

CHAPTER 4

RESEARCH DESIGN

4.1 Introduction

The main objective of this study is to investigate the effects of year 1999 changes in Thai accounting standards on value relevance of accounting information. This study examines the effects of changes in accounting standards on value relevance of earnings, whether the new accounting items in income statement are value relevant information, and how the inclusion of new accounting items in income statement affects the value relevance of earnings. In addition to accounting items in income statement, the effects of changes in accounting standards on value relevance of the balance sheet items will be also studied. The balance sheet items examined are total assets, property, plant and equipment, investment in securities, and other assets.

The main research methodology used to investigate value relevance of accounting information is to run the regression model of the relationship between returns (or stock's price) and earnings (or other accounting information). The value relevance of earnings (or other accounting information) is measured by the slope coefficients and adjusted R^2 from the regression models. This is consistent with Collins and Kothari (1989) and Brown et al. (1999). They indicate that the inference regarding the value relevance of accounting information is based on the significance of slope coefficient and the explanatory power (R^2). For the investigation of effects of changes in the accounting standards on value relevance of accounting information, the significance of slope coefficients of interaction term between accounting variables and the dummy variable (which used to partition firms into before and after the changes in accounting standards) will be examined.

4.2 Sample Selection

The sample of this study should meet all following requirements:

1. The sample composes of the listed companies of the Stock Exchange of Thailand (SET) in the period during the first quarter of year 1997 to the second quarter of year 2001 (total 18 quarters).

2. The sample does not include the firms in financial institution industry. They are the firms in banking, finance and securities, and insurance industry. The reasons are as follows.

The components of assets and liabilities in balance sheet are much different from the firms in manufacturing industry. For example, investments in securities of banking firms are divided into securities for trading and securities for investment. Investments in securities for insurance firms are divided into bonds, stocks, and debentures in balance sheet. In addition, the classification of accounting items in income statement are also different from the firms in manufacturing industry. For example, accounting items are classified into interest revenue, non-interest revenue, interest expense, and non-interest expense for banking firms.

In addition, the firms in financial institution sectors are subject to various capital and regulatory requirements administered by the Bank of Thailand (BOT). Under the capital adequacy guidelines and the regulatory framework for prompt corrective action, they must identify specific guidelines that involve quantitative measurements of assets, liabilities and certain off-balance sheet items as calculated in accordance with regulatory accounting practice.

3. The firms' financial statements which are non-December year-ended are deleted from the sample. That is, financial statements which do not end at March for the first quarter, June for the second quarter, and September for the third quarter and December for the fourth quarter or yearly data are excluded.

4. The sample includes the operative firms in the period both before and after the changes in accounting standards. If the firms are delisted from the Stock Exchange of Thailand before the changes in accounting standards (delisted in year 1997 or 1998), they will be excluded from the sample.

Moreover, if firms have the numbers of observations less than 4 consecutive quarters both before and after the changes in accounting standards, they will be also excluded from the sample. For example, firms A is a new listed company at the end of year 1998; so there is only one quarter of financial statement for firm A before the changes in accounting standards. Firm A is excluded from the sample. Firm B is delisted at the middle of year 1999, so there are

only 2 quarters of financial statements for firm B after the changes in accounting standards. Firm B is not in the sample.

5. The firms that adopt TAS No. 34 (Accounting for Troubled Debt Restructurings) in the third or fourth quarter of year 1998 are deleted from the sample. TAS No. 34 becomes operative for financial statements covering periods ending on or after 30 September 1998, which is mandated before other new accounting standards. This study's objective is to investigate the effects of changes in accounting standards and the adoption of new accounting conceptual framework in year 1999. Thus, the firms, which have gains/losses on TDR in income statements for the third quarter and fourth quarter in year 1998, will be deleted from the sample.

6. The firms that are affected by the changes in the accounting standards in year 2000 and 2001 are deleted from the sample. The data used in the analyses includes the financial statements in the year 2000 and 2001 in which some firms are affected by the adoption of new accounting standards that operative beginning on or after 1 January 2000 (TAS No. 41-48) and 1 January 2001 (TAS No. 49). From the comparison between the TAS No. 41-49 and the old ones (see APPENDIX B), the main differences are on goodwill accounting practice, accounting for joint ventures, and changes in the definition of parent and subsidiary company.

If the companies have the direct impact from either one topic stated above, these firms will be deleted from the sample.

4.3 Data Sources

The data used in the analyses and their sources are summarized as follows.

The stock returns and stock prices are taken from Data Stream database.

The financial statements information such as earnings, components of earnings, total assets, and other balance sheet items is extracted from the I-SIMS (Integrated-SET Information Management System) CDs and Listed Company Info CDs issued by The Stock Exchange of Thailand (SET). I-SIMS CDs provide financial data from the first quarter of year 1997 to the first quarter of year 1998. Listed Company Info CDs contain the financial data from the second quarter of year 1998 to the second quarter of year 2001.

The dates which the listed companies send their financial statements to the Stock Exchange of Thailand are collected from the section of news in I-SIMS CDs and Listed Company Info CDs. However, the dates of sending Q1/1997 financial statements to the SET are not contained in I-SIMS CDs and Listed Company Info CDs. So they are manually collected from SET Daily News.

4.4 Research Methodology

In this section, the research methodology is divided into the main models, model for hypotheses testing, and method of data analyses. Method of data analyses will be summarized after the presentation of each model.

4.4.1 The Main Model

The main model is based on the balance sheet model (or book value valuation model-model (a)) and derived earnings valuation model (model (e)) as stated in the section 3.3.2.

$$P_{it} = a_0 + a_1 BV_{it} + \mathcal{E}_{it} \quad (a)$$

The model (a) investigates the value relevance of balance sheet components by separating the specific balance sheet items from the book value of equity. The left-hand side variable is stock's price. The right-hand side variable is the book value of equity. The balance sheet components are total assets, property, plant and equipment, investment in securities, and other assets.

$$R_{it} = a_0 + a_1 E_{it} / P_{it-1} + \mathcal{E}_{it} \quad (e)$$

The model (e) investigates the value relevance of earnings, value relevance of earnings components (e.g. new accounting items in income statement) and the effects of the inclusion of new accounting items in income statement on value relevance of earnings. The left-hand side variable is the actual returns (R_{it}). The right-hand side variable is the level of earnings (E_{it}), and deflator variable is stock's price at beginning period (P_{it-1}).

Actual return is used as the dependent variable instead of abnormal return because it is consistent with the analytical process (stated in section 3.3.2) of the derivation of

balance sheet model to the return-earnings relationship model. It also reduces the problem in the measurement error of expected return.

This study will investigate the effects of year 1999 changes in accounting standards on the value relevance of earnings. The studies of value relevance of earnings mostly assume the random-walk earnings processes (changes in earnings as unexpected earnings) for the listed companies in Thailand (Vacharajittipan, 1990; Srisawadi, 1996; Keorath, 1996). However, this study cannot use the prior year's earnings as the expected earnings because they are recognized and measured under the old accounting standards' requirements. The reasons supporting the use of the level of earnings instead of changes in earnings as the independent variable are that the analytical and empirical studies show that the levels of earnings are related with the stock returns (Easton and Harris, 1991; Ohlson 1991; Ohlson and Shroff, 1992; Kothari, 1992) and there is the measurement error in the use of change in earnings as an unexpected earnings (Biddle and Seow, 1994).

4.4.2 Models for Hypotheses Testing and Method of Data Analyses

Several models are developed according to the hypotheses testing. Hypotheses 1-5 are the test of the effects of changes in accounting standards on value relevance of earnings, value relevance of new accounting items in income statement, and the effects of the inclusion of new accounting items in income statement on value relevance of earnings. Hypotheses 6-9 are the test of effects of changes in accounting standards on value relevance of accounting items in balance sheet. The accounting items in balance sheet that are affected by the changes in accounting standards in 1999 are total assets, property, plant and equipment, investment in securities, and other assets.

4.4.2.1 The Effects of Year 1999 Changes in Accounting Standards on Value Relevance of Earnings: The First Hypothesis

The year 1999 changes in accounting standards are expected to affect the value relevance of earnings. This test is based on that value relevance of earnings may change because the changes in the recognition and measurement criteria and the additional new accounting items in income statement. The new accounting items may affect the value relevance of earnings in the direction of an increase or a decrease.

The model (1) is used to investigate the effects of changes in accounting standards on value relevance of earnings:

$$R_{it} = \beta_0^i + \beta_1^i T + \beta_2^i (E_{it}/P_{it-1}) + \beta_3^i T (E_{it}/P_{it-1}) + \varepsilon_{it} \quad (1)$$

R_{it} = quarterly period return of firm i for quarter t ,

T = 1 if the firm-quarters' earnings are earnings after the changes in accounting standards, 0 otherwise,

E_{it} = earnings per share of firm i for quarter t ,

P_{it-1} = stock's price of firm i at the beginning of quarter t , and

ε_{it} = error term.

In addition, the β_i^m is defined as a parameter estimate of coefficient of model m and numbering i . For example in model (1) presented above, β_3^1 is the parameter estimate of coefficient of model (1) and numbering 3. It is used as the same definition for all models.

As stated in Chapter 3, it is predicted that the coefficient, β_3^1 which is the interaction term between dummy variable and earnings will be significant. That is, it indicates that value relevance of earnings after the changes in accounting standards will be different from value relevance of earnings before the changes in accounting standards. Thus, the changes in accounting standards have the effect on value relevance of earnings.

Data Analyses for Model (1) and Hypotheses Testing

The regression model (1) runs the pooled data of firm-quarters from the first quarter of year 1997 to the second quarter of year 2001. The dummy variable (T) of the model (1) is used to partition the firm-quarters' earnings into earnings before and after the changes in accounting standards. This study will examine the significance of the coefficient of earnings (β_2^1) (although it is not set as the hypothesis). If this coefficient is significant, earnings can be concluded that it is value relevant information. The significance of the coefficient of interaction term between dummy variable and earnings (β_3^1) will be investigated. If the coefficient β_3^1 is significant, there will be the change in value relevance of earnings due to the effects of changes in accounting standards.

From the research hypothesis about the effects of changes in accounting standards on value relevance of earnings, the statistical hypothesis is set as follows.

$$H_1: \beta_3^1 \neq 0.$$

Under the alternative hypothesis, it is contented that the changes in accounting standards have some effects, either positive or negative. So it is the two-sided hypothesis. The two tail t-test is used to test whether the coefficient β_3^1 is significant.

4.4.2.2 Value Relevance of New Accounting Items in Income

Statement: Hypotheses 2.1A, 2.2A, 3A, 4A, 5A

The following model is used to test whether the new accounting items in income statement are value relevant information.

$$R_{it} = \beta_0^2 + \beta_1^2 (EADJ_{it}/P_{it-1}) + \beta_2^2 (GTDR_{it}/P_{it-1}) + \beta_3^2 (LTDR_{it}/P_{it-1}) + \beta_4^2 (IMPPE_{it}/P_{it-1}) + \beta_5^2 (IMINV_{it}/P_{it-1}) + \beta_6^2 (TRADE_{it}/P_{it-1}) + \epsilon_{it} \quad (2)$$

R_{it} = quarterly period return of firm i for quarter t,

$EADJ_{it}$ = adjusted earnings or accounting earnings per share exclude the effects of new accounting items in income statement of firm i for quarter t,

$GTDR_{it}$ = gain on troubled debt restructuring per share of firm i for quarter t,

$LTDR_{it}$ = loss on troubled debt restructuring per share of firm i for quarter t,

$IMPPE_{it}$ = impairment loss (reversal of impairment loss) for property, plant, and equipment per share of firm i for quarter t,

$IMINV_{it}$ = impairment loss (reversal of impairment loss) for investment in securities per share of firm i for quarter t,

$TRADE_{it}$ = unrealized gain/loss on trading securities per share of firm i for quarter t,

P_{it-1} = stock's price of firm i at the beginning of quarter t, and

ϵ_{it} = error term.

The adjusted earnings ($EADJ_{it}$) are earnings that exclude gain and loss on TDR, impairment loss of PPE, impairment loss of investment in securities, and unrealized gain/loss on trading securities. The computation of adjusted earnings is shown in the formula as follows.

$$\begin{aligned} & \text{Adjusted Earnings (EADJ}_{it}) \\ & = \text{Accounting earnings under new accounting standards' requirements} \\ & - \text{New accounting items (in the case of gain)} \\ & + \text{New accounting items (in the case of loss)} \end{aligned}$$

As discussed in Chapter 3, it is predicted that the coefficients of loss on TDR (β_3^2), impairment loss of PPE (β_4^2), impairment loss of investment in securities (β_5^2), and unrealized gain/loss on trading securities (β_6^2) will be positively significant because we put the positive sign of value in the case of gain, and put negative sign of value in the case of loss in the model. That is, these accounting items are expected to be value relevant information. It is predicted that the coefficient on gain on TDR (β_2^2) equals to zero (or it is insignificant). That is, gain on TDR is predicted not to be value relevant information.

Data Analyses for Model (2) and Hypotheses Testing

The model (2) is estimated using the data of all firm-quarters after the changes in accounting standards (only firm-quarters with dummy variable T equals to 1). The significance of coefficients on gain on TDR (β_2^2), loss on TDR (β_3^2), impairment loss of PPE (β_4^2), impairment loss of investment in securities (β_5^2), and unrealized gain/loss on trading securities (β_6^2) will be examined. The statistical hypotheses are set as follows.

For gain on TDR (Hypothesis 2.1A),

$$H_1: \beta_2^2 = 0.$$

For loss on TDR (Hypothesis 2.2A),

$$H_1: \beta_3^2 > 0.$$

For impairment loss of PPE (Hypothesis 3A),

$$H_1: \beta_4^2 > 0.$$

For impairment loss of investment in securities (Hypothesis 4A),

$$H_1: \beta_5^2 > 0.$$

For unrealized gain/loss on trading securities (Hypothesis 5A),

$$H_1: \beta_6^2 > 0.$$

Under each of alternative hypotheses (except gain on TDR), it is contented whether each of new accounting items in income statement is positively related with the stock's return. So they are one tail t-test. For gain on TDR, it is expected not to be value relevant information. So it is two tail t-test.

4.4.2.3 The Effects of the Inclusion of New Accounting Items in Income Statement on Value Relevance of Earnings: Hypotheses 2.1B, 2.2B, 3B, 4B, 5B

The following model is used to test whether the inclusion of gain on TDR, loss on TDR, impairment loss on property, plant and equipment, impairment loss on investment in securities, unrealized gain/loss on trading securities in income statement will increase or decrease value relevance of earnings.

$$R_{it} = \beta_0^3 + \beta_1^3 D_1 + \beta_2^3 D_2 + \beta_3^3 D_3 + \beta_4^3 D_4 + \beta_5^3 D_5 + \beta_6^3 (E_{it}/P_{it-1}) + \beta_7^3 D_1 (E_{it}/P_{it-1}) \\ + \beta_8^3 D_2 (E_{it}/P_{it-1}) + \beta_9^3 D_3 (E_{it}/P_{it-1}) + \beta_{10}^3 D_4 (E_{it}/P_{it-1}) + \beta_{11}^3 D_5 (E_{it}/P_{it-1}) + \varepsilon_{it} \quad (3)$$

R_{it} = quarterly period return of firm i for quarter t,

E_{it} = earnings of firm i for quarter t,

P_{it-1} = stock's price of firm i at the beginning of quarter t,

D_1 = 1 if earnings include gain on TDR, 0 otherwise,

D_2 = 1 if earnings include loss on TDR, 0 otherwise,

D_3 = 1 if earnings include impairment loss (reversal of impairment loss) for PPE, 0 otherwise,

D_4 = 1 if earnings include impairment loss (reversal of impairment loss) for investment in securities, 0 otherwise,

D_5 = 1 if earnings include unrealized gain/loss on trading securities, 0 otherwise, and

ε_{it} = error term.

As discussed in the research hypotheses, the coefficient of interaction of dummy variable D_1 and earnings (β_7^3) is predicted to be minus sign and significant. That is, it is predicted that gain on TDR reduces value relevance of earnings. The signs of coefficients of interaction terms between dummy variable D_2 and earnings (β_8^3), dummy variables D_3 and earnings (β_9^3), dummy variables D_4 and earnings (β_{10}^3), and dummy variables D_5 and earnings (β_{11}^3) are not predicted. Thus, the effects of inclusion loss on TDR, impairment loss of PPE, impairment loss of investment in securities, and unrealized gain/loss on trading securities in income statement on value relevance of earnings are not predicted.

Data Analyses for Model (3) and Hypotheses Testing

The model (3) is estimated using the data for all firm-quarters after the changes in accounting standards and only firm-quarters with any dummy variable T equals to 1. As stated in research hypotheses in Chapter 3, the test of sign and significance of the coefficients of interaction terms between dummy variables and earnings with each of new accounting item are set in the statistical hypotheses as follows.

For gain on TDR (Hypothesis 2.1B),

$$H_1: \beta_7^3 < 0.$$

For loss on TDR (Hypothesis 2.2B),

$$H_1: \beta_8^3 \neq 0.$$

For impairment loss of PPE (Hypothesis 3B),

$$H_1: \beta_9^3 \neq 0.$$

For impairment loss of investment in securities (Hypothesis 4B),

$$H_1: \beta_{10}^3 \neq 0.$$

For unrealized gain/loss on trading securities (Hypothesis 5B),

$$H_1: \beta_{11}^3 \neq 0.$$

Under the alternative hypotheses, they are set according to the prediction discussed in Chapter 3. The hypothesis testing for gain on TDR is one tail t-test. The other hypotheses testing are two tail t-test because their directions are not predicted.

4.2.2.4 Additional Test: The Test of the Transitory Components of Earnings

If the new accounting items decrease value relevance of earnings, one plausible reason is that investors perceive these accounting items as the transitory components of earnings (Collins et al., 1997; Ramakrishnan and Thomas, 1998; Bugstahler et al., 1999; Easton et al., 2000).

The model (4) is used to test whether each of new accounting items is the transitory component of earnings.

$$(E_{it+1}-E_{it})/P_{it-1} = \beta_0^4 + \beta_1^4 (E_{it} - E_{it-1})/P_{it-1} + \epsilon_{it} \quad (4)$$

E_{it} = earnings per share of firm i for quarter t,

E_{it+1} = earnings per share of firm i for quarter t+1,

E_{it-1} = earnings per share of firm i for quarter t-1,

P_{it-1} = stock's price of firm i at the beginning of quarter t, and

ϵ_{it} = error term.

Data Analysis for Model (4)

This study will examine whether each of new accounting items is the transitory component of earnings. From the model (2) and (3), we will find which of new accounting items in income statement is not value relevant information and which of new accounting items decrease value relevance of earnings. However, the regression model (4) is run for each of new accounting items separately. The coefficient β_1^4 indicates the extent of the difference between future and current quarterly earnings ($E_{it+1}-E_{it}$) are related with the difference between current and previous quarterly earnings ($E_{it} - E_{it-1}$). Ramakrishnan and Thomas (1998) and Bugstahler et al. (1999) report that when the autocorrelation of the difference between future and current quarterly earnings ($E_{it+1}-E_{it}$) and difference between current and previous quarterly earnings ($E_{it} - E_{it-1}$) are zero, the earnings contains the transitory components.

This study investigates the significance of coefficient β_1^4 for each of new accounting items. The two tail t-test is used to test the significance of coefficient β_1^4 . From

the hypotheses testing in model (3), only gain on TDR is expected to decrease value relevance of earnings. It is predicted that the coefficient β_1^4 of the sample of gain on TDR quarters will be zero (it is insignificant), thus it is expected to be transitory components of earnings. The coefficients β_1^4 of firm-quarters with loss on TDR, impairment loss of PPE, impairment loss of investment in securities and unrealized gain/loss on trading securities are predicted to be significant (not equal to zero). That is, there are the significant correlations between $E_{it+1}-E_{it}$ and $E_{it}-E_{it-1}$ because these accounting items are expected not to be transitory components of earnings.

4.4.2.5 The Effects of Year 1999 Changes in Accounting Standards (TAS No. 32-40) on Value Relevance of Total Assets and the Effects of the Adoption of TAS Interpretation No. 4 on Value Relevance of Total Assets : The Sixth Hypothesis (Hypothesis 6A and Hypothesis 6B, respectively).

This study investigates the effects of year 1999 changes in the accounting standards (TAS No. 32-40) and the adoption of TAS interpretation No. 4 on value relevance of total assets in term of their relations between the stock's prices and total assets in balance sheet. The following model is used to test the effects of changes in accounting standards and the adoption of accounting standard interpretations on value relevance of total assets:

$$P_{it}/P_{it-1} = \beta_0^5 + \beta_1^5 T_1 + \beta_2^5 T_2 + \beta_3^5 (TA_{it}/P_{it-1}) + \beta_4^5 (TL_{it}/P_{it-1}) + \beta_5^5 T_1(TA_{it}/P_{it-1}) \\ + \beta_6^5 T_1(TL_{it}/P_{it-1}) + \beta_7^5 T_2(TA_{it}/P_{it-1}) + \beta_8^5 T_2(TL_{it}/P_{it-1}) + \epsilon_{it} \quad (5)$$

P_{it} = stock's price of firm i at the end of quarter t,

P_{it-1} = stock's price of firm i at the beginning of quarter t,

T_1 = 1 if the firm-quarters' total assets (total liabilities) are total assets (total liabilities) after changes in accounting standards, 0 otherwise,

T_2 = 1 if the firm-quarters' total assets (total liabilities) are affected by the adoption of TAS interpretation No. 4, 0 otherwise,

TA_{it} = firm i's total assets per share at the end of quarter t,

TL_{it} = firm i's total liabilities per share at the end of quarter t, and

ϵ_{it} = error term.

As discussed in Chapter 3, it is predicted that the coefficient , β_5^5 which is the interaction term between the dummy variable (based on the adoption of TAS No. 32-40) and total assets, will be positively significant. In addition, the sign and significance of coefficient of interaction term between dummy variable (based on adoption of TAS interpretation No. 4) on total assets (β_7^5) is also predicted to be positive and significant.

Data Analyses for Model (5) and Hypotheses Testing

The regression model (5) runs the pooled data of all firm-quarters sample. The dummy variable (T_1) is used the same as model (1) to partition the total assets and total liabilities into before and after the changes in accounting standards (TAS No. 32-40). The dummy variable (T_2) used to partition the firms-quarters on whether they are affected by the adoption of TAS interpretation No. 4. The study will examine the sign and significance of the coefficient on total assets (β_3^5) and those of the coefficient on total liabilities (β_4^5) (although they are not set as the hypotheses). If they are significant, it can conclude that total assets and total liabilities are value relevant information. Furthermore, the β_5^5 coefficients and β_7^5 , which are the interaction terms between the dummy variables (T_1, T_2) and total assets will be examined. If the coefficient β_5^5 is positively significant as the prediction, it can be concluded that value relevance of total assets increases due to the effects of the changes in accounting standards (TAS No. 32-40). If the coefficient β_7^5 is positive and significant as the prediction, value relevance of total assets increases due to the adoption of TAS interpretation No. 4.

The test of sign and significance of coefficient β_5^5 and β_7^5 will be set the statistical hypotheses as follows.

For the effects of changes in accounting standards (Hypothesis 6A),

$$H_1: \beta_5^5 > 0.$$

For the adoption of TAS interpretation No. 4 (Hypothesis 6B),

$$H_1: \beta_7^5 > 0.$$

Both coefficient β_5^5 and β_7^5 are predicted to be positive, so the alternative hypotheses are one-sided hypotheses. One tail t-test is used for the hypotheses testing.

4.4.2.6 The Effects of Year 1999 Changes in Accounting Standards on Value Relevance of Property, Plant and Equipment: The Seventh Hypothesis (Hypothesis 7A)

The model used to test the changes in accounting standards on value relevance of property, plant and equipment is as follows.

$$P_{it}/P_{it-1} = \beta_0^6 + \beta_1^6 T_1 + \beta_2^6 (PPE_{it}/P_{it-1}) + \beta_3^6 (BVP_{it}/P_{it-1}) + \beta_4^6 T_1 (PPE_{it}/P_{it-1}) + \beta_5^6 T_1 (BVP_{it}/P_{it-1}) + \epsilon_{it} \quad (6)$$

P_{it} = stock's price of firm i at the end of quarter t,

P_{it-1} = stock's price of firm i at the beginning of quarter t,

T_1 = 1 if firms-quarters' PPE are PPE after the changes in accounting standards, 0 otherwise,

PPE_{it} = firm i's net property, plant and equipment per share at the end of quarter t,

BVP_{it} = firm i's book value of equity per share after subtracting the amount of property, plant and equipment at the end of quarter t, and

ϵ_{it} = error term.

As stated in the section of research hypotheses, the coefficient of interaction term between dummy variable and property, plant and equipment (β_4^6) is predicted to be positive and significant.

Data Analyses for Model (6) and Hypotheses Testing

The estimation of regression of model (6) runs the pooled data of all firm-quarters the same as model (5). The study examines the sign and significance of the coefficient of PPE (β_2^6) (although it is not set as research hypothesis). If it is significant, PPE is value relevant information. The sign and significance of the coefficient of interaction term the dummy variable and PPE (β_4^6) will be investigated. As stated in research hypothesis, it is predicted that the coefficient β_4^6 is positive. That is, the value relevance of property, plant and

equipment increases due to the effects of the adoption of TAS No. 32 or TAS No. 36. It can be set as the statistical hypothesis (Hypothesis 7A) as follows.

$$H_1: \beta_4^6 > 0.$$

Under the alternative hypothesis, it is set as the prediction discussed in Chapter three. The test of this hypothesis is the one tail t-test.

4.4.2.7 Value Relevance of Revaluation Surplus Amount of Property, Plant and Equipment (PPE) and Value Relevance of Allowance for Impairment of PPE: The Seventh Hypothesis (Hypothesis 7B and Hypothesis 7C, respectively)

Model (7) is used to investigate whether the cost amount and revaluation surplus of PPE under old accounting standards' requirements are value relevant information. Model (8) is used to examine whether the cost amount, revaluation surplus, and the allowance for impairment of PPE under TAS No. 32 and No. 36 are value relevant information.

$$P_{it}/P_{it-1} = \beta_0^7 + \beta_1^7 (BVP_{it}/P_{it-1}) + \beta_2^7 (PPEC_{it}/P_{it-1}) + \beta_3^7 (PPER_{it}/P_{it-1}) + \epsilon_{it} \quad (7)$$

$$P_{it}/P_{it-1} = \beta_0^8 + \beta_1^8 (BVP_{it}/P_{it-1}) + \beta_2^8 (PPEC_{it}/P_{it-1}) + \beta_3^8 (PPER_{it}/P_{it-1}) + \beta_4^8 (PPEI_{it}/P_{it-1}) + \epsilon_{it} \quad (8)$$

P_{it} = stock's price of firm i at the end of quarter t,

P_{it-1} = stock's price of firm i at the beginning of quarter t,

BVP_{it} = firm i's book value of equity per share after subtracting the amount of property, plant and equipment at the end of quarter t,

$PPEC_{it}$ = firm i's cost amount of property, plant and equipment per share at the end of quarter t,

$PPER_{it}$ = firm i's amount of revaluation surplus of property, plant, and equipment per share at the end of quarter t,

$PPEI_{it}$ = firm i's amount of allowance for impairment of property, plant, and equipment per share at the end of quarter t, and

ϵ_{it} = error term.

As prediction in the research hypotheses, the coefficient of revaluation surplus amount of PPE (β_3^8) in model (8) is expected to be positively significant. The coefficient of allowance for impairment of PPE (β_4^8) in model (8) is expected to be negatively significant. Thus, both revaluation surplus and allowance for impairment of assets are expected to be value relevant information.

Data Analyses for Model (7) and Model (8) and Hypotheses Testing

The data using in the regression model (7) is the data of firm-quarters before the changes in accounting standards. For model (8), the data of firm-quarters after the changes in accounting standards are used. The signs and significance of coefficients on cost amount (β_2^7) and revaluation surplus amount (β_3^7) in model (7) are examined. The signs and significance of coefficients on cost amount (β_2^8), revaluation surplus amount (β_3^8), and allowance for impairment of PPE (β_4^8) in model (8) are investigated.

The coefficients in model (7) are not set as hypotheses in Chapter 3. Model (7) is run together with model (8) because it can help us find the reasons of changes in value relevance of PPE. That is, value relevance of PPE changes because of the revaluation surplus amount or allowance for impairment of PPE.

The hypotheses in Chapter 3 focus on value relevance of revaluation surplus and the allowance for impairment of PPE under new accounting standard, the statistical hypotheses in model (8) are set as follows.

For the revaluation surplus amount (Hypothesis 7B),

$$H_1: \beta_3^8 > 0.$$

For the allowance for impairment amount (Hypothesis 7C),

$$H_1: \beta_4^8 < 0.$$

Under the alternative hypotheses, they are set as the one-sided hypotheses. The signs and significance of coefficients of revaluation surplus amount (β_3^8) and allowance for impairment amount of PPE (β_4^8) are test by the one tail t-test.

4.4.2.8 The Effects of Year 1999 Changes in Accounting Standards on Value Relevance of Investment in Securities: The Eighth Hypothesis (Hypothesis 8A)

The following model is used to test the effects of the adoption of TAS No. 40 on value relevance of investment in securities.

$$P_{it}/P_{it-1} = \beta_0^9 + \beta_1^9 T_1 + \beta_2^9 (INV_{it}/P_{it-1}) + \beta_3^9 (BVI_{it}/P_{it-1}) + \beta_4^9 T_1 (INV_{it}/P_{it-1}) + \beta_5^9 T_1 (BVI_{it}/P_{it-1}) + \epsilon_{it} \quad (9)$$

P_{it} = stock's price of firm i at the end of quarter t,

P_{it-1} = stock's price of firm i at the beginning of quarter t,

T_1 = 1 if firms-quarters' investment in securities are investments in securities after the changes in accounting standards, 0 otherwise,

INV_{it} = firm i's total investment in securities per share at the end of quarter t,

BVI_{it} = firm i's book value of equity per share after subtracting the value of investment in securities at the end of quarter t, and

ϵ_{it} = error term.

As stated in the section of research hypotheses, the coefficient of interaction term between dummy variable and investment in securities (β_4^9) is expected to be positive and significant.

Data Analyses for Model (9) and Hypotheses Testing

The estimation of regression of model (9) runs the pooled data of all firms-quarters sample. The study examines the sign and significance of the coefficient on investment in securities (β_2^9), although it is not set as the hypothesis. If it is significant, it can be concluded that investment in securities is value relevant information.

The coefficient of interaction term between dummy variable and investment in securities (β_4^9) will be used to test whether the changes in accounting standards affect value relevance of investment in securities. If it is positive and significant as the prediction, value relevance of investment in securities will increase due to the effects of the adoption of TAS No. 40.

It can set the statistical hypothesis (8A) as follows.

$$H_1: \beta_4^9 > 0.$$

Under the alternative hypothesis, the coefficient β_4^9 is expected in to be positive sign. The test of significance of β_4^9 is the one tail t-test.

4.4.2.9 Value Relevance of the Investment in Securities Partitioned by the Types of Investment in Securities: The Eighth Hypothesis (Hypothesis 8B and Hypothesis 8C)

Model (10) is used to investigate the value relevance of investment in securities partitioned by types under the old accounting standards' requirements (TAS No. 12 and No. 17). Model (11) is used to investigate the value relevance of investment in securities partitioned by types under new accounting standard's requirement (TAS No. 40).

$$P_{it}/P_{it-1} = \beta_0^{10} + \beta_1^{10} (BVI_{it}/P_{it-1}) + \beta_2^{10} (STMS_{it}/P_{it-1}) + \beta_3^{10} (LTMS_{it}/P_{it-1}) + \beta_4^{10} (LTRINV_{it}/P_{it-1}) + \beta_5^{10} (LTOINV_{it}/P_{it-1}) + \epsilon_{it} \quad (10)$$

$$P_{it}/P_{it-1} = \beta_0^{11} + \beta_1^{11} (BVI_{it}/P_{it-1}) + \beta_2^{11} (TRD_{it}/P_{it-1}) + \beta_3^{11} (AFS_{it}/P_{it-1}) + \beta_4^{11} (LTRINV_{it}/P_{it-1}) + \beta_5^{11} (LTOINV_{it}/P_{it-1}) + \beta_6^{11} (HTM_{it}/P_{it-1}) + \epsilon_{it} \quad (11)$$

P_{it} = stock's price of firm i at the end of quarter t,

P_{it-1} = stock's price of firm i at the beginning of quarter t,

BVI_{it} = firm i's book value of equity per share after subtracting the value of investment in securities at the end of quarter t, and

$STMS_{it}$ = firm i's short-term marketable investment in securities per share at the end of quarter t (stated at LCM),

$LTMS_{it}$ = firm i's long-term marketable securities per share at the end of quarter t (stated at LCM),

$LTRINV_{it}$ = firm i's long-term investment in subsidiary or associated company per share at the end of quarter t (under the equity method),

- LTOINV_{it} = firm i's other investment or general investment per share at the end of quarter t (stated at cost),
- TRD_{it} = firm i's trading securities per share at the end of quarter t (stated at fair value),
- AFS_{it} = firm i's available-for-sales securities per share at the end of quarter t (stated at fair value),
- HTM_{it} = firm i's held-to-maturity debt securities per share at the end of quarter t (stated at amortized cost), and
- ε_{it} = error term.

As prediction in the research hypotheses, the coefficients of the trading securities (β_2^{11}) and available-for-sale securities (β_3^{11}) of model (11), which are stated at fair values are expected be positively significant.

Data Analyses for Model (10) and Model (11) and Hypotheses

Testing

The data using in the regression model (10) is the data of firm-quarters before the changes in accounting standards. Data of firm-quarters after the changes in accounting standards will be used in the regression of model (11). The signs and significance of coefficients of short-term marketable securities (β_2^{10}), long-term marketable securities (β_3^{10}), investment in associated company (β_4^{10}), and other investment (β_5^{10}) in model (10) are considered. The signs and significance of coefficients of trading securities (β_2^{11}), available-for-sales securities (β_3^{11}), investment in associated company (β_4^{11}), general investment (β_5^{11}), and held-to-maturity debt securities (β_6^{11}) in model (11) are also investigated.

The coefficients of each type of investments in model (10) are not set as research hypotheses in Chapter 3. Model (10) is run together with model (11) because it helps us examine the value relevance of each type of investments in securities before and after the changes in accounting standards.

The research hypotheses in Chapter 3 focus on the value relevance of fair values of investments in securities especially of trading securities and available-for-sales

securities under the new accounting standard's requirement. It is the test whether the trading securities (β_2^{11}) and available-for-sales securities (β_3^{11}) are positively related with quarterly period return in model (11). They can be set as the statistical hypotheses as follows.

For trading securities (Hypothesis 8B),

$$H_1: \beta_2^{11} > 0.$$

For available-for-sales securities (Hypothesis 8C),

$$H_1: \beta_3^{11} > 0.$$

Under the alternative hypotheses, the test of sign and significance of β_2^{11} and β_3^{11} in model (11) are the one tail t-test.

4.4.2.10 The Effects of the Adoption of Accounting Standard

Interpretation No.4 on Value Relevance of Other Assets: The Ninth Hypothesis

In this section, the following model is used to investigate whether the value relevance of other assets changes after the adoption of TAS interpretation No. 4.

$$P_{it}/P_{it-1} = \beta_0^{12} + \beta_1^{12} T_2 + \beta_2^{12} (OTHA_{it}/P_{it-1}) + \beta_3^{12} (BVO_{it}/P_{it-1}) + \beta_4^{12} T_2(OTHA_{it}/P_{it-1}) + \beta_5^{12} T_2(BVO_{it}/P_{it-1}) + \epsilon_{it} \quad (12)$$

P_{it} = stock's price of firm i at the end of quarter t,

P_{it-1} = stock's price of firm i at the beginning of quarter t,

T_2 = 1 if the firm-quarters' other assets are affected by the adoption of TAS interpretation No. 4, 0 otherwise,

$OTHA_{it}$ = firm i's other assets per share at the end of quarter t,

BVO_{it} = firm i's book value of equity per share after subtracting the book book value of other assets at the end of quarter t, and

ϵ_{it} = error term.

As stated in the section of research hypotheses, the coefficient of interaction term between dummy variable and other assets (β_4^{12}) is expected to be positive.

Data Analyses for Model (12) and Hypotheses Testing

Model (12) runs the pooled data of all firm-quarters sample. Because TAS interpretation No. 4 becomes operative for financial statements ending on or after 31 December 1999, no firm adopts this interpretation in the first, second, and third quarter of year 1999. So the dummy variable (T_2) divides the firm-quarters into before and after the adoption of this interpretation based on the quarter which firms firstly adopt this interpretation. Although the coefficient of other assets (β_2^{12}) is not set as the research hypothesis, the significance of coefficient β_2^{12} will also be examined. If it is positively significant, the other assets is value relevant information.

For the hypothesis on the effect of the adoption of TAS interpretation No. 4 on value relevance of other assets, it is predicted that the coefficient of interaction term between dummy variable and other assets (β_4^{12}) is positive and significant. That is, value relevance of other assets increases due to the adoption of TAS interpretation No. 4.

As discussed in Chapter 3, the statistical hypothesis can be set as follows.

$$H_1: \beta_4^{12} > 0.$$

Under alternative hypothesis, the coefficient β_4^{12} is expected to be positive sign. The test of significance of β_4^{12} is the one-tail t-test.

4.5 The Measurement and Definition of Variables

The measurement of and definition of variables discussed in this section is divided into two parts: dependent variables and independent variables.

4.5.1 Dependent Variables

As stated in the model (1)-(3), the dependent variable is actual return for the quarterly reporting period. Quarterly period returns are measured by the continuously compounded daily returns, beginning after a day of the prior quarterly's earnings announcement and ending on the date of the current quarterly's earnings announcement. Daily returns are extracted from Data Stream in form of Return Index (RI). Return Index (RI) shows a theoretical growth in value of a shareholding over a specified period assuming that dividends are reinvested

to purchase additional units of an equity or unit trust at the closing price applicable on the ex-dividend date.

From 1988 onwards (1973 for U.S. and Canadian Stocks), the availability of detailed dividend payments enable a more realistic method to be used in which the discrete quantity of dividend paid is added to price on the ex-ante of payment.

$$\text{Then, } RI_t = RI_{t-1} * (P_t/P_{t-1})$$

Except, when $t = \text{ex-ante of dividend payment } D_t$ then:

$$RI_t = RI_{t-1} * (P_t + D_t / P_{t-1}) \quad (1)$$

P_t = price on ex-ante dividend,

P_{t-1} = price on previous day, and

D_t = dividend payment associated with ex-date t .

Gross dividend is used when available and the calculation ignored tax and reinvested charge.

Return Index (RI) for new issued will initially based on anticipated annualized dividend until data on the first actual dividend payment becomes available. At this point, the RI is calculated back to base date.

Return Index (RI) can be derived to daily return with cash dividend reinvestment [DRETWD (t)] as follows.

$$RI_t = RI_{t-1} * (P_t + D_t / P_{t-1}) \quad (1)$$

$$\text{Then, } RI_t / RI_{t-1} = P_t + D_t / P_{t-1}$$

Take -1 plus the two sides of equations,

$$(RI_t / RI_{t-1}) - 1 = (P_t + D_t / P_{t-1}) - 1$$

$$(RI_t - RI_{t-1}) / RI_{t-1} = (P_t + D_t - P_{t-1}) / P_{t-1}$$

$$(RI_t - RI_{t-1}) / RI_{t-1} = \text{DRETWD (t)} \quad (2)$$

Thus, the daily returns with cash dividend reinvest are computed from the return index on day t minus the return index on day $t-1$ deflated with return index on day $t-1$.

Quarterly Period Returns (R_{it})

Quarterly period returns are computed by accumulating the daily returns from a day after the prior quarterly's earnings announcement through the day of current quarterly's earnings announcement as presented in the following formula.

$$R_{it} = \prod_t^T [1 + DRETWD(t)] - 1$$

Where t = a day after the prior quarterly's earnings announcement, and

T = the day of current quarterly's earnings announcement.

In addition, the difference of future and current quarterly earnings ($E_{it+1} - E_{it}$) is the dependent variable in model (4).

The dependent variable in model (5)-(12) is closing price (P_{it}) at the date, which the listed companies sent their financial statements to the Stock Exchange of Thailand. This variable is also deflated with the stock's price at the beginning of quarter t (P_{it-1}).

4.5.2 Independent Variables

The main independent variable in the model (1)-(4) is earnings (E_{it}). Earnings are earnings before any other extraordinary items except gain on troubled debt restructurings (if any). Earnings (E_{it}) in models are measured as follows.

$$E_{it} = \text{earnings before extraordinary items} + \text{gain on TDR (if any)}$$

The other independent variables are adjusted earnings ($EADJ_{it}$) and new accounting items in income statement. $EADJ_{it}$ is adjusted earnings or earnings exclude the new accounting items that can be calculated in the following formula:

$$\begin{aligned} EADJ_{it} = & E_{it} - \text{gain on TDR} + \text{loss on TDR} \\ & - \text{reversal of impairment loss for PPE} + \text{impairment loss of PPE} \\ & - \text{reversal of impairment loss for investment in securities} \\ & + \text{impairment loss of investment in securities} \\ & - \text{unrealized gain on trading securities} \\ & + \text{unrealized loss on trading securities} \end{aligned}$$

The new accounting items are gain on troubled debt restructuring ($GTDR_{it}$), loss on troubled debt restructuring ($LTDR_{it}$), impairment loss (reversal of impairment loss) of property, plant and equipment ($IMPPE_{it}$), impairment loss (reversal of impairment loss) of investment in securities ($IMINV_{it}$), and unrealized gain/loss on trading securities ($TRADE_{it}$).

Earnings, adjusted earnings, and new accounting items are per share basis (divided by the weighted average outstanding shares). These accounting items are deflated with the stock's price at the beginning period of quarter t (P_{it-1}) to reduce the heteroscedasticity problems (see APPENDIX D).

The other independent variables are the dummy variable (T) used to divide the firm- quarters' earnings into earnings before and after the changes the accounting standards.

The other dummy variables (D) are used to partition the firm-quarters into firm-quarters with and without each of new accounting items. The dummy variables (T and D) are defined according to models' quotations.

The measurements of variables in the balance sheets (model 5-12) are divided to the variables that can be extracted directly from the balance sheets and notes to financial statements and cannot be extracted directly from the balance sheets (manually calculated).

The variables that can be extracted directly from the balance sheets and notes to financial statements are total assets (TA_{it}), total liabilities (TL_{it}), net of property, plant and equipment (PPE_{it}), total investments in securities (INV_{it}), and other assets ($OTHA_{it}$).

Net of Property, plant and equipment (PPE_{it}) composes of property, plant and equipment stated at cost ($PPEC_{it}$), the revaluation surplus amount ($PPER_{it}$, if any) and the allowance for impairment amount of PPE ($PPEI_{it}$, if any).

The classification of types for investment in securities under the new accounting standards is different from old accounting standard's requirement. Under old accounting standards, investments in securities (INV_{it}) composes of short-term marketable securities ($STMS_{it}$), long-term marketable securities ($LTMS_{it}$), investment in subsidiary and associated company ($LTRINV_{it}$) under the equity method, and other investment ($LTOINV_{it}$).

After the changes in accounting standards, investment in securities (INV_{it}) composes of trading securities (TRD_{it}), available-for-sales securities (AFS_{it}), investment in subsidiaries and associated companies ($LTRINV_{it}$) under the equity method, other investment or general investment ($LTOINV_{it}$), and held-to-maturity debt securities (HTM_{it}).

Moreover, there are variables that cannot be extracted directly from the balance sheets. These variables (BVP_{it} , BVI_{it} , BVO_{it}) can be measured by the following equations.

$$\begin{aligned} BVP_{it} &= \text{Book value of equity - Net of Property, Plant and Equipment} \\ &= \text{Total Assets} - \text{Total Liabilities} - \text{Net of Property, Plant and Equipment} \end{aligned}$$

$$\begin{aligned} BVI_{it} &= \text{Book value of equity} - \text{Total Investment in Securities} \\ &= \text{Total Assets} - \text{Total Liabilities} - \text{Total Investment in Securities} \end{aligned}$$

$$\begin{aligned} BVO_{it} &= \text{Book value of equity} - \text{Other Assets} \\ &= \text{Total Assets} - \text{Total Liabilities} - \text{Other Assets} \end{aligned}$$

All independent variables from balance sheets are in the form of per share basis (divided by the outstanding shares at the end of quarter). These variables are deflated with the stock's price at the beginning period (P_{it-1}) to reduce the heteroscedasticity problems (see APPENDIX D).

The other independent variables are the dummy variable (T_1 and T_2).

Dummy variable (T_1) is used to divide the firm-quarters into firm-quarters before and after the changes the accounting standards (TAS No. 32-40), which are defined according to the models' quotations. Dummy variable (T_2) is used to divide the firm-quarters into firm-quarters affected and not affected by the adoption of TAS interpretation No. 4.