CHAPTER 4: RESEARCH METHODOLOGY

4.1 Research Objectives

The main objectives of this study are as follows:-

(1) To examine one of the two major claims made by proponents of EVA, that is EVA better explain company values and stock returns than traditional accounting measures; and

(2) To examine the relationships between MVA with EVA and EPS, and the relationships between the annual change in MVA with EVA and EPS.

This study will subsequently assess the strength of the EVA and MVA relationship as well as the EVA and the annual change in MVA relationship for both the wealth creators and wealth destroyers.

The study period spans from 1992 to 1996. The various relationships are tested using regression analysis and the tests are carried out for each of the five years between 1992 and 1996, and for the whole five-year period from 1992 to 1996.

4.2 Selection of Measures

This study is conducted along the lines of Grant's (1996) and Lefkowitz's (1999) research. The dependent variables are MVA-to-capital and the annual change in MVA-to-capital. The difference between the two measures is that MVA represents the market value change since the inception of the company while the annual change in MVA is the MVA at the end of the current year minus the MVA at the end of the previous year. A distinction is made on these two measures because EVA is a measure that pertains to a period, that is one year. Therefore, it is also appropriate to correlate EVA with the market value change for the same year. Furthermore, it is useful to look at the changes in MVA as the levels of MVA in assessing a company's performance.

The independent variables are EVA-to-capital and EPS. EPS is the profit (excluding extraordinary items) attributable to ordinary shareholders divided by the number of ordinary shares in issue.

The MVA, annual change in MVA and EVA are divided by IC in order to adjust for firm size. This will then produce a percentage return that is comparable across companies.

The computation of MVA and EVA for this study is based on the adjustments listed in Tables 1 and 2 (see Chapter 2), and other adjustments that is deemed necessary to ensure a fairer measure of assets employed in the business and that the profits are only those arising from the core business. Note that the MVA and EVA adjustments in this study are also dependent on the extent of the companies' disclosure of information in their respective annual reports. An example of how MVA, the annual change in MVA and EVA are computed for RJ Reynolds is found in Appendix 1.

4.3 Research Hypothesis and Data Analysis Techniques

To determine whether EVA better explain company values and stock returns than EPS, the test is constructed by comparing the adjusted R-square values. The adjusted R-square describes how much variation in the dependent variable is accounted for by variation in the independent variables. It indicates the ability of the independent variables to predict the dependent variable.

To test the relationships between MVA with EVA and EPS, the following regression equations are considered:-

MVA-to-capital = $a_1 + b_1$ EVA-to-capital + e_1 (1)

Where a_1 = intercept term, b_1 = slope coefficient and e_1 = error term

MVA-to-capital = $a_2 + b_2$ EPS + e_2 (2)

Where a_2 = intercept term, b_2 = slope coefficient and e_2 = error term

MVA-to-capital = a_3 + $b_{3(i)}$ EVA-to-capital + $b_{3(ii)}$ EPS + e_3 (3)
Where a_3 = intercept term, $b_{3(i)}$ and $b_{3(ii)}$ = slope coefficients and e_3 = error term

To test the relationships between the annual change in MVA with EVA and EPS, the regression equations are expressed as follows:-
Annual change in MVA-to-capital = a_4 + b_4 EVA-to-capital +e_4 (4)
Where a_4 = intercept term, b_4 = slope coefficient and e_4 = error term

Annual change in MVA-to-capital = a_5 + b_5 EPS + e_5 (5)
Where a_5 = intercept term, b_5 = slope coefficient and e_5 = error term

Annual change in MVA-to-capital = a_6 + $b_{6(i)}$ EVA-to-capital + $b_{6(ii)}$ EPS + e_6 (6)
Where a_6 = intercept term, $b_{6(i)}$ and $b_{6(ii)}$ = slope coefficients and e_6 = error term

The hypothesis for regression equation (1) is stated as follows:-
H_0 : b_1 is equal to 0
H_1 : b_1 is not equal to 0

Setting the confidence level at 95%, if the p-value is greater than 0.05, the overall regression equation is not statistically significant and H_0 cannot be rejected. This means that the slope coefficient b_1 is equal to 0 and hence, there is no statistically significant relationship between the dependent variable and the independent variable. If the p-value is smaller than 0.05, the overall regression equation is statistically significant. H_0 is rejected in favour of H_1. H_1 states that the slope coefficient b_1 is not equal to 0 and hence, there is a statistically significant linear relationship between the dependent variable and the independent variable. This hypothesis also applies to regression equations (2), (4) and (5) in order to test the slope coefficients of b_2, b_4 and b_5 respectively.

For regression equation (3), the hypothesis is stated as:-

H_0 : $b_{3(i)}$ and $b_{3(ii)}$ are equal to 0

H_1 : at least one $b_{3(i)}$ or $b_{3(ii)}$ is not equal to zero.

If the p-value is greater than 0.05, the overall regression equation is not statistically significant and H_0 cannot be rejected. H_0 states that there is no statistically significant relationship between the dependent variable and the two independent variables. If the p-value is smaller than 0.05, the overall regression equation is statistically significant. H_0 is rejected in favour of H_1. H_1 states that there is a statistically significant linear relationship between the dependent variable with at least one of the two independent variables. This hypothesis also applies to regression equation (6).

Additionally, a correlation test is conducted on the two independent variables, that is between EVA-to-capital and EPS. Correlation measures the degree or the strength of association between EVA-to-capital and EPS. The coefficient correlation value can range from negative 1 for perfect negative correlation up to positive 1 for perfect positive correlation. A coefficient correlation of 0 means there is no correlation between EVA-to-capital and EPS.

This correlation test is also used to indicate the possibility of multicollinearity problem in the multiple regression analysis. According to Green, Tull and Albaum (1988), what constitutes a serious multicollinearity remains ambiguous. They add that researchers have adopted various rules of thumb, including discarding one of the predictors if the correlation coefficient of any pair of predictor variables exceeds 0.9.

For the wealth creators and wealth destroyers, the study is limited to assessing the strength of the EVA and MVA relationship as well as the EVA and the annual change in MVA relationship. The regression tests will focus on the adjusted R-square values and the nature of the relationship between the independent and dependent variables.

4.4 Sampling Design and Data Collection Procedure

A total of 100 companies listed on the KLSE provides the database for this study. The sample selection is based on the 100 largest companies listed on the KLSE according to their market capitalization as at December 31, 1996. This listing is obtained from the Investors Digest, January 1997. Banks, finance, stock broking and insurance institutions that are featured in the top 100 list and companies that have insufficient information are excluded from this study. They are replaced by other subsequent large market capitalized companies so that the sample size remains at 100 (see Appendix 2 for list of sample companies). These 100 companies account for 51% of the KLSE's total market capitalization of RM806.8m as at December 31, 1996. Table 3 shows the distribution of the 100 companies according to sector classification.

Table 3 Distribution of sample and its representation by sector

Sector	No. of companies	Market cap (RMm)	Market cap (%)
Consumer products	20 (35.1%)	57.8 (78.1%)	14.0
Industrial products	21 (25.0%)	48.8 (46.7%)	11.8
Construction	7 (29.2%)	41.9 (78.5%)	10.2
Trading services	26 (38.8%)	204.8 (88.4%)	49.8
Hotels	3 (50.0%)	4.4 (77.7%)	1.1
Properties	12 (19.1%)	24.5 (42.3%)	5.9
Plantations	10 (25.0%)	25.5 (61.1%)	6.2
Mining	1 (10.0%)	4.0 (39.1%)	1.0
Total	**100**	**411.6**	**100.0**

Note: The percentage in the bracket denotes the sector representation in terms of number of companies and market value respectively.

For the study on wealth creators and wealth destroyers, the sample is obtained from these same 100 companies. Companies with positive EVA will be grouped under wealth creators while those with negative EVA will be classified under the wealth destroyers group.

Data such as EPS and those used for the computation of EVA and MVA are obtained from the KLSE Annual Companies Handbooks and the annual reports of the respective companies. Share prices are obtained from the KLSE Daily Diary and Bloomberg. They are corrected for rights issue, bonus issue and stock splits.

In computing the COC, where available, the average interest rates on the company's debt have been considered in arriving at the cost of debt and tax-effected (according to the applicable Malaysian corporate tax rates) to arrive at the after-tax cost of debt. The interest rates on debt are obtained from the respective companies' annual reports.

The cost of equity is calculated using the Capital Asset Pricing Model (CAPM). This cost represents the opportunity cost of capital for the shareholders funds invested in the business and is based on an assessment of the underlying riskiness of the business.

$K_e = R_f + \beta\ (R_m - R_f)$

Where K_e = cost of equity, R_f = risk free rate, R_m = market return and β = beta

Malaysia's average 3-month Treasury Bills rate is used as the proxy for the risk free rate. This data is obtained from the Ministry of Finance Malaysia's Economic Report.

The market return is computed based on a 15-year historic return on the KLSE Composite Index (KLSE CI) from 1981 to 1996. The simple arithmetic average is preferred over the geometric average because it is most consistent with the standard CAPM, that is investors are supposed to be concerned with returns during the next period (say, one year) and to focus on the expected return and the standard deviation of this return (Brigham, Gapenski and Ehrhardt, 1999). The 15-year market return based on the KLSE CI from 1981 to 1996 is 12.55%.

The beta values for the companies are obtained from the KLSE Beta Book 1994. The same beta for each company is used to compute the respective cost of equity for each of the five years. This study assumes that the beta values for companies are stable over the five-year period.