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Sectoral Beta Forecasts of Securities in a Thin Capital Market: A Case of Malaysia

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ABSTRACT

This study examined the beta forecasts of securities in the overall Malaysian securities market and the industrial, finance, property and plantation sectors. Beta coefficients of 146 securities spread across the various sectors were computed for each 2-year period over the period 1984-1993 by the ordinary least squares method, Blumes's method, Vasicek' method and Dimson-Flowler-Rorke method. The beta coefficients of the 146 securities computed by each method for any 2-year period were used to forecast the beta coefficients in the subsequent 2-year period with the forecast accuracy measured by the mean square error. The best method of forecasting 2-year beta coefficients of securities over the period 1984-1993 was Vasicek's method. It was the best not only for the overall market but also for the industrial, Finance and property sectors. The Dimson-Fowler-Rorke method was the best for the thinly traded palntation sector. An analysis for each 2-year period also showed that Vasicek's method was the best for the three periods 1986-1987, 1990-1991 and 1992-1993, wheras the Dimson-Flowler-Rorke method was the best for the period 1988-1989.

ABSTRAK

Kajian ini memeriksa ramalan beta untuk sekuriti-sekuriti dalam seluruh pasaran sekuriti Malaysia dan sektor industri, kewangan, harta benda dan ladang. Koefisien beta bagi 146 sekuriti dalam pelbagai sektor telah dihitungkan untuk setiap tempoh 2-tahun dalam tempoh 1984-1993 oleh kaedah kuasa dua terkecil biasa, kaedah Blume, kaedah Vasicek dan kaedah Dimson-Fowler-Rorke. Koefisien beta bagi 146 sekuriti yang dihitungkan dengan setiap kaedah untuk sebarang tempoh 2-tahun telah digunakan untuk meramal koefisien beta untuk tempoh 2 tahun berikutan dan ketepatan ramalan diukur oleh min ralat kuasa dua. Kaedah terbaik untuk ramalan Vasicek. Ia adalah terbaik bukan sahaja untuk pasaran seluruh tetapi juga untuk sektor industri, kewangan dan harta benda. Kaedah Dimson-Fowler-Rorke and terbaik untuk sector ladang yang kurang berniaga. Analisis untuk setiap tempoh 2-tahun juga menunjukkan bahawa kaedah Vasicek adalah terbaik untuk tiga tempoh 1986-1987, 1990-1991 dan 1992-1993 manakala kaedah Dimson-Fowler-Rorke adalah terbaik untuk tempoh 1988-1989.

INTRODUCTION

The total risk of a security in modern portfolio theory can be partitioned into two components: market (systematic) risk and unique (unsystematic) risk. The market risk ofa security measures its sensitivity to market movements. It is a risk that arises from te relationship between a security's return and the market return. This type of risk cannot be eliminated through portfolio diversificcation. Beta is a measure of this market risk. On the other hand, the unique risk of a security reflects changes in a security's return that are not associated with the market return but instead are caused by factors which are peculiar to that particular security and affect the price changesof the security in a unique manner. Such risk can be eliminated through portfolio diversification.

The capital asset pricing model (CAPM) developed by Sharpe (1964) and Lintner (1965) but based largely on the earlier works of Markowitz (1952) and Tobin (1958) has been widely used in modern portfolio analysis. under the conditions of market equilibrium, the CAPM links the market risk and return by relating the return on a security i to the return on the market M in the following fashion:

$$E(R_i) - R_F = Bi(E(R_{M)-} R_F) \qquad (1)$$

Where $E(R_i)$ = the expected return on security i
R_f = the risk-free rate
$E(R_M)$ = the expected market return
B_i = a measure of the market risk of security i, commonly known as the beta coefficient.

Since the CAPM is not observable, the ex ante relationship as in equation (1) can be tansformed to the ex post model:

$$R_{it} = R_{ft} + {}_Bi\ [R_{mt} - R_{ft}] + U\ it \qquad (2)$$

Where R_{it} = return on security $_i$ in period t
R_{ft} = risk-free return in period t
B_i = beta coefficient of security $_i$
R_{mt} = market return in period t
U_{it} = error term

The point of reference for the beta coefficient is unity. A security with beta coefficient greater than one is termed a volatile security while a security with beta coefficient less than one is regarded as a defensive security. Information on the beta value of a security serves two main purposes:

(i) to forecast the beta values of a security in a future time period;
(ii) to construct a well-diversified portfolios of securities such that the unique risk of the portfolio is greatly reduced.

LITERATURE REVIEW

There are a number of methods of predicting beta values of securities. They include the Ordinary Least Squares (OLS) method, Blume's (1975) method Vasicek's (1973) method and the Dimension-Fowler-Rorke' method.

A number of empirical research have been conducted to compare the various methods of beta forecasts. Using beta coefficients computed from monthly returns of stocks listed on the New York Stock Exchange (NYSE) over five-year periods from July 1947 to June 1972, Klemkosky and Martin (1975) comparedd Blume's method, Vasicek's method and MLPFS method (developed by Merrill Lynch, Prierce, Fenner & Smith Inc.). Evaluated by the Mean Square Error Criterion, they found that Vasicek's method was most useful in reducing the forecast error.

Lam, Mok and Cheung (1990) examined the predictability and stationarity of beta coefficients of Hong Kong securities. Weekly returned of 37 "blue chips" stocks in Hong Kong from 1 January 1980 to 31 May 1989 were used to compute their bi-yearly beta coefficients. Five methods of predicting futute beta values were compared: OLS metnod, Blume's method, Modified Blume' method, Vasicek's method and Modified Vasikcek's method. The results showed that the Modified Vasicek's method was the most suitable.

On the home front, Kok (1994) performed a similar study using beta coefficients of 75 component stocks of the Kuala Lumpur Stock Exchange (KLSE) Composite Index computed from weekly returns over three periods, January 1983 to June 1986, July 1986 to December 1989 and January 1990 to December 1991. Three methods of beta forecasts were compared. They are OLS method, Blume's method and Vasicek's, method. Vasicek's method was found to yield the best predictors of future beta coefficients in Malaysia.

OBJECTIVES OF THE STUDY

In this paper, we extend Kok's (1994) study and examine four methods of predicting beta values of stocksfor the overall market and thefour sectors of Industrial, Finance, Property and Plantation. The four methods arethe three methods used by Kok (1994) and the Dimson-Fowler-Rorke's (DFR) method. The main objectives of the study are to identify the methods which yield the best predictors of the future beta values of securities for the overall Malaysian marketand te four sectors at different two-year time periods from 1984 to 1993.

DATA AND METHODOLOGY

A sample of 146 securities spread across abroad spectrum of risk classes was randomly selected in this study. They comprise 30, 18, 29 and 31securities fromindustrial, finance, property and plantation sectors, respectively : they also include 72 components stocks of the KLSE Composite Index, 34 of which also appear in the foursectors. A list of the names of these 146 securities together with their DFR betas isgiven in Appendix A.

They weekly closing prices of the 146 securities over the period 1984 - 1993 were used in the study. The weekly returns of these 146 securities adjusted for bonus issues, rights issues, share splits, etc., were then computed. The weekly closing levels of the widely followed KLSE Composite Index were used to compute the market returns. The risk-free rate used in this paper is the 30-day Malaysian Government Treasury Bill rate since it represents the best proxy for the risk-free rate.

Four different methods of beta forecasts are examined. They ae OLS method, Blume's method, Vasicek's method and DFR metnod. The OLS method is the simplest and most common approach adopted in beta estimation. It involves a simple linear regression of returns of a particular stock on the market return. Since the CAPM is not observable, the following ex post model is used:

α

$$[R_{it} - R_{ft}] = \alpha_i + \beta_i [R_{mt} - R_{ft}] + U_{it}$$

Where R_{it} = return on security i in period t
R_{ft} = risk-free return in period t
α_i = independent return of security i
β_i = a measure ofsystematic risk
R_{mt} = market return in period t
U_{it} = error term

The OLS betas of securities for a two-year time period are used to forecast the true betas in the next two-year time period. The OLS betas are also used to compute Blume's adjusted betas and Vasicek's adjusted betas. The Blume's method adjusts for the tendency of betas to regress towards one by estimating the adjustment factors which are obtained from the cross-time periods and assuming that the adjustment factors in one period to be good estimates of the corresponding adjustment factors in the next. This method utilizes two sets of OLS betas for two time periods 1 and 2 whereby the betas in time period 2 are regressed on the corresponding betas in time period 1 in the following model:

$$\beta_{i2} = a + b\, \beta_{i1} + e_{i2}$$

Where β_{i1} = beta of security i in time period 1
β_{i2} = beta of security i in time period 2
e_{i2} = error term

The regression coefficients a and b are then utilised to obtain the ex-ante betas in time period 3, b_{13}, by using the ex post betas in time period2 using the equation $b_{13} = a + b\ b_{12}$. Thus, b_{13} is used to forecast the "true" beta in the period 3

The Vasicek's Bayesian method utilises the historical distribution of betas to adjust the OLS betas. Essentially, Vasicek's adjusted beta of security i in time period 2, b_{13}, is obtained as follows:

$$\beta_{i2} = \frac{S^2{}_{i1\beta}1 + S^2{}_{\beta 1}{}_{\beta}i1}{S^2{}_{i1} + s2\beta 1}$$

Where β_{i2} = estimated beta of security i in time period 2
β_1 = mean of the cross-secrional distribution of betas in time period 1
β_{i1} = betas of security i in time period 1
$S^2 i1$ = variance of beta ofsecurity I in time period 1
$S^2{}_{\beta 1}$ = variance of the cross-sectional distribution of betas in time period 1.

Thus, β_{12}, is used toforecast the "true" beta in time period 2. Vasicek's method adjusts a security's beta by the size of itssampling error.

The DFR method combines the procedure of Dimson's market model and Fowler-Rorke's corrections. Dimson's method corrects non-trading bias by specifying a market model with leads and lags in a time series while Fowler-Rorke's method weights the betas with serial correlations in the market returns. The DFR method is particularly appropriate in a market which has thin trading of some securities. The Malaysian securities market fell into this category until in recent years. In a thinly traded market, the prices of the infrequently traded securities do not react promptly to the current market sentiments. Thus, part of a security's actual return in any week may actually be reflected in the following week's return. Therefire, a market return constructed from the prices of such thinly-traded securities will be biased downwards in a rising market and biased upwards in a declining market. Furthermore, a positive serial correlation is also induced in the returns of these thinly traded securities with the resultant downward bias of the estimated variances of these returns.

To overcome the problems arising from the infrequently traded securities, Dimson (1979) proposed that, in addition to the current week's market return, the previous weeks' and subsequent weeks' market returns be included in the beta estimation model. Dimson's market model with two leads and two lags (arbitrarily chosen) for estimating beta is given by the following:

$$R_{it} = \alpha_i + \beta_{i,t-2} R_{m,t-2} + \beta_{i,t-1} R_{m,t-1} + \beta_{it} R_{mt} + \beta_{i,t+1} + R_{m,t+1} + \beta_{i,t+2} R_{m,t+2} + U_{it}$$

Where R_{it} = return of stock i in period t
α_i = independent return of stock i
R_{mt} = market return in period t
β_{it} = beta of stock i in period t
U_{it} = error term

Dimson's beta value is then obtained by simply aggregating the above five estimated beta coefficients. however, Gowler and Rorke (1983) argued that Dimson's beta value is biased and suggested that the beta coefficients should be weighted by the serial correlation in the market returns in order to yield a consistent and unbiased beta value. Thus, the Dimson-Fowler-Rorke's (DFR) beta, βi(DFR) of security i is obtained as follows:

$$\beta_{i(DFR)} = W_{t-2}\beta_{i,t-2} + W_{t-1}\beta_{i,\ t-1} + W_t\beta_{it} + W_{t+1}\beta_{i,\ t+1} + W_{t+2}\beta_{i',\ t+2}$$

The weights for adjusting the beta coefficients are:

$W_1 = 1$
$W_{t-1} = W_{t-1} = (1+2\theta_1 + (_2)/\ (1+2(1+2(_2)$
$W_{t-2} = W_{t+2} = (1 + \theta_{1+}(_2)/(1+2(_1+2(_2)$

Where θ_1 = first order serial correlation coefficient in R_{mt}
θ_1 = second order serial correlation coefficient in R_{mt}

The DFR beta of security i in a two-year time period is used to forecast the "true" beta in the next two-year time period.

The above four metods of forecasting beta coefficients of securities are compared for their accuracy by using the statistical measure of mean square error (MSE) as a measure of forecast error. It is defined as follows:

$$\text{MSE} = \frac{1}{m} \sum_{i=1}^{m} (A_i - P_i)^2$$

Where m = number of securities for which beta forecasts are made
A_i = estimated "true" beta coefficient of security i
P_i = predicted beta coefficient of security i.

Thus, MSE is a measure of the extent of deviation of the predicted betas from the "true" betas. However, true betas are not known. Therefore, proxies have to be used. in this study, the DFR betas are assumed tobe the best representation of the true betas.

To obtain a better picture of the forecast error, the MSE is partitioned into three components of forecast error as follows:

$$MSE = (A-P)^2 + (1-\beta_{AP})^2 S^2_p + (1-r2_{AP}) S^2_A$$

where A = mean of the cross-sectional distribution of "true" betas

P = mean of the cross-sectional distribution of predicted betas

β_{AP} = slope coefficient of linear regression of "true" betas on predicted betas

S^2_A = variance of the cross-sectional distribution of "true" betas

r^2_{AP} = coefficient of determination for "true" betas and predicted betas

The first term on the right hand side of the above equation represents bias, the second term inefficiency and the third term random error of MSE. Thus, bias indicates te extent of deviation of the average predicted betas from the average "true" betas. Inefficiency represents a tendency for the prediction errors to be positive for low predicted betas and negative for high predicted betas. Random error is the unexplained component of forecast error

RESULTS

The examination and discussion of results are divided into two parts. Firstly, the betas of securities in the overall market and each sector aer examined. Then the results of the forecast are discussed.

Table 1 presents the summary statistics of the DFR beta coefficients of the Malaysian securities in the overall market and each sector for the five 2-year time periods from 1984 to 1993. A few salient features can be gleaned. Most of the average market and sectoral betas hovered around one with roughly similar variation in any 2-year time period. The property stocks were generally more volatile in most periods except during the period 1986-87 which corresponds to the years of recession in Malaysia. The securities in the plantation sector were generally defensive securities with betas very much less than one except for the latest period 1992-93 where, together with securities in the finance sector, they were very volatile with some secutities having betas exceeding the value of four.

TABLE 1. Summary statistics of DFR Beta Coefficients of Malaysian Securities from 1984 to 1993

Sector	Mean	Standard Deviation	Minimum	Maximum
		1984 - 85		
Market	1.0424	0.4291	0.0896	2.1346
Finance	1.0103	0.7196	0.0272	2.7259
Industrial	1.0215	0.3834	0.4205	1.7112
Plantation	0.7231	0.3990	0.0347	1.5989
Property	1.2397	0.5624	0.0896	2.5129
		1986 - 87		
Market	0.9559	0.2581	0.4563	1.5842
Finance	0.8722	0.2092	0.4754	1.1852
Industrial	0.9157	0.2321	0.5793	1.4115
Plantation	0.7628	0.3288	0.0599	1.3362
Property	0.9657	0.2701	0.4027	1.5842
		1988 - 89		
Market	1.1996	0.5236	0.3601	2.9964
Finance	0.9463	0.4285	0.0626	1.7006
Industrial	1.0750	0.4544	0.5120	2.2477
Plantation	0.7022	0.5430	-0.0008	2.2827
Property	1.5433	0.6770	-0.6924	2.6064
		1990 - 91		
Market	1.0500	0.3951	0.3288	1.8204
Finance	0.9802	0.3879	0.2861	1.8530
Industrial	0.9287	0.4518	-0.1108	1.8204
Plantation	0.7147	0.4660	0.0357	1.6660
Prioerty	1.4468	0.6147	0.3156	4.0642
		1992 - 93		
Market	1.4159	0.7628	0.3056	4.0622
Finance	1.6818	0.6362	0.5668	2.7074
Industrial	1.0674	0.6053	0.1379	2.4291
Plantation	1.9905	0.7970	0.7769	4.3051
Property	1.4509	0.6395	-0.6380	2.4902

The results of the forecast errors of the four beta forecast methods for the overall market and the industrial, finance, property and plantation sectors are given in Tables 2 - 6, respectively. Based on the measure of MSE, Vasicek's method was the best for the overall market in all periods except in the period 1988-1989. Clearly, Vasicek's betas computed in period 1986-1987 that witnessed the October 1987 market crash were not good predictors of the corresponding betas in the subsequent period 1988-1989. These

TABLE 2. Forecast errors of Beta Coefficients of Malaysian Securities: Overall market (1984 - 1993)

	OLS	Blume	Vasicek	DFR
Period 2 (1986-1987)				
Mean Square Error (MSE)	0.1027	-	0.0803	0.2016
Portion of MSE due to:				
Bias	0.0009	-	0.0004	0.0064
Inefficiency	0.0465	-	0.0260	0.1301
Random error	0.0553	-	0.0539	0.0651
Period 3 (1988-1989)				
Mean Square Error (MSE)	0.2469	0.2928	0.2533	0.2524
Portion of MSE due to:				
Bias	0.0625	0.0900	0.0676	0.0576
Inefficiency	0.0008	0.0246	0.0048	0.0004
Random error	0.1836	0.1782	0.1809	0.1944
Period 4 (1990-1991)				
Mean Square Error (MSE)	0.1181	0.1808	0.1007	0.2190
Portion of MSE due to:				
Bias	0.0036	0.0529	0.0016	0.0225
Inefficiency	0.0233	0.0335	0.0095	0.0877
Random error	0.0912	0.0944	0.0896	0.1088
Period 5 (1990-1991)				
Mean Square Error (MSE)	0.8090	0.8219	0.7982	0.8391
Portion of MSE due to:				
Bias	0.1521	0.2116	0.1600	0.1369
Inefficiency	0.0827	0.0320	0.0640	0.1239
Random error	0.5742	0.5783	0.5742	0.5783

TABLE 3. Forecast errors of Beta Coefficients of Malaysian Securities: Industrial sector (1984 - 1993)

	OLS	Blume	Vasicek	DFR
Period 2 (1986-1987)				
Mean Square Error (MSE)	0.0798	-	0.0615	0.1505
Portion of MSE due to:				
Bias	0.0025	-	0.0009	0.0100
Inefficiency	0.0423	-	0.0251	0.0960
Random error	0.0350	-	0.0355	0.0445
Period 3 (1988-1989)				
Mean Square Error (MSE)	0.1446	0.1869	0.1618	0.1359
Portion of MSE due to:				
Bias	0.0256	0.0400	0.0289	0.0225
Inefficiency	0.0014	0.0293	0.0048	0.0084
Random error	0.1176	0.1176	0.1281	0.1050
Period 4 (1990-1991)				
Mean Square Error (MSE)	0.1416	0.1642	0.1288	0.2304
Portion of MSE due to:				
Bias	0.0081	0.0361	0.0049	0.0196
Inefficiency	0.0135	0.0081	0.0039	0.0568
Random error	0.1200	0.1200	0.1200	0.1540
Period 5 (1992-1993)				
Mean Square Error (MSE)	0.3130	0.3283	0.3028	0.3239
Portion of MSE due to:				
Bias	0.0144	0.0289	0.0169	0.0196
Inefficiency	0.0063	0.0071	0.0010	0.0231
Random error	0.2923	0.2923	0.2849	0.2812

TABLE 4. Forecast errors of Beta Coefficients of Malaysian Securities: Finance sector (1984 - 1993)

	OLS	Blume	Vasicek	DFR
Period 2 (1986-1987)				
Mean Square Error (MSE)	0.2636	-	0.1172	0.5697
Portion of MSE due to:				
Bias	0.0169	-	0.0036	0.0169
Inefficiency	0.2119	-	0.0844	0.5144
Random error	0.0348	-	0.0292	0.0384
Period 3 (1988-1989)				
Mean Square Error (MSE)	0.1552	0.1564	0.1535	0.1378
Portion of MSE due to:				
Bias	0.0049	0.0064	0.0049	0.0036
Inefficiency	0.0003	0.0000	0.0006	0.0002
Random error	0.1500	0.1500	0.1480	0.1340
Period 4 (1990-1991)				
Mean Square Error (MSE)	0.1092	0.1048	0.1017	0.2365
Portion of MSE due to:				
Bias	0.0016	0.0001	0.0025	0.0016
Inefficiency	0.0036	0.0007	0.0000	0.0925
Random error	0.1040	0.1040	0.0992	0.1424
Period 5 (1992-1993)				
Mean Square Error (MSE)	1.0400	0.9636	1.0311	1.1423
Portion of MSE due to:				
Bias	0.5329	0.5041	0.5184	0.4900
Inefficiency	0.0814	0.0338	0.0913	0.2266
Random error	0.4257	0.4257	0.4214	0.4257

TABLE 5. Forecast errors of Beta Coefficients of Malaysian Securities: Property sector (1984 - 1993)

	OLS	Blume	Vasicek	DFR
Period 2 (1986-1987)				
Mean Square Error (MSE)	0.2636	-	0.1532	0.4250
Portion of MSE due to:				
Bias	0.0169	-	0.0144	0.0729
Inefficiency	0.1181	-	0.0807	0.2828
Random error	0.0581	-	0.0581	0.0693
Period 3 (1988-1989)				
Mean Square Error (MSE)	0.6991	0.8517	0.7138	0.6785
Portion of MSE due to:				
Bias	0.3721	0.4489	0.3721	0.3249
Inefficiency	0.0142	0.0900	0.0289	0.0040
Random error	0.3128	0.3128	0.3128	0.3496
Period 4 (1990-1991)				
Mean Square Error (MSE)	0.2945	0.3869	0.2760	0.5157
Portion of MSE due to:				
Bias	0.0100	0.1024	0.0100	0.0081
Inefficiency	0.0109	0.0109	0.0000	0.1884
Random error	0.2736	0.2736	0.2660	0.3192
Period 5 (1992-1993)				
Mean Square Error (MSE)	0.6638	0.6024	0.5949	0.9592
Portion of MSE due to:				
Bias	0.0676	0.1444	0.0625	0.0000
Inefficiency	0.1862	0.0480	0.1224	0.5656
Random error	0.4100	0.4100	0.4100	0.3936

TABLE 6. Forecast errors of Beta Coefficients of Malaysian Securities: Plantation sector (1984 - 1993)

	OLS	Blume	Vasicek	DFR
Period 2 (1986-1987)				
Mean Square Error (MSE)	0.2019	-	0.1270	0.1014
Portion of MSE due to:				
Bias	0.0049	-	0.0036	0.0001
Inefficiency	0.1013	-	0.0376	0.0331
Random error	0.0957	-	0.0858	0.0682
Period 3 (1988-1989)				
Mean Square Error (MSE)	0.1137	0.1414	0.1330	0.1955
Portion of MSE due to:				
Bias	0.0049	0.0081	0.0025	0.0009
Inefficiency	0.0015	0.0260	0.0058	0.0003
Random error	0.1073	0.1073	0.1247	0.1943
Period 4 (1990-1991)				
Mean Square Error (MSE)	0.2154	0.2390	0.0677	0.1035
Portion of MSE due to:				
Bias	0.0036	0.0144	0.0004	0.0000
Inefficiency	0.0900	0.1028	0.0022	0.0279
Random error	0.1218	0.1218	0.0651	0.0756
Period 5 (1992-1993)				
Mean Square Error (MSE)	2.1114	2.1566	2.1179	2.0588
Portion of MSE due to:				
Bias	1.4884	1.5876	1.5129	1.4884
Inefficiency	0.0618	0.0078	0.0438	0.0336
Random error	0.5612	0.5612	0.5612	0.5368

TABLE 7. Best Beta forecast methods for Malaysian Securities Market and Sectors from 1986 to 1993

	Sector				
Period	Market	Industrial	Finance	Property	Plantation
1986-87	Vasicek	Vasicek	Vasicek	Vasicek	DFR
1988-89	OLS	DFR	DFR	DFR	OLS
1990-91	Vasicek	Vasicek	Vasicek	Vasicek	Vasicek
1992-93	Vasicek	Vasicek	Blume	Vasicek	DFR

results are consistent with those obtained by Kok (1994) who used different time periods.

Vasicek's method was also the best beta forecast method for the industrial and the property sectors, again except for the period 1988-1989. One noteworthy feature is that the DFR method was generally better for the plantation sector whose stocks were infrequently traded until in recent years. Thus, the DFR method developed for thinly traded securities hasbeen found to be suitable for the thinly traded Malaysian Plantation sector.

The best methods for the overall market and the various sector in the four different time periods are summarised in Table 7. In the second period 1986-1987, Vasicek's method was the best for the overall market and the sectors except the thinly traded plantation sector where the DFR method performed better. In the third period 1988-1989, Visicek's method did not feature at all. Instead, the OLS method was the best for the overall market and the plantation sector while the DFR method performed bestfor the other three sectors. However, in the period 1990-1991, Vasicek's method featured again as the best method for the overall market and all the sectors. In the period 1992-1993, Vasicek's method again performed the best for the overall market and the industrial and property sectors. For the first time, Blume's method was featured, beingthe best method for the finance sector. DFR method was again the best for the thinly tarded plantation sector.

An examination of the MSE for the overall market and the four sectors in Tables 2-6 shows that its magnitudes were gerater in the period 1988-1989 and especially in the period 1992-1993. Thus, the forecasts of betas in these two periods were less accurate and reliable. In the cassse of period 1988-1989, it could be attributed to the October 1987 market crash so that betas of securities computed during the period 1986-1987 were not so reliable as forecast of betas in the subsequent period 1988-1989. Similarly, betas of securities computed during the period 1990-1991 were not very good predictors of betas in the period 1992-1993 which witnessed a major bull run in the latter half of 1993 and thus significantly altered the market risk characteristics of many securities. Some of the securities with low beta values in the period 1990-1991 became very volatile and recorded very high beta values in the period 1992-1993.

The three components of the MSE for the overall market and the four sectors in the four time periods are also given in Tables 2 - 6. An examination of the magnitudes of these components from the best beta forecast method for any market or sector and for any time period indicates that, in general, random error was by far the largest component. However, there were a number of exceptions. For the property and finance sectors in the period 1986-1987 where Vasicek's method was the best, the inefficiency component was larger than the random error component. This means that, for these two sectors of the market, the actual betas of the securities in the period 1986-

1987 tended to be higher than the predicted betas based on the distribution of betas in the period 1984-1985. Similarly, in the period 1992-1993 where DFR method was the bestfor the plantation sector and Blume's method was the best for the finance sector, the bias component was much larger than the randomerror component. Thus, for these two sectors, the deviation of the average predicted betas from the average "true" betas was quite large. This means that the average market risk characteristics of these two sectors changed the most from the period 1990-1991 to the period 1992-1993. Bias was also quite large for the property sector in the period 1988-1989. In cases where the random error was the largest component, it ranged from 51.5 percent of the MSE for the property sector in the period 1988-1989 to 97.5 percent of the MSE for the finance sector in the period 1990-1991.

CONCLUSION

In this study, four methods of beta estimation were compared to determine the method that produces the best forecasts of betas of Malaysian securities. The best method, by far, of forecasting two-year beta values of securities over the period 1984-1993 is Vasicek's method. This method is the best not only for the overall market but also for the industrial, finance and property sectors. It is only the thinly traded plantation sector that DFR method performed the best.An analysis for each two-year period also showed that Vasicek's method was the best for the three periods 1986-1987, 1990-1991 and 1992-1993 while DFR method performed the best in the period 1988-1989

This study is, however, not without limitations. Firstly, the MSEs of the best methods ofbeta forecasts for the overall market and the four sectors in the last period 1992-1993 are quite large. This indicates that even the best methods in the period 1992-1993 may not adequately provide statisfactory beta forecasts of securities. Therefore, other methods of beta forecasts may need tobe considered. Secondly, the DFR betas assumed to be the best representation of the true beta may not be completely valid.

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Appendix A

DFR BETAS OF MALAYSIAN SECURITIES
Overall Market

Stock	1984-85	1986-87	1988-89	1990-91	1992-93
Berjuntai	0.9543	0.6438	0.5833	0.3729	4.0622
Berjaya Ind.	1.1387	0.6687	0.7311	0.7791	0.7866
CCB	1.0165	1.5746	1.2038	1.4586	1.3874
CI HIdgs	1.2441	0.8488	1.4436	1.6072	0.6868
CIMA	0.7962	0.7230	1.4956	0.9531	1.1040
Dutch Baby	0.4618	0.6639	0.4426	0.5391	2.2244
D K'ramat	0.5334	0.4563	0.5598	1.1896	2.0828
DMIB	0.6663	1.0738	1.2000	0.5992	1.9560
Faber	1.3468	1.4918	2.1563	1.7823	2.3194
G Coin	1.2247	0.6453	0.7399	0.6499	0.7602
G Corp	1.5311	0.9805	2.0438	1.6798	1.8801
G Kent	1.4543	0.9811	1.6044	1.5180	1.1898
Ganda	1.3900	1.0149	2.9964	1.5371	1.4453
Genting	1.2706	0.9763	1.3660	1.0023	0.2546
G Plus	0.6300	1.0308	2.5562	1.1213	1.4466
Hexza	1.6183	1.1141	1.7530	1.3468	0.8108
HL Ind	1.6236	1.2068	1.1651	1.0846	1.1680
K Emas	1.3773	0.9681	0.9338	1.3822	1.2242
K Joo	0.5539	0.5119	1.0840	0.9529	1.1558
M Cement	1.2810	1.0740	1.6154	0.6576	1.1558
MMC	0.9713	1.4048	1.4808	1.4547	1.3773
MPHB	0.9474	1.2551	1.3656	1.3889	2.7316
MUIB	0.9128	1.1467	1.5548	0.7856	0.7145
NSTP	1.0419	1.0598	1.0761	1.0377	0.6570
Oriental	0.7286	1.1329	1.3673	1.2842	0.7560
Palmco	1.3764	0.9364	1.0759	1.0046	1.3883
Pilecon	1.6354	1.0155	1.2615	1.2169	0.6840
Rahman Hyd	0.5423	0.7386	0.7676	0.4468	2.3300
Samada	2.1346	0.9259	1.5849	1.4062	1.1663
Seal	1:8262	0.9863	1.1516	1.4222	2.7086
Sg Way	1.5559	0.8651	1.6932	1.2532	0.9539
Sin Heng Chan	0.9202	0.5490	0.7840	0.9767	2.7556
Shell	0.7311	0.7122	0.7788	0.9323	0.5251
Sitt Tatt	0.7731	0.8727	0.6230	0.9344	2.6051
Time	1.3965	0.9493	1.8318	0.7344	3.7033
Timuran	0.8659	0.6794	0.9058	0.3996	0.5471
UMW	1.5223	1.3243	1.0461	1.1556	0.3056
Uniphone	0.7239	0.9765	1.4100	1.2609	1.1093

Industrial Sector

Stock	1984-85	1986-87	1988-89	1990-91	1992-93
*ALCOM	1.3959	0.6373	0.7819	1.8204	0.5187
*ASM	1.1324	1.4115	1.4769	1.7337	1.5638
Boustead	0.6039	1.1257	1.1255	0.3771	0.1379
*CCM	0.7291	0.5793	0.5120	0.4534	0.5872
*CSM	1.4581	0.8520	1.0717	0.9238	0.8498
*DNP	0.9987	0.9017	1.0958	1.3121	2.1431
*EAC	0.6973	0.7297	0.5809	0.4409	0.5527
*Esso	0.4205	0.5936	0.5368	0.4351	0.3748
*Guinness	0.5397	0.8325	0.8969	0.6589	0.6466
*Hume	1.6180	0.9843	1.7006	0.8281	0.8879
*L&G	1.4720	1.3425	1.5611	1.3114	1.3981
*Lion	1.2175	0.8551	1.3382	0.9989	0.9140
Malayawata	0.8632	1.0179	1.3186	1.0185	1.6233
*Magnum	1.2639	0.7448	1.1342	1.5293	0.7859
MAS	-	0.6988	0.5717	1.2464	1.0634
MFlour	0.9258	0.6201	0.6181	0.7809	2.4291
MISC	-	1.1894	0.9334	0.7395	0.4632
*MOX	0.8686	0.6384	0.8285	0.4910	0.3276
MPI	1.3107	0.9419	1.0765	1.4851	1.0859
MUMB	1.6588	1.2310	2.2477	1.0135	1.7895
OYL	-	1.0010	0.8040	0.7413	0.4071
*Perlis	0.6648	0.8944	0.7128	0.6590	0.9782
PMCW	1.3013	1.0688	2.0021	1.1913	1.4926
*Rothmans	0.6523	0.8636	0.7041	0.7539	1.3309
*Sime Darby	0.9514	1.0863	1.0225	0.6880	1.2570
*Setron	1.7112	0.8485	1.4657	1.5451	2.2833
*Tan Chong	0.8622	1.2918	1.7060	1.3111	1.5069
UAC	0.6023	0.6865	0.5487	-0.1108	0.2980
UEM	-	-	1.1693	0.9725	1.1150
*YHS	0.6391	0.8863	0.7063	0.5106	1.2090

Finance Sector

Stock	1984-85	1986-87	1988-89	1990-91	1992-93
AMMB	-	-	0.0626	1.0058	0.6272
*Balib	0.9543	0.6438	0.5833	0.3729	4.0622
*D&C	0.6308	0.9195	0.8706	1.4095	1.3362
HL Credit	2.7259	0.8871	1.0887	1.8530	1.5035
Kimara	-	-	-	0.8343	1.3370
*Maybank	1.2154	1.0599	0.9578	1.1464	0.9457
MBf Capital	0.8110	0.7711	0.8403	1.2660	1.6323
*MBf Hldgs	1.8400	0.9736	1.5053	1.5254	2.0861

MBSB	0.0272	0.6870	0.3544	0.2861	0.8968
MGIC	0.8542	1.1852	1.7006	1.1415	2.1368
Pan Global	0.7267	0.6356	1.2584	0.7835	2.0789
Pengkalen	-	0.9392	0.6769	0.8138	2.1100
Pacific	-	-	-	0.5978	2.5737
*Public	0.8483	1.1145	1.2557	0.5056	1.9829
RHB	-	-	1.2716	1.0773	2.0968
Southern	-	0.4754	0.5791	0.8978	0.5668
SEADC	0.5569	1.0139	0.8298	0.5425	2.7074
TA	-	-	-	1.1022	2.1676

Property Sector

Stock	1984-85	1986-87	1988-89	1990-91	1992-93
AMDB	0.8322	0.9766	0.6284	1.1898	1.5713
AP Land	1.9965	0.9296	2.3157	1.7057	1.5570
*Bandaraya	0.8661	1.4566	1.3940	1.3209	2.1346
Bedford	2.2768	0.9121	1.3257	1.3846	1.5821
Bolton	1.1107	0.8916	1.4517	1.4027	1.7098
FEA	-	1.0426	2.1076	0.8651	1.4636
Granite	0.9999	0.8395	1.5639	1.7408	-0.6380
*IGB	0.5749	1.5842	1.7528	1.2158	1.7521
Imatex	0.7925	1.1239	2.6064	1.7352	0.4776
Insas	1.5091	0.8246	2.3167	1.5921	1.7174
*I&P	0.0896	0.7550	0.4085	0.6296	1.4389
KLIH	1.8989	1.0224	1.9763	4.0642	1.2484
Kg Lanjut	0.4990	0.4027	-0.6924	0.3156	1.7452
Larut	1.6259	0.5009	1.6433	1.4158	0.7654
Lien Hoe	1.5134	1.1289	2.3715	0.8888	1.4300
LamSoonHuat	1.2387	0.7744	1.2332	1.3260	1.8272
Metrolex	2.5129	1.1122	1.8586	1.4418	1.4230
MCB	1.0226	0.6461	1.7629	1.2455	1.9273
Menang	1.4811	0.9428	1.0362	1.3850	2.4083
MRCB	1.2043	1.0420	1.8859	1.5124	0.2852
Paramount	0.9927	0.8934	0.9860	1.2074	2.2511
P Garden	0.9510	1.0726	1.6237	1.6759	1.3426
Pelangi	0.7195	0.9234	1.5804	1.4920	1.3642
*S Dredging	1.1775	1.0166	1.4659	1.5434	2.4902
*S Property	1.5024	1.3618	1.9035	1.3312	1.2292
SPK	1.8420	1.2988	2.1452	1.2270	1.7545
SriHartamas	1.0009	0.5999	1.1599	1.9192	1.6125
Talam	-	-	1.4007	1.2602	1.0463
Worldwide	-	-	-	1.9249	1.1580

Plantation Sector

Stock	1984-85	1986-87	1988-89	1990-91	1992-93
Austral	0.4701	0.0915	-0.0008	0.2540	1.6883
Asiatic	0.6818	0.8938	0.6755	0.8291	2.5426
Batu Kawan	0.5117	0.7581	0.2149	0.5858	1.7479
Benta	1.5989	1.2737	0.0290	0.0357	1.2723
Chin Teck	0.4662	0.5103	0.5389	0.3151	1.7059
Consplant	0.6707	0.9895	1.1274	1.0475	1.8989
Duff/Anson	0.9437	0.6860	0.8004	1.4491	1.0045
Glenealy	0.3962	0.6065	0.4021	0.3607	3.4837
*G Hope	0.6413	0.9315	0.4475	0.8110	1.8926
G Perak	-	-	0.6156	0.7379	1.9513
Gadek	1.2593	0.8628	1.0792	0.3136	1.4523
G Ropel	0.5457	0.8061	0.3914	0.5555	2.0742
*Hilo	0.3074	0.8146	0.3601	0.3288	1.8360
Inch Kenn	0.5736	0.1737	0.2170	0.1931	2.4859
IOI	1.0155	1.1206	1.3826	0.5910	2.0378
K Sidim	0.6557	0.8300	0.6721	0.5910	2.0378
Kemayan	0.9420	1.0732	1.6497	1.6660	4.3051
*KLK	0.6767	1.1776	0.8171	0.9845	1.4577
Kluang	0.0347	-	0.0081	0.1365	3.0881
KT Pau	0.2015	0.3227	0.2031	0.3951	1.6684
*Kulim	0.2749	0.8289	0.7405	1.0717	1.5671
Lingui	1.4818	1.0450	1.6364	1.3576	2.2353
M Plant	0.7656	0.7233	1.2402	1.2940	3.2806
Malakoff	0.6613	0.7411	0.4486	0.5489	0.9819
New S'dah	0.8188	0.6637	0.6394	0.5011	1.4012
NSOP	0.3539	0.3412	0.4905	0.2261	1.4133
Riverviw	1.1755	0.6536	0.4819	0.5474	3.0642
S Coconut	0.6715	0.6011	0.6259	0.6296	1.2320
*TDM	1.5174	1.0039	2.2827	1.2073	1.6575
Tongkoh	1.1022	1.3362	1.3861	1.5488	1.9216
Utd Plant	0.2782	0.0299	0.1657	0.2485	0.7769

Note: 1. Stocks marked with * are also in the overall market.
2. Some stocks may have changed their names or moved from one sector to another or are no longer component stocks of the KLSE Composite Index

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