金融危機期間公允價值會計資訊之價值攸關性

The Value Relevance of Fair Value Accounting Information during Financial Crisis

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摘要：本文主要目的是檢測企業在金融危機期間，其公允價值會計資訊是否仍具價值攸關性。研究期間為 2000-2008 年，以台灣上市櫃公司為樣本，共 497 家。本研究採 Ohlson (1995) 之會計基礎評價模式為實證的基礎。實證結果顯示，公允價值會計實施後，以公允價值評價之資產負債提供了較歷史成本更攸關之資訊，使得會計資訊對股價的解釋能力增加，且當權益帳面價值資訊的攸關性提高時，盈餘的價值攸關性則顯著下降。然在考慮金融危機因素後，以公允價值評價之會計資訊攸關性發生變化。這樣的結果也意味著在金融危機情況下，投資人在進行投資決策時，對財務報表會計資訊之知覺會產生結構性的改變。本研究亦同時觀察非危機期間的會計資訊的攸關性。綜言之，公允價值會計提高了會計資訊之攸關性。基此，若能更允當的衡量資產負債之公允價值，將有助於對企業真實價值之評估，使會計資訊價值提升；為達成此一目的，準則制定機構應提供更明確的規範，對財務報表編製者進行適當的指導，並建立更健全的評價制度，使其提供財務報表使用者更適當的資訊，並提升投資者對公允價值衡量之會計資訊的信心。

關鍵詞：金融危機；公允價值會計；價值攸關性；會計基礎評價模式

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Abstract: The main purpose of this study is to examine if fair value accounting information remains relevant in the event of a financial crisis. The research period ranges between 2000 and 2008. We use data from 497 listed firms in Taiwan. We will use Ohlson's (1995) accounting-based valuation model. Results indicate that after implementation of fair value accounting, accounting information reported by fair values becomes more value relevant than accounting information reported by historical costs, and such fair value accounting information also has higher explanatory power for stock prices. In addition, as the book value of equity becomes more relevant to the market value, the value relevance of earnings will significantly decline. However, when the effect of financial crisis is considered, the value relevance of accounting information reported by fair values becomes different. This finding also implies that there will be a structural change in the investors' perception of accounting information in the event of a financial crisis. In this study, the value relevance of accounting information during non-crisis periods is also observed. In general, fair value accounting contributes to higher value relevance of accounting information. Therefore, if the fair value of firm assets and liabilities are properly and objectively determined, the firm valuation result can be more accurate, and accounting information will also become more relevant. To this end, the authority responsible for development of accounting standards should offer more guidelines to compilers of financial statements and build a better valuation system that can generate more relevant information to users of financial statements.

Keywords: Financial crisis; Fair value accounting; Value relevance; Accounting-based valuation model

1. Introduction

Major changes in accounting standards have occurred in recent years, and the change from historical cost accounting to fair value accounting is said to be the most influential. Some people see this change as the cause of the 2007 financial crisis, the biggest global financial crisis since 1929. According to many

opponents of fair value accounting, fair value accounting contributed to this financial crisis and is one of the main factors that have exacerbated the crisis for financial institutions in the U.S. and around the world (Laux and Leuz, 2009). Is fair value accounting really the main cause of the global financial crisis starting in 2007?

In fact, fair value accounting was proposed to improve the low value relevance of historical cost information (Brown, Lo and Lys, 1999; Lo and Lys, 2001; Lee and Wang, 2003). Recent studies on fair value accounting (e.g. Barth, Beaver and Landsman, 1996; Rees, Gill and Gore, 1996; Khurana and Kim, 2003; Minnick, 2004; Yeh and Wang, 2009) all support the value relevance of information reported by fair values. In a nutshell, the goal of fair value accounting is to enhance the value relevance of accounting information.

However, the extant research (e.g. Ryan, 2008; Young, Miller and Flegm, 2008) has its focus more concentrated either on the causes and outcomes of a financial crisis or on the role of fair value in the crisis. The relevance of fair value accounting information on financial statements during a crisis is seldom empirically examined. Hence, this study is driven to find out whether there will be changes in the content of fair value accounting information in the event of a financial crisis.

Prior research has shared mixed views on how to measure the value relevance of accounting information. For example, Scott (2009) argues that fair value measures are better than historical cost measures. Using fair value measures, the value relevance of information reported on balance sheet will be higher, but that of information shown on income statement will be lower. Black and White (2003) also point out that the value relevance of earnings and book value of equity varies depending on economic development, accounting standards, industry, and firm financial conditions. Lo and Lys (2001) mention that value relevance can be measured by whether the financial statement offers information that maps onto market values. They suggest that the study of value relevance of accounting numbers is to examine the association between market values and accounting summary measures (e.g. earnings and book values). Among the value accounting numbers, earnings can be seen as an indicator of the dynamic result of a firm's

operations over a specific period of time, whereas equity value refers to the static value of a firm at a specific time. In this study, we will use Ohlson's (1995) valuation model to analyze earnings and book value of equity data reported on financial statements and further examine if value relevance of these accounting information items varies across periods.

Our empirical results indicate that after implementation of fair value accounting, accounting information reported by fair values becomes more value relevant than reported by historical costs, and such fair value accounting information also has higher explanatory power for stock prices. Besides, with the increase in the relevance of book value of equity, the value relevance of earnings will significantly decline. However, when the effect of financial crisis is considered, the value relevance of accounting information reported by fair values becomes different. The above findings imply that investors may have a structural change in their perception of accounting information on financial statements in the event of a financial crisis. Results of this paper can contribute to the literature on value relevance of financial reports during crisis periods.

The remainder of this paper is organized as follows: Section 2 reviews literature and presents hypotheses. Section 3 describes sampling selection, variable measurement, and empirical validation method of this research. Section 4 presents and analyzes the results. Section 5 draws conclusions and discusses the limitations of this research.

2. Literature and Hypothesis

2.1 Value Relevance

It has been documented in previous research of relevance of financial statements (e.g. Brown, Lo and Lys, 1999; Lo and Lys, 2001; Lee and Wang, 2003) that financial statements prepared based on historical costs are losing their value relevance. In contrast, financial reports where assets and liabilities are measured by fair values offer more comprehensive knowledge of a firm's

financial conditions and management outcomes, as they can better reflect variations in the firm's assets and liabilities as well as the use and maintenance of resources within the firm. Therefore, compared to historical costs, fair values can provide more transparent, instant, and relevant information and also improve the information value of financial reports.

Prior studies of fair value accounting, including Barth, Beaver and Landsman (1996), Khurana and Kim (2003), and Landsman (2007) have concluded that financial instruments that are valued at fair values are more relevant than they are at historical costs. Rees, Gill and Gore (1996) mention that firms will use asset write-downs to issue value relevant signals to investors. Minnick (2004) also point out that asset write-downs can increase the transparency of earnings information. Yen and Yen (2002) find that measurement of intangible assets can increase the relevance of stock valuation, creating a significant improvement in the association between accounting information and stock prices. Yeh and Wang (2009) propose that employee stock-based compensation is more value relevant when recognized by market values. According to Penman (2007), when using fair value accounting, stakeholders can receive the most necessary data, including the values of assets and liabilities, equity value, and management behavior through balance sheets.

On the other hand, Scott (2009) suggests that under ideal conditions, the current value model can provide the most relevant information to users of financial statements. As the ideal conditions do not exist in the real world, there may be tradeoffs between relevance and reliability in preparation of financial reports based on this current value approach. However, Scott (2009) contends that fair values are much closer to ideal conditions compared to historical costs. Since fair values provide a more ideal foundation for valuation, if fair values are used, financial statements will have higher relevance, but income statements will have less information content. Besides, it has been confirmed in previous research that a decrease in investor reliance on one accounting number (either earnings or book value of equity) will result in an increase in the relevance of the other accounting number. That is to say, there is a tradeoff between the relevance of earnings and the relevance of book value of equity (Burgstahler and Dichev, 1997; Collins,

Maydew and Weiss, 1997; Francis and Schipper, 1999). Later studies (e.g. Black and White, 2003) also find that the value relevance of earnings and book value of equity varies with economic changes and depending on the accounting system, industry, and firm financial status. From the above literature, we infer that valuation of assets and liabilities at fair values produces information of higher relevance, which in turn can lead to an increase in the information value of financial statements but an decrease in that of earnings information. Thus, we propose the following hypotheses:

> H_1: **The value relevance of book value of equity and earnings information differs before and after the implementation of fair value accounting.**

> H_{1a}: **The value relevance of book value of equity information is higher after the implementation of fair value accounting.**

> H_{1b}: **The value relevance of earnings information is lower after the implementation of fair value accounting.**

2.2 Financial Crisis

In this study, the financial crisis refers to the liquidity crisis triggered by the subprime mortgage crisis that began in the U.S. in July 2007[2]. Due to a serious decline in housing prices and financial institutions' continuous leverage reduction as a response, many financial derivatives suffered a sudden price slide, thereby causing financial problems for many large financial institutions in the U.S. and European nations. This financial crisis is also called the "Subprime Crisis".

In the wake of the 2007 financial crisis, many researchers (e.g. Ryan, 2008; Young, Miller and Flegm, 2008) attempted to investigate the causes and outcomes of this crisis as well as the role of fair values in the crisis. Ryan (2008) mentions that the crisis resulted from bad operating, investing and financial decisions or

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[2] According to R. W. Goldsmith, a financial crisis is "a sharp, brief, ultracyclical deterioration of all or most of a group of financial indicators-short-term interest rates, asset (stock, real estate, land) prices, commercial insolvencies, and failures of financial institutions". In this study, the financial crisis refers to the global financial crisis of 2007-2008.

poor risk management of firms, investors, and house-owners, high uncertainty of subprime derivatives, and information asymmetry. Young, Miller and Flegm (2008) argue that fair value accounting did not create the crisis but mitigated the impact of the crisis. They suggest that fair value accounting helped provide more transparent and relatively rational information during the financial crisis, allowing market participants to lessen the impact of the crisis on them by re-adjusting their measurement of risks and valuation of assets and liabilities upon changes of economic conditions.

Khurana and Kim (2003) note that fair values are more value relevant when objective market-determined fair value measures are available. In contrast, in the event of a financial crisis in the free investment market, market liquidity will plummet, making market prices less objective (Chen, 2009). In other words, fair values become less relevant if they are not objectively determined by the market. Besides, in a less active market, fair values must be measured using valuation models or by experts. This valuation method may raise investors' concern of the objectiveness of accounting information, further affecting how they perceive the information value of book value of equity reported on financial statements. Given that there is a tradeoff between earnings and book value, if book values become less relevant, investors will turn to earnings information, causing an increase in the value relevance of earnings.

The capital market in Taiwan mainly consists of independent investors. Most independent investors do not have as much investment knowledge as professional managers employed by institutional investors, and their accounting knowledge is also relatively limited. As they tend to make investment decisions based on information on income statements, the explanatory power of earnings may be higher for them. However, their sense of threats from the financial crisis may make them more sensitive to fluctuations in earnings.

Based on the above literature, we infer that in the event of a financial crisis, investors will have different perceptions of the value of accounting information, and such change in perceptions may further affect the relevance of the accounting information. Thus, we propose:

> ***H₂: The value relevance of book value of equity and earnings information differs between crisis and non-crisis periods after the implementation of fair value accounting.***

3. Methodology

3.1 Sample Selection and Data Source

The sample firms for this study are publicly listed firms in Taiwan, excluding firms in the financial, insurance, and stock exchange industries[3], firms whose data are not reported by calendar year[4], firms not listed before Jan 1, 2000[5], and firms with missing data required for this research. Data were obtained from *Taiwan Economic Journal (TEJ)*. After the sample selection process, the final sample consisted of 497 firms. The research period ranges between 2000 and 2008.

As this study involves examination of differences in accounting information between periods, we divide the research period by the date of implementation of Taiwan's Generally Accepted Accounting Principles (ROC GAAP) (not by date of pronouncement of any particular statement) into three sub-periods[6]: (1)

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[3] Due to special industrial characteristics, the financial, insurance, and securities industries have different accounting practices from general industries. Firms in these industries are excluded from the sample.

[4] In order to avoid compromise of research validity caused by inconsistent basis for comparison, we exclude three firms that do not report accounting information by calendar year. These firms are Mustek (June system), Quaker (July system before Dec 31, 2005), and Photronics (Oct system).

[5] Firms that were not listed before Jan 1, 2000 are excluded because they do not have stock price data needed for our empirical research.

[6] Since the 33rd statement of financial accounting standards titled "Accounting criteria for transfer of financial assets and extinguishments of liabilities" was pronounced, a series of statements regarding fair value measures had been issued. The 33rd statement applies to financial statements of fiscal year-end day before (including) Dec 31, 2004 (financial assets are still valued using the "cost or market whichever is lower method"). This valuation method is essentially fair value-based (Scott, 2009). Subsequent statements, such as the 34th statement titled "Accounting criteria for financial instruments" and the 36th statement titled "Expression and disclosure of financial instruments" apply to financial statements for periods starting Jan 1, 2006. The 35th statement titled "Accounting criteria for assets impairment" went into effect in

2000-2003 non-crisis period where historical cost accounting was adopted (hereafter referred to as T_1), (2) 2004-2006 non-crisis period where fair cost accounting was adopted (hereafter referred to as T_2), and (3) 2007-2008 financial crisis period where fair cost accounting was adopted (hereafter referred to as T_3). The value relevance of accounting information reported by the sample firms between these three periods will be compared.

3.2 Variable Measurement and Empirical Model

Peng (2005) points out that Ohlson's (1995) multi-period empirical model has higher explanatory power for stock price than Collins' model. In Ohlson's model, the anomaly of negative earnings does not exist, and book value of equity still plays an important role in the relationship between stock price and earnings. Besides, the research period is divided by the time of implementation of multiple ROC GAAP statements. Therefore, it is suitable to adopt Ohlson's (1995)[7] valuation model to examine the value relevance of accounting information shown on financial statements, including earnings and book value of equity. Considering the presence of scale effects, we analyze and compare data by value per share to mitigate the scale effects (Kothari and Zimmerman, 1995). First, we use Equation (1) to observe trends in the variation of accounting information and stock price.

$$P_{i,t} = b_0 + b_1 BV_{i,t-1} + b_2 EPS_{i,t-1} + \varepsilon_{i,t-1} \tag{1}$$

With Equation (1), we regress the sample data by year and by period to observe changes in each coefficient. Following Chen (2007), we also perform Chow test to examine presence of significant structural differences in relevance

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2005 and has undergone two revisions. The second revision applies to financial statements for periods starting Jan 1, 2007. Hence, we use the time of implementation of the 33rd statement as a basis differentiate between the period of historical cost accounting and the period of fair value accounting. Year 2004 is defined as the first year of adoption of fair value accounting.

[7] Ohlson (1995) evaluates firm value by current book value, abnormal earnings, and other information. Subsequent studies (e.g. Barth, Beaver and Landsman, 1998; Francis and Schipper, 1999) further use current earnings as a proxy for abnormal earnings to create a direct association between accounting information and firm value.

of accounting information between periods[8]. Through this process, we can test H_1 and H_2.

Later, we use Equation (2) to examine the effects of accounting information on stock price in each period. As our objective is to investigate if the effect of accounting information on stock price varies by accounting standards or economic cycle, we employ the method suggested by Riedl (2004) to examine differences in regression coefficients. The following equation are used to test H_{1a} and H_{1b}.

The following equations are used to test H_{1a} and H_{1b}.

$$P_{i,t} = Time_1\left(\alpha_0 + \alpha_1 BV_{i,t-1} + \alpha_2 EPS_{i,t-1}\right)$$
$$+ Time_2\left(\beta_0 + \beta_1 BV_{i,t-1} + \beta_2 EPS_{i,t-1}\right) + \varepsilon_{i,t-1} \qquad (2)$$

$$P_{i,t} = Time_2\left(\gamma_0 + \gamma_1 BV_{i,t-1} + \gamma_2 EPS_{i,t-1}\right)$$
$$+ Time_3\left(\delta_0 + \delta_1 BV_{i,t-1} + \delta_2 EPS_{i,t-1}\right) + \varepsilon_{i,t-1} \qquad (2)'$$

where the dependent variable is price per share (*P*). As suggested by Barth *et al.* (1998), we measure this variable by fiscal year-end closing price. Among the independent variables in this equation, book value of equity per share (*BV*) is calculated by book value of equity per common share at period *t*. According to Ohlson (1995), this variable is expected to be positive. Earnings per share (*EPS*) is calculated by earnings per common share at period *t*. When a firm has a high *EPS*, its investors will increase their confidence in the firm. This variable is also expected to be positive. In equation (2), $Time_1$ is a dummy variable, and $Time_1$ is one from 2000 to 2003; otherwise, $Time_1$ is zero. $Time_2$ is a dummy variable, and $Time_2$ is one from 2004 to 2006; otherwise, $Time_2$ is zero. $Time_3$ is a dummy

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[8] Chow test was introduced by the economist Gregory C. Chow. This test is intended to examine if there is any structural change in an observed variable over time. We also consider the scale effect and obtain no different result from Chow test.

variable, and *Time₃* is one from 2007 to 2008; otherwise, *Time₃* is zero. α and β were used to measure the relationship between EPS and book value of equity per share under different period. This equation allowed us to test the difference of coefficients across two different regimes (Riedl, 2004).

4. Empirical Results

4.1 Descriptive Statistics and Correlation Analysis

Table 1 shows the descriptive statistics. In terms of means, stock price per share *P* is 1.42, 1.51, 1.50, and 1.23 times of book value of equity per share *BV* in Panel A, B, C, and D respectively. These statistics indicate that book value of equity is significantly lower than firm value for all firms across all periods. The analysis of book value of equity per share and *EPS* after adoption of fair value accounting shows that the standard deviations of these two variables are larger in Panel D (crisis time) than in Panel C (non-crisis period). This suggests larger fluctuations of these two variables during the financial crisis, and these two variables differ between crisis period and non-crisis period.

We further perform Pearson's correlation coefficient analysis to examine the correlations between variables. As shown in Table 2, stock price per share *P,* book value of equity per share *BV,* and earning per share EPS are significantly and positively correlated, meaning that changes in accounting information are significantly reflected upon firm value. Besides, due to the implementation of historical cost measures (Panel B), the correlation between stock price per share and *EPS* is less than that between stock price per share and book value of equity per share (0.014 < 0.049). After implementation of fair value accounting (Panel C and D), the correlation between EPS and stock price per share is significantly higher than that between stock price per share and book value of equity per share (0.177 < 0.135; 0.472 < 0.412). It can be inferred that the implementation of fair value accounting indeed caused a change in the relation between accounting information and stock price.

Table1
Descriptive Statistics of Each Variable

Panel A - Descriptive Statistics for the Whole Period

Variable	Minimum	Maximum	Mean	Standard Deviation
P	0.520	2069.500	21.706	55.904
BV	0.180	226.650	15.285	7.697
EPS	-18.240	57.850	1.498	3.018

Panel B - Descriptive Statistics for the Non-crisis Period (Historical Cost Accounting)

Variable	Minimum	Maximum	Mean	Standard Deviation
P	0.520	2069.980	21.983	81.365
BV	0.400	61.130	14.551	5.468
EPS	-11.89	26.790	0.995	2.407

Panel C - Descriptive Statistics for the Non-crisis Period (Fair Cost Accounting)

Variable	Minimum	Maximum	Mean	Standard Deviation
P	1.410	1261.420	22.327	41.616
BV	0.180	226.650	14.848	8.116
EPS	-18.240	33.260	1.513	2.938

Panel D - Descriptive Statistics for the Crisis Period (Fair Cost Accounting)

Variable	Minimum	Maximum	Mean	Standard Deviation
P	0.830	513.120	20.561	30.160
BV	0.330	97.840	16.715	9.040
EPS	-10.780	57.850	2.063	3.605

Note: *P* is the closing price on balance sheet; *BV* denotes book value of equity per share; *EPS* stands for earnings per share. Panel A shows the descriptive statistics for the entire sample during 2000-2008; Panel B shows the descriptive statistics for the non-crisis period where historical cost accounting was used (2000-2003); Panel C shows the descriptive statistics for the non-crisis period where fair value accounting was used (2004-2006); Panel D shows the descriptive statistics for the crisis period where fair value accounting was used (2007-2008).

Table 2
Correlation Coefficients for Variables

Panel A - Correlation between Variables During the Entire Period			
Variable	*P*	*BV*	*EPS*
P	1.000		
BV	0.130 ***	1.000	
EPS	0.140 ***	0.716 ***	1.000

Panel B - Correlation between Variables During the Non-crisis Period (Historical Cost Accounting)			
Variable	*P*	*BV*	*EPS*
P	1.000		
BV	0.049***	1.000	
EPS	0.014	0.709***	1.000

Panel C - Correlation between Variables During the Non-crisis Period (Fair Value Accounting)			
Variable	*P*	*BV*	*EPS*
P	1.000		
BV	0.135 ***	1.000	
EPS	0.177 ***	0.622 ***	1.000

Panel D - Correlation between Variables During the Crisis Period (Fair Value Accounting)			
Variable	*P*	*BV*	*EPS*
P	1.000		
BV	0.412 ***	1.000	
EPS	0.472***	0.808 ***	1.000

Note: ** Indicates 5% level of significance; *** Indicates 1% level of significance

In addition, both book value of equity per share and *EPS* are more highly correlated with stock price per share during the crisis period than during the non-crisis period (0.412 > 0.135; 0.472 > 0.177), indicating that changes in accounting information have a higher association with stock price during the financial crisis. We also check collinearity using variance inflator factor (VIF). This factor ranges between 1.630-2.885. The fact that VIF is smaller than 10 indicates no collinearity.
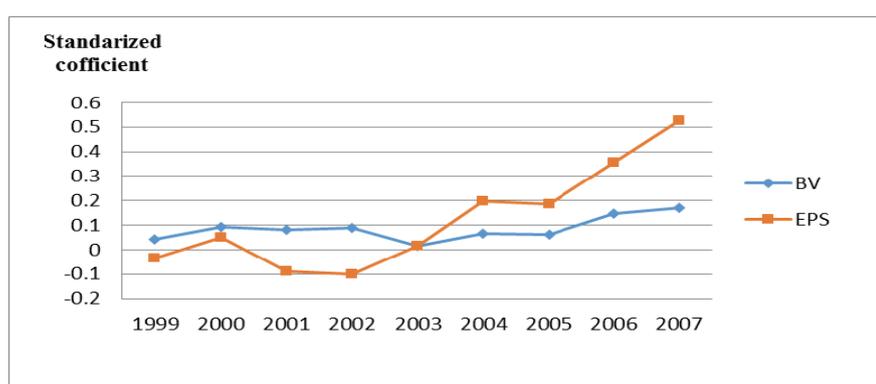
4.2 Regression Results

Model (1) is used to analyze the data by year. By observing the changes in each variable over the research period, we can have a preliminary judgment of how *EPS* and book value of equity per share are respectively relevant to stock price per share. We present the trends of standardized book value of equity per share and *EPS* by year from 1999 to 2007 in Figure 1 to show the relative importance of book value of equity per share and *EPS* for stock price per share.

As shown in Figure 1, the trend lines of book value of equity per share and *EPS* intersect in year 2003. This is also the year when adoption of fair value accounting became mandatory in Taiwan. *EPS* may fluctuate due to short-term effects of certain external factors, but it is always an important indicator that investors consider in their investment decisions. As shown in Figure 1, *EPS* has a slight drop in 2005 but continues to soar quickly in the following years; book value of equity per share also has an upward trend starting in 2005, but the growth is relatively small. This shows that in the event of a financial crisis, investors are more concerned about *EPS* than about book value of equity per share. However, this also reveals that *EPS* is considered more important in an individual investor-based market. Overall, the financial crisis has an effect on the relevance of fair value accounting.

Figure 1
Trends of standardized coefficients of book value per share and EPS

In order to test H_1 and H_2, we divide the sample period into three periods. The regression result is shown in Table 3. First, we examine if the adoption of different accounting standards affects the relevance of book value of equity and earnings information during non-crisis period. As shown in Panel B, the *F-value* in the Chow test is 3.304 at 5% level of significance, suggesting a structural difference in relevance of accounting information between the two periods. In other words, there has been a discernable change in value relevance of book value of equity and earnings information after implementation of fair value accounting. This empirical result supports H_1[9]. Later, we perform Wald test to examine differences in each coefficient between periods and use Equation (2) to test H_{1a} and H_{1b}. As shown in Table 4, under normal conditions (non-crisis period), the difference in book value of equity shown on balance sheet between before and after implementation of fair value accounting (T_1-T_2) is negative and reaches 1% level of significance. This suggests that the implementation of fair value accounting increased investors' attention to book value of equity shown on balance sheet. Hence, H_1 is supported. As to relevance of earnings reported on income statement, the difference between the two periods is positive at 1% level of significance. This implies that the implementation of fair value accounting led to reduced importance of earnings information. Hence, H_{1b} is supported.

We further examine the effect of the financial crisis on information value after implementation of fair value accounting. As shown in Panel B of Table 3, we obtain a *F-value* of 67.416 at 1% level of significance in the Chow test. This indicates a significant structural difference in the information value of book value of equity and earnings information between crisis and non-crisis periods after implementation of fair value accounting. This finding offers support for H_2. In terms of the adjusted coefficient of determination (*Adjusted R^2*), this coefficient is 0.032 during implementation of fair value accounting and is higher than the coefficient during implementation of historical accounting (0.003). This finding suggests that fair value has greater explanatory power for firm stock price. Further comparison of explanatory power between crisis and non-crisis periods shows that

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[9] We re-run the test after logarizing the variables but obtain similar results that are not significantly different from the original results (1% level of significant in Chow test).

accounting information has greater explanatory power for firm stock price during crisis period (0.225 > 0.032).

Table 3
Test for Structural Difference in Relevance of Accounting Information

Panel A - Regression Coefficients of Relevance of Accounting Information

Period	Variable	Coefficient	*t-value*	*Adjusted R^2*	*F-value*
2000-2003 (T_1)	Intercept	6.301	1.113	0.003	4.231**
	BV	1.176***	2.826		
	EPS	-1.433	-1.517		
2004-2006 (T_2)	Intercept	15.990	9.459	0.032	48.666***
	BV	0.208*	1.745		
	EPS	2.148***	6.521		
2007-2008 (T_3)	Intercept	8.810	5.943	0.225	321.197***
	BV	0.287***	2.702		
	EPS	3.370***	12.652		

Panel B - Chow Test for Structural Difference

Period	T_1:T_2	T_2:T_3
F-value	3.304**	67.416***

Note: ** Indicates 5% level of significance; *** Indicates 1% level of significance. T_1 refers to a non-crisis period from 2000 to 2003 where historical cost accounting was implemented; T_2 refers to a non-crisis period from 2004 to 2006 where fair value accounting was implemented; T_3 refers to a crisis period from 2007 to 2008 where fair value accounting was implemented.

Table 4
Test for Difference between Regression Coefficients of Relevance of Accounting Information

Difference between Historical Cost and Fair Cost Accounting

Period	Variable	*Time₁*	*Time₂*	Difference
T_1-T_2	BV	1.176	0.208	0.968**
		(2.826)	(1.745)	(2.362)
	EPS	-1.433	2.148	-3.581***
		(-1.517)	(6.521)	(-3.760)

Difference between Non-crisis and Crisis Periods

Period	Variable	*Time₂*	*Time₃*	Difference
T_2-T_3	BV	0.208	0.287	-0.079
		(1.745)	(2.702)	(-0.476)
	EPS	0.287	3.370	-1.222***
		(2.702)	(12.652)	(-2.739)

Note: ** Indicates 5% level of significance; *** Indicates 1% level of significance

In summary, the adoption of fair value accounting contributed to increased relevance of book value of equity but decreased relevance of earnings. That is to say, investors might be affected by the adoption of an accounting system to adjust their reliance on earnings or equity value information. Generally, during the financial crisis where fair value accounting was implemented, investors had reduced trust in balance sheets reported by fair values (resulting in lower information value of book value of equity) but increased their reliance on earnings information.

Table 5
Summary of Test Results (with Stock Price Measured by
the Price at the End of April)

Panel A - Regression Coefficients of Relevance of Accounting Information					
Period	Variable	Coefficient	*t-value*	*Adjusted R^2*	*F-value*
2000-2003 (T_1)	Intercept	-3.181**	-2.313	0.501	667.405***
	BV	1.359***	12.794		
	EPS	4.072***	14.949		
2004-2006 (T_2)	Intercept	-8.008***	-5.282	0.532	566.070***
	BV	1.754***	14.704		
	EPS	2.899***	9.113		
2007-2008 (T_3)	Intercept	-1.367	-1.135	0.686	723.741***
	BV	1.311***	15.214		
	EPS	3.585***	13.691		

Panel B - Chow Test for Structural Difference		
Period	T_1:T_2	T_2:T_3
F-value	3.784**	2.882**

Panel C - Wald Test for Difference between Regression Coefficients				
Period	T_1-T_2		T_2-T_3	
Variable	*BV*	*EPS*	*BV*	*EPS*
Difference	-0.395*** (-2.890)	1.173*** (3.217)	0.443*** (2.738)	-0.686 (-1.544)

Note: * Indicates 10% level of significance; ** Indicates 5% level of significance; *** Indicates 1% level of significance

4.3 Sensitivity Analysis

4.3.1 Test of Value Relevance on the Updated Day of Financial Information

Article 36 of the Stock Exchange Act of R.O.C. states that "Unless under special circumstances as otherwise provided by the Competent Authority, an issuer under this Act shall perform public announcement and registration with the Competent Authority within four months after the close of each fiscal year, publicly announce and register with the Competent Authority financial reports duly audited and attested by a certified public accountant, approved by the board of directors, and recognized by the supervisors." Therefore, we re-run the model with the stock price on financial information update day (i.e. stock price at the end of April) as a dependent variable to estimate changes in value relevance of accounting information. As shown in Table 5, the result is generally similar to the result obtained from the original model. Using the stock price on financial information update day instead of the fiscal year-end closing price does not seem to affect our conclusion regarding the relevance of accounting information.

4.3.2 Test of Value Relevance in the Electronic Industry

In Taiwan's capital market, firms in the electronic industry constitute the majority of publicly listed firms and play a pivotal role in the nation's economic development. The electronic industry is a high-tech industry. Previous research of value relevance has mentioned that the rise of high-tech industries is one of the reasons why financial statements are losing relevance (Francis and Schipper, 1999). Amir and Lev (1996) also find that for fast-changing high-tech industries, some accounting information is no longer relevant. Therefore, we use a sub-sample consisting of only firms in the electronic industry to observe whether the implementation of fair value accounting would improve the relevance of accounting information and further measure the difference in value relevance between crisis and non-crisis periods. As shown in Table 6, the result is generally similar to the result obtained from the original model. Therefore, we conclude that using a sub-sample of only electronic firms instead of the entire sample does not seem to affect our conclusion regarding the relevance of accounting information.

Table 6
Summary of Test Results (with a Sub-sample Consisting of Only Firms in the Electronic Sector)

Panel A - Regression Coefficients of Relevance of Accounting Information

Period	Variable	Coefficient	t-value	Adjusted R^2	F-value
2000-2003	Intercept	0.795	0.224	0.500	170.753***
(T_1)	BV	1.337***	5.487		
	EPS	4.691***	7.797		
2004-2006	Intercept	-21.187***	-5.154	0.608	198.244***
(T_2)	BV	3.190***	10.719		
	EPS	1.861***	2.473		
2007-2008	Intercept	-10.892***	-3.274	0.684	183.637***
(T_3)	BV	2.008***	8.859		
	EPS	2.714***	3.842		

Panel B - Chow Test for Structural Difference

Period	T_1:T_2	T_2:T_3
F-value	9.492***	8.584***

Panel C - Wald Test for Difference between Regression Coefficients

Period	T_1-T_2		T_2-T_3	
Variable	BV	EPS	BV	EPS
Difference	-1.853***	2.830***	1.182***	-0.853
	(-5.714)	(3.307)	(2.887)	(-0.784)

Note: * Indicates 10% level of significance; ** Indicates 5% level of significance; *** Indicates 1% level of significance

Figure 2

Trends of standardized coefficients of book value of equity per share
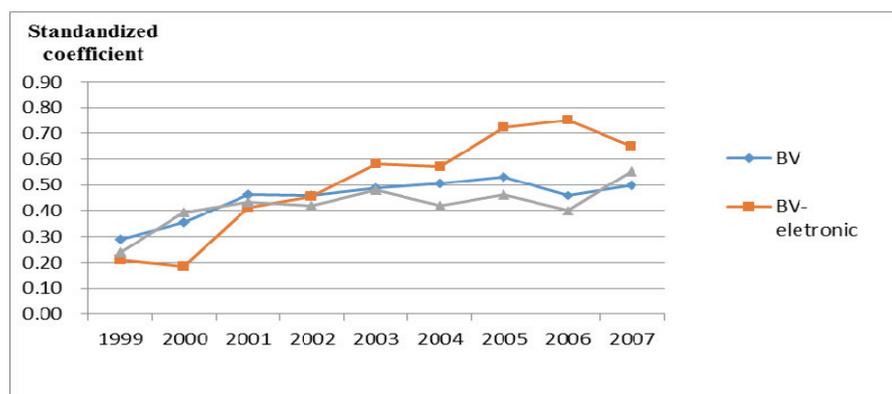
In Figure 2 and Figure 3, we respectively present the standardized coefficients of book value of equity and earnings in trends to highlight the difference between models. As shown in these figures, there is a greater difference in both the relevance of book value of equity and the relevance of earnings between the sub-sample and the entire sample. The two models based on the entire sample (one model measuring stock price by fiscal year-end closing price and the other by stock price at the end of April) have relatively flatter trends, but the difference between them is minimal. On the contrary, the model based on the sub-sample has greater coefficient variations that create steeper trends. The trends reveal that investor perceptions of accounting information prepared by firms in the electronic industry would vary more greatly by accounting principles or economic cycle.

Figure 3

Trends of standardized coefficients of book value of equity per share
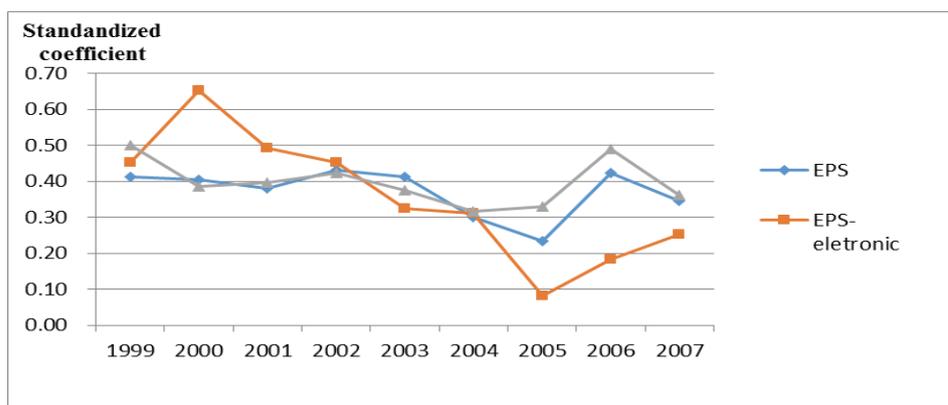
4.3.3 Test of Value Relevance in the Financial Industry

After the financial crisis went global in 2008, many financial institutions faced the greatest challenge to their survival (e.g. Fortis Bank and The Royal Bank of Scotland), and some of them even went bankrupt (e.g. Hillcrest Bank and United Commercial Bank). Therefore, many people have pinned the blame on

implementation of fair value accounting. However, Laux and Leuz (2010) find no direct evidence suggesting that fair value accounting contributed to the financial crisis from a sample of U.S. banks.

In this paper, we also conduct a sensitivity test with the financial industry as our sample to examine if the result is consistent with that obtained from the electronic industry. A summary of the results is provided in Table 7. In Panel A, we perform Chow test on value relevance between before and after implementation of fair value accounting. The *F-value* is 2.253 at 5% level of significance, indicating a structural difference in relevance of accounting information between the two periods. In other words, the value relevance of book value of equity and earnings information indeed varied after implementation of fair value accounting. This empirical result supports H_1. Further, we use Wald test to examine differences between regression coefficients from different periods. As shown in Panel B of Table 7, only the difference in book value of equity between T_2-T_3 is negative. This indicates that during the financial crisis, asset valuation by fair values produces higher values at 1% level of significance. In other words, the implementation of fair value accounting would lessen the importance of earnings information on income statement. In the above sensitivity analyses with two different sub-samples, one consisting of only firms in the electronic industry and other of only firms in the financial industry, we obtain results that are generally consistent with the results from the original model.

Table 7
Summary of Test Results (with a Sub-sample of Only the Financial Industry)

Panel A - Chow Test for Structural Difference

Period	T_1:T_2		T_2:T_3	
F-value	2.253[**]		1.242	

Panel B - Wald Test for Difference between Regression Coefficients

Period	T_1-T_2		T_2-T_3	
Variable	*BV*	*EPS*	*BV*	*EPS*
Difference	0.406	1.154	-2.626**	2.747
	(0.264)	(0.459)	(-2.094)	(0.968)

Note: * Indicates 10% level of significance; ** Indicates 5% level of significance; *** Indicates 1% level of significance

5. Conclusions

Developed on the principle of conservatism, the past accounting system is unable to reflect the real value of a firm on its financial statements. In order to provide global, transparent, and comparable accounting standards, the International Accounting Standards Committee (IASB) resolved to promote fair value accounting. In this paper, we analyze accounting information reported on financial statements by listed firms in Taiwan to examine the effect of fair values on value relevance of firm value. We also investigate value relevance of accounting information reported by fair values during the crisis period.

The empirical results show that accounting information has higher explanatory power for firm value after implementation of fair value accounting. Besides, there will be a structural change in value relevance of book value of equity and earnings after implementation of a different accounting standard. The change is characterized by an increase in relevance of book value of equity on balance sheet and a decrease in relevance of earnings on income statement. In other words, fair value-based valuation will cause a transfer of investor reliance between book value of equity and earnings information, with more reliance going to book value of equity and less to earnings per share. More specifically, there will be a tradeoff between the relevance of equity value and the relevance of earnings following implementation of different accounting standards.

In addition, after implementation of fair value accounting, there is a significant difference in value relevance of book value of equity and earnings between crisis and non-crisis periods. In the crisis period, book value of equity on balance sheet is less relevant, and earnings information is more relevant. This finding also implies that there will be a structural change in the investors' perception of accounting information in the event of a financial crisis. Investors will add more weight to earnings when making investment decisions. A plausible explanation is that investors have concern about the objectiveness of asset and liabilities values that are reported using a valuation model or by experts during a crisis period, so the relevance of book value of equity will be lower. On the other

hands, fair value accounting directly affects mainly the accounting numbers on balance sheet, so there will be a greater reduction in value relevance of book value of equity. Overall, fair values offer relatively opener and rational information. This is why both book value of equity and earnings have better explanatory power for stock price when fair values are used. Finally, the sensitivity analysis of the model with stock price on the financial information update day as the dependent variable shows that the result is generally consistent with that obtained from the original model.

In conclusion, although fair values vary with market conditions and may increase the volatility of values, they provide more accurate, transparent, and complete information to investors. Compared with historical cost accounting, fair value accounting offers more relevant information that helps investors adjust their investment strategies and assess risks in investment activities. However, under market deviation, investors may still have concern about the objectiveness of balance sheet prepared based on fair value measures. Therefore, if the fair values of firm assets and liabilities are properly and objectively determined, the firm valuation result can be more accurate, and accounting information will also become more relevant. To this end, the authority responsible for development of accounting standards should offer more guideline to compilers of financial statements and build a better valuation system that can generate more relevant information to users of financial statements. Besides, the authority should also improve investors' confidence in accounting information reported at fair values. For instance, it can train valuation specialists and establish a code of ethics for the specialists, develop a price validation procedure, and improve the reliability of accounting information to boost investor trust in the quality of fair value-based accounting information.

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