Chapter 4

Research Methodology

4.1 Development of Hypotheses

As explained in the earlier sections, two models will be tested in this study. The first model seeks to determine whether corporate rating announcements disseminated new information to the public. The first hypothesis is drawn in two parts for this model:-

Hypothesis H_{1a} : Corporate bond rating upgrade announcements significantly impact stock returns.

Hypothesis H_{1b} : Corporate bond rating downgrade announcements significantly impact stock returns.

The model is further extended to examine whether magnitude of downgrades or upgrades causes differences in stock returns. In the context of this model, "big" upgrades or downgrades are defined as rating changes over a minimum of two subscripts. "Small" upgrades or downgrades, on the other hand refer to rating changes of a single subscript. Such rating change classifications may or may not alter the main rating e.g. AA2 to A3 (big) and AAA3 to B1 (small). The second hypothesis is drawn in four parts:-

Hypothesis H_{2a} : Big upgrade rating announcements provide significant abnormal stock returns.

Hypothesis H_{2b} : Small upgrade rating announcements provide significant abnormal stock returns.

Hypothesis H_{2c} : Big downgrade rating announcements provide significant abnormal stock returns.

Hypothesis H_{2d} : Small downgrade rating announcements provide significant abnormal stock returns.

4.2 Selections of Measures

Originally proposed for studying the effects of stock split announcements over stock prices, (Fama et al., 1969), the event study methodology is quoted as being the standard measurement tool for behavioural studies of security price during an occurrence or event (Binder, 1998). Furthermore, such study can be constructed easily and has been extensively applied in accounting and finance researches especially pertaining economic or specific firm events (MacKinlay, 1997). With such reasoning, the event study methodology will be applied for the purpose of this study. Procedures which usually make up the event study methodology as noted by MacKinlay (1997) are discussed in length in the subsections below:-

a) Identifying and defining the event of interest

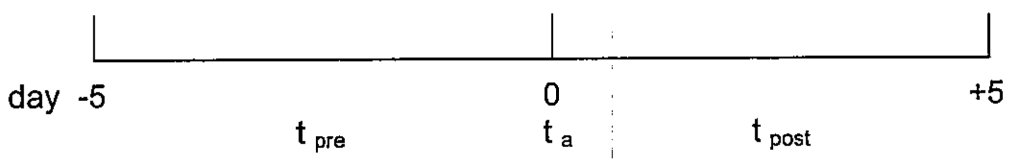
This activity forms the core of the methodology as it determines the basis of the event being studied. Definition of the event of interest allows setting of parameters to suit the purpose of the study. This may include market characteristics such as event distribution over industries, specific time periods such as the 1997 Asian Financial Crisis etc.

The event of interest identified for this study is the credit rating announcements made by RAM on bonds issued by firms whose equities are listed on the Kuala Lumpur Stock Exchange/ Bursa Malaysia. The timeframe set is between 1st January 2000 and 31st December 2009.

b) Identification of event window

An event window is then set in determine the timeframe where the event of interest is captured. Depending on the purpose of the studies, short or long event windows may be set. Too short a timeframe may sometimes fail to capture the whole effect of an event of interest, especially if such event of interest coincides with other major events. Too long a timeframe on the other hand, may subject the data to contamination due to events other than the event of interest itself, hence affecting the results of the study.

Event windows applied in similar studies pertaining effects of bond rating announcements have ranged from 20 days or from day -10 to day +10 in thirteen event window periods (Joo and Pruitt, 2006) to 180 days or day -90 to day +90 in seven event window periods (Norden and Weber, 2004; Doma & Omar, 2006). For the purpose of this study, the event window is set in eleven window panels that is between pre-announcement (day -5 to day -1), announcement date (day 0) and post announcement (day +1 to day +5).



t_{pre} = pre-announcement period

t_a = announcement date

t_{post} = post-announcement period

c) Sample selection

Caution has to be taken during sample selection to ensure its representation of the population being studied. This activity is further elaborated under the next section “Sampling Design”.

d) Prediction of normal returns

In the event study methodology, this activity is to predict the returns had the event of interest did not occur. For the purpose of this study, this is derived to mean normal returns when there are no rating announcements. The Single Index Market Model (SIMM) is applied to predict the normal returns; the model equation is as follows:-

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

whereby

R_{it}	=	normal return on security i at time t
α_i	=	constant term for security i
β_i	=	slope coefficient for security i
R_{mt}	=	return on market index on event day t
ϵ_{it}	=	error term for firm i at time t, t = 1, 2, ... k (total k days in the estimation period)

Daily returns of a particular selected security are regressed against the daily market returns over the predetermined estimated period using the ordinary least square (OLS) model. A simplified version of the market model equation used in this study is as follows:-

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

whereby

R_{it}	=	normal return on security i at time t
α_i	=	constant term for security i
β_i	=	slope coefficient for security i
R_{mt}	=	return on market index on event day t

The FTSE Bursa Malaysia KLCI Index (post June 2006) and Kuala Lumpur Composite Index or KLCI (pre June 2006) are used as a proxy of market returns. The KLCI, which was launched in April 1986 consisted of 100 of the largest stocks[14] in terms of market capitalisation listed in the then Main Board. After June 2006, Bursa Malaysia introduced the FTSE Bursa Malaysia KLCI which comprises of a smaller basket of thirty largest companies in terms of full market capitalisation listed on the Main Market (or Main Board prior to 8 May 2009).

The selection criterion posed by Bursa Malaysia[15] restricts inclusion of securities to those whose movements will incur significant impact to the market as a whole. Although the value-weighted characteristics of these indexes contrast with the research by Peterson (1989) who found equally-weighted index to be more sensitive in detecting abnormal returns.

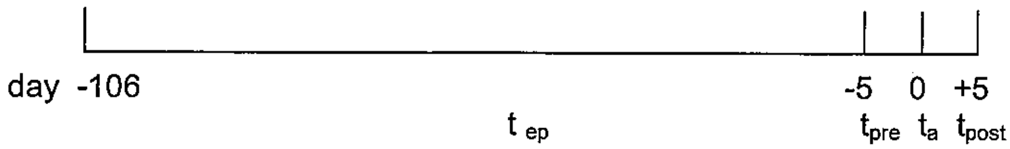
[14] The KLCI was launched in 4th April 1986 comprising 83 companies which was subsequently increased to 100 companies in 18th April 1995. [KLCI Milestones, n.d.]

[15] Criterion for inclusion of a company into the FTSE Bursa Malaysia KLCI include requirement of having a minimum 15% of free float and a minimum 10% of free float adjusted shares in issue in trading within twelve months prior to the semi-annual review by the FTSE Bursa Malaysia Advisory Committee [Ground Rules, 2009]

Furthermore, the absence of other comparable indexes which are based on equal weightage methodology renders the option unavailable for adaptation in this study. By these reasons, the KLCI/ FTSE Bursa Malaysia KLCI is utilised in this study for calculation of market returns.

The estimation period also differs amongst researchers, with some opting for 80 days (Joo and Pruitt, 2006), 100 days (Rajagopal and Kohers, 2004; Creighton, Gower and Richards, 2007) up to 300 days (Doma and Omar, 2006). According to Peterson (1989), daily studies commonly utilise an estimation period between 100 to 300 days whereas 24 to 60 months are commonly used in monthly studies. Similar to the event window, too long an estimation period may subject the sample to other unrelated issues/ events. These events in turn may influence the effectiveness of the standard methods applied in an event study (Aktas, de Bodt and Cousin, 2007).

Another issue to ponder is the timeline when the estimation period shall be applied. Prior researches had used the time period before the event window (Goh and Ederington, 1993; MacKinlay,1997; Doma and Omar, 2006; Joo and Pruitt, 2006; Creighton, Gower and Richards, 2007; Poon and Chan, 2008) or after the event window (Followill and Martell, 1997; Chelliah, 2002; Ambalagam, 2002). Goh and Ederington (1999), on the other hand had selected their estimation both before and after the event window to suit the objectives of their research. The estimation period is commonly selected prior to the event window if such event is not expected to affect the determinants of normal returns (Peterson, 1989). For the purpose of this study, the 100-day estimation period is applied before the event window.



t_{pre} = pre-announcement period

t_a = announcement date

t_{post} = post-announcement period

t_{ep} = estimation period

Inconsistent findings have been reported in the earlier research which had utilised monthly returns. Pinches and Singleton (1978) had found little informational content being conveyed during the month when the bond rating change is announced; the rating change however is anticipated some 15 to 18 months prior to the rating action. Apart from the common findings on bond downgrade announcements, Griffin and Sanvicente (1982) also reported significant positive market reaction towards upgrades months prior to an actual rating action.

As the event of interest is on the rating announcement date (day) and further suiting the selected event window and estimation period, daily returns of the securities shall be used in this study in lieu of month returns.

e) Calculation of abnormal returns

The abnormal returns within the event window period are calculated by applying the following equation:-

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

whereby

AR_{it}	=	abnormal return on security i at time t
R_{it}	=	return on security i at time t
R_{it}^*	=	predicted normal return on security i at time t

For the purpose of this study, AR_{it} is calculated for each day within the event window period.

f) Aggregation and averaging of abnormal returns across samples and periods

The average abnormal returns on event day t, AAR_t are calculated by dividing the mean abnormal returns of all securities on day t by the number of securities (N).

$$AAR_t = 1/N \sum_{t=1}^{N} AR_{it}$$

whereby

AAR_t	=	average abnormal return of all securities on time t
N	=	total number of ratings in the sample
AR_{it}	=	abnormal return on security i at time t

The average abnormal returns, AAR_t are then aggregated according to the even window period to obtain the cumulative abnormal returns or CAR using the equation below:-

$$CAR_{Nn} = \sum_{t=t1}^{t2} AAR_t$$

whereby

CAR_{Nn}	=	cumulative abnormal returns for N ratings for period n (event window period of t1 to t2)
t1	=	first day of the event window period i.e. day -5
t2	=	last day of the event window period i.e. day +5
AAR_t	=	average abnormal return of all securities on time t

The CAR_{Nn} is finally averaged by n or the event window period to obtain the cumulative average abnormal returns or CAAR

$$CAAR_{Nn} = 1/N \sum_{t=t1}^{t2} CAR_{Nn}$$

whereby

$CAAR_{Nn}$	=	cumulative average abnormal returns for period n, the event window period
t1	=	first day of the event window period i.e. day -5
t2	=	last day of the event window period i.e. day +5
CAR_{Nn}	=	cumulative abnormal returns for N ratings for period n (event window period or t1 to t2)

g) Statistical test of significance

The calculated average abnormal returns are tested for significance using the t-statistics at the confidence level of 95% to determine whether the hypothesis tested is accepted or not. To obtain the t-test value, the standard deviation for the estimation period for each of the ratings within the sample is calculated using the following formula:-

$$\sigma_i = \sqrt{\frac{\sum_{t1=+6}^{t2=+105} (R_{it} - \overline{R_{it}})^2}{T}}$$

whereby

σ_i	=	standard deviation for security i
t1	=	first day of the estimation period i.e. day +6
t2	=	last day of the estimation period i.e. day +105
R_{it}	=	daily return for security i in the estimation period
$\overline{R_{it}}$	=	mean return for security i over the estimation period
T	=	estimation period i.e. 100 days

The test statistic with a degree of freedom of (n-1) is defined as:-

$$t = \frac{AAR_t - 0}{s / \sqrt{n}}$$

whereby s = sample standard deviation

n = sample size

4.3 Sampling Design

Although it is not uncommon to utilise rating announcements from several different rating agencies[16], prior research has indicated that different rating agencies tend to vary in lead-lag times in announcing their ratings (Gűttler and Wahrenburg, 2007). The authors had found that Moody's tend to adjust its ratings on a timelier manner as compared to S&P in terms of increasing default risks. Also, even though the ratings announced have similar bearings (eg rating classification AAA from both RAM and MARC refers to superior safety for honouring payment obligations), the criterion and procedures used in coming to such rating may be dissimilar.

In order to avoid discrepancies as may be found in different rating agencies and to ensure uniformity of rating definition and rating methodology for a particular bond in study, rating announcements by one rating agency is selected for the sample. Most corporate debt issuances in Malaysia are rated by either RAM and/ or MARC. RAM was established back in November 1990, spearheading the Malaysian debt rating scene and have had issued more than 3,200 ratings since. MARC, in comparison was established about five years later as an alternative source for ratings in view of the need for more efficient rating processes due to the increased demand (Mohd Fairuz and Mohd Izad, 2004). For the purpose of this study, only ratings announced by RAM, being the longer established rating agency in Malaysia are selected.

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[16] Griffin and Sanvicente (1982), Hand et al (1992), Dallocchio et al (2006) and Creighton et al (2007) had all utilised rating announcements from both S&P and Moody's in their researches.

Most prior researches have been based on large sample size of bond ratings announced by large and well-established rating agencies such as S&P and Moody's. Dichev and Piotroski (2001) have a total of 2,328 or 924 upgrade and 1,404 downgrade usable debt observations, Kliger and Sarig (2000) has worked on 916 ratings while Goh and Ederington (1993) has a total of 428 ratings which also includes 243 downgrades. Deviations however include the research by Matolcsy and Lianto (1995) which utilised 34 rating upgrades and 38 rating downgrades and Abad-Romero and Robles-Fernández (2006) who concluded their research based on 67 samples.

Malaysian studies, on the other hand have mostly dealt with a comparatively smaller sample with Ambalagam (2002) using 144 credit ratings which comprises of 31 initial assignments, 50 reassignments, 21 upgrades and 40 downgrade ratings. Chelliah (2002) using 61 samples made up of 21 upgrades and 40 downgrade ratings while Doma and Omar (2006) worked on 71 upgrades and 135 downgrade bond ratings.

A listing of firms with long term debt ratings announcements by RAM within the identified time period of January 2000 and December 2009 is first obtained from the Bloomberg database. The following criterion was considered in selecting the sample for this study:-

a) the firm shall be listed on the Bursa Malaysia (formerly known as the Kuala Lumpur Stock Exchange) during the estimation period and when the rating announcement is made by RAM

b) there are no other significant news announced by or on the same firm during the event window; otherwise the observation shall be removed from the sample pool

c) if the firm had simultaneous rating announcements on different bond issues, only the most significant rating change shall be retained

The pool of 94 ratings is cleaned from any major events which had occurred between years 2000 and 2009. Any rating related securities which do not have a full stock returns data (for both the event window and estimation period) are omitted from the data set. The final sample which fulfils all the aforementioned requirements is 69. The final sample is noted to be not encompassing all eleven sectors of the stock market but instead covers only construction, consumer products, finance, hotels, industrial products, plantations, properties, technology and trading/ services sectors. Both the mining and infrastructure project companies sectors are unrepresented in the population and hence not included in the data analysis.

4.4 Data Collection Procedure

Three different types of data are collected for the purpose of this study. The unadjusted daily closing share prices for securities in the data sample are first obtained from the Bloomberg database. The database is then utilised to obtain the daily closing KLCI within 1^{st} January 2000 and 31^{st} December 2009. Dates which encompassed non-trading days (Saturdays and Sundays) and public holidays are all omitted from the list of closing share/ index prices. After such dates are all omitted, the closing KLCI data are then compared to that of the particular security according to the event window and estimation period calendar dates. The dates for both sets of data shall be matched.

Next, reference is made to the Bursa Malaysia website to determine whether any major events (including share suspension) had occurred during the event window period. This step is crucial to ensure that an uncontaminated sample i.e. the sample shall reflect only one major event that is the bond rating announcement which is in study is obtained for this purpose.

4.5 Data Analysis Techniques

The data analysis techniques applied in this study generally follow the following steps.

The sample in study may yield ratings from the same firm but of a different type (upgrade/ downgrade) and time period. If the same firm has two or more ratings within the same sub-sample, said data are number coded to differentiate them e.g. PBK-1 and PBK-2. Then, the date fields of both event window and estimation periods are updated before obtaining both index and price data from the corresponding dates.

The next step is to compute the daily share returns, R_{it}. The daily stock returns are calculated for both the event window period and the estimation period. Results from the calculation are presented in a percentage format based on the following formula:-

$$R_t = \ln \left[\frac{P_t}{P_{t-1}} \right] \times 100$$

whereby	R_t	=	Return for day t
	P_t	=	Daily closing stock price for day t
	P_{t-1}	=	Daily closing stock price for day t-1

Daily market returns for both the event window period and the estimation period are calculated using the KLCI daily index based on the following formula:-

$$R_{mt} = \ln \left[\frac{M_t}{M_{t-1}} \right] \times 100$$

whereby	R_{mt}	=	Market return for day t
	M_t	=	Daily closing index for day t
	M_{t-1}	=	Daily closing index for day t-1

Daily returns R_{it} for each rating related security are then regressed against the market returns R_{mt} using the OLS technique to obtain the α and β values. Both α and β values are used alongside the daily market returns to calculate the normal returns, R_{it}^* using the formula $R_{it}^* = \alpha_i + \beta_i R_{mt}$. This step is repeated for each of the eleven days in the event window period.

Values computed for normal returns are used for calculating the abnormal returns (AR_{it}) for the event window period using formulas as explained in the Selection of Measures section. The average abnormal returns across samples and sub-samples or AAR_{it} is then computed by adding up all AR_{it} and then dividing with the total number of ratings for each sample or sub-sample. This is calculated for all 11 days within the event window period. The values are then aggregated together to obtain a single final value of cumulative average abnormal returns or $CAAR_{Nn}$.

The relevant computed figures are then subjected to the t-test statistics for each rating and sample/ sub-sample. First of all, the daily abnormal return during the event window for each data sample is tested for significance level. Then, the cumulative average abnormal returns value is tested for significance for the event for the event window period. The results shall be used to either accept or reject the hypotheses to be tested.

All findings shall be compiled and tabulated into relevant tables or charts for analysis purposes. The whole data analysis works is conducted using eViews6 and Microsoft Excel 2010.