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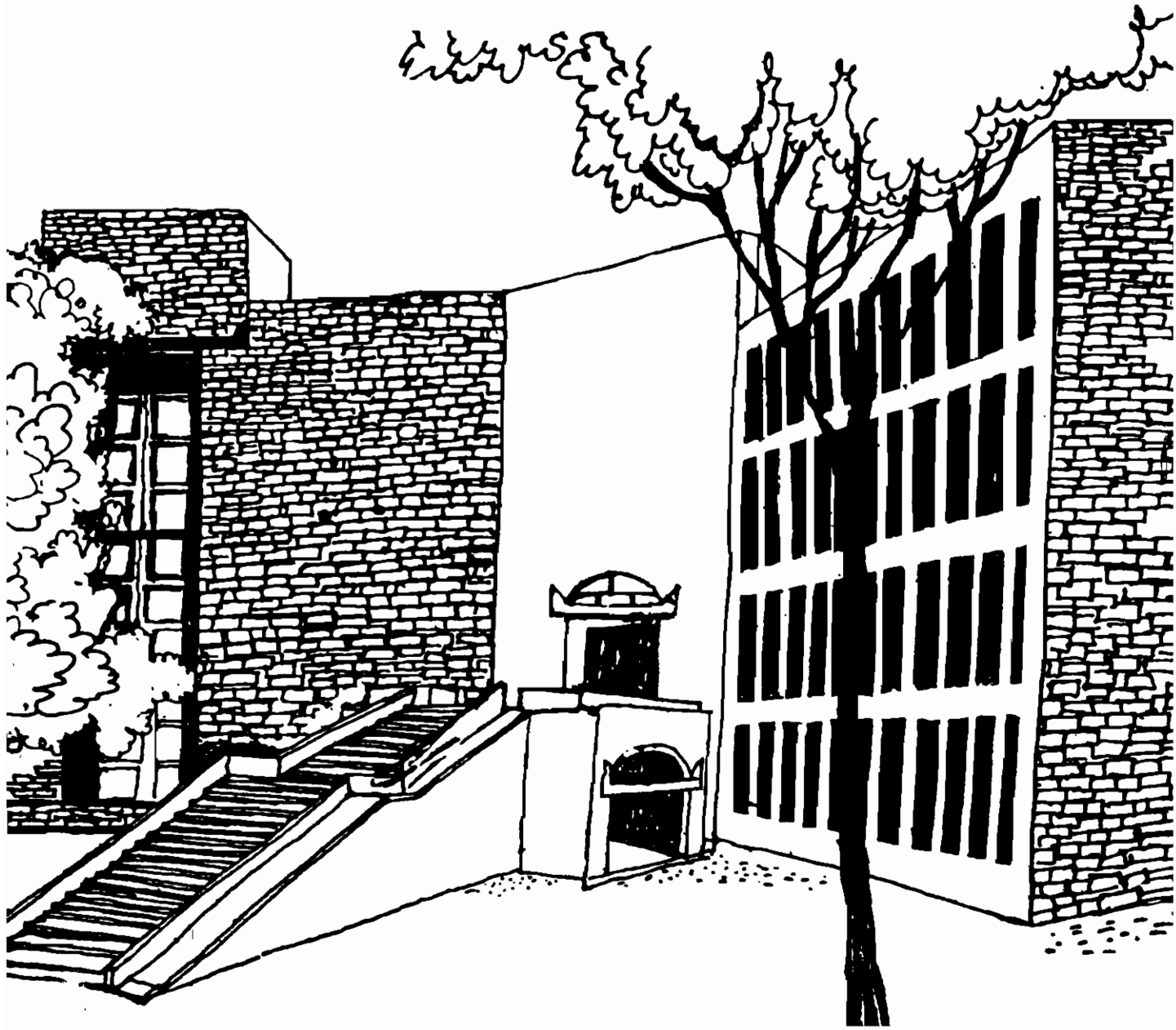

RETURN, RISK AND OPTIMUM PORTFOLIO OF STOCKS IN MALAYSIA

By

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Liew Bee Yong and G.S. Gupta

Abstract

The paper computes the return and risk (systematic and unsystematic) from investments in stocks, determines the optimum portfolio of stocks, and develops a fundamental model for beta of stocks, using data of the Malaysian economy. The sample consists of 27 companies (three from each of the nine sectors) and 10 years annual data (1984 to 1993). The findings suggest that skilled investors have a lot of scope to out perform the market. In particular, out of 27 companies studied, stocks of two companies, viz. Rothmans and Pernas International Hotel and Property, have yielded higher return with lower risk than the market index, and the optimum portfolio delineated gives a return of 32.2% with a beta of 0.62, which stand at more than twice and about two-thirds of those on the market index, respectively. The results of the fundamental model for beta are not so good but they indicate that the leverage and earnings' variability are the only two determinants of beta out of the six determinants hypothesized in the paper.

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1. INTRODUCTION

Malaysia is flourishing and so are its stock market and players in it. The economy is marching ahead of its required average rate of growth of 7% to achieve its Vision 2020 by achieving the impressive annual rate of growth of about 8% during the last seven years, coupled with rather small rate of inflation hovering around 4% and the below full employment rate of unemployment of around 3%. The Kuala Lumpur Stock Exchange (KLSE) has witnessed a tremendous growth (vide Table 1), registering the peaks of trade volume at 1.032 billion units (April 15, 1993), trade value of RM 4.804 billion (December 22, 1993), KLSE-CI at 1332.04 (January 5, 1994 : base 1977 = 100) and KLSE-Emas at 394.42 (January 4, 1994 : base 1984 = 100). By virtue of these records, KLSE has joined the stock market group of the top ten performers in the world.

TABLE 1

The investors in the stock market have reaped high returns, though not without bearing high risk. During 1993, KLSE-CI jumped from 629.51 (January 8) to 1275.32 (December 31), yielding the rate of return of 102% under the naive buy and hold strategy. The similar rate of return turns out to be 13.8% per annum for the

period 1984-1993, with a risk level of 28.4% (vide Table 3). This rate of return is considerably higher than those available on alternative financial assets and it is because of this that the stock market has attracted a fair proportion of households and institutional investors (foreign and domestic) to invest in it. Undoubtedly, stock investment is quite risky and a lay investor could lose a considerable amount as well. This is because there are large fluctuations in stock prices and the Malaysian market is no exception. Examining the major fluctuations in KLSE-CI during 1993 one notices that the index jumped from

(a) 634.42 on March 26 to 719.61 on April 30, registering a 13.4% increase in five weeks,

(b) 771.91 on August 13 to 851.43 on September 3, giving a growth rate of 10.3% in three weeks,

(c) 819.60 on September 17 to 971.99 on October 29, revealing an increase of 18.6% in six weeks, and

(d) 976.34 on November 26 to 1275.32 on December 31, showing an increase of 30.6% in five weeks.

While the 1993 witnessed an upward trend in general, the 1994 so far has produced significant fluctuations. The index moved from

(a) 1275.32 on the eve of the year to 1090.06 on January 28, indicating a decrease of 14.5% in four weeks,

(b) 1147.32 on February 4 to 959.94 on April 1, giving a decrease of 16.3% in eight weeks, and

(c) 959.94 on April 1 to 1054.50 on April 29, revealing an increase of 9.9% in four weeks,

The above are the changes in the general index only. If one were to look at individual stocks, the fluctuations would still be more. In view of the potentials of large return on the assumption of large risk in the stock market and the increasing popularity of investments in stocks, it is pertinent to study the return-risk profile of stocks in the country. The present paper is an attempt in this direction. In particular, its objectives are the following

(a) To compute the return and risk measures on the market indices as well as on the cross-section of individual stocks,

(b) To identify the dominant and non-dominant sectors and stocks among the sample,

(c) To delineate the optimum market portfolio of stocks amongst the sample stocks, and

(d) To estimate the fundamental model for beta and thereby examine the role of different factors in the explanation of the systematic component of the risk in stocks.

2. LITERATURE AND THE METHODOLOGY

Markowitz (1952)'s work marked the beginning of the modern portfolio theory, which argues in favour of investing in a portfolio of stocks rather than in a single stock, and in a portfolio of negatively or poorly correlated stocks than in a portfolio of positively or highly correlated stocks. Markowitz's model was later simplified by Sharpe (1963) through his introduction of the

Single Index Model, and the distinction between the systematic and unsystematic risks. The Separation Theory proved handy to delineate the optimum market portfolio in the presence of the risk free asset. Given the optimum market portfolio, the investors optimum portfolio is easy to derive, which is simply the weighted average of the proportion of funds in the risk free asset (which could be negative, if he decides to borrow) and the market optimum portfolio. The beta, a measure of the systematic risk, is explained through the fundamental variables of the relevant economy, industry and the firm. The empirical studies of Beaves, Kettler and Scholes (1970), Rosenberg (1975), Thompson (1978), and Chung and Charaenwong (1991), among others, have thrown ideas on the list of the explanatory variables for beta as well as their findings about their significances.

While the empirical literature on the developed countries (particularly USA) is quite voluminous, there are only a few studies on the Malaysian capital market. Lanjong (1983) study of the Malaysian market covered the period 1974 through 1980, and found that

(a) average returns was 25.2% with the Tin sector achieving the highest return of 41.5%,

(b) property sector was the most risky one, and

(c) estimated beta values fell in the range of 0.45 to 1.88, with 50% of the stocks in the sample having a beta of less than unity.

Tan et al (1992) study focused on eight countries, including Malaysia for the period 1982 to 1991. The findings of this re-

search include

(a) average beta in Malaysia stood at 1.22. This value was the second highest to Singapore's at 1.33 among the eight countries in the sample. The said magnitude was the lowest at 0.78 for Indonesia and Germany,

(b) proportion of the systematic risk was less than that of the unsystematic risk in three (including Malaysia) out of the eight countries. The proportion was the other way round in four countries, and equal in one (Singapore) country.

Perhaps there are no studies on the optimum portfolio and the fundamental model for beta on the Malaysian data.

The study is empirical. The return on various groups of stocks (indices) and individual stocks for different years were computed on the standard basis of dividend (if any) and capital appreciation. The arithmetic averaging method was followed to compute the average rate of return over a period of time. The risk on a security was measured by the standard deviation of its rate of return during a given period. The well known principle of dominance was adopted to identify the dominant and non-dominant sectors/stocks. The Sharpe's Single Index Model was used to compute the beta values :

$$R_i = \alpha_i + \beta_i R_m + u_i \qquad (1)$$

where R_i = return on security i

R_m = return on market index (KLSE-CI)

The total risk of a security was bifurcated into its systematic and unsystematic components using the following formulas :

$$\text{Systematic risk in security i } (\sigma_{si}) = \beta_i \, \sigma_m \qquad (2)$$

$$\text{Unsystematic risk in security i } (\sigma_{ei}) = \sqrt{\sigma_i^2 - \beta_i^2 \, \sigma_m^2} \qquad (3)$$

where σ_m = standard deviation of the market index

σ_i = standard deviation of return on security i

To delineate the optimum portfolio from amongst the sample stocks, we assumed that investors could borrow or lend at the risk-free rate of return of 5% (approximately equal to the interest rate on bank deposits), and that short sales were not permitted, which is true in Malaysia todate. Under these assumptions, the modern portfolio theory argues that the optimum market portfolio can be determined through the following four steps :

(a) Rank the available stocks by the index "excess return to beta" (ERTβ) ratio :

$$ERT\beta = \frac{R_i - R_F}{\beta_i} \qquad (4)$$

(b) Compute the C values for all the stocks using the formula

$$C_i = \frac{\sigma_m^2 \sum_{j=1}^{i} \frac{(R_j - R_f)\,\beta_j}{\sigma e_j^2}}{1 + \sigma_m^2 \sum_{j=1}^{i} \frac{\beta_j^2}{\sigma e_j^2}} \qquad (5)$$

(c) Identify the cut-off value for C (C*) on the basis of its principles, viz (i) all securities used in the calculation of C_i have ERTβ above C_i, and (ii) all securities not used to calculate C_i have ERTβ below C_i.

(d) Construct the optimum market portfolio using the formulas

$$X_i = Z_j \Big/ \sum_{j=1}^{n} Z_j \qquad (6)$$

where

$$Z_i = \frac{\beta_i}{\sigma e_i^2} \left[\frac{R_i - R_f}{\beta_i} - C^* \right] \qquad (7)$$

X_i = proportion (%) of total investment funds invested in security i

The corresponding expected return (R_p) and the total risk (σ_p) of the optimum market portfolio, and the portfolio beta (β_p) were computed through their following formulas :

$$R_p = \Sigma X_i R_i \qquad (8)$$

$$\sigma_p = \sqrt{\sigma_m^2 (\Sigma X_i \beta_i)^2 + \Sigma X_i \sigma_{ei}^2} \qquad (9)$$

$$\beta_p = \Sigma X_i \beta_i \qquad (10)$$

The investor's optimum portfolios are derived on certain assumptions about their risk-return attitudes.

The fundamental model for the beta was hypothesized on the lines of Beaver, et. al (1970) as follows :

$$\text{Beta } (\beta) = f \text{ (DPR, LVR, LIR, AGR, EV, AS)}$$

$$f_2, f_4, f_5 > 0 > f_1, f_3, f_6 \qquad (11)$$

where DPR = dividend payout ratio
LVR = leverage (long term liabilities to equity) ratio
LIR = liquidity ratio
AGR = assets (total) growth rate (%)
EV = earnings variability (standard deviation) (%)
AS = assets (total) size (RM millions)

Thus, the modern portfolio theory has been applied to the Malaysian stock market to pursue the objectives of the paper set out above.

3. DATA AND RESULTS

The research uses both the time series (annual) as well as the cross-section data (firm wise). The sample period is 1984 through 1993, which was dictated primarily by the availability of consistent data. The sample size for individual stocks was restricted to three from each of the nine sectors, giving a total of 27 stocks. The sampling procedure employed for the purpose could be called as the Stratified Disproportionate Random Sampling (SDRS) method. The Stock Performance Guide (SPG) and Monthly Digest (MD) (publications of Dynaquest Sdn Bhd)'s results on the categorization of various stocks in each sector into 'good', 'average' and 'poor' were used for stratification. Incidentally note that this categorization is based on four criteria : rate of return, stability, growth and management strength. One stock from each of these three categories from each sector was then selected on the random sampling basis, irrespective of the number of stocks of any category in any sector. The list of the selected companies together with their ratings and the sectors is provided in Table 2.

TABLE 2

The data on market indices (Composite index, Emas and sectoral) were collected from the Investors' Digest; on individual stock prices, earnings per share (EPS), dividend per share (DPS) and performance ratings from the Stock Performance Guide and Monthly Digest; and on the various companies' fundamental variables for the beta functions were obtained from the KLSE's Annual Companies Handbook and individual company's annual reports. The data on stock prices, EPS and DPS are adjusted for entitlements and capitalization changes, if any. The DPS for calendar (not financial) year is used to ensure consistency and it is net (i.e. post tax) rather than gross.

Return and Risk

The empirical results on return and risk on the various market and sectoral indices are presented in Table 3 and those on various stocks in Table 4.

TABLE 3

TABLE 4

The results in Table 3 indicate that the rate of return across sectors varies between 2.49% (Hotel) and 19.95% (Mining), risk between 18.67% (Hotel) and 64.44% (Mining), and the ratio of return to risk between 0.13 (Hotel) and 0.49 (Industrial). The application of the dominance principle would conclude that the

Property sector alone is dominated and it is so both by the Finance as well as the Plantation sectors.

Looking at the individual stocks' measures in Table 4, one notices that the rate of return varies between 4.77% (General Corp.) and 40.82% (Rahman), with an average value for all sample stocks at 20.77%. The total risk varies between 12.66% (PIHP) and 132.65% (Rahman), with an average value for all stocks in the sample at 50.62%. The principle of dominance would suggest that out of the 27 stocks in the sample, only three, viz. Rothmans, PIHP and Rahman, are the non-dominated ones. Thus, if one were to follow the traditional method of portfolio selection, he would invest in these three stocks only.

The findings on the distribution of the total risk into its two components suggest that the proportion of the systematic risk varies between 22% (MBF Holdings) (ignoring Antah which has a negative beta) and 86% (Bandar Raya), with an average value for all the stocks at 55%. The said proportion is above 50% in 19 of the 27 stocks in the sample. This finding is at variance with the findings of Tan et al (1992) about Malaysia but it is consistent with the latter's general finding from the study of eight countries.

The beta value for various stocks varies between 0.39 (PIHP) (ignoring negative beta of Antah) and 2.93 (Rahman), with an average value for all stocks at 1.25. Only six stocks assume a beta of less than unity, meaning their systematic risk being below the market risk.

The alpha value, which measures the excess return the particular stock enjoys over the market index is positive for 18 stocks and negative for the remaining 9 stocks. It is the highest (26.7) for Rothmans and the lowest (-10.9) for Bandar Raya.

Optimum Portfolio

The ranking results of the sample stocks on the basis of ERTβ (vide equation 4) gave Rothmans the top rank, Genting the second, PIHP the third, NSTP the fourth, Shell the fifth,...,MBF Hldgs the 24th, Bandar Raya the 25th, General Corp. the 26th and Antah the 27th (bottom). Incidentally note that Antah has a negative beta and so it is a premium stock for the portfolio but unfortunately the procedure described in equations 4 through 7 is incapable of handling stocks with negative beta, which, in fact are rare. The cut-off value for the ERTβ index was found to be 30.32%, and accordingly the first three stocks alone qualified for inclusion in the optimum portfolio. The optimum portfolio consisted of the following.

Stocks	Proportion of funds to invest (%)
Rothmans	59
Genting	25
PIHP	16
Total	100

On this portfolio, the weighted average return and beta turn out to be 32.20% and 0.62, respectively. This is the market optimum portfolio and the investors could choose any combination of this and the risk free asset, which is associated with 5% return and zero risk. Thus, an aggressive investor, desiring higher than the market portfolio return could borrow some amount

at the risk free rate and invest that also in the portfolio and thereby derive higher return, though with higher risk as well. For example, if he supplements his funds by 25% through borrowing, his return-risk would be as follows :

Return = 1.25 (32.20) - 0.25 (5) = 39.0

Beta = 1.25 (0.62) - 0.25 (0) = 0.775

On the other hand, a defensive investor could keep a part of his funds in the risk-free asset and invest the remaining in the market portfolio, and thereby reduce his portfolio beta, of course being associated with a lower portfolio return.

Fundamental Model for Beta

The selected multiple regression results for the fundamental model for beta are presented in Table 5.

TABLE 5

It must be noted that while there is only one beta value for each company, the data on its explanatory variables are different for different years for each firm. In our regressions, we have once taken the average value for each explanatory variable for the whole sample period (1984 through 1993) for each firm, and thus got the regression estimates on the average data for the cross-section of 27 firms. Also, we have regressed the same beta value set on the 1984 values of the explanatory variables for the 27 firms, as well as on the 1993 values. The table thus includes the cross-section results for the first year of the sample

(1984), the last year of the sample (1993), as well as for the average year.

The results indicate an overall poor fit of the model as judged by the R^2 value, which falls between 0.103 and 0.323. In terms of the significance of the coefficients as evaluated by the t-test, only the leverage ratio and the earnings' variability have some explanatory power. While the leverage ratio has a negative effect, the earnings' variability exerts a positive effect on the beta value. These results are consistent with the ...ng of Chung and Charaenwong (1991) (that the firm size has no influence on beta) and are in line with the poor fits of this model even for the US data. Thus, the fundamental model for beta has yet large scope for further improvements.

4. ANALYSIS AND CONCLUSIONS

The Malaysian stock market is booming and the skilled players have a lot of scope to make good money in it. This is apparent from the fact that there exists individual stocks which have offered higher average return with lower risk than the market index (KLSE-CI). Our study of 27 stocks identifies two such companies, viz. Rothmans and PIHP (Pernas International Hotel & Property). If one is more analytical, possesses skills and devotes time in selecting the optimum portfolio through the modern portfolio theory, he can do even better. This is reflected in our finding of the optimum portfolio, which gives portfolio return of 32.2% with a beta of 0.62. This return is more than twice and the

risk about two thirds of the market index.

The results of Table 4 could be further analyzed using the Security Market Line (SML) approach in identifying the under and over priced stocks. The SML relates the returns and betas of various stocks with those of the market, and it always passes through the risk-free rate of return, and the returns and beta (=1) of the market index. The same for our sample stocks appears in Figure 1. Out of the 27 stocks in the sample, 17 fall above the SML and thus all of them are underpriced and accordingly are candidates for buying. Counter number 24 (Rahman) is recommended for the most aggressive investor (desiring maximum possible return) while the counter number 12 (Antah) is the most appropriate stock for the most defensive investor (desiring minimum possible risk). Depending on the specific trade-off between return and risk, the moderate investors could choose any other stock out of these 17 stocks. Stocks numbering 3, 9, 15, 18, 19, 20, 21 and 22 are over-priced, and a skilled investor would sell them if he has and he would even short sell them if it were permitted. Stocks numbering 5 (Hume) and 14 (D & C Bank) fall on the SML and thus are fairly priced, attracting no trading.

The traditional portfolio theory ignores the advantages of benefiting from the Markowitz type of diversification, where a portfolio of stocks having poorly or negatively correlated returns is of special benefit. Thus, while an investor not caring the modern approach would invest in non-dominating stocks only, the modern portfolio theory user investors could very well find it worth even to invest in a stock which is dominated by some

other stock (s) but is poorly or negatively correlated with the returns of the other worth selecting securities. Thus, while the non-dominating stocks in our sample are Rothmans, PIHP (Pernas International Hotel & Properties), and Rahman, the securities included in the optimum portfolio are Rothmans, Genting and PIHP. Also, as pointed out above, the optimum portfolio would include Antah as well but the same did not figure out in our optimum portfolio due to the limitation of the methodology, which is unable to provide special treatment to the securities with negative betas.

The results of the fundamental model for beta are too poor to be of any great use. However, they do indicate that the leverage and earnings' variability are the only two determinants of it out of the six determinants hypothesized. Further, they suggest that one basis point (0.01 %) increase in the leverage ratio causes about a 134 basis points decrease in beta, while that in earnings' variability about a 6 basis point increase in beta. Also, since the model is a poor fit, it suggests to rely on some other approaches for forecasting the future value of the beta. The other approaches to be tried include the trend method and Rosenberg (1975)'s technique of combining historical betas and its fundamental model for forecasting the future beta. This paper has not gone into these approaches, for such efforts even for the US economy have not achieved much headway.

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TABLE 1 : GROWTH AT KLSE

YEAR	NUMBER OF COMPANIES LISTED	VOLUME TRADED (billion units)	VALUE TRADED (RM billion)	COMPOSITE INDEX (HIGHEST)	MARKET CAPITALIZATION (RM billion)	NOMINAL VALUE (RM billion)
1980	250	1.5	5.6	379.60	43.1	7.9
1981	253	1.6	8.1	540.34	55.4	10.7
1982	261	1.1	3.3	387.06	52.9	13.6
1983	271	2.3	7.9	421.30	80.3	16.3
1984	282	1.9	5.7	426.78	69.3	20.4
1985	284	2.9	6.2	320.48	58.3	22.6
1986	288	2.3	3.4	272.03	64.5	23.5
1987	291	5.3	10.1	470.17	73.9	26.6
1988	295	4.0	6.8	377.39	98.7	29.4
1989	307	10.2	18.5	564.65	156.1	34.3
1990	285	13.2	29.5	632.22	131.7	35.3
1991	324	12.3	30.1	635.02	161.3	41.7
1992	369	19.3	51.5	660.35	245.8	53.2
1993	413	107.8	387.3	1275.32	619.6	NA

TABLE 2 : SAMPLE OF COMPANIES

No.	SECTORS	PERFORMANCE RATING CATEGORY	SCORE*	COMPANIES
1	Consumer Product	Good	10.5	ROTHMANS OF PALL MALL (M) BHD
2		Average	5.5	HONG LEONG INDUSTRIES BHD
3		Poor	2.5	MWE HOLDINGS BHD
4	Industrial Product	Good	8.0	SHELL REFINING CO. (FOM) BHD
5		Average	5.5	HUME INDUSTRIES (M) BHD
6		Poor	3.0	SAMANDA HOLDINGS BHD
7	Construction	Good	5.5	YTL CORP. BHD
8		Average	4.5	PILECON ENGINEERING BHD
9		Poor	2.5	GENERAL CORPORATION BHD
10	Trading/Services	Good	9.0	GENTING BHD
11		Average	5.5	THE NEW STRAITS TIMES PRESS (M) BHD
12		Poor	1.0	ANTAH HOLDINGS BHD
13	Finance	Good	8.0	PUBLIC BANK BHD
14		Average	6.0	DEVELOPMENT & COMMERCIAL BANK BHD
15		Poor	3.0	MBF HOLDINGS BHD
16	Hotel	Good	6.0	PERNAS INTERNATIONAL HOTEL & PROPERTIES
17		Average	5.5	LANDMARKS BHD
18		Poor	4.0	FABER GROUP BHD
19	Properties	Good	6.5	SIME UEP PROPERTIES BHD
20		Average	4.0	BOLTON PROPERTIES BHD
21		Poor	1.5	BANDAR RAYA DEVELOPMENTS BHD
22	Mining	Good	4.5	MALAYSIA MINING CORPORATION BHD
23		Average	3.5	TRONOH MINES MALAYSIA BHD
24		Poor	3.5	RAHMAN HYDRAULIC TIN BHD
25	Plantation	Good	6.5	BATU KAWAN BHD
26		Average	4.5	HIGHLANDS & LOWLANDS BHD
27		Poor	1.5	KEMAYAN OIL PALM BHD

Note : * Maximum possible score is 12 points and minimum is 0 point.

TABLE 3: RETURN AND RISK ON MARKET AND SECTORAL INDICES

Sample Period : 1984 – 1993 (n = 10)

INDEX	AVERAGE RETURN (R) %	TOTAL RISK (Std. Dev.) (S) %	RETURN–RISK RATIO
KLSE CI	13.79	28.37	0.49
KLSE EMAS	15.01	31.33	0.48
INDUSTRIAL	13.83	28.26	0.49
FINANCE	18.86	42.30	0.45
HOTEL *	2.49	18.67	0.13
PROPERTY	13.95	45.59	0.31
MINING	19.95	64.44	0.31
PLANTATION	14.08	40.52	0.35

Note : * = Average of 1984 to 1989

TABLE 4 : RETURN AND RISK OF SELECTED STOCKS

Sample Period : 1984 – 1993 (n = 10)

NO.	STOCKS	AVERAGE RETURN (R) %	TOTAL RISK (S) %	PROPORTION(%) OF SYS. RISK	UNSYS. RISK	BETA	ALPHA %
1	ROTHMANS	35.14	25.73	46	54	0.62	26.70
2	HL IND	22.93	50.56	68	32	1.47	2.60
3	MWE	11.18	41.49	78	22	1.29	−6.70
4	SHELL	22.09	32.51	50	50	0.81	11.00
5	HUME	13.62	36.75	58	42	0.99	0.01
6	SAMANDA	28.08	64.90	55	45	1.70	4.70
7	YTL	28.94	52.36	59	41	1.46	−0.40
8	PILECON	32.41	65.73	53	47	1.62	7.90
9	G. CORP	4.77	38.41	67	33	1.11	−10.60
10	GENTING	34.61	28.87	58	42	0.77	23.90
11	N.S.T.P.	22.36	36.37	25	75	0.65	13.50
12	ANTAH	22.05	61.16	0.1	99.97	−0.05	22.70
13	PBB (L)	21.56	48.67	77	23	1.50	0.80
14	D&C BANK	16.60	46.43	67	33	1.34	−1.90
15	MBF HLDGS	8.68	57.37	22	78	0.96	−4.50
16	PIHP	17.64	12.66	57	43	0.39	8.90
17	LANDMARKS	22.22	69.60	28	72	1.29	4.40
18	FABER	13.74	64.22	44	56	1.50	−7.00
19	S UEP (O)	11.31	37.49	85	15	1.22	−5.50
20	BOLTON	14.27	47.01	59	41	1.27	−3.30
21	B RAYA	9.20	44.50	86	14	1.46	−10.90
22	MMC	12.77	47.56	75	25	1.46	7.30
23	TRONOH	28.02	57.51	70	30	1.70	4.60
24	RAHMAN	40.82	132.65	39	61	2.93	0.40
25	B KAWAN	15.68	39.19	57	43	1.04	1.30
26	H & L	17.70	45.02	52	48	1.14	1.90
27	KEMAYAN	32.48	81.94	51	49	2.06	4.10
	AVERAGE	20.77	50.62	55	45	1.25	3.55
	STD DEV	9.12	21.77				

TABLE 5: FUNDAMENTAL MODEL FOR ß OF STOCKS

Dependent Variable : ß
Sample Size = 27 firms

YEAR	Coefficient (t-value) of							R^2
	Constant	Div. Pay. Ratio	Leverage Ratio	Liquidity Ratio	Asset Growth	Earnings Variability	Asset Size	
Average of 1984 through 1993	1.19	0.15	−1.34	0.04	−0.00	0.06	0.00	0.225
		(0.4)	*(1.3)*	*(0.6)*	*(0.2)*	*(1.6)*	*(0.2)*	
	1.36		−1.60			0.06		0.199
			(2.3)			*(1.7)*		
1984	1.45		−1.14					0.103
			(1.7)					
	1.30	0.02	−1.98	0.02	−0.01	0.10	0.05	0.323
		(0.1)	*(1.9)*	*(0.2)*	*(1.3)*	*(2.2)*	*(0.5)*	
	1.30		−2.2			0.09		0.242
			(2.5)			*(2.1)*		
	1.38		−1.95		−0.01	0.10		0.313
			(2.2)		*(1.4)*	*(2.4)*		
1992	1.49	−0.54	−0.70	0.07	−0.00	0.02	0.00	0.264
		(1.0)	*(1.4)*	*(1.3)*	*(0.5)*	*(0.5)*	*(0.1)*	
	1.48				−0.01			0.109
					(1.7)			
	1.30		−0.66			0.05		0.135
			(1.7)			*(1.3)*		

FIGURE 1 : SECURITY MARKET LINE (SML)