CHAPTER 4
METHODOLOGY

4.1 Research Hypotheses

The hypotheses for this paper are derived from the objectives, which was explained earlier in chapter 1. It follows as below:

Objective 1:	*To determine the impact, if any, of upgrades and downgrades, across and within classes of ratings.*
Hypothesis H0:	*Upgrades rating announcements provide no significant abnormal returns within and across classes of rating*
Hypothesis H1	*Upgrades rating announcements provide significant abnormal returns within and across classes of rating.*
Hypothesis H0	*Downgrades rating announcements provide no significant abnormal returns within and across classes of ratings*
Hypothesis H2	*Downgrades rating announcement provide significant abnormal returns within and across classes of ratings.*
Objective 2	*To determine whether the reasons for upgrades and downgrades provide differences in impact, if, any.*
Hypothesis H0:	*Downgrading rating announcements provide no significant abnormal returns for deteriorating financial prospects and for changes in company leverage.*
Hypothesis H3:	*Downgrade rating announcement provide significant abnormal returns for deteriorating*

financial prospects and for changes in company leverage.

Hypothesis H0; *Upgrade rating announcements provide no significant abnormal returns for changes in financial prospects and for changes in company leverage.*

Hypothesis H4: *Upgrade rating announcements provide significant abnormal returns for changes in financial prospects and for changes in company leverage.*

4.2 Selection of Measure

For the purpose of this study, a selection of specific measure is discussed and arguments are produced for the selection of the measures.

Event study methodology is used to obtain the above-mentioned objectives. It has been the most popular statistical design used in the area of finance. This methodology is known for its simplicity as well as producing well-reflected results, according to most researchers.

In the normal circumstances, the event study methodology is commonly used to analyses the reaction of investors before, during and after the event period. It is also useful in terms of analyzing the stock returns or the behavior of stock prices of the pre-determined event.

Similar research was conducted using this methodology involving around dividend and earning announcement, occurrence of political events natural catastrophes and even nuclear accidents.

The earliest application of event study methodology was undertaken by Fama, Fisher, Jensen and Roll (1969) and by Ball and Brown (1968). This event study is focused on the information usefulness, whereby the study determines the degree of impact of the event occurrence on selected variables like share returns or trading

volume. The analyses will reveal whether new information of value is to create a significant positive or negative impact around the announcement date (pre, during and post) of the good or bad new respectively.

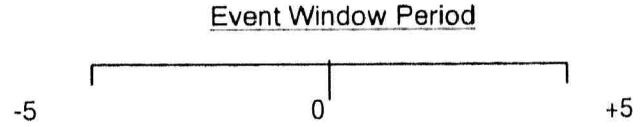
Classification of rating classes would produce the impact in terms of significant abnormal returns or earning. The following would explain the steps, which are involved in the event study methodology:

Step 1: Identification of the event of interest

The interest of the event study is to analyses the rating announcement done by RAM on bonds for the listed companies in KLSE.

Step 2: Identification of event window for the event based event date.

For the purpose of this study, event windows period will further elaborates the implication of maintaining a specific period for the purpose of this study. Too long a window period will allow other events to influence the results on an event study, such as dividend announcement or bonus issues to take place at the same time of a upgrades/downgrades announcement. At the same time too short of period also, will not reflect a strong result. Based on previous research, there were no standard setting for window period; it ranges from –300 to +60. For the purpose of this study the window period is day – 5 through day –1 (pre announcement) and day +1 through day +5 (post announcement).



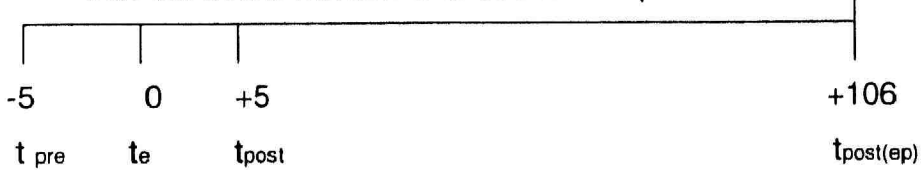
Step 3: Selection of sample set of the rating for the related companies. (Discussed under Sampling Design)

Step 4: Prediction of normal returns

The term of normal returns are used in the scenario, where no event has taken place. The ordinary least square model is used to regress the daily market returns against the daily returns on a particular security collected over the predetermined estimation period for market model.

$$R_{it}^{*} = \alpha_i + \beta_i R_{mt}$$

Market model is the most commonly used model in previous research. The availability of data (daily share prices and the KLCI) for OLS model in calculating α and β figures permits the use of the market model in event studies. For the purpose of this study, a 100 day estimation period was used to determine the α and β figures of the securities concerned. This study uses a 100-day estimation period as it felt that it would be sufficient to determine the mean returns and to avoid any major event. This estimation period is a typical period whereby the common period ranges from 100 days to 300 days(Pamela P. Peterson,1989) .A complete time line for this study with the event window and estimation period as below:



t_{pre} = pre announcement period

t_e = announcement day

t_{post} = the post announcement day

$t_{post(ep)}$ = the end of estimation period

This study will be using daily returns and not monthly returns as it may be in appropriate in term of result. There were previous

researchers that had used daily return such as Glasscock, Davidson and Henderson (1987).

Step 5: Determination of abnormal returns

Again as said earlier the market model which will be used as well to determine the abnormal returns during the event window period from day –5 through day + 5 as follows:

$$AR_{it} = R_{it} - R_{it}^{*}$$

Where:

AR_{it} = abnormal security return for security *i* in period t

R_{it} = return on security *i* in period t

R_{it}^{*} = expected or predicted or normal return for security *i* in period t

For the purpose of this study AR_{it} is calculated for each of the days in the event window period.

Step 6: Aggregation and averaging of abnormal returns across samples and periods.

The abnormal returns for security *i* in period t for each of the rating is sampled for this study for each of the days in the event window period are then averaged across ratings for each of samples and sub samples.

The formula:

$$AR_{Nt} = (1/N) \sum_{t=1}^{N} AR_{it}$$

AR_{Nt} = daily arithmetic mean of the ARit of the sample or sub sample.

N = total rating related companies in the sample or sub sample beginning from rating related companies.

ARit = abnormal security return for security i in period t

Aggregation of the individual security excess returns requires examining the cross section of excess returns for each period. The announcement date may be a different calendar time period for each security and thus excess returns are aligned in the event time.(Pamela P. Peterson, 1989)

The **AR_{Nt}** is next aggregated according for the event window period to arrive at the cumulative abnormal returns or CAR as below:

$$CAR_{Nn} = \sum_{t=T1}^{T2} AR_{Nt}$$

Where,

CAR_{Nn} = cumulative abnormal returns for N rating related companies for a period of length n

AR_{Nt} = the daily arithmetic mean of the ARit of the sample or sub sample.

T1 = the first period in which ARnt is accumulated.

T2 = the last period of which the ARnt is accumulated.

CAR_{Nt} is then divided by n a period of 11 days to arrive at $CAAR_{Nn}$ which is the cumulative average abnormal return for N rating related companies in a sample or sub sample for the n period. The CAAR as follows;

$$CAAR_{Nn} = (1/N) \sum_{t=T1}^{T2} AR_{Nt}$$

Where

$CAAR_{Nn}$ = cumulative average abnormal returns

n = the number of days in the event window period.

t1 = the first day of the event window

t2 = the last day of the event window

AR_{Nt} = the daily arithmetic mean of the ARit.

Step 7; Testing whether the abnormal returns are statistically different from zero.

The most common statistical tool used to test the significance level is t test. The t-test is used to determine the significance level on the abnormal returns due to the occurrence of rating announcement. There are two steps involved in the t-test.

Step 1 To calculated the standard deviation during the estimation period for each of the rating in the sample or sub sample.

$$\sigma_I = \sqrt{\frac{\sum_{T1=+6}^{T2=+105} (R_{iT} - R_{i^*})^2}{T-2}}$$

Where,

σ_I = the standard deviation on the security *i* of each rating

T1 = the first day of the estimation period from which the difference between Rit and Ri are to be accumulated.

T2 = the last day of estimation period from which the difference between Rit and Ri are to be accumulated.

Rit = daily returns on security *i*

Ri* = the mean returns on the security *i*

T = the estimation period.

This is a simpler way of deriving the standard deviation although statistically it might not be so accurate, however the effect is very minimal on the outcome.(Pamela P Peterson ,1989)

Step 2 To calculate the t-test value using the formula below:

$$\text{t- statistic} = \frac{AR_{it}}{\sigma i}$$

Where,

ARit =abnormal security returns

σI = the standard deviation on security I

The t- test used in this cross sectional study will calculate for each of the samples and sub-samples to determine the composite standard deviation of the sample and to test the level of significance as well.

$$\sigma_N = \frac{\sqrt{\sum_{I=1}^{N} \sigma_{i^2}}}{N}$$

Where,

σ_N = the composite standard deviation of the sample

σ_{i^2} = the variance of the individual security *i*

N = the number of rating related companies.

$$\text{t- statistic} = \frac{CAAR_{Nn}}{\sigma_N}$$

This study attempts to determine the degree of impact of the rating announcement by RAM throughout the event window period of 11 days. A high absolute t-test value away from zero would indicate

that the event is of significance to the investing public as reflected in the form of abnormal returns.

I.3 SAMPLING DESIGN

In the sampling design, sole concentration was given to RAM as to avoid heterogeneity in rating sources and rating type. Besides that RAM is the pioneer rating agency in the country.

The sampling started with the collection of data/rating announcement dates form the year 1996 through 2001. The constraint, which I faced in the data collection, was the announcement date as RAM only published the month and year of the rating announcement. As such the New Strait Times Online was used to further obtain the date of the announcement changes.

Once the announcement dates were collected, the next step was to exclude ratings of firms, which were not listed in KLSE as they do not come under the scope of this study. In the case where there were more then one rating made during the same event window period, such announcement were excluded to avoid any distorted results. The preliminary list consists of a total of 1478 rating, which was selected randomly. To spread out the sample selection through out the period of 1996-2001 an effort was made to random pick rating which cover the time frame.

Focus was also given to areas where there could be repetition of companies in the sample. However due concern was given to minimize the repetition. The announcement date was clearly identified, whereby if the date falls on a Saturday, Sunday or a Public holiday, the following day will be taken as the event day(day 0). Based on the event day the pre announcement and post announcement day was determined.

The next step focuses on the event period itself to determined that no other event has taken place during the same period in order to obtain accuracy in this study. Again for this process the New Strait

Time Online was used to determine other events. If any significant event occurs during the event window period then the particular ratings will be removed. The uncontaminated list of sample rating after the sanitization process is attached as **Appendix 1.0**

The sample or sub sample size may be small but it is not without precedent. Many event studies have used small samples as well such as Bhattacharya et al (1998) (32 samples) and Schweizer (1992) only 18 events.

4.4 DATA COLLECTION PROCEDURE

The next section lays out the in detail process of data gathering. The data's, which will be collected, is based on the uncontaminated list in **Appendix 1.0.** There will be three types of data collection involved:

a. Daily closing share price
b. Daily closing KLCI
c. Reasons for rating upgrades and downgrades.

Appendix 1.0 contains the uncontaminated listing of rating along with the event window period (day –5 through day+ 5) and the estimation period (day-+6 through day +106). In outlining the event window and estimation periods, careful focus was given to remove all days which are Saturday, Sunday and public holidays. Once this was done the Hydra system was used to collect the daily share prices and the KLCI based on the cleaned listing. The unadjusted share prices were downloaded from the year 1996-2001 for this study though the system also the adjusted prices well. There days where the KLCI or the share price remains flats, these days were taken as valid event window period.

Once this was done the downloaded information was transferred to EXCEL program in order to run a data analysis, which will be explained, in the later part of this study.

The following type of data collection is focused on the reason of upgrades and the downgrades. The reasons are based on what is reported in the press to the investing public. Although RAM

produces a detailed report for each of the rating announcement it is not used as it is not freely available to the investing public. Again using the NSTP online the summary, as appearing in the press is scrutinized for the reasons a particular rating is downgraded or upgraded. The reasons are then grouped into the three categories as follows

Group 1 Changes in financial prospects

- This means deteriorating or improving financial prospects or performances for the company in question. The reasons here are forward looking and are expressed in words like "RAM believes... will" or "the change is based on the company's prospects for (Goh and Ederington 1993)

Group 2 Changes in leverage

-The change is attributed to plans that the company has already announced like leveraged buyouts, share repurchase or acquisition.

Group 3 ; Others reasons

This group involves reasons not classifiable under the former two groups or announcements that contains reasons for both the former groups. This includes lawsuits, public disputes, nuclear power plant problems or no reasons being cited(Goh and Ederington, 1993)

4.5 DATA ANALYSIS TECHNIQUES

There are several steps involved at this point,

Step 1: Coding the individual ratings

The individual ratings in each of the samples and sub samples will be identified by the rating related company

name or its abbreviation to allow for concise reporting and efficient space usage.

Step 2: Modifying the date fields of the event window and estimation periods, The announcement dates, event window period and estimation periods are different was each rating announcement as such the date needs to be modified to the same platform. As such the event window period was converted to – 5, -4,-3,-2,-1,0,+1,+2,+3,+4,+5 respectively. Whereas the estimation period was converted the same way till the +106 day. The converted dates are then listed row- wise in EXCEL program.

Step 4: Computing the daily share and market returns R_{it} and R_{mt} respectively. This step will be done separately for the event window period and the estimation period using this formula: (New value- Old Value)/ Old value x 100 = % Value here means either the daily share price or the daily KLCI.

Step 5; Computing normal returns under the market model for each of the rating related security.
By using EXCEL, a regression analysis is run to obtain the daily share returns and the KLCI return in log form.

Step 6; Computing the normal returns R_{it}
The expected or normal return are calculated here for each of the 11 days in the event window period.

Step 7: Computing the abnormal returns AR_{it} for each rating related security. It deals with the computation of abnormal, residual or prediction error as it is variously called using equation $AR_{it} = R_{ti} - R_{it}^*$ as mentioned and explained earlier.

Step 8: Computing the average abnormal returns ARnt across samples and sub samples. For each of the samples and sub samples, the ARit as computed are totaled and divided by the number of rating related securities in each of the samples or sub samples.

Step 9: Computing CAR

The average abnormal return is aggregated to arrive at a single value.

Step 10: Computing CAAR

It is done by averaging across period the CARnn value of the event window period

Step 11: Computing the t-test values using ARit and CAARnn for each rating and samples/ sub samples respectively. This step involves the computation of t-test value of significance. The t-test statistic values are then used to accept or reject the hypothesis.

Step 12: Preparation of Charts and tables

Sample format of tables of the results of the analyses in-the tabular form are shown.