THE NATURE AND EXTENT OF BETA INSTABILITY IN THE KUALA LUMPUR STOCK MARKET

Robert D. Brooks*
Robert W. Faff*
Mohamed Ariff**

ABSTRACT

In this study we investigate the stability of individual stock betas in the Kuala Lumpur stock market over the period 1986 to 1993. However, this sample straddles a change of listing between the Singapore and Kuala Lumpur markets which occurred at the beginning of 1990. Accordingly, we examine the four year sub-periods either side of the change of listing. A comparison of our results across these different subperiods indicates an incidence of beta instability for individual stocks at about 20 per cent or less. Hence, at the general level this analysis suggests an absence of a change of listing effect on beta stability. This is broadly consistent with the results obtained by Brooks, Faff and Ariff (1996) in their study of the Singaporean stock market. However for higher risk Malaysian stocks there is a tendency for these stocks to have increased beta instability post 1990.

1. INTRODUCTION

The analysis of the risk/return characteristics of individual stocks is of central importance in modern finance research. A popular technique for measuring the risk of an individual stock is to use the well known systematic risk measure of a stock's market model beta. The utility of this measure depends in part on whether this beta remains stable over time. Research on the US equity market by Fabozzi and Francis (1978), Sunder (1980), Alexander and Benson (1982), Bos and Newbold

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** Dr. Robert D. Brooks and Dr. Robert W. Faff are both with the Department of Economics and Finance, Royal Melbourne Institute of Technology.*

*** Dr. Mohamed Ariff is Professor of Finance, Mt. Eliza Business School, Monash University, Australia.*

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(1984), Simonds, LaMotte and McWhorter (1986) and Collins, Ledolter and Rayburn (1987) suggests that between 2% and 58% of stocks have varying betas. For the Australian equity market research by Faff, Lee and Fry (1992), Brooks, Faff and Lee (1992), Faff and Brooks (1996) and Pope and Warrington (1996) suggests that between 11% and 61% of stocks have varying betas.

Ang's (1991) views on the desirability of more research on Asia-Pacific markets, indicate extending the analysis of beta stability to Asia-Pacific markets is of some interest. Indeed, if beta instability is an important issue in these developed and liquid markets then it is likely to be more significant in emerging markets. In the existing literature, research on beta instability in emerging markets is very rare. Three papers currently exist, namely, Bos and Fetherston's (1992) study of individual stock beta instability in the Korean market; Kok's (1992) study of beta stability for a sample of 77 Malaysian stocks; and Brooks, Faff and Ariff's (1996) study of individual stock instability in the Singaporean market. Bos and Fetherston (1992) found that 61% of their sample of 128 Korean stocks, over the period 1980 to 1988, had varying betas. Brooks, Faff and Ariff (1996) found that in their eight year sample (1986-1993) approximately 40% of Singaporean stocks had varying betas. This result is potentially confounded by the change of listing that took place between the Singapore and Kuala Lumpur markets in 1990. In four year sub-samples either side of the change of listing, Brooks, Faff and Ariff (1996) found that only 20% of their sample of stocks had varying betas.

Kok (1992) examined the stability of his sample across two adjacent 42 month subperiods, namely, January 1983 to June 1986, and July 1986 to December 1989. Generally, he found that there was substantial stability of betas across the two subperiods. However, this evidence on the beta stability of Malaysian stocks can be extended in two important ways. Firstly, given that his data period is limited to the 1980's the evidence can be updated to a more recent period. Secondly, the analysis can include tests of stability which consider time varying beta in addition to the mean shift approach employed by Kok (1992). This is important because as Chen and Keown (1981) note, beta instability adds an additional risk component which may be priced. Further to this Chen and Martin (1980) argue that to the extent that stock returns are positively correlated this risk component cannot be totally diversified away. Clearly, more evidence on beta instability from emerging Asia-Pacific markets is needed. Accordingly, in this paper we analyse the beta instability of individual stocks in the Kuala Lumpur stock market.

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The Kuala Lumpur Stock Exchange (KLSE) is a fully order-driven dealer market without specialists or market making. The KLSE was established in June 1973 as the Malaysian Exchange trading in the then newly-introduced Malaysian Ringgit as the currency and the market commenced with 262 firms of which 107 were non-Malaysian-origin firms (69 of these were from Singapore). The exchange underwent a major structural change in 1990, when all the (a) Singapore-origin firms traded on the exchange were required to be delisted and (b) Malaysian-origin firms were required to limit their listing to the Kuala Lumpur exchange. After the change, KLSE gained liquidity and created a euphoria for new shares and for new share capital unprecedented in its history. This has led to the KLSE consolidating itself as a major capital market in Southeast Asia. At end-1994, the exchange had 478 listed firms, of which only 3 were non-Malaysian firms (there were 251 Malaysian firms listed at year-end 1989). In 1994, the total capitalisation of the main board was estimated at US$176 billion, which makes it the third largest Asian market next to Korea and Taiwan (Japan excluded). A second board was established in 1989 for smaller firms and this board has less stringent listing requirements. There were 147 firms listed in that market in 1994 and its capitalisation was only 1% of the main board. This study is restricted to the main board stocks only.

The Malaysian share market, though large in size, is a volatile share market exhibiting characteristics that are common to most emerging markets in the Asia Pacific region. While the five developed Asia Pacific markets (Australia, Hong Kong, Japan, Singapore and New Zealand) are known for intense trading activities but moderate level of volatility, the Malaysian market is known for intense cyclical volatile price behaviour. For example, KLSE lost about 35% of its peak price by mid-1995 after achieving record high prices at year-end in 1993. In contrast, the Singapore market lost less than 20% after the 1993 peak. The long-run average market return calculated for 1980-1990 is 18% per annum and the standard deviation of returns is 34%. Thus, the coefficient of variation is 1.8. The average coefficient of variation of developed Asia Pacific markets is in the region of 0.9 to 1.3. Based on this measure the KLSE is a far more risky market than the more established markets[1].

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[1] *For further details see Ariff and Johnson (1990).*

The KLSE has been studied by a number of scholars. Barnes (1986) and Anwar, Ariff and Shamsher (1994) have shown that the market is weak and semi-strong efficient though it is not strong-form efficient based on a study of stock recommendations. The Malaysian stock market is growing very fast, and is expected to be among the top tier Asian markets by the end of the century. It is being more liberalised, and is beginning to compete globally with an aim of becoming another international financial market in the Asia Pacific region.

The plan of this paper is as follows. In section two we discuss the econometric methodology for testing beta instability. In section three we outline the data used in the paper. In section four we discuss the results obtained for Kuala Lumpur stocks. The final section contains some concluding remarks.

2. ECONOMETRIC METHODOLOGY

The standard market model can be expressed as follows:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it,}$$

where R_{it} is the return for an individual stock, R_{mt} is the return on an index used to proxy for the market portfolio, α_i and β_i are unknown firm specific parameters which are typically assumed to be constant over time and ϵ_{it} is a random shock distributed IN$(0,\sigma_i^2)$.

In Brooks, Faff and Lee (1992) it is noted that previous research has argued that time variation in beta may be due to microeconomic factors at the level of the firm. Fabozzi and Francis (1978) suggested the reasons of alterations to the product mix or changes in leverage or dividend policy as giving rise to time variation in systematic risk. Bos and Newbold (1984) claimed that changes in the operational structure of the firm may be the cause of time variation in systematic risk. Dielman and Nantell (1982) argued that the key operational change is likely to be merger activity. Turnbull (1977) identified maturity and growth of the firm as important determinants of systematic risk. Therefore, as the firm matures and its growth rate fluctuates through time, then so too may its beta risk change. Time variation in systematic risk due to microeconomic factors is also consistent with some of the arguments provided by Blume (1975). For example, he suggested that when firms engage in any project which is risky, the risk of the project may tend to be less extreme over time.

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Alternatively, Brooks, Faff and Lee (1992) also noted a line of research that suggests that macroeconomic factors could lead to time variation in the systematic risk. Both Fabozzi and Francis (1978) and Bos and Newbold (1984) claimed that business cycle factors such as inflation and unemployment may account for the time variation in systematic risk. In a similar vein Fabozzi, Francis and Lee (1982) argue that beta instability may be due to factors such as non-normality of asset returns, multi-factor models and imperfections in capital markets. Another possibility is to attribute time variation in systematic risk to the behaviour of portfolio managers as was done in Alexander, Benson and Eger (1982).

Despite the desirability of actually modelling the factors that lead to time variation of systematic risk, their unobservability prevents one from doing so in empirical work. Instead, we apply the Hildreth-Houck (1968) random coefficient model of beta instability. This model provides a simple statistical parameterisation of time variation which has achieved considerable support in the United States equity market (see Bos and Newbold (1984) and Collins, Ledolter and Rayburn (1987)), and in the Australian equity market (see Brooks, Faff and Lee (1992, 1994) and Brooks and Faff (1995)).

The Hidreth-Houck (1968) model states,

$$\beta_{it} = \bar{\beta} + a_{t,}$$

where a_t is distributed IN(0,$\lambda_0\sigma^2$). The effect of beta being time varying on the market model is to alter the properties of the disturbance term, ϵ_{it}. In the case of beta following the Hildreth-Houck (1968) model the disturbances become hexeroscedastic and the form of the heteroscedasticity is given by,

$$\sigma_t^2 = \sigma^2 \ (1+\lambda R^2_{mt})$$

In this setting the heteroscedasticity is proportional to R^2_{mt}. A large number of econometric tests exists for this type of heteroscedasticity. The most computationally simple test available is the Lagrange Multiplier (LM) test of Breusch and Pagan (1979), in which the test statistic is calculated as the number of observations times the R^2 from the auxiliary regression,

$$\hat{\epsilon}_{it}^2 = \gamma_0 + \gamma_1 R^2_{mt}$$

The analysis of beta stability conducted in this paper exclusively employs this testing framework[2].

3. DATA

Month-end price relatives are used in this study. Price relatives are adjusted for capitalisation change and dividend streams. The original price series were obtained from the SCANS daily price series and these series were extended over the years through checks on transcription and other errors. Price relatives were calculated from corrected and adjusted month-end series.

The exchange underwent a major structural change in 1990, when all the (a) Singapore-origin firms traded on the exchange were required to be delisted and (b) Malaysian-origin firms were required to limit their listing to the Kuala Lumpur exchange. As a result, the activities of 53 Singapore-origin firms were removed from the exchange while the activities of 182 Malaysian-origin firms hitherto in two exchanges in Singapore and Kuala Lumpur were limited to the Kuala Lumpur stock exchange. The Malaysian exchange gained trading intensity, but the firms listed in that market are constrained to raise capital only in that country.

The price relatives for 174 firms continually listed over the period 1986 to 1989 and 114 firms continually listed over the period 1990 to 1993 are chosen for this study. The market returns are measured using the Kuala Lumpur Stock Exchange Composite Index.

4. RESULTS

The complete sample of stocks in each period was partitioned into three different risk categories as measured by the OLS point estimates of market model betas. Stocks were classified as low risk if their beta was less than 0.8, medium risk if their beta was between 0.8 and 1.2, and high risk if their beta was greater than 1.2. In the first period, it was found that 80 stocks were low risk, 72

[2] *Several other techniques have successfully used to investigate beta stability in the literature. For example, Faff, Lee and Fry (1992) used the LBI test and Brooks, Faff and Lee (1992, 1994) used the POI test. These techniques are not used here because of the desire to compare our results to the obtained for Singapore by Brooks, Faff and Ariff (1996) which employed the LM testing approach. Further, the results obtained between LM test versus LBI tests versus POI tests have been very similar. For details compare Faff, Lee and Fry (1992), Brooks, Faff and Lee (1992) and Pope and Warrington (1996).*

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stocks were medium risk and 22 stocks were high risk. The average beta for the 174 stocks was 0.84237, with a range of beta estimates from 0.037073 to 1.55455. In contrast, in the second period, 15 stocks were low risk, 45 stocks were medium risk and 54 stocks were high risk. The average beta for the 114 stocks was 1.16516, with a range of beta estimates from 0.033190 to 2.05311. This is consistent with Ariff and Prasad's (1996) finding of an increase in systematic risk post 1990.

The results for the Breusch and Pagan (1979) LM test for beta instability are presented in Table 1.

Table 1

The number of rejections of beta stability for a sample of 174 Malaysian stocks, over the period 1986 to 1989, and 114 Malaysian stocks, over the period 1990 to 1993 are shown. Rejections are assessed according to the LM test at the 5% significance level. Results are presented for the sample of all stocks, stocks with low betas *($\beta \leq 0.8$),* stocks with medium betas *($0.8 \leq \beta \leq 1.2$)* and stocks with high betas *($\beta \geq 1.2$).*

	n	**1%**	**5%**	**10%**
		1986-1989		
All	174	25	32	35
%		14.4	18.4	20.1
Low	80	18	22	23
%		22.5	27.5	28.8
Med	72	6	9	11
%		8.3	12.5	15.3
High	22	1	1	1
%		4.5	4.5	4.5
		1990-1993		
All	114	21	25	28
%		18.4	21.9	24.6
Low	15	4	5	5
%		26.7	33.3	33.3
Med	45	8	9	12
%		17.8	20.0	26.7
High	54	9	11	11
%		16.7	20.4	20.4

At the 5% significance level we find that 18.4% of stocks have varying betas in the first period and 21.9% of stocks have varying betas in the second period. Hence, there is a close similarity in percentage of varying betas between the two periods.

An examination of the stability results across the different categories of risk suggests an inverse relationship between the level of risk, as measured by the OLS point estimate of beta and beta instability, in both periods. Interestingly, this is the opposite finding to that in Singapore, where Brooks, Faff and Ariff (1996) report a tendency for higher risk stocks to be more unstable. The Malaysian results are now discussed in more detail.

Firstly, the degree of beta instability is considerably higher for low beta stocks. Specifically, for this subgroup at the 5% significance level we find that 27.5% of these stocks have varying betas in the first period and 33.3% of these stocks have varying betas in the second period. Again, there is a close similarity between the results found in the two periods.

Secondly, and in contrast, the degree of beta instability is considerably lower for medium and high beta stocks. Interestingly, this is more pronounced in the first subperiod. For medium beta stocks at the 5% significance level we find that 12.5% of these stocks have varying betas in the first period and 20.0% of these stocks have varying betas in the second period.

Finally, the degree of beta instability is also low for stocks with betas in excess of 1.2 in the first period, where at the 5% significance level, only 4.5% of these stocks have varying betas. In contrast, 20.4% of the high beta stocks have varying betas in the secound period. This is a similar but stronger finding than in the case of medium beta stocks.

The question posed by these results is, put simply, why? Why has there been a general increase in the instability of betas and why does instability seem to be most pronounced in low beta stocks? While the explanation of theses results is beyond the scope of the present paper, we offer the following plausible possibilities. The reader is cautioned that they are untested and speculative only and, as such, represent fruitful issues for future research.

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Firstly, the undertaking of privatisation projects by blue chip (low risk) companies is a plausible explanation of this result. Many large scale infrastructural projects (having long gestation periods) were undertaken by large (low risk) companies such as Petronas, United Engineers and other firms which were in a position to undertake such projects. It is likely that such projects would have increased the systematic risk of these companies.

A second plausible explanation relates to a substantial growth phase that occurred for blue chip stocks over the latter half of our sample period. Malaysia experienced a recession for the years around 1987-1988. The years 1990-1996 heralded a restructuring of industrial structure so that manufacturing and services were dominant. As a result, this period has been one of tremendous growth for blue chip (low risk) firms. Moreover, these once low risk companies tended to undertake investments to expand into new areas of far more volatile earnings. For example, Sime Darby which was previously a plantation based firm, now engaged in many non-plantation projects that were far more risky than its core activities. These low risk companies would have experienced increased risk as a result. Hence, this growth phase (post 1990 years) is also consistent with findings in our paper.

In support of the above arguments it is interesting to investigate how measures of leverage were changing for Malaysian companies over our sample period. Two useful measures are the Debt-to-Equity (D/E) ratio and the Debt-to-Total Assets (D/A) ratio. Table 2 reports averages for these ratios for Industrials, Properties and Plantation companies over two periods: 1983-1989 and 1990-1994. It can be seen from the table that the D/E ratio showed an increase between the two periods, for all industries. For example, the D/E ratio of Industrials over the period 1983-1989 was 1.10 compared to a value of 1.25 over the period 1990-1994. Likewise, it can be seen that the D/A ratio rose for all industries. For example, the D/A ratio of Properties over the period 1983-1989 was 0.34 compared to a value of 0.50 over the period 1990-1994. The increase in financial risk, as reflected by these ratios, is consistent with the increased beta instability result found in this paper.

Table 2

This table reports averages for the Debt-to-Equity (D/E) and the Debt-to-Total Assets (D/A) ratios for Malaysian Industrial, Properties and Plantation Companies over two periods: 1983-1989 and 1990-1994.

	D/E Ratio		D/A Ratio	
	1983-1989	1990-1994	1983-1989	1990-1994
Industrials	1.10	1.25	0.50	0.55
Properties	0.90	1.20	0.34	0.50
Plantation	0.60	0.80	0.25	0.35

This is further confirmed by the following analysis. Using a sample of 195 companies on the KLSE there is a positive (but weak) relationship between beta and Debt/Equity (D/E) ratios:

$$D/E = 1.33 + 0.425\beta$$

This indicates that a deteriorating (higher) D/E will be associated with higher beta. Hence, the changes in capital structure observed over the period are consistent with our findings.

5. CONCLUSION

An investigation of whether individual stock instability is a significant issue in the Kuala Lumpur stock market has been presented in this study. In particular, given the major structural change occurring in the market in 1990, our primary focus has been to assess whether the beta stability characteristics changed pre and post this major event. The results of our analysis produce three major conclusions. First, a significant proportion of individual Malaysian stocks have varying betas. This is strongly consistent with similar findings in other developed markets. Second, an important difference between the Malaysian results and previous research on Singapore is that in Malaysia there is a tendency for lower risk stocks to be more unstable, a finding opposite to that of Singapore.

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Finally, with regard to the subperiod analysis which examined the beta stability characteristics, our evidence suggests the following. The level of risk seems to have increased from the first to the second period, suggesting an effect in terms of a change in the mean level of beta risk. In contrast, at a general level there does not seem to have been a change in the stability of risk across the two periods. However, for medium and especially high beta stocks we found increasing risk instability. In the paper we speculate as to the possible causes of these results. Specifically, we suggested that it could in part be related to the privatisation process experienced over our sample period, under which a number of government owned firms were listed. This resulted in higher stock market volatility and potentially greater beta levels and beta instability. Further, we suggest that over the period, blue chip stocks experienced substantial growth which led to increased risk. This conjecture was supported by leverage figures which revealed increased financial risk for Malaysian companies over our sample period. However, these possible explanations are speculative only. A detailed investigation of the causes remains a topic for future research.

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