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الجامعة الإسلامية العالمية ماليزيا
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA
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THE EXPLANATORY POWER OF BETA: A LOOK AT THE MALAYSIAN STOCK MARKET

BY

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A THESIS SUMMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION

MANAGEMENT CENTER
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

AUGUST, 2001

ABSTRACT OF THE THESIS

An extensive body of empirical research over the last 10 to 15 years has presented evidence contradicting the central prediction of the Sharpe (1964), Lintner (1965) and Black (1972) capital asset pricing model ("CAPM") that the cross-section of expected returns is linear in beta. A number of authors have highlighted the failure of one of the CAPM's key prediction. Fama and French (1992) find that the excess return on the market was not priced and instead a small sub-set of these alternative variables, commonly referred to as market anomalies, could explained expected stock returns. Davis (1994) and He and Ng (1994) come to a similar conclusion to that of Fama and French (1992).

On the other hand, Kothari et al. (1995) find that beta does have explanatory power for the cross-section stock returns. Clare et al. (1998) using a different methodology due to McElroy et al. (1985) find a highly significant role for beta in the UK stock market when they allow for correlation amongst idiosyncratic returns.

In this paper, the author uses the Fama and MacBeth's (1973) two-step methodology to examine the cross-section of expected returns of the Malaysian stock market. The findings of this study suggest a highly significant role for beta in the Malaysian stock market.

The study fails to established any proposition that the various market anomalies could instead captured the cross-sectional stock returns as suggested by some of the previous studies, particularly that of Fama and French (1992). The overall findings of this study hence infer that beta is not dead and that beta outperforms the various anomalies in capturing the average stock returns, at least in the case of Malaysian market.

APPROVAL PAGE

THE EXPLANATORY POWER OF BETA: A LOOK AT THE MALAYSIAN STOCK MARKET

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This thesis was submitted to the Management Center and is accepted as partial fulfillment of the requirements for the Master of Business Administration (MBA)

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Date: 15th August 2001

DECLARATION

I hereby declare that this thesis is the result of my own investigations, except where otherwise stated. Other sources are acknowledged by footnotes giving explicit references and a bibliography is appended.

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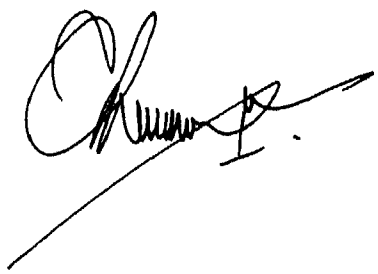

15th August 2001

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ACKNOWLEDGEMENT

Comments and guidance of the supervisor, Dr. Mohd Azmi Omar, in the preparation of this research paper is gratefully acknowledged and appreciated. I would also like to express appreciation to my wife, Tan Sok Peng, for her great encouragement to me in completing this thesis. My feeling of gratitude goes to my parents, brothers and sister for their support.

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CHAPTER ONE

INTRODUCTION

1.1 Introduction

Capital Asset Pricing Model ("CAPM") is regarded as the most popular analytical method amongst today's investment professionals due to its success in expressing a powerful theoretical insight in a simple yet usable form. The primary use of CAPM is to determine the minimum required rates of return from investments in risky assets. More precisely, it is a theory about the relationship between stock returns and systematic risk. CAPM states that (a) expected returns on stocks are positively related to their risk (market beta), and (b) market betas are the only risk factor to explain the cross-sectional variation of expected returns (Sharpe and Cooper, 1972). The key variable in the CAPM, known as beta ("β"), is a *standardized* measure of systematic risk which has become as familiar as, and is indeed, interchangeable with CAPM itself

The famous and powerful CAPM captures the relationship between risk and return as:

$$E(R_i) = R_{rf} + \beta_i(R_m - R_{rf}) \qquad (1)$$

Where:-

$E(R_i)$	=	the expected rate of return on asset i
R_{rf}	=	the risk-free rate of return
R_m	=	the expected rate of return on market portfolio
β_i	=	the beta for asset i

Proposition (1) states that the expected rate of return for a risky asset i is determined by the R_{rf} plus a risk premium for the individual asset. The risk premium, in turn, is determined by the systematic risk of the asset (β_i) and the prevailing market risk premium (R_m - R_{rf}). The equation implies that the expected rate of return for a risky asset is linear in beta, and that the expected rates of return for all assets and all portfolios during the same holding period are only affected by their respective beta, all other variables being constant.

The ultimate question regarding the CAPM is whether it is useful in explaining the return on risky assets, specifically, the positive linear relationship between systematic risk and the rates of returns on these risky assets. In other words, it questions on how well do returns conform to the security market line (SML) equation given above. Sharpe and Cooper (1972), for example, found a positive relationship between risk and return, although it was not completely linear. They found that the returns increased with risk class except for the highest classes, where the returns leveled off and declined slightly.

A number of researchers have highlighted the failure of the CAPM's key predictions that is the cross-section of expected asset returns should be linear in beta. A previous study that examined the viability and usefulness of the CAPM is quite damaging not only because of the depth of the analysis, but also because one of the authors, Eugene Fama, has been a great supporter of the CAPM. Fama and French (1992) estimate the CAPM for the US stock market over the period between 1963 and 1990 comparing the cross-sectional explanatory power of beta with the explanatory power of an alternative set of variables such as market value, leverage and book-to-market value. Their works indicated that the excess return on the market was not priced and that a small sub-set of these anomalies, e.g. firm size and book-to-market value, could instead explain the expected stock returns. They inferred that the linear and positive relationship found in empirical studies prior to 1969 vanished between 1963 and 1990 and that **beta is dead**, at least for the said period.

Given the significance of the Fama and French (1992) study, several studies followed that considered their results. These studies concentrated on two questions: (a) is beta really dead whereby no relationship exists between beta and rates of returns? and (b) why and how does the *book value-market value ratio* (BE/ME), particularly, help predict rates of returns? Davis (1994) and He and Ng (1994), for example, find considerable evidence in supporting the empirical results of Fama-French.

Fletcher (1997) examines the conditional relationship between beta and return in the UK stock returns and finds a significant relationship between beta and return when

sample is split into periods according to whether the excess market return is positive or negative. Clare et al. (1998) focuses on the methodology employed by Fama and French (1992) and explored the relationship between beta and expected returns using alternative methodology developed by Gibbons (1982) and extended by McElroy et al. (1985). They tested the relationship for a sample of the UK stock returns between 1980 and 1993 and find, in contradiction to Fama and French (1992) study, a highly significant and positive relationship between beta and expected UK stock returns and that the alternative variables used by Fama and French have little additional or no explanatory power for the cross-section of expected stock returns.

1.2 Purpose of the Study

The various empirical studies in search for the usefulness of beta have presented to the investment community both academicians and practitioners a rather mixed results in supporting the usefulness of CAPM to explain the return on risky assets. These results could be grouped into two broad categories with one that casts doubt on the explanatory power of beta in capturing the linear and positive relationship between risks and returns. Fama and French (1992), Davis (1994) and He and Ng (1994) have reached to a similar conclusion that beta is dead and that an alternate set of anomalies such as firm size and book-to-market-value could instead out-perform the CAPM's beta coefficient in measuring the cross-section of United States stock returns.

In contrary, Kothari et al. (1995) in the other group, using an alternative methodology, find that beta does have explanatory power for the cross-section of US stock returns. The results of Clare et al. (1998) also find comparable evidence regarding the measurability of beta in explaining the UK stock returns when they allow for correlation amongst idiosyncratic returns.

Given the contradicting results vis-à-vis the explanatory power of beta, this study will test for a linear and positive relationship between beta and expected stock returns for a sample of Malaysian stocks over the period 1988 to 1997. In addition, the Malaysian data is used following the suggestion by Leamer (1983) who states that it is not really appropriate to continue testing a hypothesis using data from which the hypothesis was first generated since any tests thereafter may lead to "fragile inference." Thirdly, most studies on the relationship between beta and the expected stock returns all US and UK stock returns (see Fama and French, 1992; Davis, 1994; He and Ng, 1994; Kothari et al., 1995). Although the sample period vary between these studies, the results of Fama and French (1992) are so important that their conclusions should be tested using data from another considerable emerging capital market, if not major, i.e. the Malaysian market.

This study focus on and adopt the methodology employed by Fama and French (1992) to explore the relationship between beta and expected returns. Using the two-stage procedure, this paper intends to (a) analyze the stability of the cross-sectional relationship between beta and expected returns; and (b) provide evidence of this relationship from an alternative emerging market i.e. Malaysian equity market.

1.3 Outline of the Study

The remainder of the paper is organized as follows: Chapter two reviews the previous literature and a brief review of Malaysian stock market. Chapter three deals with the sample selection, portfolio construction and data analysis. Chapter four reports and discusses the empirical findings. Chapter five concludes the paper.

CHAPTER TWO

LITERATURE REVIEW

2.1 Tests on the CAPM

The CAPM is undoubtedly the major benchmark of the modern finance theory. Its primary prediction that only market risk should be priced remains the heart of much research. Nonetheless, a number of academicians and researchers have identified empirical descriptors of expected returns commonly referred to as stock market anomalies.[1]

Fama and French (1992) tested and documented the cross-sectional relationship between expected stock returns and other variables such as market capitalization (ME), book-to-market values (BE/ME), asset to market capitalization (A/ME), asset to book equity (A/BE) and the earning price ratio (E/P). Using the two-step estimator developed by Fama and MacBeth (1973), they predict that the price of risk associated with the beta coefficient is positive (0.15% per month) as the CAPM estimates, but statistically insignificant. The study's findings based on the US stock data for the period 1963 to

[1] See Basu (1977), Banz (1981), Keim (1983), Rosenberg et al. (1985), or Bhandari (1988).

1990, has been interpreted as meaning that there is no significant risk premium attached to beta risk.[2] They find among other things (a) an inverse relationship between beta and expected stock returns, though insignificant, when ln(ME) is included in the cross-sectional regressions, while the slope of ME is negative and highly significant; (b) a significant positive relationship between book-to-market value and average returns[3]; and (c) a significant negative relationship between firm size, based on market capitalization, and average stock return[4]. Fama and French concluded that between 1963 and 1990, beta was not related to average returns on stocks when included with other variables, or when considered alone.

Given the significance of Fama and French (1992) study, several studies followed that investigate these results. Davis (1994) analyzes the ability of certain fundamental variables to explain the cross-section of realized returns of 100 stocks, compiled under the COMPUSTAT data, in the period from July 1940 to June 1990. The results from his study indicates that book-to-market equity, earning yield and cash flows yield each have explanatory power with respect to subsequent returns in univariate regressions. Even though there is no clear winner among the 3 variables in explaining the cross-sectional variation in stock returns, each is shown to reliably predict returns during the 1940 to 1963 period. He further finds that there is a strong January seasonal in the explanatory power of these variables.

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[2] Kothari et al. (1995), however, highlighted that the standard error of the CAPM price of risk estimate is so large that the Fama and French (1992) evidence "indicates that a non-trivial risk premium of 6% per year is about as likely as no risk premium."

[3] Fama and French (1992) confirm the results of Rosenberg et al. (1985)

[4] This result is consistent with the original findings of Banz (1981)

He and Ng (1994) both find, within a similar two-step framework using US stock data, considerable evidence to support Fama and French results. They examine whether size, measured by market capitalization, and book-to-market value (BE/ME) of equity are proxies for risks associated to the macroeconomic factors or are measures of a stock's sensitivity to relative distress. Their study uses a larger sample of NYSE, AMEX and NASDAQ monthly stock returns over the period from July 1963 to December 1989. Using a multi-factor asset-pricing framework, they have found that the betas on the term and default factors are subsumed by size, but not by BE/ME. They also find that size and BE/ME are related to relative distress and that relative distress can explain the size effect, but only partially the effect on BE/ME, on average stock returns. Overall, BE/ME still exhibits the most explanatory power in the cross-section of average returns, while size plays a weaker role.

Dennis et al. (1995) also confirmed the Fama and French (1992) results. Apart from confirmation on the optimal combination involved portfolios of small firms with high BE/ME ratios, they also showed that this superiority prevailed after assuming 1% transaction cost and annual re-balancing. They subsequently showed that the optimal results were derived if one assumes re-balancing every four years.

Chan et al. (1991) also finds that book-to-market value plays a significant role in explaining the cross-sectional variation of stock returns in Japanese market. These empirical results strongly suggest that the widely used market beta was not related to expected stock returns, and which Fama and French describe as "beta is dead".

In contrast to Fama and French (1992) who measure beta with monthly returns, Kothari et al. (1995) measure beta with annual returns to avoid trading problems involved with using monthly data. With the Fama and French's study as backdrop, they reexamine whether beta explains cross-sectional variation in average returns over the post-1940 period as well as the longer post-1926 period, and whether BE/ME captures cross-sectional variation in average returns over a longer 1947 to 1987 period. Using annual Standard & Poor's industry level data, they find that the relation between BE/ME and returns is weaker and less consistent than that in Fama and French (1992) and conjecture that past BE/ME results using COMPUSTAT data are affected by a selection bias and provide indirect evidence. On the other hand, they presented evidence that average returns do indeed reflect substantial compensation (about 6 to 9 percent per annum) for beta risk when betas are estimated from time-series regressions of annual portfolio returns on the annual return on the equally weighted market index. However, this does not mean that beta alone accounts for all the cross-sectional variation in expected returns, as implied by the CAPM. In short, they find an economically and statistically significant role for beta.

A different study by Pettengill et al. (1995) noted that the empirical studies typically used realized returns to test the CAPM when theory specifies expected returns. They argue that the statistical methodology used to evaluate the relationship between beta and return requires adjustment to take into account of the fact that realized returns and not ex ante returns have been used in the test. They further developed a conditional relationship between return and beta, which depends on whether the excess return on the

market index is positive or negative. In periods when the excess market return is positive (up market), there should be a positive relationship between beta and return. In periods when the excess market is negative (down market) there should be a negative relationship between beta and return (Fletcher, 1997, pg. 212). This is because high beta stocks are more sensitive to the negative market excess return and will have a lower return than low beta stocks. The evidence in Pettengill et al. (1995) indicates that for the period between 1936 and 1990, there is strong support for beta when the sample period is split into up market and down market months.

Previous studies of the relationship between beta and expected returns all use the US stock return data (see for example Fama and French, 1992; Davis, 1994; He and Ng, 1994; Kothari et al., 1995), although the sample periods vary between these studies. Recognizing the significance and importance of Fama and French's study, Fletcher (1997) examines the cross-sectional relationship between beta and return in the UK stock returns between January 1975 and December 1994 using data on stock returns collected for securities included in the London Business School Share Price Database (LBS). Consistent with the findings of Fama and French (1992), there was no evidence of a significant risk premium on beta when the unconditional relationship between beta and return was examined.[5] In addition, there was no significant relationship between size and returns. This appears to be due to a possible non-linear relationship between portfolio average returns and the proxy for portfolio size. When the sample period was split into periods of positive and negative excess market return, there was a significant positive

[5] See, also, Strong and Xu (1994).

relationship between beta and return in periods of positive excess market return, and a significant negative relationship between beta and return in periods of negative excess market returns.[6] However, the conditional relationship between beta and return in up market and down market was not symmetrical, as predicted by Pettengill et al. (1995). The relationship was stronger in down markets. This contradicts one of the conditions of a positive risk and return tradeoff. The results of Fletcher's study do suggest that the market beta still has a role to play for portfolio managers.

Clare et al. (1998) tested Fama and French's conclusions using data from the UK stock market[7] to avoid "fragile inference" as pointed out by Leamer (1983). They employ the one-step estimator, as oppose to the two-step estimator, in their study. The results indicate that, when they allow for the full correlation structure between idiosyncratic returns, the CAPM's cross-sectional restriction is accepted overwhelmingly. Thus, they find a highly significant and positive relationship between beta and expected UK stock returns. In addition, both recursive estimation of the CAPM and the selection of random sub-samples of the data indicate that the relationship is highly stable. They however, when integrate the alternative explanatory variables used by Fama-French, did not find Book to Market Equity (BE/ME), Asset to Market Equity (A/ME), Market Equity (ME), Earnings Per Share (EPS) and a measure of leverage (L) to have any additional explanatory power for the cross-section of expected UK stock returns. They therefore

[6] The result is consistent with Pettengill et al. (1995), and suggests the need to focus on the conditional relationship between beta and return.

[7] The study uses monthly stock return data on 100 stocks quoted on the London Stock Exchange between January 1980 and December1993.

suggested that it would be unwise to rely on such a relationship in any practical application of the CAPM.

With a backdrop that "*Numerous and contradictory studies recently published in the American literature have cast doubts as to whether beta plays a role at all when it comes to explain average returns on the American Stock Exchange. As the results obtained seem to depend upon the methodology used...*" in mind, Lilti and Montagner (1998) propose to implement some of the methodological advances advocated in these recent papers to test for the usefulness of beta as a determinant of returns on the French Stock Exchange. The result they obtain using daily returns of 43 stocks of the French Stock Exchange over the period from 1 January 1990 to 31 December 1995 speaks for a flat relation between realized returns and beta. Implementing both the methodological advances separately proposed by Fama and French (1992) and Pettengill et al. (1995), they cannot confirm the results exhibited by Pettengill et al., while their results corroborate only half of Fama and French's findings, which highlight the significance of size as a determinant of stock returns.

CHAPTER THREE

DATA AND METHODOLOGY

3.1 Data

As pointed out by Leamer (1983), one ought not continue to test economic hypothesis using data from which the hypothesis was first generated, since this leads to weaker econometric inference. Given the view and cautious, this study tests the CAPM and the claims of Fama and French (1992) about the explanatory power of anomalies such as earnings, market capitalization and leverage using stock market data from the Kuala Lumpur Stock Exchange ("KLSE"). Malaysian capital market is chosen as much of the previous studies in this area were based on developed markets, particularly the US and UK. The use of data from an alternative market and the result derived thereinafter in support of the findings and results of Fama and French (1992) would definitely add much weight to their claims that "beta is dead". The selection of data is deemed appropriate and valid as Malaysian stock market has witnessed some tremendous changes since late 1980s and developed into one of the prominent emerging markets.