CHAPTER 3

DATA AND RESEARCH METHODOLOGY

This chapter sets out the research data and methodology used in the study. The first section describes the research method followed by brief description of the sample with the method of computation for EMAS and Second Board Index, the movement of the EMAS and Second Board Index and the rationale for choosing these indices as the data sample. Section three describes how the data was obtained while section four discusses the research methodology, which includes elaboration of the research design, research model and the statistical test used.

Exploratory research method is used in this research as it involves the exploration of the existence of the day of the week effect at KLSE from January 1994 – December 1998.

3.1 SAMPLING

The sample for this research is the daily EMAS Index and Second Board Index throughout the study period. The sample period from January 1994 to December 1998 consists of 231 Mondays, 234 Tuesdays, 240 Wednesdays, 236 Thursdays and 242 Fridays for which the Kuala Lumpur Stock Exchange was open.

3.1.1 EMAS Index

Exchange Main Board All-Share Index or EMAS Index was launched on 16 October 1991 and it incorporates all Main Board
companies. Main Board companies has paid up capital of RM50 Million and above. The companies in the Main Board are classified into the following sectors; Industrial Products, Consumer Products, Construction, Trading/Services, Infrastructure Project Companies, Finance, Hotel, Property, Plantation, Mining, Closed-end Funds and Property Trust. There are 454 companies listed on the Main Board. The base year used in computation of EMAS Index is the year 1984.

The method of computation for the EMAS Index is as follows:

\[
\text{Index} = \frac{\text{AMV}_1 \times 100}{\text{AMV}_2}
\]

where:

\[
\text{AMV}_1 = \sum P_1 Q_1 = \text{Current Aggregate Market Value}
\]

\[
\text{AMV}_0 = \sum P_0 Q_0 = \text{Base Aggregate Market Value}
\]

The Index is calculated by the weighted average method. The weight used is the market capitalisation.

The KLSE EMAS Index movement for period from 1994 to 1998 is depicted in Figure 1.
FIGURE 1
KLSE EMAS INDEX MOVEMENT
1994 TO 1998

Source: Appendix 10 - 14
From Figure 1, we can see that from the year 1994 to 1996, the movement of the EMAS Index has been on an upward trend, while the year 1997 saw a sharp declining trend. The year 1998 indicate all time low in the EMAS Index though there is slight upward movement in the second half of 1998.

3.1.2 Second Board Index

Second Board companies are companies with minimum paid up capital of RM10 Million but less than RM50 Million. The sectors in the Second Board are Consumer Products, Industrial Products, Construction and Finance. There are 282 companies on the Second Board. The base date used in computation of Second Board Index is 31.12.90.

The method of computation of the Second Board Index is the same as the method used for computation of the EMAS Index.

The movement of the Second Board Index from 1994 to 1998 is shown in Figure 2.
FIGURE 2

KLSE SECOND BOARD INDEX MOVEMENT
1994 TO 1998

Source: Appendix 15-19
From Figure 2, it can be seen that the Second Board KLSE Index also saw an all time low in the year 1998 and a sharp declining trend in the year 1997 after a sharp increase in the stock movement to an all time high in the year 1996. The stock movement was more stable in the year 1994 and 1995.

3.2 DATA

Data for EMAS Index and Second Board Index was drawn from PACAP database for the period 1994-1998. For the analysis on the effect of the economic conditions on the day of the week effect, data is divided into two sub-periods, that is from January 1994 – June 1997 and from July 1997 – December 1998 to differentiate the economic conditions as the stock market experienced severe stock market downturn in the second sub-period that is from July 1998 – December 1998.

Daily stock return is calculated from the close of today to close of previous day. For example Tuesday return is computed by taking closing Index of Tuesday and closing Index on Monday. Monday return is then calculated as being the three-day holding return from the close on the previous Friday. Except for Monday, any trading day’s return, which grossed more than one day on account of holidays would not be included. For example, if the share market is closed on Tuesday, the return on Wednesday would be omitted. This meant to exclude any exceptional or abnormal return.
3.3 RESEARCH METHODOLOGY

3.3.1 Research Design

The analysis of this research is divided into 3 parts. Firstly, to investigate the existence of the day of the week effect for the overall market from 1994 – 1998, the daily mean returns of the EMAS Index is computed, compared and tested for significance. For further insight, the writer will look at the effect on a yearly basis from 1994 to 1998.

Next, to investigate whether the day of the week effect is affected by economic conditions, the study period will be divided into 2 sub period that is from 1994 – June 1997 and July 1997 to December 1998 to differentiate period with bullish and bearish performance of stock market accordingly. The daily mean return for sub-period 1 and sub-period 2 is computed, compared and tested for significance.

To further investigate the existence of day of the week effect for both the large and small firms, the daily mean return for Second Board Index over the study period is computed and compared with the daily mean return of the EMAS Index investigated in the first part. Both mean returns will be tested for significance differences in the distribution of the daily mean returns.

3.3.2 Research Model

The data obtained only had the date and the index value. Thus, the "day" of the indices was assigned by indicating 1 for Monday, 2 for Tuesday, 3 for Wednesday, 4 for Thursday and 5 for Friday.
The main computation is the derivation of the daily return, $R_t$ as follows:

$$R_t = \frac{I_t - (I_{t-1})}{I_{t-1}} \times 100$$

**Where:**

$I_t$ = the share price index at the closing of trading day $t$

$I_{t-1}$ = the share price index at the close of the previous closing day $t-1$

Both parametric and non-parametric statistical test is employed to investigate whether the mean return on Monday is significantly different from the other days of the week. The test is based on the following model:

$$R_t = \alpha_1 D_{1t} + \alpha_2 D_{2t} + \ldots + \alpha_5 D_{5t} + \varepsilon_t$$

**Where:**

$D_1$ = a dummy variable for Monday, that is $D_{1t} = 1$ if observation $t$ falls on Monday and 0 otherwise. Similarly, $D_{2t}$ to $D_{5t}$ are the dummy variable for Tuesday to Friday.

$\alpha_1$ to $\alpha_5$ = the mean returns for Monday to Friday

$\varepsilon_t$ = the disturbance term
The disturbance term $\epsilon_t$ is assumed to be independently and identically distributed.

Running regression on the research model will give the mean return for Monday to Friday based on its coefficients. For example coefficient of (1) are the mean return for Monday through Friday.

However, instead of running the regression, F Test from One Way ANOVA is used to obtain the daily mean return. This is in view that the daily mean return from both method would be similar if not same as the dummy variables that are exclusively dummy, or qualitative in nature are also called analysis-of-variance (ANOVA) models (Gujarati). The research model is stated to show the underlying model used in the F Test.

3.3.3 Statistical Test

The SAS statistical package is used for the purpose of this study. Under the parametric test, one way ANOVA, F statistics with 4.2887 degrees of freedom is used to analyze the equality of mean returns across the days of the week and tested for significance at 5 per cent alpha level. If p value under this test is less than 0.05, then the null hypothesis will be rejected, indicating that there is a significant difference in the mean return across the days of the week. If the p value is more than 0.05, then the null hypothesis will failed to be rejected, indicating that there is no significant difference in the mean return across the days of the week and that the mean return across the days are equal.
The writer is not quite justified in employing the F test only to analyze the equality of mean returns across the days of the week as the underlying distribution of the daily returns based on share price index may not be normal. Thus, a non-parametric test which in this case, Kruskal-Wallis test, is conducted to further confirm the result.

In the computation of the Kruskal-Wallis test, each of the N observations is replaced by ranks. That is, all the scores from all the 5 days are ranked in a series. The smallest score is replaced by rank 1 and the next smallest by the rank 2 and the largest by rank N. Then the sum of the ranks in each of the days is found.

To perform the above test, all the daily return observations is ranked in ascending order and replace each observation by its rank \( R_{ij} \), which refers to the rank assigned to observation j from the \( i^{th} \) day of the week. The smallest rank assigned is 1, and in the case of ties, average rank is assigned to each of the tied observations.

The statistic used in Kruskal-Wallis test is defined by \( H \), as follows:

\[
H = 1 \frac{1}{S^2} \left( \sum \frac{R_i^2}{n_i} - \frac{N(N-1)}{4} \right)
\]

Where:

- \( R_i \) = sum of the ranks in the \( i^{th} \) day of the week
- \( n_i \) = the number of observation in the \( i^{th} \) day of the week;
- \( N \) = the total number of observations;
- \( S^2 \) = the variance of the ranks.
Under this test, if p value is less than 0.05, then the null hypothesis will be rejected, indicating that there is a significant difference in the mean return across days of the week. If p value is more than 0.05, then the null hypothesis will failed to be rejected, indicating that there is no significant difference in the mean return across days of the week and that the mean return across the days are equal.

To complete the investigation of the day of the week effect on the overall market from 1994-1998, T-tests will be performed on the EMAS Index and Second Board Index to determine whether the mean returns for Monday and every other day is identical or not.

The mean return of the days will be tested for significance at 5% alpha level. The null hypothesis of equal mean returns across the days of the week will be rejected if the p value is less than the alpha level of 5% which will indicate that the mean return of the days being compared are significantly different. If the p value is more than alpha level of 5%, than the null hypothesis of equal mean returns across the days of the week will failed to be rejected which will indicate that the mean return of the days being compared are not significantly different and that the mean returns are the same.