African Journal of Business Management Vol.6 (26), pp. 7622-7638, 4 July, 2012
Available online at http://www.academicjournals.org/AJBM
DOI: 10.5897/AJBM10.1240
ISSN 1993-8233 ©2012 Academic Journals

Full Length Research Paper

The effect of financial instruments usage on the value-relevance of earnings and equity book value: A panel data approach

Ching-Lung Chen* and Chung-Jen Fu

Department of Accounting, National Yunlin University of Science and Technology, Taiwan.

Accepted 2 February, 2011

This study explores the prediction that the pricing multiple on the earnings (equity book value) increases/decreases as the listed firms who have larger magnitudes of financial instruments usage after the SFAS No. 34 is enforced in Taiwan. The empirical result indicates that the relative value relevance of earnings variable increases for the active financial instruments users compared to firms who only moderately use or do not use financial instruments. These results remain robust to the various specification tests. It is also found that the relative value relevance of equity book value decreases for the active financial instruments users; yet, are sensitive in some robust tests.

Key words: SFAS No.34, financial instruments, value-relevance, earnings, equity book value.

INTRODUCTION

The purpose of this paper is to examine the possible effects on the relative value relevance of earnings and equity book values of listed firms which recognized the use of financial instruments regulated under Statement of Financial Accounting Standards No.34 (Financial Accounting Standards Board 2004; hereafter, SFAS No. 34) in Taiwan. Prior studies focusing on the value relevance of accounting information have demonstrated that the information of both income statement and balance sheet play a role in determining equity values (Collins et al., 1997; Francis and Schipper, 1999; Barth et al., 1998; Ou and Sepe, 2002; Marquardt and Wiedman, 2004). Recently, a couple of studies have been aimed at specifying the conditions under which earnings or equity book value would either be assigned a relatively higher weight in explaining stock values or explain a relatively higher proportion of the market value of the equity (Burgstahler and Dichev, 1997; Collins et al., 1997; Lev and Zarowin, 1999; Black and White, 2003; Shamy and Kayed, 2005; Francis and Schipper, 1999; Barth et al., 1998; Ou and Sepe, 2002; Marquardt and Wiedman, 2004; Whelan and McNamara, 2004). SFAS No. 34 requires entities to recognize all financial instruments as assets or liabilities at their fair values on the balance sheet and also to include the resulting gains or losses from financial instruments as a component of earnings. Thus, the magnitude of financial instruments usage would have an effect on both the income statement and balance sheet. Because of the scenario, we are motivated to examine whether the usage of financial instruments will have the effects on the relative value relevance of earnings and equity book values and thus explains the security prices in Taiwan. In other words, this study examines the possible policy effects after the enforcement of SFAS No. 34.

Since earnings have two components, cash flows from operation and accruals, the volatility in earnings can result from volatility in cash flows and/or accruals. Thus, reducing cash flows volatility could result in real smoothness in earnings. Firms can purchase and/or sell financial instruments to reduce the risks associated with inherent currency exchange rates, interest rates, and/or commodity price movements, which may be significant

*Corresponding author. E-mail: clchen@yuntech.edu.tw. Tel: 886-5-5342601 ext.5515. Fax: 886-5-534-5430.

sources of variation in cash flows outside of managerial control. Prior studies (Nance et al., 1993; Tufano, 1996; Gèczy et al., 1997; Barton, 2001; and Pincus and Rajgopal, 2002) found that financial instruments can be used to hedge and reduce cash flows volatility, in turn result in real smoothness in earnings. SFAS No.34 in Taiwan provides more specific guidance compared to the previous financial accounting standards in determining disclosed and recognized magnitude and/or types of financial instruments. This new standard provides investors an opportunity to comprehensively understand the risk management and increases reporting transparency of the listed firms in Taiwan. Since risk management theorists have evidenced a variety of firm risks and maintain hedging increases firm value. It is expected that SFAS No.34 offer some private information of valuation effect to the market about firms who use financial instruments as an instrument for income smoothing since financial instruments have been a critical tool for hedging. Recently, using a sample of banks that have recognized financial instruments after SFAS No.133, Ahmed et al. (2006) shows the valuation coefficients on recognized financial instruments are significant. The authors then conclude that SFAS No.133 has increased the transparency of derivatives financial instruments and convey the valuation information to investors. Inspired by the aforementioned studies, this study examines the possibility that the reporting of financial instruments usage under SFAS No.34 in Taiwan has changes the relative value-relevance of accounting numbers for the firms with large magnitude of financial instruments position.

As to the issue whether financial instruments usage improves the information value of the accounting numbers, several studies investigate the value-relevance of financial instruments. It is found that the majority of them focus on banking industry and the examining of how the use of financial instruments affect managers' earnings reporting decisions (Venkatachalam, 1996; Barton, 2001; Li and Stammerjohan, 2004; Wang et al., 2005; Ahmed et al., 2006; Zhang, 2009). Except for the designated industry, the effect of financial instruments usage on the non-financial industries valuation relationship between earnings and the equity book value in determining the stock price is called for examination. SFAS No.34 in Taiwan points out that financial instruments create new risks that are not appropriately disclosed or recognized under historical cost accounting and that fair value recognition makes the use of financial instruments more transparent and thus, encourages prudent risk management. Moreover, inspired by the studies of Nance et al. (1993), Tufano (1996), Gèczy et al. (1997), Barton (2001), and Pincus and Rajgopal (2002) which suggest that financial instruments can be used to hedge and reduce cash flows volatility, it is expected that the larger magnitude of financial instruments usage is associated with earnings smoothness. Since more transparent/visibility financial reporting after SFAS No.34 is enforced, this study conjectures that the earnings variable is more value-relevant in determining the stock price for the large magnitude of financial instruments usage listed firm. In addition, Burgstahler and Dichev (1997) develop an option-style valuation model based on the prediction that equity value is a convex function of both earnings and book value, where the function depends on the relative values of earnings and equity book value. It is expected that the more value-relevant of earnings variable the less value-relevant of book value of equity for users have large magnitude of financial instruments position. In terms of the relative value relevance on financial statement components, this study provides insights into the quality of the financial information provided to the market after the new standard is implemented. The empirical result indicates that, as conjectured, the relative value-relevance of earnings variable increases for the larger magnitude of financial instruments users. These results remain robust to the various specification tests. It suggests that to somewhat more transparent/visibility financial reporting after SFAS No.34 is enforced; the earnings variable is more value-relevant in determining the stock price for the large magnitude of financial instruments usage listed firms. It is also found that the relative value-relevance of equity book value decreases for the larger magnitude of financial instruments users; yet, the results are sensitive in some robust tests. Although, the decreasing value relevance of equity book value is moderate trade-off by the increasing value relevance of earnings, the value relevance on financial statement components, specifically earnings variable, indeed changed after the new standard is initially implemented. Overall, this study documents that SFAS No. 34 requiring recognition of financial instruments has a valuation effect and provides feedback for regulators with respect to the subsequent reporting requirement in the equity market.

This study enriches the researches in financial instruments from three angles. First, distinction from using the designated banking industry in the prior research, this study uses non-financial industries as samples and examines the valuation implications of using financial instruments. Moreover, extend extant researches which focus on examining the influences of financial instruments usage on earnings component, this study examines both the possible changes in the relative value-relevance of equity book values and earnings of firms which recognized the using of financial instruments. The second angle, more importantly, with the panel regression model test which can both capture the role of reporting characteristics and eliminate heterogeneity bias, this study provides appropriate evidence on whether the relative value-relevance of equity book value or earnings will change after SFAS No.34 is enforced. This examination, to some extent, also provides references for

the regulators in evaluating the policy effect of SFAS No. 34. Finally, the focus on the Taiwan capital market is of interest for its relatively small and deregulated characteristics. Most of all, the emerging economy has few barriers to trade and puts a heavy reliance on export/import business activities. The demand and availability for using financial instruments to control business activities risk exposures is important and essential to managers in Taiwan. In other words, this study provides comparative evidences for the emerging capital market with persistent export/import transactions and more hedge decisions with the empirical findings found in larger capital markets such as U.S.A. It is worth pointing out the difficulties of enriching the data resource from the United States. When compiling the sample firms, it is surprising to notice that the U.S. GAAP only requires disclosure with significant amount of gain or loss on the financial statements; thus, there are a large number of firms in the United States out of this requirement because of the immaterial hedging activities. Contrary to the United States, Taiwan's economic attributes are under more opportunity to adopt the financial instruments, and as aforementioned, the hedging activities are of more attention.

BACKGROUND, RELATED RESEARCH AND HYPOTHESIS

Accounting for financial instruments in Taiwan

The ongoing growth in use of financial instruments together with the accompanying financial instruments debate has motivated accounting regulators to develop and stretch disclosure requirements in Taiwan. The Financial Accounting Standards Committee of the Accounting Research and Development Foundation in Taiwan firstly issued SFAS No.14 regulated the accounting treatments about Foreign Currency Translation transactions in December 1998. Subsequently, SFAS No.27 (Disclosure of Financial Instruments) was issued in 1997 which sought to improve the usefulness of publicly available financial instruments. Namely, it required the disclosure of the extent (that is, the contractual or notional amount), nature, terms, and the concentrations of credit risk for all financial instruments. Since the requirements for disclosing of financial instruments were not clear and uniform, the disclosures about financial instruments in financial statement are obscure and discretionary. SFAS No.34, Accounting for Financial Instruments, was issued in December 2004 and was effective for fiscal years beginning in 2006 and early adoption in 2005 is not encouraged.

This new standard basically follows IAS 32(1995), IAS 39(1998), and IFRS 7 requires all financial instruments owned by the listed companies, without exception and regardless of the accounting treatment for the underlying asset, liability, or transaction, to be recognized in the balance sheet as either liabilities or assets at their fair values. It also requires the immediate recognition of the resulting gains or losses from marking financial instruments to market in income or in equity, depending on the intended use of financial instruments and the types of hedging. This standard setting provides this study with a unique opportunity to identify a distinct and stylical financial instruments users sample that recognized financial instruments in their comparative annual reports during 2005 to 2007 to examine the impact of SFAS No.34 on the relative value-relevance on earnings and equity book value.

Related research

Firms normally make plans based on expectations of what foreign exchange rates, interest rate, and commodity prices will be over the near time. If prices or rates change, the result of operations and cash flows will also differ from expectations (Blankely and Schroeder, 2000). Cash flows volatility is costly. Minton and Schrand (1999) documents that cash flows volatility not only leads to earnings volatility but also associates with higher costs of accessing external capital. Therefore, when firms have incentives to reduce the volatility of cash components of earnings through real risk-management activities, one possible way is to use financial instruments to hedge the risks inherent in commodity prices, foreign currencies, and interest rate (Nance et al., 1993; Tufano, 1996; Gèczy et al., 1997). That is, firms can use properly structured hedging financial instruments forms, whose rate or price moves in the opposite direction of the rate or price of the underlying item being hedged, to reduce the magnitude of differences. There are substantial studies examining the using of financial instruments to smooth earnings and cash flows volatility. For examples, Smith and Stulz (1985) shows that the use of financial instruments to hedge can maximize shareholder value because hedging may be reduce expected tax and expected costs of financial by reducing the probability that the firm encounters financial distress. Breeden and Viswanathan (1998) found that hedging reduces noise related to exogenous factors and hence, decreases the level of asymmetric information regarding a firm's earnings and quality. This finding again is supported by the study of Dadalt et al. (2002). From the linkage of financial instruments usage and corporate governance, Prevost et al. (2000) found that the board plays an important role in the decision to use financial instruments. The authors attribute to the outsiders on the board should have a significant role in monitoring and controlling the use of financial instruments. Recently, Marsden and Prevost (2005) examines whether board composition has systematic bearing on financial instruments usage and

whether such association changes following the new regulation is enforced. Marsden and Prevost (2005) finds a greater proportion of outside directors were less likely to use financial instruments following the introduction of more fiduciary responsibilities on outside directors.

Another line of research examines the tradeoffs managers make between financial instruments and other risk management tools. For example, Schrand and Unal (1998) documents that managers of thrift institutions integrate financial instruments and the composition of loan portfolios to manage overall risk. Petersen and Thiagarjan (2000) using gold mining companies and Pincus and Rajgopal (2002) using oil and gas firms examine the interaction of accounting choice and financial instruments hedging evidence similar tradeoffs pattern. Barton (2001) uses sample firms of Fortune 500 non-financial companies and estimates a set of simultaneous equations that captures managers' incentives to maintain a desired level of earnings volatility through hedging and accruals management. The author concludes that managers use financial instruments and discretionary accruals as partial substitutes for smoothing earnings. Following Barton (2001), Wang and Kao (2005) using Taiwanese companies also found the substitution relationship between discretionary accruals and financial instruments in earnings management. According to the aforementioned, to some extent, managers have incentives to smooth earnings by reducing cash flows and earnings volatility. In addition, financial instruments can be a tool to smooth earnings.

Since the seminal works of Ball and Brown (1968) and Beaver (1968), accounting and finance researchers have been studying the association between accounting numbers (that is, earnings, book values, and cash flows) and capital market values (that is, stock prices and returns). There are substantial studies investigating the incremental information content or value-relevance of financial instruments disclosures beyond earnings and book value of equity under SFAS regulations. Riffe (1997) examines the valuation implications of disclosures on contractual (notional) amounts for off-balance sheet financial instruments using U.S. banking holding companies and found the contractual amounts for loan commitments and swaps are positively related to market value of bank equity. Concurrently, Barth et al. (1996) and Eccher et al. (1996) employ a cross-sectional valuation framework and found that fair value disclosures provide incremental explanatory power beyond book value under SFAS No.107. Furthermore, Venkatachalam (1996) investigates the value-relevance of banks' financial instruments disclosures provided under SFAS No.119 and evidences that the fair value estimates for financial instruments help explain cross-sectional variation in bank share prices and that the fair values have incremental explanatory power over and above notional amounts of financial instruments. Recently, Wang et al. (2005) examines the value-relevance of banks' financial instruments disclosure under SFAS No.119 and SFAS No.133. They investigate whether expanded disclosures under SFAS No.133, in comparison with SFAS No.119, provide incremental information content beyond earnings and book value of equity. Ahmed et al. (2006) examines how investor valuation of derivative instruments differs depending upon whether the fair value of these instruments is recognized or disclosed. The authors found that the valuation coefficients on recognized financial instruments are significant both the prior and after SFAS No.133, then, conclude that SFAS No.133 has increased the transparency of financial instruments. According to the aforementioned, it is found that sample firms are all restricted banking industry and, except for Wang et al. (2005), focus on examining the association between using of financial instruments and earnings variable. Thus, this study is motivated to use non-financial firms examining the value-relevance of financial instruments disclosures beyond earnings and book value of equity under SFAS No.34 in Taiwan.

Whereas a fundamental role of income statement is for equity valuation, a distinctive role of balance sheet is to facilitate loan decisions and monitoring of debt contracts (Barth et al., 1998). In the post-1990 period, it is found that more studies assert that both earnings and book value of equity are priced and thus omitting one or the other potentially leads to model mispecification (Easton and Harris, 1991; Kothari and Zimmerman, 1995; Feltham and Ohlson, 1995; Ohlson, 1995; Ou and Sepe, 2002; Marquardt and Wiedman, 2004; Whelan and McNamara, 2004). In more realistic settings with market imperfections, accounting systems can provide information about book value and earnings as complementary, rather than redundant, components of equity value (Burgstahler and Dichev, 1997). Accordingly, the value of the firm can be expressed as a function of both earnings and book value of equity, and yet differential model specifications exist in the literature. Ohlson (1995) expresses stock price as a linear function of book value of equity and abnormal earnings. Subsequently, Burgstahler and Dichev (1997) suggest when the firm's going concern situation becomes questionable, its book value of equity will then proxy for the liquidation value and/or the adaptation value. They develop an option-style valuation model based on the prediction that equity value is a convex function of both earnings and equity book value, where the function depends on the relative values of earnings and book value. When the earnings/book value ratio is high, the firm is likely to continue its current way of using resources and earnings is the more important determinant of equity value. On the other side, when the earnings/book value ratio is low, the firm is more likely to exercise the option to adapt its resources to a superior alternative use and make book value the more important determinant of equity value. Inspired by Burgstahler and Dichev (1997)

and other empirical studies (Collins et al., 1997; Barth et al., 1998; Ou and Sepe, 2002; Marquardt and Wiedman, 2004) have reported specific conditions induce the tradeoff relationship between earnings and book value of equity, it is expected that when a firm's current earnings is perceived to be a good indicator of future earnings, due to either a transparent earnings reporting or a designated properly structured risk management, market participants will likely offer more weight to earnings for guidance in stock valuation. Therefore, after SFAS No.34 is implemented, the relative value-relevance of earnings for the firms with large magnitude of financial instruments position essentially is expected to be increased. Alternatively, the relative value-relevance of equity book value is expected to be decreased due to a convex function of both earnings and book value.

Hypothesis

The complexity of financial instruments and the need for transparency in their financial reporting have triggered the Financial Accounting Standards Committee of the Accounting Research and Development Foundation in Taiwan set forth SFAS No.34. The disclosures requirement under SFAS No.34 should help external financial statement users understand better a company's risk exposure and its corresponding risk management policy. Some positive market evidences observed from well-developed capital market that is, Wang et al. (2005), Ahmed et al. (2006), along this line has recently been provided for financial instruments disclosures by banks. Thus, reporting requirements on financial instruments used may potentially affect firm behavior with respect to risk management and, in turn, increase the transparency of financial instruments and convey the positive valuation information to investors. In other words, financial instruments create new risks that are not appropriately disclosed or recognized under historical cost accounting and SFAS No.34 makes the financial instruments usage more transparent and encourages prudent risk management (Melumad et al., 1999). From the perspective of investors, transparency and prudent risk management reduce noise related to exogenous factors and hence, decreases the level of asymmetric information regarding a firm's earnings and quality, in turn, increases the value-relevance of earnings.

On the accounting treatments of financial instruments viewpoint, in an effective hedging financial instruments contract, the changes in the value of the underlying exposure would be exactly offset by the change in the value of the financial instruments contract leaving the hedger's cash flow or asset value position unchanged and have no impact on the income statement under the financial instruments standard, thus, unlikely increase the earnings volatility. It is expected that only the ineffective portion of a hedging instrument is reflected in contemporaneous earnings. Nevertheless, if the increase Gèczy et al., 1997; Barton, 2001; Pincus and Rajgopal, in earnings volatility is material and costly and a firm timely adjusts its financial instruments portfolio in anticipation of this potential cost, the increasing in earnings volatility after the new financial instruments regulation will not be observed. It is not surprised to found that prior research (Nance et al., 1993; Tufano, 1996; 2002; Wang and Kao, 2005) all documented that firms can reduce cash flows volatility and, in turn, earnings volatility from active risk management using financial instruments. If firms can reduce cash flows volatility and thus earnings volatility, the least extent can not expand volatility, from active risk management using financial instruments, it is expected earnings volatility will be decreases. Lewis and Chaney (1990) found that the market makes better assessments of the information content of earnings for firms with less earnings volatility. Zarowin (2002) also shows that firms with moderate earnings volatility have more informative stock price. Inspired by prior literature, earnings persistence has been identified as one major determinant in the magnitude of the earnings-return relationship. When a firm's current earnings are perceived to be a good indicator of future earnings, market participants will then likely rely more heavily on the earnings for guidance in equity valuation. Thus, this study expects the large magnitude of financial instruments position will efficiently reduce the earnings volatility and, in turn, increase the relative value-relevance of earnings variable. Moreover, following Burgstahler and Dichev (1997), Yee (2000), and others, if a firm's current earning is perceived to be a good indicator of future earning, due to either a transparent earnings reporting or a designated properly structured risk management, market participants offer more weight to earnings for guidance in stock valuation. In addition, it is expected that the relative value-relevance of equity book value would be decreased due to a convex function of both earnings and book value.

From previous discussions, the present study therefore establishes the hypothesis as follows:

H: The relative value relevance of current earnings increases and the relative value relevance of the equity book value decreases for the active financial instruments users compared to the non-active financial instruments users.

RESEARCH DESIGN

Data and samples

The time frame 2005 to 2007 is chosen because SFAS No.34 is enforced for 2006 annual reports; yet, the concurrently comparative financial statements disclosure requirements for all listed firms in Taiwan provide us the 2005 financial instruments usage data in 2006 annually comparative reports. As for choosing the year 2007 as the ending year, it is dictated by data availability and obviated the strike of financial tsunami triggered by the Lehman Brothers Holdings Inc. in 2008 consideration. The sample firms used in this

study are composed of publicly traded companies listed on the TSE and OTC in Taiwan. That only TSE-listed and OTC-listed firms are considered is due to the feasibility of collecting the necessary reliable data. The empirical data are retrieved from both the Taiwan Economic Journal Database (TEJ) and the Open Market Observation Post System (MOPS) of the TSE and OTC in Taiwan. The supplementary data is collected from the prospectuses or annual reports of listed companies compiled by the Institute of Securities and Futures Markets Development Foundation (ISFMDF). This study deleted sample firms whose accounting period ends were not December 31 for consistency, banking and insurance industries for their regulated peculiarities.

The initial non-financial firms are 1,376 basing on year 2006 which represents SFAS No.34 is enforced. This study deleted 130 sample firms whose data were deficient or unavailable. This study further excludes 83 sample firms that have only one or two year data to establish the balanced panel data. These selection procedures yield a final sample firm of 1,163 and 3,489 firm-year observations (Panel A of Table 1). Among them, 1,068 firms use financial instruments at least one fiscal year, which includes 931 (80.05%) companies which use financial instruments in all the three continuous years, 70 (6.02%) companies use financial instruments only in one fiscal year and 68 (5.85%) firms use financial instruments in two fiscal years. The remaining 94 (8.08%) firms belonged to the sub-sample which operates without using financial instruments. The industry distribution of the sample firms is presented in Panel B of Table 1. As shown in Panel B of Table 1, approximately 56.92% of the sample firms belonged to the electronics industry. All the sample firms in cement (11), electric appliance (16), paper pulp (19), and car industry (22) industries used financial instruments in their operating activities. The relative less using financial instruments industry is electric machinery (15), but still reaches high level of 84.62% of the industry sample.

Empirical model and variable measurement

To examine the value relevance of these financial numbers and the magnitude of financial instruments usage, this study follows prior research to express the stock price as a function of the net income and equity book value (Barth et al., 1998; Collins et al., 1999; Ou and Sepe, 2002; Black and White, 2003; Nwaeze, 1998; Arce and Mora, 2002; Marquardt and Wiedman, 2004). To capture the complete effect of SFAS No.34 on the relative value relevance of the earnings and equity book value, this study incorporates the magnitude of financial instruments usage variable into the empirical model. This study then estimates the following equation, which is a revision of Ohlson (1995) model that includes the interactive variables between the magnitude of financial instruments usage variable and the earnings and with equity book value, respectively. Naturally, this study also includes various variables to control the possible effect on stock price (Aboody et al., 2004).

Becker et al. (1998) suggest that firm size might surrogate numerous omitted variables and improve the goodness of fit of the specified model.

In order to control for the potential effect of firm size on the value relevance of accounting numbers, this study uses the natural logarithm of total assets as a proxy for client's firm size (denoted as SIZE). This study also embeds the inverse Mill's ratio (denoted as IMR) in the empirical equation as a correction variable for self-selection bias because not all our sample firms report using financial instruments, and each factor behind the decision to use financial instruments may have a different effect on the magnitude of financial instruments usage (Allayannis and Ofek, 2001; Haushalter, 2000; Barton, 2001).

Firms with higher debt level are more likely to be subjected to covenants from bondholders that could hinder them from undertaking new long-term investments, in turn, affect firms' value. In addition, a firm's ability to payback its short-term liabilities may be bottlenecked by its liquidity and to some extent represents its financial healthy condition. This study also incorporates both leverage (denoted as LEV) variable and liquidity (denoted as QR) variable into empirical model to control the influences of debt contracts and financial conditions. The empirical model is presented as follows:

$$\mathbf{P_j} = \beta_0 + \beta_1 * \mathbf{EPS_j} + \beta_2 * \mathbf{BV_j} + \beta_3 * \mathbf{DER_j} + \beta_4 \mathbf{DER} * \mathbf{EPS_j} + \beta_5 * \mathbf{DER_j} * \mathbf{BV_j} + \beta_6 * \mathbf{IMR_j} + \beta_7 * \mathbf{LEV_j} + \beta_8 * \mathbf{SIZE_j} + \beta_9 * \mathbf{QR_j} + \varepsilon_j \quad (1)$$

where P_j is firm j's stock price per share at the end of the calendar year. This study found that most value relevance related studies (Barth et al., 1998; Nwaeze, 1998; Arce and Mora, 2002; Marquardt and Wiedman, 2004) use the stock price per share at the end of the calendar year as the dependent variable. Alternatively, other value relevance related studies adopt the stock price per share at the end of March of the following year (Ou and Sepe, 2002; Black and White, 2003) to test the value relevance of the financial information. However, because listed firms must input annual reports into MOPS before April 30 of the next calendar year under the Taiwan Securities Exchange Law §36 regulation, there is a time lag between the calendar year-end and the date that listed firms input the magnitude of financial instruments usage details.

Thus, this study firstly uses stock price per share at the end of the calendar year (calendar year-end model) as the dependent variable in the empirical models and use alternative measurement date (April-30 model) to examine the robustness check. EPS_j is reported earnings per share for firm j during the year. Based on the theoretical valuation model derived from Ohlson (1995), it is expected that the coefficient of EPS_j to be positive. BV_j is book value per share for firm j at the end of the year. For the same reason, it is expected that the coefficient of BV_j to be positive. DER_j is financial instruments per share for firm j at the end of the year. It measures as the disclosed notional/nominal amount of total financial instruments scaled by the outstanding shares at the end of the calendar year.

IMR_j is inverse Mill's ratio for firm j at the end of the year, computed by the Probit regression obtained from Equation (2). LEV_j is the debts to assets ratio of sample firms measured as total debts divided by total assets at the end of the calendar year. $SIZE_j$ is the natural logarithm of total assets representing sample firms' size at the end of the calendar year.

QR_j is current ratio of sample firms measured as current assets divided by current liabilities representing sample firms' liquidity and/or financial healthy at the end of the calendar year. ε_j is the error term.

According to the previous discussion, the coefficient of β_4 represents the incremental value relevance of EPS_j for the larger magnitude of financial instruments users and will be positive to reflect the SFAS No.34 makes the use of financial instruments more transparent and encourages prudent risk management. At the same time, the coefficient of β_5 represents the incremental value relevance of BV_j for the larger magnitude of financial instruments users and will be negative to reflect the fact that the convex function of both earnings and book value.

To measure the inverse Mill's ratio, this study first estimates the

following equation to explain the decision to use financial instruments:

$$USER_j = \beta_0 + \beta_1 * COMP_j + \beta_2 * STOCK_j + \beta_3 * LEV_j + \beta_4 RD_j + \beta_5 * FS_j + \beta_6 * D\_IND_j + \beta_7 * QR_j + \beta_8 * DIV\_YIELD_j + \beta_9 * ST\_LEV_j + \varepsilon_j \quad (2)$$

where USER is a binary variable and coded 1 if the firm uses financial instruments, 0 otherwise. This study uses Probit regression on the full sample of 3,489 firm-years to estimate Equation (2)(see Appendix A). Following Greene (2004), γ and W are denoted as the coefficient vector and the explanatory variable vector in the financial instruments user model respectively. And let $\hat{\gamma}$ be the estimate of γ. Then, the inverse Mill's ratio is defined as: $\mathbf{IMR} = \phi(\hat{\gamma}'\mathbf{W}) / \Phi(\hat{\gamma}'\mathbf{W})$ if USER variable equals 1 and $\mathbf{IMR} = \phi(\hat{\gamma}'\mathbf{W}) / [\Phi(\hat{\gamma}'\mathbf{W}) - 1]$ if USER variable equals 0, where: $\phi(\bullet)$ and $\Phi(\bullet)$ are denoted as the standard normal probability density function and the standard normal cumulative distribution function, respectively. This study includes IMR as an additional control variable to correct for potential self-selection bias in the empirical equation, which we estimate using only the sample of financial instruments users.

The explanatory variables included in the Probit regression are discussed as follows:

Managers' compensations are often linked to the firm's earnings performance (Lambert, 1984). A stable earnings pattern implies higher both compensation and job security. It is expected that managers may use financial instruments to smooth income. According to the compensations of directors, supervisors and managers are linked to the firm's performance, this study incorporates the compensations (COMP) variable into Probit regression. Managers' wealth is tied to the magnitude of their shareholdings. It suggests that managers' incentive to smooth earnings increases with the shareholdings. Thus, a positive relation between managers' shareholdings and the use of financial instruments is expected. This control variable (STOCK) is measured as a percentage of managers' shareholdings to total shares outstanding. Smith and Stulz (1985) found that high-levered firms can change the perception of their creditors if they have a stable earnings reporting. It implied the higher cost of default provides managers incentives to smooth income. If financial instruments can be used to mitigate the volatility of a firm's earnings, it is expected that firms with higher leverage will use more magnitude of financial instruments. This study incorporates the leverage variable (LEV) into Probit regression to control this managers' incentive. Since research and development being a discretionary expense, the expenditure is often geared to the firm's performance. Recently, Graham et al. (2005) also document that managers tend to cut Research and Development expenditures in case of earnings shortfall. It is expected that the Research and Development expenditures will be associated with the use of financial instruments. This study measures RD variable as Research and Development expenditure divided by the market value of equity. Guay (1999) found that the hedging currency exposure risk is an important concern for firms' using financial instruments. Because of the exporting and/or importing has played a major role in operating activity for many Taiwanese firms, it is expected that hedging against currency risk is a critical issue of firms. It is reasonable to incorporate the foreign sales variable (FS) into Probit regression to capture the influence of foreign/domestic sales ratio on the structural divergence in using financial instruments. This study also follows the findings of prior study (Nance et al., 1993; Foke et al., 1997) that document firms using financial instruments for hedging tend to have lower liquidity and incorporate the current ratio variable (QR) into regression. It is expected that the magnitude of financial instruments usage to be negatively associated with the QR variable. Furthermore, given the managers tend to smooth earnings to sustain a long-term target dividend payout ratios (DIV_YIELD), it is expected that a positive relation between dividend payout and the usage of financial instruments. Prior studies (Visvanathan, 1998; Barton, 2001) suggest that firms with shorter debt maturity are more likely to use interest rate swaps and expects short maturity debt to be positively associated with financial instruments use, this study defines shorter debt maturity variable (ST_LEV) as the ratio of short-term debt to total debt to control this effect. Specifically, as previously mentioned, it was found that approximate 56.92% of the sample firms are belonged to the electronics industry. Wang et al. (2003) found that industries such as computer software, electronics, telecommunication-wireless, and semiconductors and telecommunications equipment apparently dominated what could have been called traditional industries and suggest a strong industry effect in their study. If the electronic industry effect truly exists, it is worth a try to incorporate a dummy variable for the electronics industry (D_IND, the firm belonging to electronic industry is denoted as 1, otherwise 0) into the model to enhance the model specification.

EMPIRICAL ANALYSIS

Descriptive statistics

Table 2 presents descriptive statistics pertaining to the empirical samples. The result indicates that the average stock price per share in the entire sample was $25.41. The average book value and earnings per share is $15.78 and 1.67, respectively. The average disclosed notional/nominal amount of total financial instruments scaled by the outstanding shares is $1.56.

Empirical results

Preliminary results from the volatility of quarterly earnings pre- vs. post- SFAS No.34

This study firstly uses the quarterly earnings in the empirical periods, 2005 to 2007 (Post-SFAS No.34), to calculate the means and standard deviations, then defined the coefficient of variation (CV) as the standard deviation of quarterly earnings scaled by the absolute value of the quarterly earnings mean for each sample to measure the earnings volatility after the SFAS No.34 is implemented. Naturally, this study also adopts the same approach to trace and calculate the coefficient of variation(CV) during 2002 to 2004 (Pre-SFAS No.34) for each sample to measure the earnings volatility before SFAS No.34. This study further calculates the average magnitude of financial instruments per share during 2005 to 2007 and divide the entire samples into two exclusively sub-sample by the average magnitude of financial instruments per share. This study identifies the larger average magnitude of financial instruments per share

Table 1. Sample selection and industry distribution.

Panel A: Sample selection (Based on 2006-the year SFAS No.34 is enforced)	
Non-financial initial firms	1,376
Less:	
Missing or incomplete data samples	130
Companies using financial instruments for one or two years only	83
Final empirical samples	1,163

Panel B: Industry distribution

User types **Industry(code)**	**Continuous user sample**	**Non-user sample**	**Selective user sample**	**Entire sample**
Cement(11)	7	0	0	7
Food(12)	20	1	1	22
Plastics(13)	24	1	2	27
Spin and fiber(14)	47	3	3	53
Electric machinery(15)	50	10	5	65
Electric appliance (16)	14	0	0	14
Chemical and medical(17)	62	5	9	76
Glass and ceramic(18)	5	1	0	6
Paper pulp(19)	7	0	0	7
Steel plant(20)	31	1	3	35
Rubber industry(21)	9	0	1	10
Car industry(22)	5	0	0	5
Electronics(23)	505	59	98	662
Construction(25)	41	4	7	52
Shipping(26)	19	0	3	22
Tourism(27)	10	1	1	12
General merchandise(29)	16	1	2	19
Fuel and gas (97)	11	1	0	12
Unclassified (99)	48	6	3	57
Total	931	94	138	1,163

sub-sample as “active financial instruments users” and the rest as “moderate financial instruments users” basing on the average magnitude of financial instruments per share. Specifically, this study compares the volatility of quarterly earnings of the “active financial instruments users” sub-sample with the volatility of quarterly earnings of the “moderate financial instruments users” in the post-SFAS No.34 period to examine the possible association between magnitude of financial instruments usage and volatility of earnings. To control the fact that changes in volatility of earnings could be caused by exogenous reasons outside of the specific effects of SFAS No.34, this study also compares earnings volatility between “active financial instruments users” and “moderate financial instruments users” for the pre-SFAS No.34 (2002 to 2004) period and the post-SFAS No.34 (2005 to 2007) period. The preliminary results are revealed in Table 3.

From Panel A in Table 3, this study firstly divides the entire sample into two exclusively sub-samples by the median of average magnitude of financial instruments use during 2005 to 2007 to examine the association between earnings volatility and magnitude of financial instruments usage. It is found that the mean coefficient of variation of quarterly earnings decreased in both “active” and “moderate” financial instruments users basing on SFAS No.34 is implemented. However, the mean difference in the pre- and post-SFAS No.34 period is 0.4059 ($p = 0.2809$) and 0.2822 ($p = 0.5891$) in both “active” and “moderate” financial instruments users, respectively, and statistically insignificant. It suggests, to some extent, that the volatility of quarterly earnings in these two sub-samples have not incurred structurally change. It is also showed that the mean coefficient of variation of earnings was larger in the “moderate financial instruments users” (2.4688 and 2.1866 in the Pre- and Post-SFAS No.34 period, respectively) sub-sample than in the “active financial instruments users” (2.0039 and

Table 2. Descriptive statistics of the samples (N = 3,489).

Variable	Mean	Standard deviation	Min	Q1	Median	Q3	Max
P	25.41	32.41	0.36	10.55	16.96	28.19	558.72
EPS	1.67	3.31	-10.78	0.17	1.26	2.82	57.85
BV	15.78	7.85	0.17	11.77	14.47	18.16	97.84
DER	1.56	2.51	0.00	0.09	0.61	2.01	30.24
IMR	1.36	0.74	-0.80	1.35	1.57	1.77	8.06
LEV	0.39	0.17	0.02	0.26	0.38	0.50	0.99
SIZE	15.04	1.35	11.71	14.05	14.89	15.79	20.25
QR	2.38	4.09	0.06	1.27	1.72	2.54	160.30

P: Stock price per share at the end of the calendar year; EPS: Reported earnings per share during the calendar year;BV: Book value per share at the end of the calendar year; DER: Financial instruments per share for firm at the end of the calendar year; IMR: Inverse Mill's ratio for firm at the end of the calendar year computed by the Probit regression; LEV: Debts to assets ratio at the end of the calendar year; SIZE: The natural logarithm of total assets at the end of the calendar year; QR: Current ratio at the end of the calendar year;D_34: Dummy variable for the years of SFAS N0.34 is enforced.

1.5980 in the Pre- and Post-SFAS No.34 period, respectively) sub-sample. And the mean coefficient of variation of earnings was significantly larger in the "moderate financial instruments users" sub-sample than in the "active financial instruments users" in the Post-SFAS No.34 period ($p = 0.0310$), nevertheless, was statistically insignificant comparing with the mean coefficient of variation of earnings in the Pre-SFAS No.34 period ($p = 0.4253$). It suggests that the earnings volatility is negatively associated with the magnitude of financial instruments usage in the Post-SFAS No.34 period.

In addition, this study also alternatively divides the entire samples into exclusively three sub-samples, that is, continuous users, selective users, and non-users, basing on the frequency of financial instruments usage and again compares the mean coefficient of variation of quarterly earnings of them to gain confirmatory evidences. From Panel B in Table 3, it is found that the mean coefficient of variation of quarterly earnings of continuous users sub-sample (1.8134) is smaller than both the selective users and non-users sub-samples (2.0975 and 2.3631) in the Post-SFAS No.34 period, nevertheless, the mean differences between the continuous users and non-users are statistical insignificantly ($p = 0.4221$). Although, the mean coefficient of variation of quarterly earnings in the Pre- and Post-SFAS No.34 periods of the three sub-samples are statistically insignificant (that is, $p = 0.1681$, 0.4794, and 0.9084, respectively), it is interested to found that the mean coefficient of variation of the continuous users sub-sample decreased (from 2.3209 to 1.8134), yet the other two sub-samples increase (from 1.6802 to 2.0975 and from 2.2079 to 2.3631, respectively). It is reasonable to infer, yet cannot conclude, continuously using financial instruments is moderate associated with lower volatility of quarterly earnings.

Overall, although, the mean coefficient of variation of quarterly earnings decreased in the Post-SFAS No.34 period, above preliminary sub-samples comparison indicates that the volatility of quarterly earnings in the empirical sample has not incurred dramatically structural change. And, the volatility of quarterly earnings for the continuous/active financial instruments users is likely small than the volatility of quarterly earnings for the non-users.

Results from stock price on earnings and book value regressions and two interactive variables for the magnitude of financial instruments users

To explore the impacts of magnitude of financial instruments usage on the relative value relevance change in earnings (EPS) and equity book value (BV), this study estimates the results from model (1). The estimation process begins with least-squares regression of the pooled data followed by as assessment of the validity of the pooled model's assumption of a single, overall intercept term. When the Lagrange multiplier statistic (LM test) rejects the pooled model (implies heterogeneous intercepts), this study adopts the panel data model to go in guest of more powerful examination. Conceptually, the fixed-effects model is appropriate when differences across firms are substantial, constant over time, and correlated with independent variables in the model. The random-effects model is appropriate when correlated omitted variables are not an issue (Greene, 2004). In the heterogeneous intercepts case, following the statistical guidance established by Hausman specification test (Hausman, 1978), estimation proceeds to choice between fixed effects and random effects. Naturally, this study also adopts White's (1980) heteroskedastity consistent covariance matrix estimator first to deal with the possible heteroskedasticity problem in all empirical regressions.

For the heterogeneous intercepts examination, regression results appear the null hypothesis of homogeneous intercepts is rejected as the resulting LM-

Table 3. Coefficient of variations (CV) measured by quarterly earnings for financial instruments users/non-users.

Panel A: Comparison between active vs. moderate derivatives users-by median				
	Active financial instruments users (N = 581)	**Moderate financial instruments users (N = 582)**	**CV mean difference**	**p-value (Active vs. moderate)**
Pre-SFAS No.34	2.0039	2.4688	-0.4649	0.4253
Post-SFAS No.34	1.5980	2.1866	-0.5886	0.0310
CV Mean Difference	0.4059	0.2822		
p-value(Pre- vs. post-)	0.2809	0.5891		

Panel B: Comparison Between All, Selective, And Non- Financial Instruments Users				
	Continuous users (cover all 3 years) (N = 931)	**Selective Users (cover 1 or 2 year) (N = 138)**	**Non-users (cover zero year) (N = 94)**	**p-value (Continuous vs. non)**
Pre-SFAS No.34	2.3209	1.6802	2.2079	0.9262
Post-SFAS No.34	1.8134	2.0975	2.3631	0.4221
p-value(Pre- vs. post-)	0.1681	0.4794	0.9084	

statistic is significant in both calendar year-end price and April-30 price models (LM = 31.82 and 44.82, respectively, and p-value < 0.01). Therefore, pooled regression results may be biased, so this study proceeds to panel data regression and to a comparison of fixed-effects and random-effects estimates. Based on the nature of the data, the Hausman test ($\chi^2 = 255.89$ and $\chi^2 = 479.36$ for the calendar year-end price and April-30 price model, respectively, and also p-value < 0.01) which rejected the null hypothesis of correlated omitted variables is not an issue and indicates that the fixed-effects model is preferred over the random-effects model. Thus, fixed-effects estimates dominate the following discussion of results. Additionally, incorporated year-dummy variable into pooled regression reveals statistically significant time effect in the cross-section empirical model (empirical result of the cross-section regression model in Table 4b). This study proceeds the panel fixed effect regression with time fixed effect to control the year effects.

The empirical results from model (1) using cross-section regression model, panel regression with random effects model, and panel regression with fixed effects model, respectively, are presented in Table 4. It is found that the panel fixed effects regression model's explanatory power far exceeds that of the pooled cross-sectional and panel random effects regression models. This is primarily due to the panel fixed effects model's use of firm-specific intercepts that both capture the role of reporting omitted variables and eliminate heterogeneity bias (Henderson and Kaplan, 2000). The coefficients on EPS and BV, as expected, are both positive and statistically significant at the 1% level in the three regression models. These findings are consistent with those of previous studies that there is a strong positive relationship between the share price and earnings/book value of equity. Most importantly, the coefficients on the pivotal explanatory variable DER*EPS are 0.852 (t = 4.61), 0.653 (t = 14.43), and 0.515 (t = 10.05), all positive and statistically significant at the 1% level in the regression models, respectively. According to the panel regression with fixed effects model, this suggests that the magnitude of financial instruments usage has taken as positive information impounded in the current net income resulting in positive impact on the value relevance of the earnings. The coefficients on the second pivotal explanatory variable DER*BV are -0.067 (t = -1.32), -0.097(t = -2.74), and -0.090 (t = -6.57), all negative but only statistically significant at the 1% level in the panel regression models, respectively. According to the panel regression with fixed effects model, this suggests that following a convex function of both earnings and book value, the magnitude of financial instruments usage had been taken as positive information impounded in the current earnings resulting in the value relevance of the book value of equity decreased. As predicted, there is indeed a positive impact of SFAS No.34 on the relative value-relevance of the earnings to reflect that the active financial instruments position will efficiently reduce the earnings volatility and, in turn, increase the relative value-relevance of earnings variable and decreases the relative value-relevance of equity book value.

As for the controlling variables, the coefficient of variable for correcting self-selection (IMR) is -1.636 (t = -7.88), negative and statistically significant at 1% level in the panel regression with fixed-effects model. The coefficients of leverage (LEV) and current ratio (QR) are 14.039 (t = 3.00) and 0.169 (t = 3.28), both positive and statistically significant at 1% level in the fixed-effects model. It suggests that the larger leverage and current ratio the higher firm's equity price at the end of calendar

Table 4. Results from regressions of stock price on earnings, book value and two interactive variables for the magnitude of financial instruments use

$$\mathbf{P_j} = \beta_0 + \beta_1 * \mathbf{EPS_j} + \beta_2 * \mathbf{BV_j} + \beta_3 * \mathbf{DER_j} + \beta_4 \mathbf{DER} * \mathbf{EPS_j} + \beta_5 * \mathbf{DER_j} * \mathbf{BV_j} + \beta_6 * \mathbf{IMR_j} + \beta_7 * \mathbf{LEV_j} + \beta_8 * \mathbf{SIZE_j} + \beta_9 * \mathbf{QR_j} + \varepsilon_j$$

Explanatory variable	Dependent variable (P)		
	Pooled regression with year-dummy	Panel regression with random effects	Panel regression with fixed effects
Intercept	20.182[a](4.72)	9.253(1.03)	---
EPS	3.267[a](8.70)	2.051[a] (10.52)	2.124[a](3.86)
BV	1.629[a](7.91)	2.480[a](3.09)	1.518[a](3.70)
DER	-0.943(-1.31)	0.158(0.36)	0.82(1.64)
DER*EPS	0.852[a](4.61)	0.653 [a](14.43)	0.515[a](10.05)
DER*BV	-0.067(-1.32)	-0.097 [a](-2.74)	-0.090[a](-6.57)
IMR	-1.276[a](-2.39)	-1.478[b](-2.00)	-1.636[a](-7.88)
LEV	9.919[a](4.40)	16.073[a](7.83)	14.039[a](3.00)
SIZE	-2.074[a](-5.41)	-1.673[a](-3.59)	14.144[a](6.59)
QR	0.232[a](2.88)	0.208[a](5.33)	0.169[a](3.28)
Year-2006	4.030[a](5.19)	---	---
Year-2007	3.406[a](4.23)	---	---
N	3,489	3,489(1,163*3)	3,489(1,163*3)
Adj-R^2	65.35%[a]	53.24%[a]	87.64%[a]
F-value	599.04	362.03	22.09

P: Stock price per share at the end of the calendar year; EPS: Reported earnings per share during the calendar year;BV: Book value per share at the end of the calendar year; DER: Financial instruments per share for firm at the end of the calendar year; IMR: Inverse Mill's ratio for firm at the end of the calendar year computed by the Probit regression; LEV: Debts to assets ratio at the end of the calendar year; SIZE: The natural logarithm of total assets at the end of the calendar year; QR: Current ratio at the end of the calendar year;D_34: Dummy variable for the years of SFAS N0.34 is enforced; a, b, and c indicate statistically significant at the 1, 5, and 10% levels, respectively.

year. The coefficient of firm size (SIZE) is 14.144 (t = 6.59), positive and statistically significant at 1% level. It seems that the firms with larger size have relative higher equity price.

In summary, these empirical findings lend support to the view that magnitude of financial instruments usage under SFAS No. 34 is systematically associated with investors' changing their valuation assessments about the active financial instruments decisions. It is found that the relative value-relevance of earnings increased, nonetheless, the relative value relevance of the equity book value decreased for the active financial instruments users. The research hypothesis of this study has gained empirical support.

ADDITIONAL ANALYSIS

Incremental value-relevance effect of SFAS No. 34 examination

Although, the time frame includes 2005 to 2007, yet, the financial instruments usage data in 2005 is derived from the annually comparative reports in 2006. This study then divides the entire sample into two sub-periods, that is, pre-SFAS No.34 (year 2005) and post-SFAS No.34 (year 2006 to 2007), to further examine the incremental regulated effect of SFAS No.34. To capture the incremental effect of SFAS No.34 on the relative value relevance of the earnings and equity book value, this study uses the indicator variable for the year of SFAS No.34 is enforced (post-SFAS No.34) and incorporate two three-way interactive variables into the empirical model. This study then estimates the following equation, which is a revision of Equation (1), to investigate the incremental regulated effect of SFAS No.34.

$$\mathbf{P_j} = \beta_0 + \beta_1 * \mathbf{EPS_j} + \beta_2 * \mathbf{BV_j} + \beta_3 * \mathbf{DER_j} + \beta_4 \mathbf{DER} * \mathbf{EPS_j} + \beta_5 * \mathbf{DER_j} * \mathbf{BV_j} + \beta_6 * \mathbf{IMR_j} + \beta_7 * \mathbf{LEV_j} + \beta_8 * \mathbf{SIZE_j} + \beta_9 * \mathbf{QR_j} + \beta_{10} * \mathbf{D\_34} * \mathbf{DER_j} * \mathbf{EPS_j} + \beta_{11} * \mathbf{D\_34} * \mathbf{DER_j} * \mathbf{BV_j} + \varepsilon_j \quad (3)$$

The indicator variable D_34 denotes one if the sample firms belong to the post-SFAS No.34 period and zero otherwise. The definitions of the remaining variables are the same as Equation (1). The additional empirical results are summarized in Table 5. It is found that the coefficients on DER*EPS and DER*BV, as expected, are positive/negative and statistically significant at the 1 and

Table 5. Results from regressions of stock price on earnings, book value and two interactive variables for the magnitude of financial instruments use

$$\mathbf{P_j} = \beta_0 + \beta_1 * \mathbf{EPS_j} + \beta_2 * \mathbf{BV_j} + \beta_3 * \mathbf{DER_j} + \beta_4 \mathbf{DER} * \mathbf{EPS_j} + \beta_5 * \mathbf{DER_j} * \mathbf{BV_j} + \beta_6 * \mathbf{IMR_j} + \beta_7 * \mathbf{LEV_j} + \beta_8 * \mathbf{SIZE_j} + \beta_9 * \mathbf{QR_j} + \beta_{10} * \mathbf{D\_34} * \mathbf{DER_j} * \mathbf{EPS_j} + \beta_{11} * \mathbf{D\_34} * \mathbf{DER_j} * \mathbf{BV_j} + \varepsilon_j$$

Explanatory variable	Dependent variable (P)	
	Panel regression with random effects	Panel regression with fixed effects
Intercept	7.371(0.53)	---
EPS	2.597[a](3.12)	2.308[a](4.21)
BV	2.047[a](7.53)	1.370[a](3.71)
DER	0.757(0.82)	1.072[a](2.92)
DER*EPS	0.408[b](2.05)	0.232[a](5.75)
DER*BV	-0.136[b](-2.12)	-0.126[a](-7.42)
IMR	-1.562[b](-2.11)	-1.702[a](-7.38)
LEV	13.905[a](8.64)	9.673[a](3.98)
SIZE	-1.494[b](-2.48)	15.641[a](12.81)
QR	0.208[a](6.03)	0.161[a](2.98)
D_34*DER*EPS	0.272(1.29)	0.296 [a](3.10)
D_34*DER*BV	0.020(0.64)	0.015(0.70)
N	3,489(1,163*3)	3,489(1,163*3)
Adj-R^2 (%)	53.04[a]	87.64[a]
F-value	359.12	22.08

P: Stock price per share at the end of the calendar year; EPS: Reported earnings per share during the calendar year;BV: Book value per share at the end of the calendar year; DER: Financial instruments per share for firm at the end of the calendar year; IMR: Inverse Mill's ratio for firm at the end of the calendar year computed by the Probit regression; LEV: Debts to assets ratio at the end of the calendar year; SIZE: The natural logarithm of total assets at the end of the calendar year; QR: Current ratio at the end of the calendar year;D_34: Dummy variable for the years of SFAS N0.34 is enforced; a, b, and c indicate statistically significant at the 1, 5, and 10% levels, respectively.

5% level in the regression with fixed effect and with random effect models, respectively. The coefficients on the incorporated interactive explanatory variable D_34*DER*EPS are 0.296 (t = 3.10) and 0.272 (t = 1.29), positive and only statistically significant at the 1% level in the panel regression with fixed effect model. It is interested to find that the coefficients on the second additional interactive explanatory variable D_34*DER*BV are 0.015 (t = 0.72) and 0.020 (t = 0.64), both positive and statistically insignificant in the models. Thus, the statistically significant decreased in value relevance of equity book value in the pre-SFAS No.34 period is consistent in the post-SFAS No.34 period. Since the incremental regulated effect is statistically significant on earnings variable in the panel regression with fixed effect model, the empirical results from the additional test suggest the enforcement of SFAS No.34, to some extent, increases the relative value-relevance of earnings in comparison with the pre-SFAS No.34 period. Nevertheless, the prediction of Burgstahler and Dichev (1997) that equity value is a convex function of both earnings and book value is again gained empirical support after the SFAS No.34 is enforced.

Cross-section regression examination

As previously mentioned, regression results appear the null hypothesis of homogeneous intercepts is rejected as the resulting LM-statistic is significant in empirical models, therefore, this study proceeds to panel data regression estimates. This choice would unavoidably be deprived of some samples in the empirical examination. To gain confirmatory empirical results, this study uses pooled cross-section sample and rerun Equation (1). These additional empirical findings are summarized in the columns entitled "Pooled Cross-section regression Model" in Table 6. It is found that the coefficients on EPS and BV, as expected, are both positive and statistically significant at the 1% level again. The coefficient on the pivotal explanatory variable DER*EPS is 0.816 (t = 4.93), positive and statistically significant at the 1% level in the regression model. The coefficient on the second pivotal explanatory variable DER*BV is -0.081(t = -1.66), negative and statistically significant at the 10% level in the model. The empirical results from the robustness test again provide strong corroborative evidence to the research hypothesis.

Alternative measurement date examination

People know that investors could acquire the magnitude of financial instruments usage information from MOPS after the listed firms post in Taiwan. However, because

Table 6. Results from regressions of stock price on earnings, book value and two interactive variables for the magnitude of financial instruments use

$$\mathbf{P_j} = \beta_0 + \beta_1 * \mathbf{EPS_j} + \beta_2 * \mathbf{BV_j} + \beta_3 * \mathbf{DER_j} + \beta_4 \mathbf{DER} * \mathbf{EPS_j} + \beta_5 * \mathbf{DER_j} * \mathbf{BV_j} + \beta_6 * \mathbf{IMR_j} + \beta_7 * \mathbf{LEV_j} \beta_8 * \mathbf{SIZE_j} + \beta_9 * \mathbf{QR_j} + \varepsilon_j$$

Explanatory variable	Dependent variable (P)				
	Pooled cross-section regression model	Panel regression with fixed effects, April model	Panel regression with fixed effects, scaled by total assets model	Panel regression with fixed effects, excluding selective sub-sample	Panel regression with fixed effects, excluding outlier sample)
Intercept	22.205[a] (5.44)	-	-	-	-
EPS	3.354[a](8.82)	2.317[a](9.80)	3.142[a](8.19)	1.830[a](3.96)	2.132[a](4.25)
BV	1.753[a](8.91)	0.386[b](2.00)	2.065[a](19.13)	1.196[a](3.77)	1.447[a](3.08)
DER	-0.650(-0.98)	0.162(0.32)	0.404(0.77)	-0.532[c](-1.93)	-0.046(-0.03)
DER*EPS	0.816[a](4.93)	0.129[b](2.20)	3.861[c](1.72)	0.452[a](6.86)	0.554[a](5.63)
DER*BV	-0.081[c](-1.66)	-0.034(-1.59)	-0.957(-1.13)	-0.044[c](-1.67)	-0.090[c](-1.70)
IMR	-1.875[a] (-3.42)	-2.156[a](-2.87)	-0.116[a](-6.23)	-12.799[a](-10.80)	-1.542[a](-14.18)
LEV	10.717[a](4.69)	12.198[b](2.50)	1.576[a](6.24)	5.640[a](4.76)	14.186[a](2.69)
SIZE	-2.313[a] (-6.45)	9.341[a](4.51)	-0.191[b](-2.55)	16.577[a](10.08)	13.984[a](5.55)
QR	0.304[a](3.19)	0.266[a](2.86)	0.008[a](3.00)	0.526[a](5.66)	0.177[a](2.85)
D_2006	4.423[a](5.51)	-	-	-	-
D_2007	4.380[a](5.28)	-	-	-	-
N	3,781	3,489(1,163*3)	3,489(1,163*3)	3,075(1,025*3)	3,453(1,151*3)
Adj-R^2	65.60%[a]	84.50%[a]	79.16%[a]	89.70%[a]	87.65%[a]
F-value	656.45	17.21	12.30	26.85	22.10

P: Stock price per share at the end of the calendar year: EPS: Reported earnings per share during the calendar year; BV: Book value per share at the end of the calendar year; DER: Financial instruments per share for firm at the end of the calendar year; IMR: Inverse Mill's ratio for firm at the end of the calendar year computed by the Probit regression; LEV: Debts to assets ratio at the end of the calendar year; SIZE: The natural logarithm of total assets at the end of the calendar year; QR: Current ratio at the end of the calendar year; Year-2006 and Year-2007: Dummy variable for the calendar year. a, b, and c indicate statistically significant at the 1, 5 and 10% levels, respectively.

listed firms must input annual reports into MOPS before April 30 of the next calendar year under the Taiwan Securities Exchange Law §36 regulation, there is a time lag between the calendar year-end and the date that listed firms input the magnitude of financial instruments using details. Thus, except for the initial stock price per share at the end of the calendar year, this study again uses the stock price per share at the date April 30 in the subsequent year to capture the possible market under-reaction problem and alleviate bias in the empirical study. The additional result is presented in the columns denoted "Panel Regression with Fixed Effects---April Model" in Table 6. It is found that the coefficients on EPS and BV, as expected, are 2.317 (t = 9.80) and 0.386 (t = 2.00), positive and statistically significant at the 1 and 5%, level respectively. The coefficient on the pivotal explanatory variable DER*EPS is 0.129 (t = 2.20), positive and statistically significant at the 5% level in the regression model. However, the coefficient on the second pivotal explanatory variable DER*BV is -0.034 (t = -1.59), negative but statistically insignificant in the model. The empirical result from the earnings variable robustness test again provides corroborative evidence to the research hypothesis, yet, the ratiocination about the equity book value variable is unlikely gain strong evidence to support in alternative measurement date.

Magnitude of financial instruments scaled by total assets examination

This study initially uses the outstanding shares at the end of calendar year calculating the derivatives per share to measure the magnitude of financial instruments usage. This study also uses beginning total assets to scale the magnitude of financial instruments, equity market value, and equity book value, respectively, and reexamines the panel regression model. The further examination result is presented in the columns denoted "Panel Regression with Fixed Effects---Scaled by Total Assets Model" in Table 6. Again, it is found that the coefficients on EPS and BV are 3.142 (t = 8.19) and 2.065 (t = 19.13), positive and statistically significant at the 1% level, respectively. The coefficient on the pivotal explanatory

variable DER*EPS is 3.861 (t = 1.72), positive and statistically significant at the 10% level in the regression model. Nonetheless, the coefficient on the second pivotal explanatory variable DER*BV is -0.957 (t = -1.13), negative but statistically insignificant in the model. The empirical result indicates that the interactive variable of earnings and magnitude of financial instruments usage is positive associated with firm's equity price and supports research hypothesis. However, the influence of the interactive variable of equity book value and magnitude of financial instruments usage on firm's equity price seems, to some extent, interfered with the differential scaling variable and cannot gain confirmatory evidence to support the hypothesis.

Excluded selective sub-sample and outlier samples consideration

The empirical results reported in preliminary results from the volatility of quarterly earnings Pre- vs. Post- SFAS No.34 show that there are differential pattern about the volatility of quarterly earnings between "Continuous Users Sub-sample" and "Selective Users Sub-sample". Since the firms in the "Selective Users Sub-sample" have not been consistently using financial instruments in their operation, following Wang and Kao (2005), it is reasonable to exclude this sub-sample and reexamines the regression model. In addition, it is expected to delete some samples that have larger magnitude of financial instruments per share to avoid the possible outlier sample bias in the regression model. This study deleted 12 firms (1%) which have largest magnitude of financial instruments per share (DER) and use the remaining 1,151 firms to run the panel regression model. The further examination results are presented in the columns denoted "Panel Regression with Fixed Effects---Exclude Selective Sub-sample" and "Panel Regression with Fixed Effects ---Exclude Outlier sample" in Table 6, respectively.

From Table 6, the coefficients on EPS and BV, as expected, are all positive and statistically significant at the 1% level in model checks, respectively. The coefficients on the pivotal explanatory variable DER*EPS are 0.452(t = 6.86) and 0.554 (t = 5.63), all positive and statistically significant at the 1% level in the "Panel Regression with Fixed Effects---Exclude Selective Sub-sample" and in the "Panel Regression with Fixed Effects---Exclude Outlier sample" models. More importantly, the coefficients on the second pivotal explanatory variable DER*BV are -0.044 (t = -1.67) and -0.090 (t = -1.70), both negative and statistically significant at 10% level in the respective model. The results confirm the initial findings. Overall, these empirical findings provide confirmatory supports to the hypothesis and are not confounded by the sample selection bias.

In summary, the above additional diagnostic checks demonstrate that the empirical results are robust to the various specifications for the earnings variable. The major findings for the equity book value variable as reported, yet, are only robust in some additional tests.

Conclusion

The purpose of this study is to examine the relative value-relevance changes in equity book value and earnings for the magnitude of financial instruments usage after the SFAS No. 34 is enforced in Taiwan. This study explores the prediction that the pricing multiple on the earnings (equity book value) increases (decreases) as the listed firms who have larger magnitude of financial instruments usage. By examining the equity market effect related to initial financial instruments using information, this study provides investors with evidence concerning the importance of this recently available data with respect to equity market valuations.

The empirical result indicates that the result, as conjectured, provides evidence about the relative value-relevance of earnings variable increases for the large magnitude of financial instruments users compared to listed firms who only moderate or none using financial instruments. These results remain robust to the various specification tests, which include pooled cross-section regression test, differential measurement date, scaled by the total assets, excluding the selective financial instruments users, and excluding the outlier samples. However, it is also found that the relative value-relevance of equity book value decreases for the large magnitude of financial instruments users; yet, the results are sensitive in some specification tests. Although the decreasing value relevance of equity book value is moderate trade-off by the increasing value relevance of earnings, the value relevance on financial statement components indeed changed after the new standard is initially implemented.

The findings in this study are subject to a number of limitations and should be interpreted with caution. Because the analysis is based on the stylized Ohlson model, the usual caution with joint model fitting and initial magnitude of financial instruments usage effect should be employed in interpreting the results. In addition, this study adopts a broad approach to examine the consequences (that is, value-relevance) of SFAS No.34, instead of the motivations to adopt this new standard. Thus, this study cannot remove the possibility that such motivations constitute bias in the empirical findings. Lastly, this study notes that although this study provides evidence on the value relevance of the magnitude of financial instruments usage to examine the possible policy effect of SFAS No.34, it does not consider the costs of these recognitions and disclosures. As Elliott and Jacobson (1994) pointed out, the costs of developing and presenting disclosures and a host of other factors should

be considered in evaluating any public disclosure policy.

ACKNOWLEDGEMENTS

The first author gratefully acknowledges the financial support generously provided by National Science Council in Taiwan (Grant number: NSC98-2410-H-224-033-MY2). All errors are our responsibility.

REFERENCES

Aboody D, Barth ME, Kasznik R (2004). SFAS No.123 stock-based compensation expense and equity market value. Account. Rev., 79: 251-275.

Ahmed AS, Kilie E, Lobo GJ (2006). Does recognition versus disclosure matter? Evidence from value-relevance of banks' recognized and disclosed derivative financial instruments. Account. Rev., 81: 567-588.

Allayannis G., Ofek E (2001). Exchange rate exposure, hedging, and the use of foreign currency derivatives. J. Int. Mon. Fin., 20: 273-295.

Arce M, Mora A (2002). Empirical evidence of the effect of European accounting differences on the stock market valuation of earnings and book value. Eur. Account. Rev., 11: 573-599.

Ball R, Brown P (1968). An empirical evaluation of accounting income numbers. J. Account. Res., 6: 159-177.

Barth ME, Beaver WH, Landsman WR (1996). Value-relevance of banks' fair value disclosures under SFAS No.107. Account. Rev., 23: 513-537.

Barth ME, Beaver WH, Landsman WR (1998). Relative valuation roles of equity book value and net income as a function of financial health. J. Account. Econ., 25: 1-34.

Barton J (2001). Does the use of financial derivatives affect earnings management decisions? Account. Rev., 76: 1-26.

Beaver WH (1968). Market prices, financial rations, and the prediction of failure. J. Account. Res., 6(2): 179-192.

Becker C, Defond M, Jiambalvo J, Subramanyam K (1998). The effect of audit quality on earnings management. Cont. Account. Res., 15: 1-24.

Black EL, White JJ (2003). An international comparison of income statement and balance sheet information: Germany, Japan and the US. Eur. Account. Rev., 12: 29–46.

Blankely A, Schroeder R (2000). Accounting for derivatives under SFAS No.133. Mid-Atlantic J. Bus., 36: 17-35.

Breeden D, Viswanathan S (1998). Why do firms hedge? An asymmetric information model. Working Paper, Duke University.

Burgstahler DC, Dichev ID (1997). Earnings, adaptation and equity value. Account. Rev., 72: 187-215.

Collins DW, Maydew EL, Weiss IS (1997). Changes in the value-relevance of earnings and book values over the past forty years. J. Account. Econ., 24: 39-67.

Collins M, Pincus M, Xie H (1999). Equity valuation and negative earnings: the role of book value of equity. Account. Rev., 74: 29-61.

Dadalt P, Gay G, Nam J (2002). Asymmetric information and corporate derivatives use. J. Fut. Mar., 22: 241-267.

Easton PD, Harris TS (1991). Earnings as an explanatory variable for returns. J. Account. Res. 29: 19-36.

Eccher A, Ramesh K, Thiagarajan S (1996). Fair value disclosures of bank holding companies. J. Account. Econ., 22: 79-117.

Elliott R, Jacobson P (1994). Costs and benefits of business information disclosure. Account. Hori., 8: 80-96.

Feltham GA, Ohlson JA (1995). Valuation and clean surplus accounting for operating and financial activities. Cont. Account. Res., 11: 689-732.

Foke RC, Carroll WC, Chiou MC (1997). Determinants of corporate hedging and derivatives: A revisit. J. Econ. Bus., 49: 569-585.

Francis J, Schipper K (1999). Have financial statements lost their relevance. J. Account. Res., 37: 319-352.

Gèczy C, Minton BA, Schrand CM (1997). Why firms use currency derivatives. J. Fin., 52: 1323-1334.

Gèczy C, Minton BA, Schrand CM (2007). Taking a view: Corporate speculation, governance, and compensation. J. Fin., 62(5): 2405-2443.

Graham JR, Harvey CR, Rajgopal S (2005). The economic implications of corporate financial reporting. J. Account. Econ., 40: 3–73.

Greene WH (2004). *Econometric Analysis*, 4 ed., Prentice-Hall, Inc., New Jersey.

Guay WR (1999). The impact of derivatives on firm risk: An empirical examination of new derivative users. J. Account. Econ., 26: 319-351.

Haushalter GD (2000). Financing policy, basis risk, and corporate hedging: Evidence from oil and gas producers. J. Fin., 55: 107-152.

Hausman JA (1978). Specification tests in econometrics. Econom., 46: 1251-1271.

Henderson BC, Kaplan SE (2000). An examination of audit report lag for banks: A panel data approach. Aud. J. Prac. Theo*.,* 19: 159-175.

Kothari SP, Zimmerman J (1995). Price and return models. J. Acc. Econ., 20: 155-192.

Lambert RA (1984). Income smoothing as rational equilibrium behavior. Account. Rev. 59: 604-618.

Lev B, Zarowin P (1999). The boundaries of financial reporting and how to extend them. J. Account. Res., 37: 353-385.

Lewis C, Chaney P (1990). An empirical analysis of income smoothing: evidence from initial public offering. Working Paper, Vanderbilt University.

Li W, Stammerjohan WW (2004). Empirical analysis of effects of SFAS No.133 on derivatives use and earnings smoothing. Working Paper, 2004 AAA Annual Meeting.

Marquardt CA, Wiedman CI (2004). The effect of earnings management on the value relevance of accounting information. J. Bus. Account., 31: 297-329.

Marsden A, Prevost A (2000). Derivatives use, corporate governance, and legislative change: an empirical analysis of New Zealand listed companies. J. Bus. Fin. Account., 32: 255-295.

Melumad N, Weyns G, Ziv A (1999). Comparing alternative hedge accounting standards: Shareholders perspective. Rev. Account. Stud., 5: 265-292.

Minton BA, Schrand C (1999). The impact of cash flow volatility on discretionary investment and the cost of debt and equity financing. J. Financ. Econ., 54: 423-460.

Nance DR, Smith CW, Smithson CW (1993). On the determinants of corporate hedging. J. Fin., 48: 267-284.

Nwaeze ET (1998). Regulation and the valuation relevance of book value and earnings: evidence from the United States. Cont. Account. Res., 15: 547-573.

Ohlson J (1995). Earnings, book values and dividends in security valuation. Cont. Account. Res., 11: 661-668.

Ou JA, Sepe JF (2002). Analysts' earnings forecasts and the roles of earnings and book value in equity valuation. J. Bus. Fin. Account., 29: 287-316.

Petersen MA, Thiagarjan SR (2000). Risk measurement and hedging: with and without derivatives. Financ. Manage., 29: 5-30.

Pincus M, Rajgopal S (2002). The interaction of accounting policy choice and hedging: evidence from oil and gas firms. Account. Rev., 77: 127-160.

Prevost A, Rose L, Miller G (2000). Derivatives usage and financial risk management in large and small economics: a comparative analysis. J. Bus. Fin. Account., 27: 733-759.

Riffe S (1997). The valuation of off-balance-sheet financial instrument disclosures in the banking industry. Derivatives, Regul. Banking*,* ed. by Barry Schachter, North-Holland.

Schrand C, Unal H (1998). Hedging and coordinated risk management: Evidence from thrift conversions. J. Fin., 53: 979-1013.

Shamy MA, Kayed MA (2005). The value relevance of earnings and book values in equity valuation: an international perspective - the case of Kuwait. Int. J. Com. Manage., 14: 68-79.

Smith CW, Stulz RM (1985). The determinants of firms' hedging policies. J. Financ. Quant. Anal., 20: 391-405.

Tufano P (1996). Who manage risk? An empirical examination of risk management practices in the gold mining industry. J. Fin., 51: 1097-1137.

Venkatachalam M (1996). Value-relevance of banks' derivatives disclosures. J. Account. Econ., 22: 327-355.
Visvanathan G (1998). Who uses interest rate swaps? A cross-sectional analysis. J. Account. Aud. Fin., 13: 173-200.
Wang W, Kao SH (2005). Discretionary accruals, derivatives and income smoothing. Taiwan Account. Rev., 5: 143-168.
Wang L, Alam P, Makar S (2005). The value-relevance of derivative disclosures by commercial banks: a comprehensive study of information content under SFAS No 119 and 133. Rev. Quant. Fin. Account., 25: 413-427.
Wang C, Lee C, Huang B (2003). An analysis of industry and country effects in global stock returns: evidence from Asian countries and the U.S. Q. Rev. Econ. Fin., 43: 560-577.
Whelan C, McNamara R (2004). The impact of earnings management on the value-relevance of financial statement information. unpublished manuscript, The Georgia College & State University, USA.
White H (1980). A heteroscedasticity-consistent covariance matrix estimator and a direct test for heteroscedasticity. Econom., 48: 817-838.
Yee K (2000). Opportunities knocking: residual income valuation of an adaptive firm. J. Account. Aud. Fin., 15: 225-270.
Zarowin P (2002). Does income smoothing make stock prices more informative? Working Paper, New York University.
Zhang H (2009). Effect of derivative dccounting rules on corporate risk-management behavior. J. Account. Econ., 47(2): 244-264.

APPENDIX

Appendix A. Probit regression result of the derivatives user choice model

$$\mathbf{USER_j} = \beta_0 + \beta_1 * \mathbf{COMP_j} + \beta_2 * \mathbf{STOCK_j} + \beta_3 * \mathbf{LEV_j} + \beta_4 \mathbf{RD_j} + \beta_5 * \mathbf{FS_j} + \beta_6 * \mathbf{D\_IND_j} + \beta_7 * \mathbf{QR_j}$$
$$\beta_8 * \mathbf{DIV\_YIELD_j} + \beta_9 * \mathbf{ST\_LEV_j} + \varepsilon_j$$

Independent variable	Dependent variable---USER	
	Coefficients	Z-statistic
Intercept	2.190[a]	12.48
COMP	-61.433[a]	-3.21
STOCK	-1.626[a]	-8.93
LEV	-0.489[a]	-2.43
RD	-1.369[a]	-2.57
FS	0.001	1.53
D_IND	-0.237[a]	-3.43
QR	0.036	1.38
DIV_YIELD	2.662[a]	2.81
ST_LEV	-0.570[a]	-4.02
N	3,489	
McFadden R^2(%)	5.68	
LR statistic	160.39[a]	

USER: An indicator variable that equals 1 if a firm is a derivatives user and 0 otherwise; COMP: Compensation variable, measured as managers, directors, and supervisors' compensation divided by beginning total assets; STOCK: Percentage of managers, directors, and supervisors' shareholdings at the end of fiscal year; LEV: Debts to assets ratio at the end of the calendar year; RD: Research and development expenditure divided by the equity capitalization; FS: Foreign sales ratio measured by foreign sales divided by the total sales; D_IND: An indicator variable for electrical industry that equal 1 if a firm is belonged to the electrical industry and 0 otherwise; QR: Current ratio measured as current assets divided by current liability; DIV_YIELD: Dividend yield ratio measured as dividend divided by the equity price; ST_LEV: Short-term debt ratio measured as current liability divided by the total liability; a, b, and c denote statistical significance at the 1, 5%, and 10% level, respectively, in a two-tailed test.