CHAPTER 2

LITERATURE REVIEW

2.1 A brief review of CAPM theory

Based on Markowitz's (1952) and Tobin's (1958) works, Sharpe(1964), Lintner(1965) and Black(1972) paved the way for the development of the modern day Capital Asset Pricing Model now commonly known as CAPM in short.

Markowitz(1952) defined risk as variability of expected returns. Although it was already common knowledge during his time that investors could minimise risks by diversifying their portfolios through holding various types of stocks and/or stocks of various companies, he was the first one to formally postulate the theory. He pointed out that diversifying portfolios would not reduce the risk if the stocks had high positive correlation of returns. In order to maximise returns with a given level of risks, a large number of combinations of stocks must be tested. Due to the tedious nature of the computational work, Markowitz's model has not been popular. Despite this shortcoming, Markowitz(1952) made an important contribution to the development of the modern portfolio theory.

Tobin(1958) introduced the idea of super-efficient portfolio as the market portfolio. He believed that in a simple world investors will hold the market portfolio, achieving their own risk-return tradeoff through borrowing and lending. Sharpe(1964) extended the portfolio theory. He believed that the risk of individual stocks could be divided into two components, one of which is market risk and the other is unique risk. With Black's(1972) pioneering work in the two pass testing methodology, the modern portfolio theory was born. The modern portfolio theory takes the following form:

CAPM states that the portfolio/security returns are linearly and positively elated to systematic risk, which is popularly known as beta. In other words, CAPM ıssumes that investors are rewarded with a correspondingly higher rate of return rom an investment in securities with a greater rate of risk than the market rate of isk. Further, investors would have to accept a return that was correspondingly lower han the market rate of return, if they invested in securities that carried less risk than he market rate of risk.

The ex ante relationship is as follows:

$$E(R_i) - R_F = \beta[E(R_M) - R_F]$$

where $E(R_i)$: the expected return on security i

R_F : the risk free rate

$E(R_M)$: the expected market return

β : the measure of market risk known as beta

The CAPM is expressed in terms of expectation and thus unobservable. To test the CAPM empirically the following ex-post model is used:

$$\tilde{R}_{it} = a_i + b_i \tilde{R}_{mt} + \tilde{U}_{it}$$

where $\tilde{R}_{it}$: the average return on portfolio/security *i* over time t

$\tilde{R}_{mt}$: the market return over time t

b_i : the estimated market risk of security i

a_i : the estimated intercept of the regression model

$\tilde{U}_{it}$: the error term

Since the composition of the market portfolio is unknown the KLSE Composite Index is used as a proxy for the market portfolio. The ex-post form assumes that the capital markets are efficient and the rate of return on any asset is a fair game.

2.2 Review of previous and recent related studies

Vast and extensive research has been carried out to test the CAPM model. The work by Fama and Macbeth(1973) was the first reported study in America of the near relationship as predicted by CAPM. The study shows that there is a positive near relationship between average stock returns and beta in the US during the pre-969 period. Ball, Brown and Officer(1979) reported evidence of robust positive elationship between beta and returns in Australia.

In Asia, there are a number of studies that empirically tested the CAPM. One such study by Cheung and Wong(1992) on the Hong Kong Stock Exchange over he period 1980-1989 using monthly data on 90 securities shows a weak relationship between stock returns and various measures of risks (i.e. systematic risk, total risks and skewness of distribution). In a study by Chou, Zhou and Hsu(1998) on the Tokyo Stock Exchange, systematic risk failed to explain the cross-section of monthly expected returns although it significantly explains the variation of the expected returns over half-yearly and annual intervals. However, it was found that size of firm is a significant factor in explaining the cross-sectional variation especially over the monthly interval while book-to-market equity(BE/ME) ratio significantly explains the cross-sectional variation in expected returns for various time intervals. The monthly return data(1975-1994) for all non-financial stocks listed on the Tokyo Stock Exchange for this study were obtained from Sandra Ann Research Center of the University of Rhode Island. Another study by Wong and Tan(1991) on the Stock Exchange of Singapore over a period of 1980-85 using weekly data, shows a weak linear relationship between stock returns and beta. The findings also show that there were no significant relationship between stock returns and unsystematic risk and

otal risk but relative skewness of returns distribution does affect prices of individual stocks.

Empirical work by Lakonishok and Shapiro (1980) between stock market eturns and the following variables: beta, total variance and size for the period 1962-1981 showed that only firm size seems to matter irrespective of portfolio formation procedures. In this study portfolios were formed based on ranking of beta, size and otal variance. When January returns were omitted, the size variable was no longer significant. This study includes all stocks with adequate return and market capitalisation data and traded on the New York Stock Exchange for at least eight years between January 1954 and December 1981.

A study by Chan, Hamao and Lakonishok (1991) of the stocks listed on the Tokyo Stock Exchange relates the cross-sectional differences on the Japanese stocks to four variables: earnings yield, size, book-to-market ratio, and cash flow yield. The study reveals a significant relationship between these variables and the expected returns in the Japanese market. Among the four variables considered, the book-to-market ratio and cash flow yield possesses the most significant positive impact on the expected returns.

An extensive study on the US markets by Fama and French (1995) testing the CAPM shows no relationship between average stock return and beta, and that average firm size and the ratio of book-to-market equity do a good job in capturing the cross-sectional variation in average stock returns. The period of this study stretches from 1963 to 1992 and covers all stocks listed on the New York Stock Exchange.

In another study by Kothari, Shanken and Sloan(1995), an examination of the cross section of expected annual returns of the U.S. markets reveals economically

ınd statistically significant beta when betas are estimated from time-series egressions of annual portfolio returns on the annual return on the equally weighted narket index. The data used comprises all stocks from New York stock Exchange ınd American Stock Exchange and the portfolios formed were tested in two periods: 1927 to 1990 and 1941 to 1990. Further they found that the relationship between ɔook-to-market equity and returns is weaker and less consistent than that in Fama ınd French(1992). They conjectured that the past book-to-market data are affected ɔy selection bias and provided indirect evidence to support this.

Recent studies by Chou, Zhou and Hsu(1998) and Fama and French(1995) show no relationship between stock returns and systematic risk, beta. The studies ɔy Wong and Tan(1991) and Cheung and Wong (1992) show a weak relationship ɔetween stock returns and systematic risk. Beta, therefore, may not be the best risk measure. Investors, however, find variance (total risk) and standard deviation (unsystematic risk) appealing measures of risk. These risks are reduced by holding a diversified portfolio. However, the study by Friend and Blume(1975) shows that the individual investors hold undiversified portfolios. Hence, variance (total risk) and standard deviation (unsystematic risk) are possible risk factors.

The CAPM model was tested on the Malaysian market by Ariff(1998) using four independent variables: beta, beta-squared, size, leverage, earning-price ratio and book-to-market ratio. His findings reveal that significant relationship between expected returns and three variables: beta, beta-squared and size. Aside from the low explanatory power of these variables the signs of the coefficients of beta and size are contrary to those obtained in other studies. He felt that no firm conclusions could be drawn and suspected that the results were anomalous and variables were

:onfounded. Also, data for only a period of 15 years were used. However, returns)ver a period of 20 years or more are expected to give a more consistent result.

The results of previous related studies above indicate that beta, unsystematic isk, total risk, relative skewness of the return distribution, firm size and book-to-narket equity are possible risk factors that may affect the share prices on the KLSE. These risk factors will be examined in this study.