CHAPTER 3

RESEARCH METHODOLOGY

This chapter provides the research methodology. It includes the description of research methodology and empirical research design which is composed of research model, variables, hypotheses, statistical inferenses, data collection procedure, data controls and analyses.

3.1 Description of Research Methodology

Research methodology is seperated into two parts. Both are empirical studies which are based, in the first place, upon observing carefully and objectively what happens during a certain period of experimental sequence. They pertain to the scientific method which Kerlinger (1973, pp.3-6) has described as a systematic, controlled, empirical investigation of a set of hypotheses derived from a theoretical structure.

To this end, two statistical techniques are used : one-way analysis of variance (ANOVA) and multiple regression.

One-way ANOVA usually deals with a comparison of means, using estimates of variance. It deals with the effects of a single factor on a (single) response variable. Multiple regression is then applied in a cross sectional analysis of the theory tests. The regression model is used to explain the involved theoretical factors which include agency theory or contract process, political process, naive-investor theory, and industry differences .

3.2 Empirical Research Design

The empirical research design is to investigate the relationship between security price and economic events. In this study , the event is described as mandated accounting change which is to be tested whether it affects the stochastic behavior of the investors. Cumulative abnormal return (CAR) analysis that employs the ***market model*** is daily observed ***10 days*** around the event date of the first quarter financial statements ended 31 March 1994 which have been announced.

The methodology is separated into 2 parts. The first part is to investigate the market performance against the accounting information content of the mandated accounting change. The security price reactions are observed and recorded in terms of cumulative abnormal return (CAR) of the securities. To analyze the effect of the regulation, the one-way Analysis of Variance (ANOVA) of the dependent variable (CAR) by the factor of the mandated accounting change is used. The One-way ANOVA deals with the effect of a single factor (accounting change) on a (single) response variable (CAR), which involves a comparison of serveral (two or more) population means. It can be said that different populations correspond to different levels of the single factor "population". The structured observation is applied in data collection to record the practitioners' responses to the regulation. The research questions are as follows :

Question 1.1 :

Does the mandated accounting change from the cost to equity method in equity investment have information content?

Question 1.2 :

Does the retroactive accounting change method have information content?

Question 1.3 :

Does the cumulative effect accounting change method have information content?

The second part deals with the tests of the theories with which the other factors may be concerned. Table 2.3 provides the explanation of the tests included in this study. Multiple linear regression model is applied to explain that some other variables may affect the changes in CAR in accordance with the theories. The result of this part is to answer the following research questions :

- Condition :

If the answer of question 1 or question 2 or question 3 is "yes" then :-

Question 2.1 :

Is the firm's debt/equity ratio a factor in selecting the accounting procedures?

Question 2.2 :

Is firm size a factor for manager in chooseing the accounting procedures?

Question 2.3 :

Is systematic risk (β) a reason underlying the management's selection of the accounting methods?

Question 2.4 :

Does accounting number influence the investors in making investment decisions?

Question 2.5 :

Are differences in industries likely to affect the investors in making investment decisions?

The following sections are the details of the research design which consist of one-way ANOVA, multiple linear regresssion model, the explanations of independent and dependent variables, research

hypotheses, the statistic inferences, data collection procedure, and, data controls and analyses.

3.3 Part 1 : One-way ANOVA

Analysis of variance (ANOVA)[1] is a technique for assessing how several nominal independent variables affect a continuous dependent variable. A fixed factor, for example, sex, age, education, and group, is one whose levels are only relevant levels of interest. Given is a fixed factor, one -way ANOVA (often referred to as fixed-effects one-way ANOVA) involves a comparison of several (two or more) population means. It can be said that different populations correspond to different levels of the single factor "population". Most ANOVA procedures can be alternatively considered in a regression-analysis setting. This can be done by defining appropriate dummy variables in a regression model.

The following sections are the details of dependent variable, factor or independent variable, the research hypotheses, and the statistical inference used in this part of the study.

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1. Davis G. Kleninbaum and Lawrence L. Kupper, Applied Regression Analysis and Other Multivariable Methods, Duxbury Press, 1978, pp.244-260.

3.3.1 Dependent variable

Within the test period of interest, cumulative abnormal return of each firm is estimated for each period around the announcement date as follows:

$$CAR_j = \sum_{t \in TP} \frac{1}{N} \sum U_{jt} \qquad (3.2)$$

where $u_{ji} = R_{jt} - (\alpha_j + \beta_j R_{mt})$; (3.3)

(OLS) $R_{jt} = \alpha_j + \beta_j R_{mt} + e_j$ (estimation period)

(The ordinary least squares (OLS) estimates, α_j , β_j)

where $R_{jt} = \ln(1+R_{jt})$;

$R_{jt} = (P_{jt} + D_{jt}) / P_{jt-1}$;

P_{jt} = price of security j at period t ;

P_{jt-1}= price of security j at the end of period $t-1$;

D_{jt} = dividends paid during period t ;

R_{mt} = rate of return on market portfolio estimated by SET price index

$= \ln(SI / SI_{t-1})$;

SI_t = marketable security price index at time t;

SI_{t-1}= marketable security price index at time $t-1$.

3.3.2 Single fixed factor or independent variable

A single fixed factor is one whose levels are the only relevant levels of interest. The relevant level of interest in this study is the difference of means of CAR between 2 groups : change group and no-change group. Alternatively, it can be formulated in regression analysis model of a single dummy variable (D) which represents 1 and 0 for the change group and no-change group, respectively. The simple regression model is illustrated as follow:

$$CAR_j = \alpha_j + \beta_j D_j + e_j \qquad (3.4)$$

where CAR_j = Cumulative abnormal return of security j;

D_j = Dummy variable : D = 1 change group;

D = 0 no-change group.

According to reseach questions 1, 2, and 3, one-way ANOVA is used to analyze the three categories of the mandated accounting change as follows :

(1) Overall accounting change from the cost method to equity method regardless of the procedure used in cumulative effect adjustment.

(2) Accounting change from the cost to equity method using the retroactive adjustment procedure.

(3) Accounting change from the cost to equity method by using the cumulative effect adjustment procedure.

3.3.3 Research hypotheses

The null hypothesis in one-way ANOVA is $H_0 : \mu_1 = \mu_2$ which means there is no mean difference between the two groups. The equivalent regression null hypothesis of the alternative equation (3.4) is $HO : \beta = 0$, which means there is no effect on CAR across the different groups.

One-way ANOVA hypothesizes the three categories of the tests as follows :

Null Hypothesis 1.1 :There is no mean difference between the overall change group and no-change group.

Null Hypothesis 1.2 :There is no mean difference between the change group using retroactive procedure and no-change group.

Null Hypothesis 1.3 :There is no mean difference between the change group using cumulative effect procedure and no-change group.

3.3.4 Statistical inferences

As stated earlier, most ANOVA procedures can be alternatively considered in a regression-analysis setting which can be done by setting appropriate dummy variables in a regression model. The ANOVA *F*-tests are then formulated in the same manner in terms of hypotheses concerning the coeffients of dummy (β) in the regression model.

3.4 Part 2 : Multiple Linear Regression Model

3.4.1 Regression model

Using the multiple regression model, a cross-sectional test is illustrated in the following full model:

$$CAR_j = \alpha + \beta_1 D_j + \beta_2 DE_j + \beta_3 TAS_j + \beta_4 BETA_j + \beta_5 INCEF_j + \beta_6 CUMEF_j + \beta_{(N+6)} IND_{Nj} + e_j \quad (3.5)$$

where CAR_j = cumulative abnormal return;

D_j = dummy variable 1 = change, 0 = no-change;

DE_j = debt/equity ratio;

TAS_j = total assets (size);

$BETA_j$ = systematic risk (beta);

$INCEF_j$ = income effect per share;

$CUMEF_j$ = cumulative effect per share;

IND_{Nj} = industry type (dummy variable for each type, e.g. IND01=1: is in the agribusiness, if IND01=0 is not),

N = number of industry (30-1 industries).

3.4.2 Descriptions of certain independent variables

To determine the relationship between market reaction and variables of interest, it is necessary to ensure that the observed reaction is caused by the variables of interest.

The equity investment accounting change from the cost to equity method affects the reported income according to the following methods of adjustments:

(1) Under the cumulative effect method, the income effect would include the periodic income effect and the cumulative effect of the prior years to the beginning period of the change.

(2) Under the retroactive restatement method, the income effect would be only the periodic effect; the cumulative effect is separatly reported as the beginning retained earnings adjustment.

The effects of the aforementioned methods are divided by the number of outstanding shares at time of interest. The combined effects the two method are also considered. The independent variables should be as follows:

INCEFj = income effect per share of security j;

CUMEFj = cumulative effect per share of security j.

3.4.3 Dependent variable

Within the test period of interest, cumulative abnormal return for each firm is estimated for each period around the announcement date as follows:

$$CAR_j = \sum_{t \in TP} \frac{1}{N} \sum U_{jt}$$

where $u_{ji} = R_{jt} - (\alpha_j + \beta_j R_{mt})$;

(OLS) $R_{jt} = \alpha_j + \beta_j R_{mt} + e_j$ (estimation period)

(The ordinary least squares (OLS) estimates, α_j , β_j)

where $R_{jt} = \ln(1+R_{jt})$;

$R_{jt} = (P_{jt} + D_{jt}) / P_{jt-1}$;

P_{jt} = price of security j at period t ;

P_{jt-1}= price of security j at the end of period $t-1$;

D_{jt} = dividends paid during period t ;

R_{mt} = rate of return on market portfolio estimated by SET price index

$= \ln(SI / SI_{t-1})$;

SI_t = marketable security price index at time t;

SI_{t-1}= marketable security price index at time $t-1$.

3.4.4 Research hypotheses

Following Part-1, if hypothesis 1 or 2 or 3 is rejected

the implication is there is information content with respect to each hypothesis. Then, the tests of the theories will be conducted. The full model in the equation (3.4) is tested by the following null hypotheses :

Null Hypothesis 2.1 : The firm's debt/equity ratio is not a factor for manager in selecting the accounting procedures.

Null Hypothesis 2.2 : Firm size is not a factor for manager in choosing the accounting procedures.

Null Hypothesis 2.3 : Systematic risk (β) does not influence the manager's choose of accounting procedures.

Null Hypothesis 2.4 : Accounting number dose not influence the investors in making invesment decisions.

Null Hypothesis 2.5 : There is no difference among industries as to the likelihood to affect the investors in making invesment decisions.

3.4.5 Statistic inferences

The statistic tests should be dictated by the particular hypotheses being tested and the data being analyzed. For this study, SPSS PC$^+$ and PCgive are applied for OLS estimations, one-way ANOVA and the multiple regression statistic analysis. *F*-test is applied for the statistic inference.

3.5 Data Collection Procedure

Structured observation applies when the problem has been defined precisely enough to permit a clear a priori specification of the events that will be observed and categories that will be used to record and analyze the situation. To use the more structured approach, it would have been necessary to previously decide precisely what to be observed and the specific categories and units that would be used to record the observations.

The ultimate aim of the collection is to observe the response of the practitioners to the SET regulation which was effective at the first quarter ended 31 March 1994.

The specific categories to be observed

The following Table 3.1 illustrates the specific categories used in data collecting consideration. The sources of data are the destinations where the required data exists and would be used to record. The details of these procedures are as follows :

TABLE 3.1 CATEGORIES AND SOURCES OF DATA

Catàgories	Sources of data
1. Which listed companies were likely to respond to the SET regulation?	Listed companies that have associates and subsidiaries as at 31 December 1993 which were collected from Annually Summarized SET Information.
2. How did they respond : change or no change?	The first Quartery financial reports ended 31 March 1994.
3. Which method of changes is used : retroactive restatement or cumulative effect method or other?	
4. Was data available?	

The collected data is used in combination with the data from the SET by the following steps:

(1) Select all listed companies as at 31 December 1993 except mutual funds. Those companies are available in the annually summarized information of the listed companies for the year 1993. The selection criteria are the companies which have :

a) subsidiaries and/or associates,

b) accounting periods year ended 31 December,

c) no dilution effects caused by issuing warrants or share splitting, and

d) data available.

(2) The accounting change data is collected from the first quartery report ended 31 March 1994.

(3) The movements of security prices and others are collected from the SET's database documentation.

TABLE 3.2 illustrates the result of the structured observations mentioned above. Three hundred and fifty eight listed companies are selected from all industries except mutual funds. The targeted number includes 278 firms which possess subsidiaries and/or associates in their accounts. The result revealed that 87 firms recorded the mandated accounting change. The number of firms which applied either the accounting change methods of retroactive, cumulative effect, or some methods is 49, 31, and 7 firms, respectively. The rest are those that no change in accounts was made. One hundred and ninety five firms are tested in part 1 and 185 firms are tested in part 2.

TABLE 3.2

OBSERVATIONS

INDUSTRY	TOTAL	TARGET	ACCOUNTING CHANGE			NO-CHANGE GROUP	
			RETRO.	CUMU.	OTHER.	PART-1	PART-2
1.Agribusiness	40	28	6	4	0	18	17
2.Banking	16	14	0	0	0	14	14
3.Building & Fur--nishing materials	27	24	5	4	1	14	14
4.Chemicals & Plastics	9	6	1	1	0	4	3
5.Commerce	13	11	3	3	1	4	4
6.Communication	9	5	2	0	1	2	2
7.Electrical Products & Computer	11	8	2	1	0	5	4
8.Electronic & Components	5	3	0	1	0	2	2
9.Energy	5	1	0	1	0	0	0
10.Entertainment & Recreation	2	2	0	1	0	1	1
11.Finance & Securities	39	30	3	1	0	26	26
12.Foods & Beverages	11	8	0	2	0	6	6
13.Health Care Services	9	7	2	0	0	5	5
14.Hotels & Travel Services	13	13	4	2	0	7	7
15.Household Goods	8	3	0	0	0	3	3
16.Insurance	21	18	0	0	1	17	17
17.Jewelry & Ornaments	5	4	0	1	0	3	3
18.Machiner	2	2	1	1	0	0	0
19.Mining	3	3	1	2	0	0	0
20.Packaging	15	15	2	0	1	12	11
21.Phama. & Cosmetics	2	1	0	1	0	0	0
22.Printing/Publishing	9	9	3	0	0	6	6

TABLE 3.2 Continued

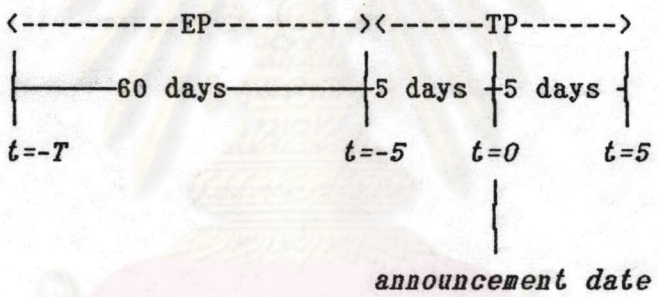
INDUSTRY	TOTAL OBSERVATIONS	TARGET	ACCOUNTING CHANGE			NO-CHANGE GROUP	
			RETRO.	CUMU.	OTHER.	PART-1	PART-2
23.Professional Services	2	2	0	0	0	2	2
24.Property Development	30	23	8	2	2	11	11
25.Pulp & Paper	3	2	0	0	0	2	1
26.Textiles, Clothing & Footwear	32	23	6	2	0	15	14
27.Transportation	4	2	0	1	0	1	1
28.Vehicles & Parts	6	4	0	0	0	4	4
29.Warehouse & Silo	4	4	0	0	0	4	4
30.Others	3	3	0	0	0	3	3
TOTAL	358	278	49	31	7	191	185

3.6 Data Controls and Analyses

3.6.1 Data controls

(1) The estimation and test periods

The variable CAR stated in equations (3.4) and (3.5) is used to analyze the collected data throughout the test period. The estimation period (EP) and the test period (TP) are illustrated schematically bellow:



The parameters in the market model (α, β) are systematically estimated on the basis of daily data and estimate period of 60 days. The test period covers a 10-day period : 5 days before and 5 days after the announcement date ($t = 0$).

(2) Market auto-correlation adjustment

All too often, nonsynchronous trading of securities and the use of daily data in the market model can cause econometric problem of errors in variables. Specifically, the ordinary least squares estimators of both alphas and betas for almost all

securities are biased and inconsistent. Scholes and Williams (1977) constructed the consistent estimators of alpha and beta, using as an instrument the moving sum of measured rates of return on market for the previous, current, and subsequent periods.

The betas are consistently estimated by combining lead, contemporaneous, and lag OLS betas adjusted by market auto-correlation. αj and βj in the equation (3.3) are calculated as follows:

$$\beta j = (\beta^{-1} + \beta^{0} + \beta^{+1}) / (1 + \rho m);$$

and

$$\alpha j = (\sum_{t=2}^{t-1} Rjt)/(T-2) + \beta j.(\sum_{t=2}^{t-1} Rmt)/(T-2);$$

where ρm = estimate of the first-order auto-correlation of return on market portfolio or ρm estimated from Durbin-Watson d static[1] $\tilde{-}$ 1 - d/2

β^{-1} = OLS estimate of β when regressing Rjt on $Rmt-1$;

β^{0} = OLS estimate of β when regressing Rjt on Rmt;

β^{+1} = OLS estimate of β when regressing Rjt on $Rmt+1$.

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[1] Damodar Gujarati, Essentials of Econometrics, McGraw-Hill, 1992, p.368.

3.6.2 Data analyses

In part 1, one-way ANOVA is used to analyze the information content of the mandated accounting change. CAR is the surrogate of accounting information content. The premise is that if there is mean difference between the change group and no -change group, the accounting change has information content. Using the *F*-test statistic, if null hypothesis 1.1 is rejected, the mandated accounting change from the cost to equity method in equity investment has information content. Also in testing each accounting change procedure, if null hypotheses 1.2 and/or 1.3 are rejected, retroactive and/or cumulative effect procedures have information content. These three hypotheses are separately tested.

In part 2, the mutiple regression model is applied to analyze other theoretical factors cross-sectionally involved. After null hypotheses 1.1 and/or 1.2 and/or 1.3 in part 1 are rejected, the cross-sectional model stated in equation (3.5) is further analyzed. The tested null hypothesis is as follow :

(Null Hypothesis) $H_0 : \beta_1=\beta_2=\beta_3=\beta_4=\beta_5=\ldots.\beta(N+6) = 0$

SPSS PC^+ is then applied in processing the multiple regression, using the stepwise method. The *F*-test statistic is the statistic inference for the fitness of the regression model. The *T*-test statistic infers each test for regression coefficients ($\beta_1, \beta_2,\ldots, \beta(N+6)$).