CHAPTER 4

RESULTS AND ANALYSES

This chapter describes the results of the statistical analyses of the data. It contains two parts. The first part concerns the tests of information content and the second part is the tests of the theories. In part 1, the results can provide the analyses of whether the accounting changes have information content. The analyses are conduced separately following three tests: the overall changes, the retroactive method change, and the cumulative effect method change. If the results of the analysis reveals that there is information content, the second tests of cross-sectional regression model will be further conducted to find out additional variables associated with the interesting theories mentioned in chapter 2.

4.1 Part 1 : The Tests of Information Content

TABLE 4.1 provides the summary statistics used in the three tests of One-way ANOVA with respect to three accounting change groups: overall change methods, retroactive method, and cumulative effect method. The control group includes 191 firms with no-change in accounting. This control group is used in all three tests in conjunction with the changed groups which contain 87, 49 and 31 firms, respectively.

TABLE 4.1

Summary Statistics in One-way ANOVA

	Test 1. Overall Methods	Test 2. Retroactive Method	Test 3. Cumulative Effect Method
	278 firms	240 firms	222 firms
CAR :-			
Mean	-.004	-.002	-.005
Standard diviation	.032	.007	.035
Normality $Chi^2(2)$	29400[0.0000]**	200.53[0.0000]**	18929[0.0000]**
ANOVA :-			
F	2.808	.094	8.894
Signif. of F	.095	.760	.003**

4.1.1 The test for normality

Descriptive statistics is concerned with summarizing the information in data on one or more variables, and it provides the methods for estimating the values of various parameters, including the coefficients of an economitric model.

Kleinbaum and Kupper (1978) defined :

A descriptive statistics may be defined to be any single numerical measure computed from a set of data, which is designed *to describe a particular aspect or characteristic of the data set. The most common types of descriptive statistics are measures of central tendency and variability (or dispersion).*

Doornik and Hendry (1994) provide PcGive 8.0 (a modelling system) in which the test for normality is one of its functions of descriptive data analysis. The test statistic is normality Chi-square which is derived from the details illustrated in Appendix C.

The dependent variable CAR for each test is normally distributed according to the normality tests of statistic chi^2 which are reported with probabilities. For example, in Test 1 normality (normality $chi^2(2)$ = 29400[0.0000]), the 1% chi^2 critical value with two degrees of freedom is 9.22 (from statistical Chi^2 Distribution Table); so the normality hypothesis is rejected, (alternatively prob (chi^2>=29400)=0.0000, which is less than 1%). It can be concluded that the dependent variable CAR in Test 1 has normality qualification. The results of the remaining tests are essentially the same as the result of Test 1. The CARs in the three tests follow the normality assumpion.

4.1.2 One-way ANOVA results and analyses

The main analysis problem in fixed-effects one-way ANOVA concerns the question of whether or not the population means are equal. For each test, there are two means (denoted as μ_1, μ_2); the basic *null hypothesis* of interest is given by

$$H_o : \quad \mu_1 = \mu_2$$

The alternative hypothesis is given by

$$H_a : \quad \text{the 2 population means are not equal.}$$

The null hypothesis of equal population means is tested using an *F*-test. When H_o is true, the *F* statistic has the *F* distribution. Thus, for a given α, H_o would be rejected and it can be concluded that the population means are different if

$$F >= F_{k-1,n-k,1-\alpha} \text{ (k=number of group, n=number of observations).}$$

The ANOVA results of the three tests in TABLE 4.1 giving *F* and significant *F* statistics indicate that for a given α=.01, H_o of Test 3 is rejected where H_o of others cannot be rejected.

According to the results, there is mean differences of CARs between the accounting change group applying the cumulative effect method and the no-change groups. In conclusion, the cumulative effect method following the mandated accounting change has ***information content.***

4.1.3 Simple regression with dummy variable

Kleinbaum and Kupper (1978) mentioned that, most ANOVA procedures can be alternatively considered in a regresssion -analysis setting; this can be done by defining appropriate dummy variables in a regression model. The ANOVA *F* tests are then formulated in terms of hypotheses concerning the coefficients of dummy variables in the regression model. The simple regression model in equation (3.4)($CARj = \alpha j + \beta Dj + ej$) is applied in the three tests using the same data as the above one-way ANOVA tests. TABLE 4.2 provides the results of the three regression analyses. The additional Durbin-Watson statistic has proved to be in the qualified range in which no autocorrelation exists among the CARs.[1]

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[1] Supol Durongwatana, Statistic Analysis : Regression Analysis, 1st Edition, Chulalongkorn University Press, 1994.

TABLE 4.2

Simple Regression Model with Dummy Variable

TEST 1 Overall Methods

$CARj = -.002009 - .006881*Dj + ej$

SE	(.00297)	(.00416)
t	-.88	-1.676
Sig-t	.3825	.0949

$R^2 = .01007$ $SE = .03174$

TEST 2 Retroactive Method

$CARj = -.002009 + .000369*Dj + ej$

SE	(.00054)	(.00120)
t	-3.692	.306
Sig-t	.0003	.7599

$R^2 = .00039$ $SE = .00752$

TEST 3 Cumulative Effect Method

$CARj = -.002009 - .02017*Dj + ej$

SE	(.00253)	(.00676)
t	-.795	-2.982
Sig-t	.4276	.0032**

$R^2 = .03886$ $SE = .03494$

	CAR		*Residual*				
	Normality Chi²	*Durbin-Watson*	*DF*	*SS*	*MS*	*F*	*Sig F*
T-1	29400 [0.0000]	2.02	276	.27813	.00101	2.80837	.0949
T-2	200.53[0.0000]	1.96	238	.01346	.00006	.09362	.7599
T-3	18929 [0.0000]	2.13	220	.26853	.00122	8.89371	.0032**

The null hypothesis for each test is given by :

$$H_o \quad : \quad \beta j = 0$$

The alternative hypothesis is given by :

$$H_a \quad : \quad \beta j \text{ is not equal } 0 \quad .$$

The null hypothesis of Test 3 the cumulative effect method is rejected for a given α=.01 (*F = 8.8937, Sig-F = .0032*). The conclusion of the test is also the same as that of the one_way ANOVA; that is the cumulative effect method of accounting change has *information content.*

4.2 Part 2 : Tests of the Theories

This part is performed subsequently to Part 1 given the condition that if the mandated accounting change has information content regardless of the adjustment method, then tests of the interesting theories would be the next process. The results from Part 1 reveal that the cumulative effect method of accounting change has information content. The tests of the interesting theories illustrated in TABLE 2.3 will be analyzed using a cross -sectional regression model.

4.2.1 The full model and the test model

Equation (3.5) denotes the full model of a cross-sectional multiple regression:

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

or

$$\begin{aligned} CAR_j = {} & \alpha + \beta_1 D_j + \beta_2 DE_j + \beta_3 TAS_j + \beta_4 BETA_j + \\ & \beta_5 INCEF_j + \beta_6 CUMEF_j + \beta_7 IND01_j + \beta_8 IND02_j + \\ & \beta_9 IND03_j + \beta_{10} IND04_j + \beta_{11} IND05_j + \beta_{12} IND06_j + \\ & \beta_{13} IND07_j + \beta_{14} IND08_j + \beta_{15} IND09_j + \beta_{16} IND10_j + \\ & \beta_{17} IND11_j + \beta_{18} IND12_j + \beta_{19} IND13_j + \beta_{20} IND14_j + \\ & \beta_{21} IND15_j + \beta_{22} IND16_j + \beta_{23} IND17_j + \beta_{24} IND18_j + \\ & \beta_{25} IND19_j + \beta_{26} IND20_j + \beta_{27} IND21_j + \beta_{28} IND22_j + \\ & \beta_{29} IND23_j + \beta_{30} IND24_j + \beta_{31} IND25_j + \beta_{32} IND26_j + \\ & \beta_{33} IND27_j + \beta_{34} IND28_j + \beta_{35} IND29_j + e_j \qquad (4.1) \end{aligned}$$

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 *(N = 30-1 industries)*.

The results from Part 1 indicate that the cumulative effect adjustment method of accounting change has information content. In effect, the full model would be reduced by omitting the independent variable CUMEF*j* because it is included in the income effect (INCEF*j*). The test model would be as follows:

$$CAR_j = \alpha + \beta_1 D_j + \beta_2 DE_j + \beta_3 TAS_j + \beta_4 BETA_j + \beta_5 INCEF_j + \beta_7 IND01_j + \beta_8 IND02_j + \beta_9 IND03_j + \beta_{10} IND04_j + \beta_{11} IND05_j + \beta_{12} IND06_j + \beta_{13} IND07_j + \beta_{14} IND08_j + \beta_{15} IND09_j + \beta_{16} IND10_j + \beta_{17} IND11_j + \beta_{18} IND12_j + \beta_{19} IND13_j + \beta_{20} IND14_j + \beta_{21} IND15_j + \beta_{22} IND16_j + \beta_{23} IND17_j + \beta_{24} IND18_j + \beta_{25} IND19_j + \beta_{26} IND20_j + \beta_{27} IND21_j + \beta_{28} IND22_j + \beta_{29} IND23_j + \beta_{30} IND24_j + \beta_{31} IND25_j + \beta_{32} IND26_j + \beta_{33} IND27_j + \beta_{34} IND28_j + \beta_{35} IND29_j + e_j \quad (4.2)$$

TABLE 4.3 provides the summary of the statistics and variables used in the tested regression model. The observations include 31 firms which use the cumulative effect method in response to the mandated accounting change. The controlled group in which no accounting change is made and all data is readily available, consists of 185 firms, of which the independent variable CAR satisfies the normality assumption and autocorrelation defections ($Chi^2(2)=16137$ [0.0000] and Durbin -Watson=1.905).

TABLE 4.3

Summary Statistics-Variables in Regression Model; 216 Firms

	CARj	Dj	DEj	TASj	BETAj	INCEFj
Mean	-.005	.144	2.64	17.535 m.	.73	.07
Standard Diviation	.036	.35	3.74	74.952 m.	.58	.85

Normality $Chi^2(2)$ 18137 [0.0000]**

Durbin-Watson 1.905

N INDUSTRY (INDN)	216 Firms Dj = 1 (Change)	Dj = 0 (No-change)
01.Agribusiness	4	17
02.Banking	0	14
03.Building & Furnishing materials	4	14
04.Chemicals & Plastics	1	3
05.Commerce	3	4
06.Communication	0	2
07.Electrical Products & Computer	1	4
08.Electronic & Component	1	0
09.Energy	1	0
10.Entertainment & Recreation	1	1
11.Finance & Securities	1	26
12.Foods & Beverages	2	6
13.Health Care Services	0	5
14.Hotels & Travel Services	2	7

TABLE 4.3-continued

Summary Statistics-Variables in Regression Model; 216 Firms

INDn INDUSTRY	216 Firms	
	Dj = 1 (Change)	Dj = 0 (No-change)
15.Household Goods	0	3
16.Insurance	0	17
17.Jewelry & Ornaments	1	3
18.Machiner	1	0
19.Mining	2	0
20.Packaging	0	11
21.Phama. & Cosmetics	1	0
22.Printing & Publishing	0	6
23.Professional Services	0	2
24.Property Development	2	11
25.Pulp & Paper	0	1
26.Textiles, Clothing & Footwear	2	14
27.Transportation	1	1
28.Vehicles & Parts	0	4
29.Warehouse & Silo	0	4
30.Others	0	3
TOTAL	31	185

4.2.2 The best-fitting regression model problem

In general, in the case where there exists one dependent variable (Y) and a set of k independent variables ($X_1, X_2, ...X_k$), the problem is how to determine the best (i.e. the most important) subset of these k independent variables and the corresponding best-fitting regression model that best describe the relationship between Y and the X's. Stepwise regression procedure is an improved version which permits reexamination, at every step, of the variables incorporated in the model in the previous steps. A variable that entered at an early stage may, at a later stage, become superfluous because of its relationship with other variables now in the model. To check on this possibility, at each step, a partial F test for each variable present in the model is made, treating it as though it were the most recent variable entered, irrespective of its actual entry point into the model. Once the variable with the smallest nonsignificant partial F statistic (if there is such a variable) is removed, the model is refitted with the remaining variables. The partial F's are then obtained and similarly examined, and so on. The whole process continues until no more variables can be entered or removed.[1]

[1] David G. Kleinbaum and Lawrence L. Kupper, Applied Regression Analysis and Other Multivariate Methods, Duxbury Press, 1978, pp.231-232.

4.2.3 Multiple regression results-almost variables included

The SPSS PC+ system is applied with the function of Enter regression method which allows almost all variables to be included in the model. The test model in equation 4.2 is analyzed and its results are shown in TABLE 4.4 as follows:

TABLE 4.4

Multiple Regression Results - Almost All Variables Included

	Mean	Standard Diviation	Coeffi--cient (α, β)	S.E.	T	Sig-T
CAR*j*	-.005	.036				
Constant	-	-	.00436	.02174	.201	.8413
D*j*	.14	.35	-.0261	.00858	-3.039	.0027**
DE*j*	2.64	3.730	.00065	.00152	.431	.6672
TAS*j*	17,535 m.	74,952 m.	.00000	.00000	.162	.8717
BETA*j*	.73	.58	-.0038	.00507	-.754	.4517
INCEF*j*	.07	.84	.00199	.00351	.567	.5716
IND01*j*	.10	.30	-.0214	.02325	-.920	.3587
IND02*j*	.06	.25	-.0119	.03124	-.382	.7028
IND03*j*	.08	.28	-.0110	.02346	-.470	.6391
IND04*j*	.02	.14	-.0030	.02887	-.103	.9182
IND05*j*	.03	.18	.00800	.02615	.306	.7596
IND06*j*	.01	.10	-.0023	.03437	-.068	.9458
IND07*j*	.02	.15	.00141	.02749	.051	.9592
IND08*j*	.01	.12	.00268	.03127	.086	.9319
IND09*j*	.00	.07	.01502	.04411	.341	.7339

TABLE 4.4 - continued

Multiple Regression Results - Almost Variables Included

	Mean	Standard Diviation	Coeffi- -cient	S.E.	T	Sig-T
IND10*j*	.01	.10	.01278	.03467	.369	.7129
IND11*j*	.12	.33	-.0041	.02558	-.161	.8721
IND12*j*	.04	.19	-.0009	.02547	-.039	.9691
IND13*j*	.02	.15	-.0046	.02736	-.169	.8662
IND14*j*	.04	.20	.00183	.02504	.073	.9420
IND15*j*	.01	.12	-.0044	.03055	-.142	.8869
IND16*j*	.08	.27	-.0081	.02365	-.342	.7330
IND17*j*	.02	.14	.00306	.02866	.107	.9152
IND18*j*	.00	.07	.01704	.04545	.375	.7082
IND19*j*	.01	.10	.02376	.03560	.668	.5053
IND20*j*	.05	.22	-.0043	.02439	-.174	.8618
IND21*j*	.00	.07	.00725	.04590	.158	.8747
IND22*j*	.03	.16	-.0070	.02649	-.264	.7922
IND23*j*	.01	.10	-.0060	.03417	-.176	.8604
IND24*j*	.06	.24	.00178	.02428	.073	.9416
IND25*j*	.00	.07	-.0306	.04326	-.706	.4810
IND26*j*	.07	.26	-.0011	.02361	-.045	.9641
IND27*j*	.01	.10	.01180	.03459	.341	.7334
IND28*j*	.02	.14	-.0048	.02861	-.167	.8675
IND29*j*	.02	.14	-.0075	.02860	-.260	.7948

R^2 = .09023 Multiple R = .30039 F = .52801

Adjusted R^2 = -.08066 Standard Error = .03742 Sig-F = .9852

To analyze the results in TABLE 4.4, the regression model in equation (4.2) is not the basic thrust to explain as much of the variation in the dependent variable (CAR) as possible by explanatory variables included in the model. This problem may presume upon the overfitting a model which includes unnecessary variables.

4.2.4 Multiple regression results - Stepwise method

The consequences of including unnecessary variables in the model may be called the (inclusion of) irrelevant bias. The specification error consists in overfitting the model which causes the inefficient estimations of true coefficients. As commented in 4.2.2, this is one of the best-fitting regression model problems and the stepwise regression method can provide a procedure that can omit the irrelevant variables. TABLE 4.5 is the Stepwise regression results of the model which is reduced to the two explanatory variables; one is controlled variable D_j and the other is industry type 01 ($IND01_j$), "Agribusiness".

Compared with the results in TABLE 4.4, almost all variables enterred into the model caused the whole model to not explain the variation of CAR by the variations of all variables. The Stepwise regression method can provide, in this case, a better fitting model than the overfitting model.

TABLE 4.5

Multiple Regression Model Results -Stepwise Method

$$CARj = -.000524 - .01925*Dj - .01866*IND01j + ej \qquad (4.3)$$

SE	*(.00268)*	*(.00681)*	*(.00805)*
t	*-.196*	*-2.829*	*-2.317*
Sig-t	*.8452*	*.0051***	*.0215**

R^2 = .06157 *Standard Error = .03503*

Adjusted R^2 = .05275 *Multiple R = .24813*

CAR

Normality Chi^2	*Durbin-Watson*
18137 [0.0000]**	1.905

Residual

DF	*SS*	*MS*	*F*	*Sig F*
213	.26141	.00123	6.98698	.0012**

4.2.5 Testing the hypotheses

The following five null hypotheses introduced in chapter 3. have to be tested accordingly to the test model, they are:

Null Hypothesis 2.1

H_o : The firm's debt/equity ratio is not a factor for manager in selecting the accounting procedures, or

: $\beta 2 = 0$

Null Hypothesis 2.2

H_o : Firm size is not a factor for manager to choosing accounting procedures, or

: $\beta 3 = 0$

Null Hypothesis 2.3

H_o : Systematic risk (β) does not cause the manager to choose the accounting procedure, or

: $\beta 4 = 0$

Null Hypothesis 2.4

H_o : Accounting number does not influence the investors in making investment decisions, or

: $\beta 5 = 0$

Null Hypothesis 2.5

H_o : There is no difference in industries that is likely to affect the use of changed accounting information, or

: $\beta 7 = \beta 8 = \beta 9 \ldots\ldots = \beta 35 = 0$

Since the test model is reduced by the result of the stepwise regression model in equation (4.3), the variables excluded in the reduced model cannot explain variations of the dependent variable CAR. Then, all the null hypotheses except 2.5 cannot be rejected. It can be concluded that for a given $\alpha = .05$, the industry type is likely to affect the use of changed accounting information, especially the cumulative effect method of mandated accounting change from the cost to equity method.

4.2.6 Reclassified types of industry

The results of the cross-sectional test illustrated in Table 4.5 are from the model in which thirty industry types are classified according to the SET's classification. To confirm these results, the researcher reclassifies types of industry by using the categories presented in the Monthly Economic Report for July 1996 published by Bank of Thailand. Nine industry types are, reclassified, with the Agribusiness (IND01) remaining as in the former test. Table 4.6 illustrates the result of the reclassification as follows:

Table 4.6

Reclassified Types of Industry

INDUSTRY	TOTAL	TARGET	ACCOUNTING CHANGE			NO-CHANGE
			RETRO.	CUMU.	OTHER.	PART-2
1. Agribusiness	40	28	6	4	0	17
2. Financial institutions	76	62	3	1	0	57
3. Trade	13	11	3	3	1	4
4. Construction	27	24	5	4	1	14
5. Mining/quarrying stone	3	3	1	2	0	0
6. Services	52	44	11	4	1	28
7. Real estate	30	23	8	2	2	11
8. Industries	114	80	12	11	2	51
9. Others	3	3	0	0	0	3
TOTAL	358	278	49	31	7	185

The tested model is changed by eliminating industry types to nine categories. Stepwise regression method is then applied to analyze the following model :

$$\mathrm{CAR}j = \alpha j + \beta 1\mathrm{D}j + \beta 2\mathrm{DE}j + \beta 3\mathrm{TAS}j + \beta 4\mathrm{BETA}j + \beta 5\mathrm{INCEF}j + \beta 6\mathrm{IND01}j + \beta 7\mathrm{IND02}j + \beta 8\mathrm{IND03}j + \beta 9\mathrm{IND04}j + \beta 10\mathrm{IND05}j + \beta 11\mathrm{IND06}j + \beta 12\mathrm{IND07}j + \beta 13\mathrm{IND08}j + ej \qquad (5.1)$$

The results are as follows :

$$\mathrm{CAR}j = -.00052 - .0193\mathrm{D}j - .0187\mathrm{IND01}j + ej \qquad (5.2)$$

SE	*.0027*	*.0068*	*.0081*
t	*-.196*	*-2.829*	*-2.317*
Sig-t	*.8452*	*.0051*	*.0215*

R^2 = *.06157*, *F* = *6.98689*

SE = *.03503*, *Sig-F* = *.0012*

These results are the same as those illustrated in Table 4.5. It confirms that only Agribusiness industry type involves in the investors' decision making.

4.3 Limitations

The empirical research results of this study may confirm the proposed hypotheses, but there are some limitations. The main problem is the small sample size. The lack of mandated disclosure firms which comprises 31.3% (87/278) of the target adopters, causes the sample size to reduce substantially. In addition, the more powerful research methodology, specifically, the pair matching technique, cannot be used in this case. Instead, the group matching is applied that is less explanatory in terms of the reseach design.

This study can provide only an explanatory regression model rather than a predictive model. A good explanatory model only requires a high *F*-statistic value for testing all explanatory variables together, (*F* value represents the ratio of explained variance to the unexplained variance in the dependent variable), or a high *t*-value for testing the individual explanatory variables, while a good predictive model must have a high R-square value (R-square value is the ratio of explained variation to the total variation in the dependent variable). The regression model of this study has somewhat low R-square value (R^2 = .06157). However, for a majority of the accounting and finance studies that deal with the test of hypotheses, such an explanatory model has proved adequate.(For example, Hagerman, Zmijewski, and Shah, 1984, R^2=0.05; Leftwich, 1981, R^2 = 0.018; Holthausen, 1981, R^2= .013)[1]

Although the tests of the theories are widely conducted to investigate the effect of managers' bonus and compensation plans which are based on the accounting numbers, in Thailand, such data is usually confidential and not allowed for the outsiders. For this reason, the scope of the tests of the theories in this study is limited.

4.4 Summary

The empirical results indicate that the mandated accounting change from the cost to equity method of equity investment, regulated by SET, has information content, especially the use of the cumulative effect method to account for the change. In addition, additional investigation is performed to find if some other factors are involved in the investment decision of the investors that may produce security price changes when using the accounting information. The tests of theories include the agency

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[1] Wu, Tsing Tzai, An Examination of the Market Reaction of the Adoption of SFAS No.52: A New-Information-de-Facto Approach, Ph.D. Dissertation, City University of New York, 1988, pp.147-8.

theory (debt contract), firm theory (political cost : firm size), naive-investor theory (accounting numbers e.g. cumulative effect, income effect), risk theory (beta), and industry types. The multiple regression model is applied along with the stepwise method. The empirical result reveals that no other factors are involved in the investors' investment decisions except the industry type.