Journal of Accounting Review
會計評論，第 64 期，2017 年 1 月
第 39－59 頁

財務會計準則第四十號公報規範不確定性分析揭露之資訊內涵

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摘要

不確定性分析旨在提供會計衡量值之點估計的信賴區間，此項揭露通常被認為具有資訊價值(IASB 2010; CFO Forum 2009)。然而，與之相關的證據仍不多。本研究為第一個針對保險業精算假設的不確定性分析之資訊內涵進行探討的研究，使用台灣保險公司於 2011 年及 2014 年間的此項揭露資料，實證結果顯示精算假設變動所造成的盈餘變動和下一期的盈餘變動有正向關係。再者，由於風險管理委員會在保險公司風險管理政策上扮演相當重要的角色，本研究亦探討風險管理委員是否影響此項揭露之資訊內涵，實證結果顯示若風險管理委員會品質較高，即當委員會成員數較多或是委員會員平均出席率較高，此項揭露的資訊內涵也較高。本研究的結果清楚地呈現不確定性分析之揭露有助於了解公司未來風險，可以作為主管機關在遵循國際財務報導準則時的參考依據。

關鍵詞：不確定性分析之揭露、資訊內涵、財會準則第四十號公報、風險管理委員會

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收稿日：2015年11月
接受日：2016年 7月
二審後接受
DOI: 10.6552/JOAR.2017.64.2
第三屆會計師公會全國聯合會論文獎 銀獎
本文採多向匿名送審，送審期間未對評審與領域主編揭露作者姓名與身分，作者亦不知道評審與領域主編之身份

The Informativeness of Uncertainty Analysis Disclosure Under TFAS No. 40 in the Insurance Industry

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Abstract

Aiming to provide a confidence interval of the point estimate of reported accounting performance measures, uncertainty analysis disclosure is usually considered to contain valuable information (IASB 2010; CFO Forum 2009). However, little empirical evidence has been documented. As the first study to examine the relevance of such disclosures, we examine the mandatory disclosures of Taiwanese insurance companies during the period 2011-2014. The result finds a positive relationship between the absolute values of earnings effects due to changes in actuarial assumptions and the insurers' earnings change in the subsequent periods. In addition, because the risk management committee is responsible for formulating and implementing the risk management policies of an insurance company, we find that the informativeness of the uncertainty analysis disclosure is improved by the quality of the risk management committee, measured by the committee size and the attendance of the committee members. Our findings provide critical insights for regulators when applying the International Accounting Standards.

Keywords: *Uncertainty analysis, Informativeness, TFAS No. 40, Risk management committee.*

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Submitted November 2015
Accepted July 2016
After 2 rounds of review
DOI: 10.6552/JOAR.2017.64.2
Silver Prize, the 2014 Best Paper Awards of National Federation of Certified Public Accountant Associations of the ROC (NFCPAA)

1. INTRODUCTION

Accounting metrics for financial reports are so-called point estimations of a company's performance. While a point estimation is easy for users to understand, decision making will be improved if information regarding the uncertainty of this point estimation is also provided. Based on this, International Financial Reporting Standards (IFRS) 4 phase I stipulates[1] that insurance companies should disclose how changes in actuarial assumptions will affect current earnings, that is, the uncertainty analysis.[2] Such disclosure is also mandatory under Taiwan Financial Accounting Statement No. 40 (TFAS 40), "Insurance Contract," which is essentially a translation[3] of IFRS 4 phase I and which took effect in 2011. More specifically, an insurance company should disclose how a change in each actuarial assumption, such as the mortality[4] or morbidity[5] rates, the lapse rate,[6] or the investment yield rate,[7] affects the reported earnings and equities.

The aim of this study is to examine the informativeness of such uncertainty analysis. We argue that such disclosure contains information that facilitates decision making in two ways. First, while insurance companies are faced with similar categories of non-financial (e.g., mortality or morbidity rate and lapse rate) or financial (e.g., investment yield rate) risks, the magnitude may differ. An insurance company that invests more heavily in the stock market would have earnings that are more responsive to the volatility of stock prices, while another insurance company that has most of its investments in fixed-income securities may be less influenced by the fluctuation of the stock market. Similarly, a change in lapse rates may affect two insurance companies to different degrees if one of them focuses on protection-oriented products and the other primarily sells investment-linked policies.[8] Second, while one might assume that the management has made unbiased estimations when

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[1] Due to the great complexity and controversy involved in the valuation of insurance liabilities, the implementation of IFRS accounting standards for insurers is planned in two phases. Phase I, in force since 2005, is documented in IFRS 4, and it serves as an interim solution with a focus on disclosure. The exposure draft (ED) for Phase II (IASB2013) was announced in 2013. See http://www.ifrs.org/Pages/default.spx for details about the ED for Phase II.

[2] Such disclosure is also known as "sensitivity analysis," and because it is phrased as "uncertainty analysis" in the formal guidance for International Accounting Standards Board (IASB) standards, we use "uncertainty analysis" in this study.

[3] As preparation for the overall application of International Accounting Standards, Taiwan has adopted several accounting standards that are essentially translations of the guidance for related International Accounting Standards.

[4] The mortality rate refers to the likelihood that a person belonging to a particular group, categorized according to age or some other factor such as occupation, will die.

[5] The morbidity rate is the likelihood that a person will suffer a disease, illness, injury, or sickness based on being a member of a particular group, categorized by age, occupation, or some other factors.

[6] Lapse rate is defined as policies lapsed divided by policies in force during the period.

[7] Investment yield rate is defined as net investment income divided by average invested assets, which generally refer to total investments on the balance sheet.

[8] Notably, while the product mix might be the reason for the differential effect of the change in actuarial assumptions on earnings, the product mix itself would not be more informative than the disclosed earnings effect because from users' viewpoint, what really counts is how much and not why the change in actuarial assumptions affects the earnings.

applying the actuarial assumptions, users may still desire some small adjustments to those assumptions and assess whether the revised earning metrics would affect their decisions. Taken together, we hypothesize that the uncertainty analysis information captures the combined earnings effect of underlying volatility and net exposure to operating risks, which include mortality, morbidity, lapse rate, investment yield rate, etc. Therefore, we predict the earnings effect due to the changes in actuarial assumptions to be informative about a company's subsequent earnings change.

We further investigate how a unique mechanism in insurance companies—the risk management committee—affects the informativeness of uncertainty analysis disclosure. More specifically, under the Code of Corporate Governance for Insurance Companies,[9] insurance companies in Taiwan are required to form a risk management committee.[10] Because such a committee usually has an oversight role in developing, enforcing, and monitoring the implementation of the risk management policy, we propose that when the characteristics of a risk management committee are associated with a higher quality of decision making, the committee may set more stringent standards for its management team regarding actuarial expertise and allow for less deviation from estimations. Therefore, the uncertainty analysis disclosure provided by companies with a higher quality risk management committee is more informative about in subsequent earnings change.

Based on the quarterly data from the uncertainty analysis disclosed by Taiwan's insurance companies during the period 2011-2014,[11] we assess the relationship between the absolute values of earnings effects due to changes in actuarial assumptions and the absolute value of one-quarter-ahead earnings change. The quality of an insurer's risk management committee, measured by the committee size or the average attendance of the committee members, is interacted with the metrics from the uncertainty analysis disclosure to evaluate the incremental effect. Taiwanese data is used for two reasons. First, such disclosure is required only when the jurisdiction applies accounting rules that are similar to the International Accounting Standards. Thus, U.S. insurance companies rarely provide such information. Second, while European insurers are subject to the disclosure requirement under IFRS 4 phase I, a preliminary inspection reveals that the format of their disclosure is not uniform. By contrast, in Taiwan, the Financial Supervisory Commission offers clear guidance regarding how to report the uncertainty analysis information; therefore, the data provided by Taiwanese insurance companies are in the same format, which is an important advantage when conducting empirical testing.

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[9] Available at http://www.lia-roc.org.tw/index06/law/selfregu02.htm.

[10] Although the Code phrases it as "strongly encouraging" instead of "requiring" the formation of a risk management committee, a preliminary inspection indicates that almost 90% of insurance companies have set up such a committee.

[11] The data for 2014 is only available up to 2014Q2.

We document the following findings. First, the absolute value of earnings effects due to changes in actuarial assumptions is positively related to a company's risk, controlling for the effects of size, leverage, and profitability. Second, when the number of members on a company's risk management committee is greater, or the average attendance of the committee members is higher, the informativeness of the uncertainty analysis disclosure is more pronounced.

This study makes the following contributions. First, it is the first to document the informativeness of uncertainty analysis disclosure in the insurance industry. While the insurance industry has usually been excluded from general empirical analysis, it has great influence on economics as a whole. However, due to the high uncertainty and complexity inherent in insurance policies, reporting precise point estimations of companies' performances is even more difficult in this industry than in other industries. Therefore, uncertainty analysis information is particularly insightful, which is similar to the concept of providing a confidence interval. As our results clearly demonstrate the informativeness of the uncertainty analysis disclosure, various users of financial statements can utilize such disclosure to refine their decision making, including insurance policy purchasing, stock investing, etc.

The second contribution relates to the direct implications for accounting standard-setting. Notably, while IFRS 4 phase I makes such disclosure mandatory, the latest exposure draft (ED) of IFRS 4 phase II (IASB 2013), announced in 2013, eliminated that requirement. In its basis for conclusions for its ED, the IASB states the following:

"*The 2010 Exposure Draft proposed the disclosure of an analysis of the measurement uncertainty in the inputs that have a material effect on the measurement. This would have been similar to the disclosure for unobservable inputs in fair value measurement, as described in paragraphs BC202-BC210 of the Basis for Conclusions to IFRS 13. The IASB decided not to require such a disclosure for unobservable inputs in IFRS 13 because of concerns about costs relative to benefits, but instead required more quantitative information about the inputs as well as narrative information about how those inputs influence the measurement. Accordingly, consistent with its decision for IFRS 13, the IASB did not include such a disclosure in this Exposure Draft.*"

Interestingly, the IASB's belief that uncertainty analysis metrics may not provide enough benefits to outweigh costs is contrary to the viewpoint of insurance practitioners. The European Insurance CFO Forum, a high-level discussion group formed and attended by the chief financial officers of major European insurance companies, emphasizes that uncertainty analysis metrics provide very useful information[12] and would allow an informed analyst to make valid comparisons on different assumption sets.[13] The CFO Forum therefore stipulates that uncertainty analysis information is mandatory under the market consistent embedded value (MCEV) reporting system.[14] Our findings that uncertainty analysis disclosure is relevant when assessing an insurance company's unexpected earnings suggest that the IASB should reconsider such elimination. Meanwhile, for other jurisdictions that apply the International Accounting Standards, additional local guidance may be necessary to ensure the reporting of uncertainty analysis if the IASB still chooses not to make such disclosure mandatory. Clearly, for U.S. authorities, similar disclosures should be encouraged for the purpose of enhancing users' decision making.

Last, this is the first study to provide direct evidence of the role of an insurance company's risk management committee in determining the quality of financial reporting. Due to the great complexity of insurance products, it is difficult for general investors and policyholders to evaluate the credibility of accounting metrics provided by insurance companies. As our results show that the characteristics of the risk management committee influence the degree to which the company's disclosure is informative about its subsequent earnings change, users' decision making would essentially be enhanced by taking such information into account.

The remainder of this research proposal proceeds as follows. We review the relevant literature and posit testable hypotheses in Section 2. The data and empirical methodology are described in Section 3, and the results are discussed in Section 4. We provide the conclusion and implications in Section 5.

[12] Basis for conclusions to G17.4, 17.5: Sensitivities provide very useful information, but they are very demanding for company resources to produce. Accordingly, attention should be focused on those whose information value justifies the cost of production.

[13] G17.6: Disclosure of sensitivities is intended to allow an informed analyst to make valid comparisons on different assumption sets.

[14] Embedded value is a supplementary performance measure that is widely reported by European insurance companies. In brief, it is made up of the sum of discounted values of distributable earnings from in-force business and the excess of market values of assets over statutory liabilities. Notably, the former component represents the "anticipated" profits that will be earned from in-force insurance policies, which are not recognized under current IFRS or U.S.GAAP. See Serafeim (2011) for more details about embedded value reporting.

2. INSTITUTIONAL BACKGROUNDS, LITERATURE, AND HYPOTHESES

TFAS No. 40, "Insurance Contract", took effect in Taiwan in 2011. It is basically a translation of IFRS 4 phase I, which was announced by the IASB in 2004. Due to the great complexity and controversy associated with the valuation of insurance liabilities, IFRS 4 phase I did not stipulate the measurement issue but focused on the classification and disclosure requirements. One of the most emphasized disclosures is information about how the changes in actuarial assumptions affect before-tax earnings and equities; this disclosure is usually referred to as the uncertainty analysis (or the sensitivity analysis). For the purpose of illustration, the following two disclosures are taken from the Cathay Life Insurance quarterly report ending March 31, 2011 and from the Shinkong Insurance quarterly report ending December 31, 2012.

EXHIBIT 1 An Example of Uncertainty Analysis Disclosure– Life

	Change in Assumption	Change in Earnings ($ in Thousands)	Change in Equity ($ in Thousands)
Mortality/Morbidity	×1.05 (×0.95)	Decrease (increase) 506,085	Decrease (increase) 420,051
Lapse	×1.05 (×0.95)	Decrease (increase) 77,436	Decrease (increase) 62,272
Expense[15]	×1.05 (×0.95)	Decrease (increase) 640,808	Decrease (increase) 531,871
Investment yield	+0.1%	Increase 734,655	Increase 609,764

Source: Cathay Life Insurance quarterly report ending March 31, 2011.

EXHIBIT 2 An Example of Uncertainty Analysis Disclosure– Non-Life

	The Earnings Effect Due to A 5% Increase in the Loss Ratio[16]	
Product line	Before Reinsurance	After Reinsurance
Fire insurance	$114,426,517	$40,777,354
Marine insurance	31,417,212	16,124,532
Land and air insurance	214,300,319	167,437,946
Liability insurance	23,911,651	18,985,447
Construction insurance	32,084,926	15,802,509
Other property insurance	5,887,173	4,428,128
Casualty insurance	65,989,400	54,940,597
Health insurance	279,976	141,193
Total	$488,297,174	$318,636,806

Source: Shinkong Insurance quarterly report ending December 31, 2012.

[15] Expenses refer to items included in operating costs and expenses, such as underwriting outlay, commissions, selling, administrative and training spending, etc.

[16] A loss ratio demonstrates the proportion of incurred losses as a percentage of earned premiums. If, for example, a company pays $100,000 in premiums for workers' compensation insurance in a given year and its insurer pays $50,000 in claims, the insurer's loss ratio is 50% ($50,000 incurred losses/$100,000 earned premiums).

According to the IFRS 4 phase I Basis for Conclusions, uncertainty analysis is mandatory because it informs users about the extent to which the insurer might reasonably have arrived at different measurements. More specifically, the insurance liability is estimated based on numerous actuarial assumptions, such as mortality, morbidity, lapse rate, investment yield rate, etc. Intuitively, such disclosure can facilitate users' decision making in two ways. First, when two insurance companies that are considered to be similar in operation apply varying actuarial assumptions, users may utilize metrics in the uncertainty analysis to modify reported earnings for the purpose of comparing their performances in a more reasonable way. Second, when users anticipate a change in any actuarial assumption, the information in the uncertainty analysis helps in evaluating the extent to which the reported earnings (or equities) will be affected. In the current ever-changing and sometimes unpredictable economic environment, such disclosure should be highly informative because even a tiny adjustment to actuarial assumptions may lead to a great difference for insurance contracts.

However, based on the existing literature, little is known about the informativeness of the uncertainty analysis provided by insurance companies, although the research stream about value-at-risk (VAR) disclosure provides some insightful evidence. For instance, based on a sample of U.S. commercial banks, Jorion (2002) investigates the informativeness of VAR, a measure of the dollar amount of the potential loss incurred due to adverse market moves. For instance, a company disclosing that its daily VAR is $30 million at the 95% level means that there is only a 5% chance the company will incur more than a $30 million loss over the next day. Based on some analytical works, Jorion (2002) predicts that VAR is informative about the risks of future trading revenues. He conducted empirical tests by estimating the relationship between the VAR-based quarterly volatility and the absolute value of the unexpected trading revenue in the subsequent quarter, found supportive evidence, and concluded that the results are consistent with analysts being able to meaningfully compare the risk profiles of different banks using their disclosed VARs.

Liu, Ryan, and Tan (2004) extend Jorion's findings using a larger sample of 17 banks reporting trading VARs from 1997-2002. They find that banks' trading VARs have predictive power for a bank-wide measure of total risk and return variability and for two bank-wide measures of priced risk, beta, and realized returns. Lim and Tan (2007) further investigate whether VAR estimates disclosed by 81 non-financial companies during the period 1997-2002 are value-relevant. They hypothesize that a high VAR implies less persistent earnings and results in a lower expected rate of returns. Also, because VAR captures a company's exposure to market risk, which affects the variability of cash flows, they posit that the level of VAR is positively related to future market-based measures, which is supported by their results. Summarizing the above evidence and returning to the informativeness of uncertainty analysis based on changes in actuarial assumptions, we argue that such information captures

the combined effect of underlying volatility and net exposure to operating risk, which includes mortality, morbidity, lapse rate, investment yield rate, etc. Therefore, similar *ex ante* changes in actuarial assumptions will have greater impact on an insurer that discloses a greater earnings effect due to changes in actuarial assumptions. The following hypothesis is proposed:

H1: The earnings effect due to changes in actuarial assumptions disclosed by an insurance company is informative about its subsequent earnings change.

We further examine whether the informativeness of the uncertainty analysis disclosures varies with the soundness of an insurance company's risk management mechanism. Specifically, under the Code of Corporate Governance for Insurance Companies[17] stipulated by the Financial Supervisory Commission, insurance companies in Taiwan are required to form a board-level risk management committee. In general, a risk management committee is responsible for advising and making recommendations to the board, independent of management, on the governance of risk management by the company. Usually, it has an oversight role in developing, updating, enforcing, and monitoring the implementation of the risk management policy on behalf of the board (Choi 2013).[18] While the focus is on examining factors that affect a company's decision to set up such a committee (Yatim 2010; Liew, Zain, and Jaffar 2012),[19] existing studies on the effectiveness of the risk management committee are limited. As the formation of such a committee is mandatory in Taiwan, we propose that the characteristics of a risk management committee are more relevant in the Taiwanese context. In particular, when the characteristics of a risk management committee are associated with a higher quality of decision making, the committee may set more stringent standards for its management team regarding actuarial expertise and allow for less deviation from estimates. Therefore, the management team is more capable of providing uncertainty analysis disclosures that anticipate future risks more accurately. Summarizing the above, the following hypothesis is put forward:

H2: The informativeness of uncertainty analysis disclosures is enhanced by the quality of an insurance company's risk management committee.

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[17] Available at http://www.lia-roc.org.tw/index06/law/selfregu02.htm.

[18] Generally, more specific duties of the risk management committee may include: (1) in conjunction with and based on inputs from management, discussing the risk appetite and risk tolerance of the entity, determining and confirming the risk management objectives, and developing the annual enterprise risk management strategy to be recommended to the full board for adoption; (2) reviewing the entity's risk management infrastructure and control systems to ensure that they are capable of fulfilling the risk management objectives and enforcing the risk management policies; (3) reviewing policies, procedures, methodologies, and tools to be adopted by the entity to identify, evaluate, manage, report, and communicate risks; (4) overseeing the management's role and responsibilities and providing them with direction; and (5) reviewing the management's determination of what constitutes key balance sheet and off-balance sheet risks.

[19] Based on the non-financial companies in Malaysia during 2009, Liew et al. (2012) examine the determinants of setting up a risk management committee using a logistic regression model. Their results indicate that the percentage of independent directors, the size of the board, the number of board meetings, and the percentage of directors that have financial or accounting expertise is positively related to the probability of forming a risk management committee. Yatim (2010) documents similar findings.

3. RESEARCH DESIGN

3.1 Sample and Data Description

The sample includes all Taiwanese insurance companies whose quarterly data are available for some or all years during the period 2011Q1–2014Q2. Financial data items were obtained from the Taiwan Economic Journal (TEJ), and the earnings effects due to changes in actuarial assumptions (i.e., the uncertainty analysis disclosure) were manually retrieved from quarterly reports required by the Financial Supervisory Commission because they are not readily available in any database. Data on the details about the risk management committee were collected from the official websites of insurance companies. Observations with missing values were excluded from the original sample. As shown in TABLE 1, the final sample consists of 140 observations from seven life insurance companies and nine non-life insurance companies. Following prior studies (Brown, Christensen, Elliott, and Mergenthaler 2012; Kirch and Terra 2012), the sample used in the regression test was winsorized by 1% to mitigate the effect of outliers.

TABLE 1 Sample Construction and Distribution

Panel A: Sample Selection by Observations			
	# of observations		
Insurance Companies in Taiwan	356		
Less: without quarterly financial statements or with missing financial data	201		
Less: without related sensitivity test disclosure	15		
Total sample	140		
Panel B: Sample Distribution by Firms			
	# of Firms	Life	Non-life
Insurance Companies in Taiwan	34	23	11
Less: firms without quarterly financial statements	17	15	2
Less: firms without any related sensitivity test disclosure	1	1	0
Total sample firms	16	7	9

3.2 Empirical Models

As presented in EXHIBIT 1, we first calculate the combined earnings effect due to the changes in actuarial assumptions by summing the absolute values of earning effects due to the changes in all the actuarial assumptions deflated by the lagged earning. For instance, referring to EXHIBIT 1, the reported combined earnings effect due to the changes in actuarial assumptions, denoted as *TOTAL*, is equal to 1,958,984 (506,085+77,436+640,808 +734,655). Because the ratio of change in actuarial assumptions disclosed by different firms may vary, we modify the disclosed earning effect, assuming the linear transformation is valid; the modified earning effect is denoted as *adjTOTAL*. For instance, Firm A discloses that the earning effect of increasing the lapse rate by 0.5% is $20,000, and Firm B discloses that the earning effect of increasing the lapse rate by 0.1% is $4,400. To make the comparison between Firms A and B appropriate, the disclosed $4,400 is revised to $22,000 (4,400×5). In other words, the *adjTOTAL* for Firm A is $20,000 while that for Firm B is $22,000; both represent the earning effects due to changing the lapse rate by 0.5%. We use *adjTOTAL* as our main variable and examine its association with an insurer's unexpected earnings, which is measured by the absolute value of earnings change in the subsequent quarter (Jorion 2002). Specifically, the following regression is estimated:

$$DNI\ NI_{i,t} = \alpha_0 + \alpha_1 adjTOTAL\_NI_{i,t} + \alpha_2 SIZE_{i,t} + \alpha_3 LEV_{i,t} + \alpha_4 ROE_{i,t} + \alpha_5 DLF_{i,t} + YearDummies + QuarterDummies + \varepsilon_{i,t}. \quad (1\text{-}1)$$

$DNI\_NI_{i,t}$ is defined as the absolute value of earning changes (that is, $NI_{i,t+1}$-$NI_{i,t}$) deflated by $NI_{i,t}$;[20] $adjTOTAL\_NI_{i,t}$ is the linearly modified value of the absolute values of earning effects due to changes in all the actuarial assumptions ($adjTOTAL_{i,t}$) deflated by $NI_{i,t}$, which has been detailed in the previous paragraph. $NI_{i,t}$ is the after-tax earnings. Four control variables are included. $SIZE_{i,t}$ is the natural logarithm of total assets (Colquitt and Hoyt 1997; Elango, Ma, and Pope 2008); $LEV_{i,t}$ is the debt-to-asset ratio, which is defined as the total liabilities divided by total assets (Lim and Tan 2007); $ROE_{i,t}$ is the return on equities (Ferreira and Laux 2007), calculated as the after-tax earnings divided by equities; and $DLF_{i,t}$ is an indicator variable equal to 1 for insurers that are primarily life insurers and equal to 0 otherwise (Hoyt and Liebenberg 2011) to control for potential differences in firm characteristics related to the industry sector in which firms operate. Year and quarter fixed effects are also added to equation (1-1) in order to control for any potential influence. The relationship between the earning effect due to changes in actuarial assumptions and the absolute value of changes in subsequent earning is tested using the α_1 coefficient. Finding α_1 to be significant and positive is consistent with our hypothesis that the uncertainty analysis disclosure is informative about an insurer's subsequent earnings change.

[20] We do not use market-based measures because most Taiwanese insurance firms are subsidiaries of financial holding firms and therefore are not publicly traded.

Although it is reasonable to assume that both life and non-life insurance firms provide unbiased estimates in terms of the uncertainty analysis information, the interaction terms between the earning effect and the life dummy ($DLF_{i,t}$), denoted as $DLF_{i,t} \times adjTOTAL\_NI_{i,t}$, are included to test for any significant difference in the informativeness of uncertainty analysis metrics provided by life and non-life insurance firms. In sum, the additional test is conducted using the following models:

$$\begin{aligned} DNI\ NI_{i,t} = {} & \alpha_0 + \alpha_1 adjTOTAL\_NI_{i,t} + \alpha_2 DLF_{i,t} \times adjTOTAL\_NI_{i,t} + \alpha_3 SIZE_{i,t} \\ & + \alpha_4 LEV_{i,t} + \alpha_5 ROE_{i,t} + \alpha_6 DLF_{i,t} + \alpha_7 DLF_{i,t} \times SIZE_{i,t} + \alpha_8 DLF_{i,t} \times LEV_{i,t} \\ & + \alpha_9 DLF_{i,t} \times ROE_{i,t} + YearDummies + QuarterDummies + \varepsilon_{i,t}. \end{aligned} \quad (1\text{-}2)$$

To test Hypothesis 2, which focuses on the role the quality of the risk management committee (denoted as *RM_quality* in equation (2)) plays in the informativeness of uncertainty analysis disclosures, two characteristics are used as proxies for quality. First, prior studies have indicated that a larger subcommittee is more capable of making correct decisions (Zhou and Chen 2004; Sharma and Iselin 2012). Therefore, we predict that the size of a risk management committee enhances the informativeness of uncertainty analysis disclosure. Second, prior studies typically consider the attendance of board members at board meetings as a proxy for the level of diligence (Harris and Shimizu 2004; Jiraporn, Davidson III, DaDalt, and Ning 2009; Adams and Ferreira 2009; Chou, Chung, and Yin 2013). For instance, Harris and Shimizu (2004) investigate whether "over-boarded" directors are less diligent, measured by their absence rates, and are thus associated with less favorable acquisition outcomes. Adams and Ferreira (2009) show that female directors usually have better attendance records and are more likely to join monitoring committees. Therefore, we argue that members may be more willing to attend committee meetings if they tend to put more effort into correct decision making. That is, the attendance of committee members may capture the members' efforts and thus will reflect on the quality of the financial information. In sum, the average attendance of risk management committee members is included.

For robustness, the size of a risk management committee is set to be (1) the continuous value of the number of risk management committee members, denoted as *RMSIZE_CON*, and (2) an indicator equal to 1 if the number of members on a company's risk management committee is greater than the annual median and 0 otherwise, denoted as *RMSIZE_DUM*. Similarly, to test the effect of the attendance of the risk management committee, we use (1) the average attendance of the committee members, denoted as *RMATTEND*, and (2) an indicator equal to 1 if the average attendance of committee members is greater than the annual median and 0 otherwise, denoted as *RMATTEND_DUM*. We also control for the size of the board of directors. The board size (*BDSIZE_DUM*) is defined as an indicator equal to 1 if the number of members on a company's board of directors is greater than the annual

median and 0 otherwise.[21] All the models are estimated based on year and quarter fixed effects to control for potential influence.[22]

$$\begin{aligned} DNI\ NI_{i,t} = {} & \alpha_0 + \alpha_1 adjTOTAL\_NI_{i,t} + \alpha_2 adjTOTAL\_NI_{i,t} \times (RM\_quality)_{i,t} \\ & + \alpha_3 SIZE_{i,t} + \alpha_4 LEV_{i,t} + \alpha_5 ROE_{i,t} + \alpha_6 DLF_{i,t} + \alpha_7 (RM\_quality)_{i,t} \\ & + \alpha_8 BDSIZE_{i,t} + \Phi_K YearDummies_K + \omega_M QuarterDummies_M + \varepsilon_{i,t}. \quad (2) \end{aligned}$$

where *RM_quality* = *RMSIZE_CON*, *RMSIZE_DUM*, *RMATTEND*, and *RMATTEND_DUM*, respectively.

4. EMPRICIAL RESULTS AND ANALYSIS

4.1 Descriptive Statistics

The descriptive statistics of our sample data are shown in TABLE 2. Panel A shows the basic financial information of our sample. The average asset size is about NT$388,000 million, with a maximum of NT$3,562,000 million and a minimum of NT$11,800 million. The average earnings are NT$368 million. Additionally, the total earning effect due to the changes in actuarial assumptions (*TOTAL*)[23] is between NT$14 million and NT$7,487 million, with a mean of NT$738 million. The linearly modified total earning effect due to changes in actuarial assumptions (*adjTOTAL*) is NT$705 million on average. Panel B shows the descriptive statistics for variables used in the regression model. The mean of *DNI_NI* is roughly 2.363. *adjTOTAL_NI*, defined as linearly adjusted *TOTAL* deflated by current earnings, has an average of roughly 3.783. In our sample, 35% of observations are from life insurers and 65% of observations are from non-life insurers. *ROE* has a mean value of 0.029 and the sample firms' average debt-to-asset ratio (*LEV*) is 0.813. As to the characteristics of risk management committees, on average, the sample firms' risk management committees have around ten members, and the average attendance of committee members is about 89.5%.

[21] Because the risk management committee is one of the sub-committees of the board, its size is related to the board size. For instance, some directors are usually members of the risk management committee (refer to the Cathay Life Insurance, https://www.cathaylife.com.tw/bc/web/ext/pages/headerfooter/info/administration/adm_10.pdf or the CTBC LIFE, https://customer.ctbclife.com/upload/ebook/ebookcontent_1038.pdf). So, to ensure that the *RMSIZE* variable does not simply capture the effect of board size, we additionally control for the board size.

[22] It is possible that a specific firm's strategy regarding the asset allocation or business development may affect a firm's performance change, but such effects are more or less captured by the financial or non-financial variables used in our models, such as size, profitability, leverage, risk management committee quality or the board size. Meanwhile, as prior studies focusing on the insurance industry (Pottier and Sommer 1999; Huang, Lai, McNamara, and Wang 2011) usually do not include a firm effect dummy variable, we choose not to do so, either. Nevertheless, un-tabulated results indicate that when the firm effect dummy is included, the signs and significances of the variables of interest are not affected.

[23] For life insurance firms, the total earning effect results from changes in actuarial assumptions related to the change in mortality/morbidity, lapse rate, expense rate and investment yield rate. For non-life insurance firms, the total earning effect is related to changes in the expected loss ratio.

TABLE 2 Descriptive Statistics (observations=140)

Panel A: Descriptive Statistics for Our Sample (NT$ in million)				
Variable	Mean	Std. Dev	Min	Max
NI	367.877	1,097.624	-2421.802	7,597.989
ASSETS	388,411.144	845,342.399	11,865.815	3561,957.324
TOTAL	738.012	1393.842	14.704	7487.52
adjTOTAL	704.908	1272.131	16.992	7487.52
Panel B: Descriptive Statistics for Variables Used in Regression				
Variable	Mean	Std. Dev	Min	Max
DNI_NI	2.363	7.535	0.038	60.423
adjTOTAL_NI	3.783	6.336	0.087	41.162
DLF	0.35	0.479	0	1
ROE	0.029	0.0312	-0.065	0.17
LEV	0.813	0.118	0.63	1.039
SIZE	17.871	1.791	16.338	21.964
BDSIZE_CON	10.637	3.779	7	20
RMSIZE_CON	10.030	5.148	3	18
RMATTEND	0.895	0.087	0.73	1

[a] *NI* is the after-tax earnings. *ASSETS* is the total assets. *TOTAL* is a total earnings effect due to all changes in actuarial assumptions, and *adjTOTAL* is the linearly modified earning effect. *DNI_NI* is defined as the absolute value of (NI_{t+1}-NI_t) deflated by NI_t. *adjTOTAL_NI* is *adjTOTAL* deflated by *NI*. *DLF* is an indicator variable equal to 1 for insurers that are primarily life insurers and equal to 0 otherwise. *ROE* is the return on equities. *LEV* is the debt ratio. *SIZE* is the natural logarithm of the total assets. *BDSIZE_CON* is the number of members of a company's board of directors. *RMSIZE_CON* is the number of members on a company's risk management committee, and *RMATTEND* is the average attendance of risk management committee members.

4.2 The Informativeness of Uncertainty Analysis Disclosure

TABLE 3 shows the regression results of the earning effect due to changes in actuarial assumptions. Column (1) contains the results of equation (1-1) and, consistent with our prediction, *adjTOTAL_NI* and *DNI_NI* are positively and significantly correlated (coefficient=0.6505, and *t*-value=5.32). That is, the earning effect due to the changes in actuarial assumptions is positively related to the absolute value of the firm's one-quarter-ahead change in earnings. Column (2) shows whether the informativeness of uncertainty analysis metrics varies with the type of insurers (life or non-life insurance firms). The results show that *adjTOTAL_NI* still has a positive and significant effect (coefficient=0.2689 and *t*-value=7.86) while *DLF*×*adjTOTAL_NI* has a significant and positive effect on *DNI_NI* (coefficient=0.9023 and *t*-value=8.64). Collectively, the results support Hypothesis 1, which states that the combined earnings effect due to changes in actuarial assumptions is informative about an insurer's magnitude of earnings change in subsequent periods. Additionally, it appears that the uncertainty analysis disclosure reported by non-life insurance firms is far less informative than that reported by life insurance firms. One possible explanation is that life policies are usually with long-durations while non-life firms' policies are mostly with a term of less than one year. Hence, the compounding effect makes the change in life actuarial assumptions to affect changes in earnings in greater magnitude.

TABLE 3 The Informativeness of Uncertainty Analysis Disclosure (observations=140)

$$DNI\ NI_{i,t} = \alpha_0 + \alpha_1 adjTOTAL\_NI_{i,t} + \alpha_2 SIZE_{i,t} + \alpha_3 LEV_{i,t} + \alpha_4 ROE_{i,t} + \alpha_5 DLF_{i,t} + YearDummies + QuarterDummies + \varepsilon_{i,t}. \quad (1\text{-}1)$$

$$DNI\ NI_{i,t} = \alpha_0 + \alpha_1 adjTOTAL\_NI_{i,t} + \alpha_2 DLF_{i,t} \times adjTOTAL\_NI_{i,t} + \alpha_3 SIZE_{i,t} + \alpha_4 LEV_{i,t} + \alpha_5 ROE_{i,t} + \alpha_6 DLF_{i,t} + \alpha_7 DLF_{i,t} \times SIZE_{i,t} + \alpha_8 DLF_{i,t} \times LEV_{i,t} + \alpha_9 DLF_{i,t} \times ROE_{i,t} + YearDummies + QuarterDummies + \varepsilon_{i,t}. \quad (1\text{-}2)$$

	(1)	(2)
adjTOTAL_NI	0.6505 ***	0.2689 ***
	(5.32)	(7.86)
DLF	5.3758 ***	-0.2819
	(2.76)	(-0.02)
ROE	-20.7865 **	1.1496
	(-2.04)	(0.22)
LEV	9.1217 ***	4.773 ***
	(2.58)	(2.88)
SIZE	-0.9300 *	0.6473 ***
	(-1.66)	(3.32)
DLF×adjTOTAL_NI		0.9023 ***
		(8.64)
DLF×ROE		-52.9432 *
		(-1.84)
DLF×LEV		50.4000 *
		(1.78)
DLF×SIZE		-2.4199 ***
		(-3.00)
Constant	5.8891	-15.4515 ***
	(0.72)	(-3.74)
Adj. R^2	36.94%	56.20%

[a] Year and quarter dummies are included but not reported for simplicity.
[b] *p-value < 0.10 ; **p-value < 0.05; ***p-value < 0.01.
[c] Refer to TABLE 2 for variable definitions.

4.3 The Effect of the Characteristics of the Risk Management Committee on the Informativeness of Uncertainty Analysis Disclosure

TABLE 4 shows the result of equation (2), in which the effect of the characteristics of the risk management committee on the informativeness of uncertainty analysis disclosure is examined. Columns (1) and (2) show the results when the size of the risk management committee is measured in continuous value (*RMSIZE_CON*) or as an indicator variable (*RMSIZE_DUM*). All coefficients on the interaction between the size of the risk management committee and the uncertainty analysis disclosure, that is, *RM quality*×*adjTOTAL_NI* in Columns (1) and (2), are positive (0.0095 and 0.1215) and significant (*t*-values = 2.08 and 3.36). Therefore, it is consistent with an insurer that has more members on its risk management committee providing more informative uncertainty analysis disclosure, perhaps because of the benefits of a larger and broader knowledge base.[24]

Columns (3) and (4) show the results when the average attendance of committee members (*RMATTEND*) is used or defined as an indicator variable (*RMATTEND _DUM*). As shown, all corresponding coefficients on the interaction between the average attendance of the risk management committee and the uncertainty analysis disclosure are positive (0.7619 and 0.0878) and significant (*t*-values = 1.88 and 2.12). The results suggest that a higher average attendance, which means members of the risk management committee make more effort, improves the informativeness of an insurer's uncertainty analysis disclosure.

[24] We test for the potential non-linear relationship in the following way. First, the sample is sorted by the size of the risk management committee. Second, *MIDDLE* is set to be 1 if the observation's committee size is larger than the 40th percentile, and 0 otherwise. *HIGH* is set to be 1 if the observation's committee size is larger than the 80th percentile, and 0 otherwise. Then, *MIDDLE*, *HIGH*, and the related interaction terms with the uncertainty analysis disclosure (denoted as *MIDDLE*×*adjTOTAL_NI* and *HIGH*×*adjTOTA_NI*) are included in the model. The result shows that: (1) the coefficient on *adjTOTAL_NI* is positive (0.3103) and significant (*p*-value < 0.001), (2) the coefficient on *MIDDLE*×*adjTOTAL_NI* is positive (0.0082) and insignificant, and (3) the coefficient on *HIGH*×*adjTOTAL_NI* is positive (0.1788) and significant (*p*-value = 0.023). Because the coefficients differ across the three subsamples, it may be interpreted that non-linearity exists. Though, on average, the inference that the size of the risk management committee improves the disclosure quality of the uncertainty analysis is not affected by the non-linearity.

TABLE 4 Risk Management Committee and the Informativeness of Uncertainty Analysis Disclosure (observations=135)

$$DNI\ NI_{i,t} = \alpha_0 + \alpha_1 adjTOTAL\_NI_{i,t} + \alpha_2 adjTOTAL\_NI_{i,t} \times (RM\_quality)_{i,t} + \alpha_3 SIZE_{i,t} + \alpha_4 LEV_{i,t} + \alpha_5 ROE_{i,t} + \alpha_6 DLF_{i,t} + \alpha_7 (RM\_quality)_{i,t} + \alpha_8 BDSIZE_{i,t} + YearDummies + QuarterDummies + \varepsilon_{i,t}. \quad (2)$$

where *RM_quality* = *RMSIZE_CON*, *RMSIZE_DUM*, *RMATTEND*, and *RMATTEND_DUM*, respectively.

	(1) *RM_quality = RMSIZE_CON*	(2) *RM_quality = RMSIZE_DUM*	(3) *RM_quality = RMATTEND*	(4) *RM_quality = RMATTEND_DUM*
adjTOTAL_NI	0.2641 ***	0.3208 ***	-0.308	0.3777 ***
	(4.54)	(9.2)	(-0.78)	(10.94)
RM_quality×adjTOTAL_NI	0.0095 **	0.1215 ***	0.7619 *	0.0878 **
	(2.08)	(3.36)	(1.88)	(2.12)
BDSIZE_DUM	-0.0309	-0.0557	-0.4827 **	-0.2856
	(-0.16)	(-0.28)	(-2.08)	(-1.24)
RM_quality	-0.0728 ***	-0.471 ***	5.0068 *	1.0247 ***
	(-4.14)	(-2.76)	(1.96)	(4.28)
DLF	-0.8851	-0.4739	-2.128 **	-1.7085 **
	(-1.18)	(-0.68)	(-2.28)	(-2.16)
ROE	-3.4348	-2.4220	-5.9263	-2.4129
	(-0.96)	(-0.66)	(-1.46)	(-0.68)
LEV	3.9850 **	2.4945 *	6.8815 ***	8.3591 ***
	(2.54)	(1.74)	(3.5)	(4.26)
SIZE	0.7041 ***	0.6648 ***	0.8379 ***	0.7037 ***
	(3.62)	(3.62)	(3.68)	(3.8)
Constant	-14.8503 ***	-13.7128 ***	-24.3116 ***	-19.574 ***
	(-3.8)	(-3.68)	(-3.4)	(-4.7)
Adj. R^2	60.31%	60.55%	64.24%	62.62%

[a] Year and quarter dummies are included but not reported. *p-value < 0.10; **p-value < 0.05; ***p-value < 0.01.

[b] *BDSIZE_DUM* equals 1 if the number of board members is above the annual medium. *RMSIZE_CON* is the continuous value of the number of members on the committee, and *RMSIZE_DUM* is set to be 1 if *RMSIZE_CON* is greater than the annual medium. *RMATTEND* is the average attendance of committee members, and *RMATTEND_DUM* is set to be 1 if *RMATTEND* is greater than the annual medium. Refer to TABLE 2 for other variable definitions.

4.4 Sensitivity Analysis

Our sample is composed of 16 insurance companies, and one possible concern with our findings is whether the results are driven by individual insurance companies. Among our 16 sample firms, 6 of them- Shinkong Insurance Co., Ltd, South China Insurance Co., Ltd, The First Insurance Co., Ltd, Union Insurance Company, Chung Kuo Insurance Co., Ltd, and CTBC Life Insurance Co., Ltd- have more observations than the others. Hence, to address this potential concern, we re-estimate our models in TABLE 3 and TABLE 4 by dropping each of these 6 insurance companies one at a time.

For equations (1-1) and (1-2), all the untabulated re-estimated results, including the coefficients and the significances, are very similar to those reported based on the full sample no matter which company is dropped. For instance, the coefficient of *adjTOTAl_NI* in equation (1-1) is 0.6506 based on the full sample, while it is 0.4306 based on the observations when Chung Kuo Insurance Co., Ltd is dropped, and in both cases the *p*-values are below 0.001. In addition, when we repeat our analyses of equation (2), most of the untabulated results are consistent with our original results. For example, the coefficient of *RM_quality*×*adjTOTAL_NI* in column (1) of TABLE 4 is 0.0095 (*t*-value = 2.08) based on the full sample, while that is 0.01 (*t*-value = 2.1) based on the observations when Shinkong Insurance Co., Ltd is dropped. Additionally, by dropping the observations from South China Insurance Co., Ltd, the re-estimated coefficient of *RM_quality*×*adjTOTAL_NI* is 0.094 (*t*-value = 2.14), which is also very close to the result based on our original sample. However, one exception is when the observations from Chung Kuo Insurance are dropped. In that case, the significance of the coefficient is slightly lower than our original results in TABLE 4. For instance, the coefficient and *t*-value of *RM_quality*×*adjTOTAL_NI* in equation (2) are 0.1215 and 3.36 based on the full sample. The coefficient and *t*-value of *RM_quality*×*adjTOTAL_NI* in equation (2) are 0.0664 and 1.5 based on the observations when Chung Kuo Insurance is dropped. In sum, on average, our findings are not likely to be driven by individual insurance companies.

5. CONCLUSIONS

Accounting metrics for financial reports are so-called point estimations of a company's performance. While a point estimation is easy for users to understand, decision making will be improved if information regarding the uncertainty of this point estimation is also provided. Accordingly, IFRS 4 phase I stipulates that insurance companies should provide uncertainty analysis disclosure showing how a change in each actuarial assumption, such as mortality or morbidity, the lapse rate, or the investment yield rate, will affect the reported earnings and equities.

Based on the mandatorily disclosed uncertainty analysis data from Taiwanese insurance firms from 2011–2014, this study investigates the informativeness of such disclosures. We find that the earning effect due to the changes in actuarial assumptions is informative about the insurer's subsequent earnings change. Additionally, we also investigate how the risk management committee affects the informativeness of uncertainty analysis disclosure; the results show that when the number of members in a company's risk management committee is greater or the average attendance of a company's risk management committee members is higher, the informativeness of such disclosure is more pronounced.

This study is the first to document the informativeness of uncertainty analysis disclosure in the insurance industry. Our results suggest clear and direct implications of accounting standard-setting. That is, the IASB should reconsider the elimination of the requirement for such uncertainty analysis in the ED for IFRS 4. Meanwhile, if the IASB still chooses not to make such disclosure mandatory for other jurisdictions that apply the International Accounting Standards, additional local guidance may be necessary to ensure the reporting of uncertainty analysis.

APPENDIX LIST OF SAMPLE FIRMS

Company Name	Life/Non-life
CTBC Life Insurance Co., Ltd.	Life
Taiwan Life Insurance Co. Ltd.	Life
BNP Paribas Cardif TCB Life Insurance Co., Ltd.	Life
Cathay Life Insurance Co., Ltd.	Life
Fubon Life Insurance	Life
Shin Kong Life Insurance Co., Ltd.	Life
Chaoyang Life Insurance Co., Ltd.	Life
Chung Kuo Insurance Co., Ltd.	Non-life
Union Insurance Company	Non-life
MSIG Mingtai Insurance Co., Ltd.	Non-life
Taian Insurance Co., Ltd.	Non-life
Cathay Century Insurance Co., Ltd.	Non-life
The First Insurance Co., Ltd.	Non-life
Fubon Insurance	Non-life
South China Insurance Co., Ltd.	Non-life
Shinkong Insurance Co., Ltd.	Non-life

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