COEFFICIENT, ρ

Correlation is the extent to which two variables move together. In our case, we are using this statistical tool to determine the degree of correlation between the CI and the stock price . Correlation run from +1 (when two securities have always moved in the same direction) to -1 (when they have moved in the opposite direction). A zero correlation means that their movements is completely independent of each other. The formula used is as follows:

$$\rho_{i,m} = \beta_i . (\sigma_m / \sigma_i)$$

Where: ρ_{im} is the correlation coefficient

β_i is the market risk of the stock

σ_i is the standard deviation of the return of the stock

σ_m is the standard deviation of the return of the CI index.

3.6 PORTFOLIO CONSTRUCTION

Portfolio construction shall be formed using two main strategies:

1) Naïve portfolio. It is called naïve in the sense that the selection of stocks for the portfolio formation is at random. No specific criteria adopted.

2) Designed portfolio. First the stocks shall be selected based on a predetermined criteria. Next the stocks will be subjected to a ranking procedure before selected for portfolio formation.

Portfolio construction criteria:

1. Beta,β

Ranking of stocks base on risk level.

a) Ranking according to β_i value.

b) Grouping according to top 30 (high risk)

and least 30 (low risk) beta value.

2. Book Value

Ranking of stocks according to net worthiness of a stock. It relates the firm's total assets excess over total liabilities.

a) Calculation of book value.

b) Ranking according to book value

c) Grouping into top 30 and least 30 of book values.

3. Market Capitalization

Ranking of stocks base on firm size.

a) Calculation of market capitalization for individual firms.

b) Ranking according to market capitalization

c) Grouping into strong (top 30) and weak (least 30) capitalization.

4 Sectors

Classification of stocks base on business activities.

Data used for the calculation of book value is derived from the firms financial statement.

Data used for the calculation of market capitalization is extract from Investor Digest , March 1997 issue.

CHAPTER 4

4.0 FINDINGS

4.1 INDIVIDUAL STOCKS

Table 1A

An analysis of individual stocks.

	CI	Minimum	Maximum
Avg Return	0.015	(0.002)	0.210
Std.Deviation	0.045	0.084	0.709
CV	3.028	(58.608)	545.6
Beta		(1.499)	4.346
C.Coeff		(0.213)	0.693

Table 1A shows the overall result of the analysis on the 100 selected stocks of the KLSE second board.

Beta or market risk of the individual stocks ranges from -1.499 up to a maximum of 4.346. Negative beta indicates that some of the stocks are negatively correlated to the market benchmark , Composite Index (CI).

Standard deviation (σ) for individual stock ranges from 0.084 to 0.709. Comparing the extremes of the stocks standard deviations to the CI indicates that the stocks are much more volatile than the CI.

Average return ranges from -0.002 to 0.210. Only one stock exhibited negative return. The range for the coefficient of variation also indicate the same trend, ranging from -58.6 to 545.6 risk per unit return.

Table 1B

An analysis of individual stocks.

	CI	<= CI	>CI
		No. of Stocks	No. of Stocks
Avg Return	0.015	7	93
Std.Deviation	0.045	0	100
CV	3.028	38	62
Beta	1.00	3	97
C.Coeff	0.5	89	11

Findings in Table 1B shows the summary analysis of the individual stocks.

Ninety three percent of the stocks outperformed the CI on the average returns and all stocks had greater volatile than the CI.

However 38 percent of the stocks have lower risk per unit of return than the CI. The results also show the 93 percent of the stocks have beta value of more than 1.0. This shows that the stocks' have greater return variability than the market.

Table 1C

Risk and Return of Sectors

	Construction	Industrial	Consumer	Trading
Avg Ret	(0.002)-0.094	0.000-0.142	0.023-0.142	0.012-0.210
Std.Dev	0.103-0.270	0.084-0.477	0.110-0.327	0.113-0.709
CV	(58.608)-13.290	(0.213)-545.6	2.298-6.561	2.136-9.265
Beta	0.434-1.650	(1.489)-2.878	(0.381)-2.185	0.148-4.346
C.Coef	0.140-0.462	(0.029)-0.690	(0.089)-0.468	0.059-0.487

Analysis of the individual stocks by sectors shows that all the sectors have positive average return except for construction sector. Construction sector also has the lowest average return . Trading has the highest average return among the sectors and the industrial sector had the highest risk per unit return. The lowest beta value was from industrial and the highest was from trading sector.

4.2 PORTFOLIO ANALYSIS

Naïve and design portfolio were constructed of the main strategies adopted for analysis.

Portfolio strategy by design require the ranking/classification of stocks according to the following predetermined criteria:

. Beta

.Book Value

.Firm size

.Sector

4.2.1 NAÏVE PORTFOLIO

Stocks were grouped according to multiple of ten. Stocks are selected without any predetermined criteria.

Table 2

Risk and Return characteristics of Naïve Portfolio

	CI	P10	P20	P30	P40	P50	P60	P70	P80	P90	P100
Avg Ret	0.015	0.053	0.051	0.052	0.053	0.054	0.053	0.053	0.055	0.056	0.056
Std.Dev	0.045	0.160	0.186	0.193	0.195	0.194	0.196	0.195	0.199	0.204	0.203
CV	3.028	3.033	3.645	3.742	3.676	3.602	3.717	3.704	3.605	3.633	3.606
Beta		1.093	1.134	1.173	1.176	1.167	1.294	1.251	1.265	1.324	1.337
C.Coeff		0.303	0.274	0.273	0.271	0..271	0.297	0.290	0.286	0.291	0.297

The stocks was grouped in a portfolio of 10 stocks was denoted by P10, the same rule apply to the other portfolios.

Table 2 , shows that the average returns of all the portfolios constructed by naïve strategy outperformed the CI by 3.5 times. All the portfolios are more volatile than the CI.

The analysis shows that given the same return, diversification have managed to reduce the volatility of the portfolio when the number of stocks is increased up to 50 stocks and this is supported by a lower risk per unit return value on the P50 portfolio.

It is interesting to note that P10 portfolio has the least volatility, and the lowest risk per unit return among the portfolios. It also possessed nearly the same market risk as the benchmark portfolio, the CI. It is quite premature to summarize that, it is not the number of stocks that diversified the risk rather the quality of the stocks making up the portfolio.

4.2.1 PORTFOLIO BY DESIGN

Table 3

Risk and Return of Designed Portfolio (by BETA)

	CI	P1:Top 30	P2:Least 30
Avg Return	0.015	0.065	0.052
Std.Deviation	0.045	0.223	0.094
CV	3.028	3.404	3.769
Beta		2.279	0.422
C.Coeff		0.459	0.098

From the analysis of the two portfolios , portfolio P2, exhibit lower volatility and lower return . It outperform the CI on average return by almost 4 times. However the risk per unit return exceeded 24 percent of CI. The portfolio is also weakly correlated to the CI.

Portfolio P1, exhibit higher volatility and higher return. It also outperformed the CI on average return by more than 4 times . However the risk per unit return exceeded only 12 percent of CI. In general, beta designed portfolio outperformed the CI on average return.

Table 4

Risk and Return of Designed Portfolio (by BOOK VALUE)

	CI	P1:Top 30	P2:Least 30
Avg Return	0.015	0.051	0.053
Std.Deviation	0.045	0.194	0.190
CV	3.028	3.790	3.615
Beta		1.434	1.333
C.Coeff		0.333	0.315

The results in Table 4 suggests that book value portfolios on this board does not show significant
characterized higher average return and volatility than the CI by more than 3 times. Risk per unit return is more than 19 percent higher than CI. The market risk also bigger as exhibited by the strong beta.

In general, result shows that, given the same return, lower book value (P2) portfolio offer lower volatility, lower risk per unit return, lower

market risk and correlation factor to the CI than its higher book value portfolio (P1).

Table 5

Risk and Return Analysis of Designed Portfolios (by FIRM SIZE)

	CI	P1:Top 30	P2:Least 30
Avg Return	0.015	0.069	0.051
Std.Deviation	0.045	0.241	0.171
CV	3.028	3.504	3.345
Beta		1.491	1.334
C.Coeff		0.279	0.351

Findings in Table 5 shows that higher capitalization P1 portfolio outperformed the CI by more than 4.5 times on average return . P1 also outperformed the CI on the volatility by 5 times .Risk per unit return is also higher than CI by more than 15 percent.

However lower capitalization P2 portfolio does not show the small firm effect. It should beat P1 portfolio on average return and exhibited larger volatility. This is shown in the lower risk per unit of return ratio compared to P1.

The small firm may not be so evident in this test because the difference in the capitalization is not that substantial. As compared to the CI which comprised of 100 selected big capitalization stocks, P1 and P2 portfolios already exhibited the small firm effect in this respect.

Table 6

Risk and Return Analysis of Designed Portfolios (By SECTOR)

	CI	Construction	Industrial	Consumer	Trading
		12stks	51stks	21stks	16stks
Avg Return	0.015	0.048	0.055	0.061	0.07
Std.Deviation	0.045	0.174	0.208	0.199	0.231
CV	3.028	3.617	3.798	3.275	3.321
Beta		1.107	1.434	1.135	1.577
C.Coeff		0.286	0.309	0.257	0.307

The stocks selected were from construction, industrial, consumer and trading sectors. It shows that all sectors outperformed the CI on average return .All sectors also indicated higher volatility compared to CI.

The trading sector had the highest volatility compared to the other sectors. Construction sector track the CI on market risk, it also shows the lowest return and the least volatility. However industrial sector have the highest risk per unit return. All the portfolios tend to correlate to CI positively.