CHAPTER 3

DATA AND METHODOLOGY

3.1 Sources of data and sample

The approach of this study is basically similar to many other works done on the countries in the sense that it examines the usefulness of beta coefficients in predicting the future returns of securities. This study uses secondary data, that is, the weekly closing prices of index-linked stock, the Kuala Lumpur Stock Exchange Index (KLSE CI), and data related to dividend payout, bonus, rights, consolidation and split issues. The data were obtained various issues of Investors Digest, the KLSE Research Department and other secondary sources.

The sample of this study consists of seventy-one index-linked stocks. (See Appendix A.) The weekly closing prices(end of the week closing price) collected for these stocks and the KLSE CI were from January 1991 to December 1995. The first three years' data(January 1991 to December 1993) is used to determine the beta values of the stocks and the last two years data, that is, January 1994 to December 1995 is used for analysis.

3.2 Performance measure

The performance of each stock is measured by the actual return of each stock. The return is the sum of cash dividends and price change, adjusted for bonus issues, right issues, stock splits and consolidation. The actual returns of each stock was computed with the employment of the buy and hold strategy. Using this strategy stocks are purchased at the last day of the prior period (t-1) and sold on the last day of the current period (t).

i.e. $R_t = [(P_t - P_{t-1}) + D_t] / P_{t-1}$ --(3.1)

where
R_t = actual return of stock stock at period t
P_t = closing price of stock at last day of period t
P_{t-1} = closing price of stock at last day of period t-1
D_t = dividend for the period t.

The price P_{t-1} is adjusted for bonus,split,consolidation and right issues. (See Appendix B for the list of stocks (selected in the study) that issue bonus, rights and split issues and their adjusted prices.

3.3 The risk measure, Beta

The beta of a security is a measure of risk of the security that arises from the relationship between the return of the security and the return on the market. This type of risk is referred to as market risk. This study uses the weekly closing prices from January 1991 to December 1993 of the 71 component stocks of the KLSE Composite Index to compute their beta coefficients. Weekly returns of the 71 securities were computed using equation (3.1) above. The betas of these securities were then obtained using the statistical formula below. The widely followed KLSE Composite Index was used as the market index .

$$\beta_i = Cov(r_i , r_m) / \sigma^2_M \text{ ------------------------------------ } (3.2)$$

Where

$Cov (r_i , r_m)$ = Covariance of return of the ith stock with the market

σ^2_M = variance of return for the market index

β_i = beta coefficient of the ith stock

3.4 Beta and related issues

Beta values calculated from historical data should not be confused with the expectational idea that investors form in the course of their investments. For them, the relevant beta is the expected risk in the future conditions. Barring serious changes in the nature of the firms in an economy at the next period, one can make simplifying assumption of using the most recent beta to be indicative of the nature of likely systematic risk in the next period. Examination of betas computed with ex post data has led to a number of general conclusions, which are worth noting.

The measured beta values of a portfolio of securities over five years are more stable than betas from individual securities (Blume (1975) and Levy (1971)). Betas measured over successive time periods for the same stocks tend, on average, to regress towards the mean of 1 (Blume(1975)). This could be due to an empirical reason in that management of the firms are making decisions that move the firms to assume the typical characteristics of the market. Firms that are very risky tend to diversify to make their risk lower as would low risk firms take on more risky investment. In either case the firm's risk will regress towards unity.

An important pratical question relates to usefulness of beta estimates for future or expected riskiness of the security. Is beta sufficiently stationary or stable for investors to act as if it was constant ? Several empirical studies have been done in the past to examine the stability of beta for different time periods and investment horizons, and for different portfolio sizes. One of the most recent and closely related to this study is the study done by Kok(1992). Kok found that there is substantial stability of betas of the 72 component stocks of the KLSE component Index over the eight-year period 1983-1990. He also found that betas of portfolios of 5,10 or 15 stocks exhibit greater degree of stability than those of individual securities. These findings are consistent with the results obtained by Blume(1971), Levy(1971) and Ta and Wan(1986).

3.5 Portfolio construction.

Information on the market risk for a security as measured by its beta is useful for two reasons:

(i) it can be used to forecast the market risk for the security in a future time period.

(ii) it enables us to construct a portfolio of secuities such that the unique risk of the portfolio can be greatly reduced through a well-diversified portfolio thereby ensuring that the variability of a portfolio return is due mainly to its market risk as measured by its beta value.

In this study the portfolios of securities were constructed in the following manner : Beta coefficients of securities were arranged in ascending order of magnitude. The securities were then selected in pairs to form 36 portfolios of 2 securities, that is, the first portfolio consisted of 2 securities which have the lowest estimates of beta and the second portfolio consisted of those 2 securities with next lowest estimates and so on. Similar procedures were adopted to construct 24 portfolios of 3 securities, 18 portfolios of 4 securities, 15 portfolios of 5 securities, 12 portfolios of 6 securities, 11 portfolios of 7 securities. As 71 is not perfectly divisible, overlapping of securities in the last two portfolios of each size was performed.

3.6 Statistical analysis

In this study, the data used for beta computation was from 1991 to 1993, while data from 1994 to 1995 was used for analysis. Beta for portfolios (constructed as described in the previous section) were computed using the equation (2.3b), that is,

$$\beta_p = \sum_{i=1}^{n} x_i \beta_i$$

where x_i= fraction of the investment in ith security. In this study, each security is given equal weight as it is assumed that equal amount of money is invested in each security of a portfolio.

The weekly returns of the the market were computed using the equation,

$$R_M = (C_t - C_{t-1}) / C_{t-1} \quad \text{---} (3.3).$$

where C_t = composite index at period t.

The weekly closing levels of the KLSE Composite Index from January,1994 to December,1995 are then plotted to determine the bullish and bearish periods. Based on the graph in Appendix C , five bullish/bearish periods have been identified in this study. They are of between three to five months duration and are the following : 07 January 1994 - 03 Jun1994, 03 Jun 1994 - 16 September 1994, 16 September 1994 - 27 January 1995, 27 January 1995 - 02 Jun 1995 and 02 Jun 1995 - 17 Nov 1995. The changes in the levels of KLSE CI over the five periods are given in Table 3.1. If modern portfolio theory holds for the Malaysian equities market and the betas computed as described in section 3.3 remain valid, we should expect the returns of the securities with high betas to be greater than the returns of the securities with low betas for the second and fourth periods where KLSE CI increased by 22.76 percent and 22.05 percent, respectively. On the other hand, during the first, third and fifth periods where the KLSE CI declined by 18.92 percent, 25.48 percent and 17.55 percent respectively, it is expected that the returns of the securities with high betas will be lower than the returns of the securities with low betas.

TABLE 3.1 KLSE CI LEVELS AND PERCENTAGE CHANGES

02 January 1994 - 31 December 1995

Date	KLSE CI	Percentage change
07 January 1994	1190.73	
		- 18.92 %
03 Jun 1994	965.49	
		+ 22.76 %
16 September 1994	1185.27	
		- 25.48 %
27 January 1995	883.29	
		+22.05 %
02 Jun 1995	1078.08	
		-17.55 %
17 Nov 1995	888.91	

The returns of the seventy-one component stocks, are computed using equation (3.1). The ranks of actual returns of these 71 component stocks in each of the five periods are given beside their respective beta coefficients in Appendix A.

The Pearson's product-moment correlation coefficient and the Spearman's rank correlation coefficient are used in this cross-sectional analysis of the linear relationship between the risk and the future return of the 71 component stocks in each of the five periods of this study. To compute the Spearman's rank correlation coefficient, the beta coefficients are ranked from the lowest to the highest. Similarly,the actual returns in each period are also ranked from the lowest to the highest. If there is no linear relationship between the beta coefficients and the returns of the securities, the correlation coefficient is zero. On the other hand, if such relationship exists, the correlation coefficient is expected to be positive for the second and fourth periods when the market rose and negative for the first, third and fifth periods when the market declined.

3.7 Limititations of the study

The first problem is the imperfections of Malaysian capital market. Market imperfections like transaction costs, information costs, insolvency or bankruptcy costs, institutional constraints in the capital market, and investors' heterogeneous expectations with respect to expected return and risk may cause investors to hold inefficient portfolios, that is, portfolios that do not provide the highest expected return for any degree of risk, or portfolios that do not provide the lowest degree of risk for any expected return. The second problem is that we cannot claim that the CAPM is absolutely valid in explaning the relationship between risk and return of common stocks traded in the KLSE. Possible expalnation for the non-conformity of the empirical results with the theoretical result is the existence of market imperfections, as mentioned earlier. The assumptions of perfect divisibility and liquidity of an investment and of the absence of transaction costs, do not conform to reality as most investors differ in their investment strategy and many of them hold stocks of only one company or portfolios which are not efficient. The final problem is that factors like changes in company fundamentals and capital structure can influence the stability of beta. Sharpe and Cooper(1972) provided some evidence regarding the instability of beta by estimating the betas of securities using the past sixty months of rates of return for each year from 1931 to 1967. They concluded that the instability of beta was significant.