Corporate Management Review
Vol. 43 No. 1, 2023
pp.97-135

Fair value measurements of financial assets and audit fees for the non-banking industry: The role of corporate governance

非銀行業的金融資產公允價值衡量與審計公費：公司治理之角色

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Abstract: This research takes non-banking listed companies in Taiwan over the period 2016-2021 as samples to investigate the correlation between fair-valued measurements of financial assets and audit fees and to further explore the moderating effects of corporate governance performance. The paper documents that the proportion of total fair-valued financial assets is negatively associated with audit fees, but that the proportion of financial assets that are fair-valued using Level 3 inputs is positively associated with audit fees. In addition, my study finds that corporate governance performance influences audit fees, but it has no impact on the association between the proportion of total fair-valued financial assets and audit fees. Additional analyses find that (1) the proportion of financial assets that are fair-valued using Level 1 inputs is negatively associated with audit fees, however, the sum of the proportion of financial assets that are fair-valued using Level 2 and Level 3 inputs is positively associated with audit fees; (2) after deleting observations without fair-valued financial assets, the results mostly match my above tests; (3) after changing several variables in the equations, findings are consistent with prior results; and (4) separating my sample period into two sub-periods (pre-COVID-19 (2016 to 2019) and post-COVID-19 (2020 to 2021)), the empirical results have a few inconsistent findings between each other. Finally, I

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DOI: 10.53106/102873102023064301004

employ the fixed-effect model to mitigate the endogeneity that arises from omitted unobservable variables, and all findings are consistent with my main tests. The findings herein complement the literature and offer implications for adopting fair value accounting.

Keywords: Fair-valued measurement, audit fee, corporate governance, non-banking industry, fair value hierarchy.

摘要：本研究以台灣 2016 年至 2021 年的非銀行業上市櫃公司為研究樣本探討非銀行業的金融資產公允價值衡量與審計公費之關聯性，並進一步分析公司治理表現的調節效果。本研究發現總公允價值衡量的金融資產比重和審計公費成負相關；然而第三階公允價值衡量的金融資產比重則和審計公費成正相關。再者，本研究發現公司治理表現會影響審計公費，但不會影響總公允價值衡量的金融資產比重和審計公費之關聯性。除此之外，本研究的額外測試發現(1)第一階公允價值衡量的金融資產比重和審計公費成負相關，然而，第二階及第三階公允價值衡量的金融資產比重合計數則和審計公費成正相關；(2)移除沒有金融資產公允價值衡量的樣本公司，結果大致仍相同；(3)改變部分變數定義結果仍一致；(4)將樣本區分為新冠疫情前(2016 - 2019)及新冠疫情後(2020 - 2021)，兩期間的結果只有小部分不相同。最後本研究也採用固定效果模型來控制遺漏變數的內生性問題，實證結果和正文相同。本研究結果可以補充現有文獻的不足，並對公允價值會計提供啟示。

關鍵詞：公允價值衡量、審計公費、公司治理、非銀行業、公允價值階層

1. Introduction

An audit fee is remuneration paid by the client to an accounting firm and represents an observable and measurable instrument that captures significant influences of regulatory and task-related changes on an audit (Alexeyeva and Mejia-Likosova, 2016). According to other studies, like Simunic (1980) and Whisenant *et al.* (2003), an audit fee is a function of the audit effort and risk premium to cover auditors' possible future losses, such as complexity of the firm,

company size, risk factors, and so on.

Fair-valued assets are those that need to be measured by fair value. Reviewing prior research, Bratten *et al.* (2013) assert that evaluating the fair values of firms' assets covers a considerable amount of uncertainties, such as managers having to not only provide assumptions and estimates, but also to choose among estimation approaches. In addition, macroeconomic risks influence a potential hazard whereby the models are inappropriately chosen or implemented, implying that a higher level of estimation uncertainty leads to a greater risk of material misstatements. In other words, auditing fair-valued data is less structured than other auditor tasks. Therefore, there is correlation between fair value measurements and audit fees.

Referring to related studies, like Bratten *et al.* (2013) and Ettredge *et al.* (2014), a positive relation appears between the proportion of total fair-valued assets and audit fees for the U.S. banking industry. In contrast to those two papers, Alexeyeva and Mejia-Likosova (2016) take 177 banks from 24 European countries over the period 2008-2013 as observations and find no correlation between the proportion of total fair-valued assets and audit fees. Conversely, Goncharov *et al.* (2014) and Sangchan *et al.* (2020) both find a negative correlation between the proportion of total fair-valued assets and audit fees taking European and Australian real estate companies as their sample, respectively.

Summarizing the evidence of the above studies, fair value exposure does not always affect audit fees for the banking industry in a single direction. In addition, the association between the proportion of total fair-valued assets and audit fees is inconsistent for the banking industry and non-banking industry, such as real estate companies. Because the real estate industry is only one kind of non-banking industry, the first purpose of my research is to test the correlation between the proportion of total fair-valued assets and audit fees for the whole non-banking industry. According to Taiwan's GAAP, property, plant, and equipment (PPE), investment properties, and intangible assets can be measured by the depreciation cost method or fair value method, but in Taiwan no company uses the fair value method on them. Thus, in my paper "fair-valued assets" only include "financial"

assets and not "non-financial" assets.

The Financial Accounting Standards Board (FASB) defines three levels of inputs used in fair value measurement, with Level 1 being the least subjective and Level 3 the most subjective. The literature suggests that audit risk and complexity are primarily influenced by the presence of subjectivity in the estimation of fair value (Alexeyeva and Mejia-Likosova, 2016), meaning the degree of audit risk and complexity is positively proportional to the level of uncertainty in fair value estimates. Thus, a higher degree of uncertainty likely correspondingly affects the complexity of the audit process and requires more audit inputs. Therefore, the second purpose of my paper is to investigate whether the positive association between audit fees and proportion of fair-valued financial assets is more pronounced for fair-valued financial assets using Level 3 inputs for the non-banking industry.

Many studies do analyze the issue of audit fees under different facets (Habib and Jiang, 2015), and some show that audit fees relate to the CG mechanism (e.g., Johl *et al.*, 2012; Redmayne *et al.*, 2011; Zaman *et al.*, 2011). Karamanou and Vafeas (2005) declare that firms with better governance mechanisms are able to make more forecasts and updated disclosures. Therefore, measurements of fair-valued assets need numerous estimations, and so CG mechanisms likely influence the relation between fair value measurements and audit fees. Hence, employing data from Taiwan's CG evaluation exercises, the third purpose of my paper is to test whether CG mechanism performance negatively impacts the association between audit fees and the proportion of total fair-valued financial assets.

A few studies do investigate the relationship between fair-valued measures and audit fees. I take five papers, Alexeyeva and Mejia-Likosova (2016), Ettredge *et al.* (2014), Goncharov *et al.* (2014), Sangchan *et al.* (2020), and Yao *et al.* (2015), and to illustrate the differences between their research and mine. First, Ettredge *et al.* (2014) employ publicly traded banks in the U.S. from 2008 to 2011 as samples and find that the proportion of total fair-valued assets is positively associated with audit fees for the banking industry. They also explore the moderating impact of auditors who are specialists of the bank industry on this issue. Second, Goncharov

et al. (2014) and Sangchan *et al.* (2020) investigate European and Australian real estate companies respectively and show that audit fees are lower for firms having an above-average proportion of fair-valued assets than those using the depreciation cost method. Third, Alexeyeva and Mejia-Likosova (2016) use 177 banks from 24 European countries over the period 2008-2013 as observations and present evidence of no significant correlation between the proportion of total fair-valued assets and audit fees. Finally, Yao *et al.* (2015) use the Australian non-banking industry as their sample and investigate an association between fair value measurement of "non-financial" assets and audit fees.

Summarizing the above discussions, fair value exposure does not always influence audit fees for the banking industry in any one specific direction. In addition, firms in the non-banking industry (e.g., real estate companies) exhibit a different association between the proportion of total fair-valued assets and audit fees compared with those of the banking industry. Moreover, the real estate industry is only one kind of non-banking industry that does not represent the whole non-banking industry. Finally, the research targets of Yao *et al.* (2015) and my paper are also different. Their target is "non-financial" assets, but mine is "financial" assets. Therefore, based on my present knowledge, the literature does not present any study using a sample of the whole non-banking industry to explore the correlation between fair value measurements of "financial" assets and audit fees. Thus, my first contribution is to use all non-banking industry firms as my samples to examine this correlation.

Many studies show that audit fees relate to CG performance (e.g., Johl *et al.*, 2012). To measure such performance appropriately, I choose Taiwan as my study target for three reasons. First, prior literature (e.g., Bebchuk and Hamdani, 2009) argue that the notion of an optimal governance structure suitable in developed countries may not work well in emerging markets (e.g., Bruno and Claessens, 2010). To address such concerns, this research employs Taiwan, an emerging market, as the sample target so as to complement the related literature.

Second, some papers compile a set of independent variables to proxy CG performance, whereas others only use one or two variables to proxy CG

performance. For instance, Gompers *et al.* (2003) utilize 24 provisions to develop a CG index (denoted as G-index), but Bebchuk and Hamdani (2009) find only 6 out of those 24 provisions included in the index contribute to the empirical results of Gompers *et al.* (2003). Each CG evaluation exercise in Taiwan is conducted using indicators from five corporate governance dimensions based on guidance from the Organization for Economic Cooperation and Development (OECD). This means the CG evaluation exercise in Taiwan offers more appropriate evaluation results to completely and exhaustively measure the CG performance of listed firms.

Third, according to regulation by the Taiwan government, it is mandatory for all listed firms to participate in these CG evaluation exercises. Doing so thus decreases potential selection or judgmental biases generated in the literature. Therefore, the second contribution of my paper is using a better CG performance measure, Taiwan's CG evaluation ranking, to investigate the moderating impacts of CG performance on the relationship between fair value measurements of financial assets and audit fees for the whole non-banking industry.

Finally, my third contribution is that my study enriches the literature on fair value accounting. According to prior literature, like Maksymov *et al.* (2012), fair value accounting is a critical issue in today's financial reporting environment, yet relatively scant literature has addressed the correlation between fair-valued assets and audit fees. I show evidence to support the fair value hierarchy, thus providing useful information to investors, because a positive association between audit fees and fair-valued measurements exists only for fair-valued financial assets using Level 3 inputs.

The remainder of the paper runs as follows. Section 2 reviews the literature and develops the research hypotheses. Section 3 describes the research method, including sample selection procedures, definition of variables, and research methodology. Section 4 presents the empirical findings. Section 5 reports the results of robustness tests. Finally, Section 6 summarizes the empirical findings and discusses implications.

2. Literature review and hypotheses' development

2.1 Literature review

2.1.1 Fair value measurements and audit fees

Audit fees are the result of auditors' assessment of their clients' control environment, taking into consideration clients' demand for audit quality (Jizi and Nehme, 2018). Company characteristics impact audit fees due to the extent and level of the supply of audit effort (Simunic, 1980). For instance, Bell *et al.* (2001) state that audit clients with high business risk require more audit effort and imply an increase in audit fees. In other words, audit fees appear to be positively associated with audit costs and also reflect auditors' expected future losses resulting from unaudited financial statements (e.g., Hay *et al.*, 2006a).

Bratten *et al.* (2013) state that fair-valued assets are unusually difficult to audit. Auditors charge higher fees when auditing critical accounting estimates and employing fair value measurement (Ettredge *et al.*, 2014). I choose three papers to illustrate this more deeply. Among them, Alexeyeva and Mejia-Likosova (2016) and Ettredge *et al.* (2014) investigate the relationship between fair-valued assets and audit fees for the banking industry. Goncharov *et al.* (2014) investigate the relationship between two variables for the real estate industry.

First, Ettredge *et al.* (2014) document for the banking industry that the proportion of total fair-valued assets is positively associated with audit fees. The positive relationship is more pronounced for fair-valued assets using Level 3 inputs than for fair-valued assets using Level 1 or Level 2 inputs. This means that audit fees increase with the difficulty of verifying asset fair values. They also document that bank specialist auditors charge lower audit fees to bank clients, however, bank expert auditors charge more for auditing the proportion of fair-valued assets.

Second, Alexeyeva and Mejia-Likosova (2016) employ 177 banks from 24 European countries during the period 2008 and 2013. They show no significant association between the proportion of total fair-valued assets and audit fees. Furthermore, the strength of a country's institutional setting positively relates to effort on evaluating the uncertainty of fair-valued assets.

Third, Goncharov *et al.* (2014) explore European real estate companies. Their findings show that audit fees are lower for firms having an above-average proportion of fair-valued assets relative to those using the depreciated cost method. They further find an increase in audit fees is accompanied by a greater fair value estimation of Level 2 and Level 3 inputs.

To summarize the above three studies, the findings are clearly inconsistent. There is a positive (not significant and negative) correlation between the proportion of total fair-valued assets and audit fees in the first (second and third) study. In the first study all three levels of fair-value estimates positively affect audit fees, but in the second and third studies audit fees are driven only by higher uncertainty in fair-valued assets; i.e., Level 2 and Level 3. Furthermore, until now the literature does not have any research using all non-banking industry firms as samples to explore the relation between the proportion of total fair-valued financial assets and audit fees. Therefore, this research uses the whole non-banking industry as observations to examine the above issue.

2.1.2 Impact of CG on the correlation between fair value measurements and audit fees

There are many studies that analyze the issue of audit fees in different facets (e.g., Habib and Jiang, 2015; Hay, 2013; Hay *et al.*, 2006a), and some find that the audit fees relate to the CG mechanism, such as audit committees and internal auditor (e.g., Johl *et al.*, 2012; Redmayne *et al.*, 2011; Zaman *et al.*, 2011). Auditors also charge more audit fees, because of a higher level of inherent risk (Muniandy, 2007). For instance, Hines *et al.* (2015) note that bigger audit committees incur a higher risk profile, which requires more monitoring from auditors. Karim *et al.* (2015) state that audit fees positively relate to a large board of directors. In other words, auditors may charge lower audit fees when firms' CG performance is better.

Jizi and Nehme (2018) document that an effective CG mechanism, such as an absence of the dual role of CEO, may raise a company's performance and decrease audit fees. Abbott and Parker (2000) also present that a board with a

higher level of independence can assign a more effective audit committee and higher-quality auditors. Bliss (2011) argues that firms without audit committees incur lower audit fees.

Karamanou and Vafeas (2005) declare that firms with better governance mechanisms are able to make more forecasts and updated disclosures. Krishnan and Visvanathan (2009) find that accounting experience positively relates with audit fees. The measurement of fair-valued assets needs numerous estimations, and so CG mechanisms are likely to influence the relationship between fair value measurements and audit fees.

In summary, according to other studies, CG mechanisms impact the correlation between fair value measurements and audit fees. Therefore, I further examine the moderating effects of CG performance in this research.

2.2 Hypotheses' development

2.2.1 Fair value measurements and audit fees

Alexeyeva and Mejia-Likosova (2016) state that audit fees represent an observable and measurable instrument that captures significant influences of regulatory and task-related changes on an audit. According to Simunic (1980), the audit fee is a function of the audit effort and risk premium to cover possible future losses incurred by auditors.

Bell and Griffin (2012), Bratten *et al.* (2013), Christensen *et al.* (2012), and Pannese and DelFavero (2010) find a positive association between fair value measurement and estimation uncertainty, because managers are forced to apply models requiring multiple assumptions to measure fair value. Bell and Griffin (2012), Bratten *et al.* (2013), and Christensen *et al.* (2012) suggest that the measurement of fair value considerably impacts complexity of the audit process. In other words, this type of measurement increases complexity of the evaluation process for auditors.

Bratten *et al.* (2013) discuss many factors causing unusual difficulty when auditing fair-valued assets. First, they assert that firms generating fair values of

their assets confront many considerable uncertainties. For instance, managers have to not only provide assumptions and estimates, but also must choose among estimation approaches or appropriate weights for different approaches. Macroeconomic risks also influence the peril that models are chosen or implemented inappropriately; i.e., little trading volume or high volatility in capital markets creates difficulties when using observed prices as bases for fair values. In other words, a higher level of estimation uncertainty implies a greater risk for material misstatements to exist. Therefore, auditors will protect themselves through exerting more audit efforts, which lead to higher audit fees.

Bratten *et al.* (2013) further mention that auditing assets' fair values lacks objective verifiability, implying this action is less structured than other auditor tasks. Other studies also show that managers use discretion in allowing judgments and estimates to bias fair-valued data opportunistically, implying auditors devote more efforts to audit the reliability of assets' fair values. In short, Bratten *et al.* (2013) argue that fair-valued measurements are more difficult to audit than many other types of data. Therefore, auditors respond to greater difficulty in auditing fair values by devoting greater resources (e.g., time, efforts, and specialists) to audits, resulting in an increase in audit fees. Ettredge *et al.* (2014) find that the proportion of total fair-valued assets is positively associated with audit fees for the banking industry. Based on the above discussion, I provide my first hypotheses as follows.

H1: Ceteris paribus, the proportion of total fair-valued financial assets is positively associated with audit fees for the non-banking industry.

FASB defines three levels of inputs used in fair value measurement, with Level 1 being the least subjective and Level 3 the most subjective. This means that asset values obtained using Level 3 inputs incorporate little or no market-based information; i.e., observed trading prices for similar assets. It further means Level 3 inputs usually consist of variables incorporating expected cash flows, discounted at assumed rates. In other words, if fair-valued assets are more difficult to audit, then these difficulties are less substantial with fair-valued assets based on Level 1 inputs and are most pronounced for fair values measured using Level 3 inputs (Bell and Griffin, 2012; Christensen *et al.*, 2012; Song *et al.*, 2010). The implication is

that audit risk is arguably greater for Level 3 inputs, since Level 1 and 2 inputs are largely observable.

A higher level of measurement risks, especially related to Level 3 inputs, could increase auditors' efforts and lead to greater audit fees (Pannese and DelFavero, 2010), indicating that all three levels imply a progressively growing degree of subjectivity involved in the estimation process (Alexeyeva and Mejia-Likosova, 2016). From Level 1 to Level 3, the degree of complexity and the extent of risks involved in the evaluation of fair value estimates increase, because the highest concern regarding Level 3 inputs relates to the absence of observed prices (Christensen *et al.*, 2012). To further judge the degree of estimation uncertainty, auditors have to evaluate the outcomes for similar accounting estimates (IAASB, 2010), implying higher levels of complexity and risk have a corresponding effect on audit efforts and audit fees (e.g., Alexeyeva and Mejia-Likosova, 2016; Ettredge *et al.*, 2014; Goncharov *et al.*, 2014). Therefore, incremental audit efforts and costs will occur for auditing fair value measurements of Level 3.

For the reasons described above, I expect that the positive relation between the proportion of fair-valued assets and audit fees should be more pronounced for Level 3 inputs (least objective inputs) than for Level 1 and Level 2 inputs. I present my next hypothesis below.

H2: Ceteris paribus, the positive association between audit fees and the proportion of fair-valued financial assets is more pronounced for fair-valued financial assets using Level 3 inputs for the non-banking industry.

2.2.2 Impact of CG on the correlation between fair value measurements and audit fees

The conflict of interests between principal (shareholders) and agency (managers) and the problem of information asymmetry between those two roles are mitigated by CG mechanisms (Tai, 2020). In other words, the amount of audit fees is associated with CG performance (e.g., Abbott and Parker, 2000). It also means that firms with effective CG mechanisms experience less agency problems, and so the efforts auditors have to exert are less, and the audit fees of firms are

lower (Fan and Wong, 2005). Therefore, just like the viewpoint of Jizi and Nehme (2018), an effective CG mechanism may decrease auditors' fees.

In summary, firms with better CG mechanisms cause strong monitoring activities that lead to a reduction in audit fees (Krishnan and Visvanathan, 2009). For instance, firms with better governance mechanisms are able to make updated disclosures (Karamanou and Vafeas, 2005). Therefore, better CG performance has a positive impact on disclosures resulting in more accurate fair value measurement, and so the lower degree of uncertainty will likely correspondingly affect the complexity of the audit process and will require less audit inputs, leading to a decrease in audit fees. Yao *et al.* (2015) show that high-quality corporate governance mitigates concerns regarding managerial opportunism or errors embedded in estimates. Consequently, this reduces the level of effort required from auditors, rather than necessitating increased input from auditors to verify the precision of estimates. I now develop my final hypothesis.

H3: CG performance negatively impacts the association between audit fees and the proportion of total fair-valued financial assets for the non-banking industry.

3. Research design

3.1 Sample

This research uses a sample of Taiwanese non-banking listed firms[2] for the period 2016-2021, because IFRS 13[3] has been implemented from 2013, and FSC

[2] According to industry coding principles of the Financial Supervisory Commission (FSC) for Taiwan- listed companies, FSC refers to the non-banking industry as the non-financial and insurance industry.

[3] According to statements posted on the official website, IFRS 13 defines fair value, sets out a framework for measuring fair value, and requires disclosures about fair value measurements. They apply when another standard requires or permits fair-value measurements or disclosures about fair-value measurements (and measurements based on fair value, such as fair value less costs to sell), except in specified circumstances in which other Standards govern. IFRS 13 defines fair value as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date (an exit price). When measuring fair value, an entity uses the assumptions that market participants would use

announced CG evaluation results for all participating firms from the third-round CG evaluation exercise, which covers the evaluation period from January 1, 2016 to December 31, 2016. The study therefore chooses its period of research from the start of 2016.

Table 1 presents the sample collection process. My paper first selects TWSE/TPEx listed companies' data from the end of 2016, 2017, 2018, 2019, 2020, and 2021 and deletes samples in the financial and insurance industry or with missing data. This results in a total of 5,979 observations. The data for the variables examined in this paper come from the Taiwan Economic Journal (TEJ) database and are supplemented by related information disclosed in the financial statements of the sample firms.

3.2 Variables

3.2.1 Dependent variable and independent variable

The variables in my paper are mainly based on the research design developed by Fields *et al.* (2004), supplemented by a number of other studies (e.g., Alexeyeva and Mejia-Likosova, 2016; Cameran and Perotti, 2014; Ettredge *et al.*, 2014; Kanagaretnam *et al.*, 2010). The dependent variable, *LNFEE*, is the natural logarithm of audit fees. This paper also includes four independent variables: *FVA1*, *FVA2*, *FVA3*, and *FVA123*. Referring to Alexeyeva and Mejia-Likosova (2016) and Ettredge *et al.* (2014), the first three variables are calculated as fair-valued assets measured using each level of fair-value hierarchy divided by total assets. Finally, I aggregate *FVA1*, *FVA2*, and *FVA3* to form the variable *FVA123*.

3.2.2 Moderating variable

The moderating variable of this study is CG performance (*CG*). I obtain the

when pricing the asset or the liability under current market conditions, including assumptions about risk. As a result, an entity's intention to hold an asset or to settle or otherwise fulfil a liability is not relevant when measuring fair value.

Table 1

Sample collection process (N=5,979)

	2016	2017	2018	2019	2020	2021	Total
Initial firm-year cases (number of listed companies at the end of 2016, 2017, 2018, 2019, 2020, and 2021)	1,760	1,766	1,769	1,770	1,772	1,772	10,609
Step 1: Less listed firms in the financial and insurance industry	(43)	(43)	(43)	(43)	(43)	(43)	(258)
Step 2: Less companies with missing data of *LNFEE*	(335)	(303)	(283)	(249)	(229)	(391)	(1,790)
Step 3: Less companies with missing data of *FVA1*, *FVA2*, *FVA3*, and *FVA123*,	(227)	(277)	(186)	(189)	(180)	(157)	(1,216)
Step 4: Less companies with missing data of *CG*	(326)	(280)	(250)	(200)	(174)	(136)	(1,366)
Firm-year cases used in the study	829	863	1,007	1,089	1,146	1,045	5,979

LNFEE: Natural logarithm of audit fees. *FVA1*: Fair-valued financial assets measured using Level 1 inputs divided by total assets. *FVA2*: Fair-valued financial assets measured using Level 2 inputs divided by total assets. *FVA3*: Fair-valued financial assets measured using Level 3 inputs divided by total assets. *FVA123*: Sum of *FVA1*, *FVA2*, and *FVA3*. *CG*: Proxy for CG performance. Because FSC separates observations into seven rankings, above 5%, 6%~20%, 21%~35%, 36%~50%, 51%~65%, 66%~80%, and 81%~100%, I code *CG* of the "above 5%" group as 7, of the "6%~20%" group as 6, of the "21%~35%" group as 5, of the "36%~50%" group as 4, of the "51%~65%" group as 3, of the "66%~80%" group as 2, and of the "81%~100%" group as 1.

CG performance (*CG*) of each firm from Taiwan's CG evaluation exercises.

In 2014, TWSE,[4] TPEx,[5] SFI,[6] and FSC[7] together set up the CG evaluation

[4] TWSE is the abbreviation for Taiwan Stock Exchange Corporation.

[5] TPEx is the abbreviation for Taipei Exchange Corporation.

[6] SFI is the abbreviation for Taiwan's Securities and Futures Institute. It is a non-profit organization established on May 29, 1984 by the Taiwan government.

[7] FSC is the abbreviation for Taiwan's Financial Supervisory Commission. It was established on July 1, 2004 as the competent authority responsible for the development, supervision, regulation, and examination of financial markets and financial service enterprises in Taiwan.

exercise. After several rounds of public hearings to solicit comments and suggestions, multiple dimensions were identified and incorporated into Taiwan's CG evaluation exercise. These dimensions were derived according to domestic as well as foreign corporate governance regulations and practices. Each dimension includes several indicators. To reduce the degree of judgmental biases and to simplify the evaluation exercises, the indicators can only be rated by "yes" or "no" answers. To differentiate the rating scores, these indicators have three categories: basic (Type A), general (Type B), and advanced (Type C). Among these indicators, "basic" applies to all companies, while "general" applies to all companies unless the indicator is not applicable to a company. Finally, "advanced" focuses on international issues. One point is awarded to the total score when the answer to this indicator is "yes." The evaluated year covers the entire accounting calendar year.

SFI first announces the evaluation results to the general public after the institute has calculated the scores, reconciled them with the evaluated firms, and made proper adjustments. The results of the evaluation exercises are then announced to the general public on a specific date. On April 30, 2015, SFI released the results of the first corporate governance evaluation exercises. The announcement revealed the names of enterprises that made the top 20% among all participating firms. On April 8, 2016, the FSC announced the second corporate governance evaluation results of those listed in the top 50% according to the scores reconciled. On April 14, 2017, April 30, 2018, April 30, 2019, and April 30, 2020, respectively, the FSC announced the third, fourth, fifth, and sixth rounds of CG evaluation results for all participating firms and separated observations into seven rankings: above 5%, 6%~20%, 21%~35%, 36%~50%, 51%~65%, 66%~80%, and 81%~100%. I code *CG* of the "above 5%" group as 7, of the "6%~20%" group as 6, of the "21%~35%" group as 5, of the "36%~50%" group as 4, of the "51%~65%" group as 3, of the "66%~80%" group as 2, and of the "81%~100%" group as 1.

3.2.3 Control variable

The audit fee literature documents a number of factors that influence the explanation of audit fees. To avoid model misspecification I therefore include several control variables in my equation. Referring to Alexeyeva and Mejia-Likosova (2016), Ettredge *et al.* (2014), Fields *et al.* (2004), Jizi and Nehme (2018), Kanagaretnam *et al.* (2010), and Yao *et al.* (2015), I include control variables in my regression models as follows: *LNASSET* (natural logarithm of total assets), *BIG4* (dummy variable coded as 1 for firms audited by the Big 4 auditors and 0 otherwise), *LOSS* (dummy variable coded as 1 for firms with a net loss and 0 otherwise), *STDRET* (a firm-specific standard deviation of 12-month returns ending at the fiscal year-end), *INTANGIBLE* (percentage of intangible assets divided by total assets), *ROA* (ratio of net income divided by total assets), *LEV* (ratio of total debts divided by total assets), *CURRENT* (ratio of total current assets to total current liabilities), and *INHERENT* (sum of inventory and account receivables to total assets). I also add *TWSE*, *INDUSTRY*, and *YEAR* to control for trading market, industry, and firm-year influence, respectively.

3.3 Regression model

I use Equation (1) to test H1. It asserts that, ceteris paribus, the proportion of total fair-valued financial assets is positively associated with audit fees for the non-banking industry. H1 is supported if β_1 is significantly positive.

I use Equation (2) to test H2. It asserts that, ceteris paribus, the positive association between audit fees and the proportion of fair-valued financial assets is more pronounced for fair-valued financial assets using Level 3 inputs for the non-banking industry.

I finally employ Equation (3) to test H3. It states that CG performance negatively impacts the association between audit fees and the proportion of total fair-valued financial assets for the non-banking industry. H3 is supported if β_3 is significantly negative.

Following Rogers (1993) and Ettredge *et al.* (2014), I address the problem of

firm clustering by adjusting the standard errors and related t-statistics in estimating Equation (1), Equation (2), and Equation (3). The study presents the three as follows.

$$LNFEE_{i,t} = \beta_0+\beta_1 FVA123_{i,t} +\beta_2 CG_{i,t} +\beta_3 LNASSET_{i,t}+\beta_4 BIG4_{i,t}+\beta_5 LOSS_{i,t} +\beta_6 STDRET_{i,t} +\beta_7 INTANGIBLE_{i,t} +\beta_8 ROA_{i,t} +\beta_9 LEV_{i,t} +\beta_{10} CURRENT_{i,t}+ \beta_{11} INHERENT_{i,t}+\beta_{12} TWSE_{i,t}+\beta_{13} INDUSTRY_{i,t} +\sum_{2016}^{2021} \beta_{14} YEAR_{i,t}+\varepsilon_{i,t} \quad (1)$$

$$LNFEE_{i,t} = \beta_0+\beta_1 FVA1_{i,t}+\beta_2 FVA2_{i,t}+\beta_3 FVA3_{i,t}+\beta_4 CG_{i,t}+\beta_5 LNASSET_{i,t} +\beta_6 BIG4_{i,t}+\beta_7 LOSS_{i,t}+\beta_8 STDRET_{i,t}+\beta_9 INTANGIBLE_{i,t} +\beta_{10} ROA_{i,t} +\beta_{11} LEV_{i,t} +\beta_{12} CURRENT_{i,t}+ \beta_{13} INHERENT_{i,t} +\beta_{14} TWSE_{i,t}+ \beta_{15} INDUSTRY_{i,t} +\sum_{2016}^{2021} \beta_{16} YEAR_{i,t}+\varepsilon_{i,t} \quad (2)$$

$$LNFEE_{i,t} = \beta_0+\beta_1 FVA123_{i,t}+\beta_2 CG_{i,t}+\beta_3 FVA123_{i,t}*CG_{i,t} +\beta_4 LNASSET_{i,t} +\beta_5 BIG4_{i,t}+\beta_6 LOSS_{i,t}+\beta_7 STDRET_{i,t}+\beta_8 INTANGIBLE_{i,t} +\beta_9 ROA_{i,t} +\beta_{10} LEV_{i,t} +\beta_{11} CURRENT_{i,t}+ \beta_{12} INHERENT_{i,t} +\beta_{13} TWSE_{i,t}+ \beta_{14} INDUSTRY_{i,t} +\sum_{2016}^{2021} \beta_{15} YEAR_{i,t}+\varepsilon_{i,t} \quad (3)$$

LNFEE: Natural logarithm of audit fees;

FVA1: Fair-valued financial assets measured using Level 1 inputs divided by total assets;

FVA2: Fair-valued financial assets measured using Level 2 inputs divided by total assets;

FVA3: Fair-valued financial assets measured using Level 3 inputs divided by total assets;

FVA123: Sum of *FVA1*, *FVA2*, and *FVA3*;

CG: Proxy for CG performance; because FSC separates observations into seven rankings (above 5%, 6%~20%, 21%~35%, 36%~50%, 51%~65%, 66%~80%, and 81%~100%), I code *CG* of the "above 5%" group as 7, of the "6%~20%" group as 6, of the "21%~35%" group as 5, of the "36%~50%" group as 4, of the "51%~65%" group as 3, of the "66%~80%" group as 2, and of the "81%~100%" group as 1;

LNASSET: Natural logarithm of total assets;

BIG4: Dummy variable coded as 1 for firms audited by the Big 4 auditors

and 0 otherwise;

*LOS*S: Dummy variable coded as 1 for firms with a net loss and 0 otherwise;

STDRET: A firm-specific standard deviation of 12-month returns ending at the fiscal year-end;

INTANGIBLE: Percentage of intangible assets divided by total assets;

ROA: Ratio of net income divided by total assets;

LEV: Ratio of total debts divided by total assets;

CURRENT: Ratio of total current assets to total current liabilities;

INHERENT: Sum of inventory and account receivables to total assets;

TWSE: Dummy variable equal to 1 for a TWSE-listed firm and 0 otherwise;

INDUSTRY: An indicator set to each industry category according to FSC codes;

YEAR: Dummy variable coded as 1 for firm i in year t and 0 otherwise;

t: t^{th} year; the research period is from 2016 to 2021;

i: i^{th} firm;

$\varepsilon_{i,t}$: Residuals.

4. Empirical results

4.1 Desriptive statistics

I use the winsorizing method on the variables at the 1% level to process the outlier. Table 2 reports the descriptive statistics of Equation (1), Equation (2), and Equation (3). First, the mean and median of *LNFEE* are respectively 14.982 and 14.931. The means of *FVA1*, *FVA2*, *FVA3*, and *FVA123* are respectively 0.036, 0.004, 0.013, and 0.053. This denotes that the ratios of fair-valued financial assets measured using Level 1 inputs, Level 2 inputs, and Level 3 inputs to total fair-valued financial assets are respectively 68%, 7.5%, and 24.5%, implying for Taiwanese non-banking firms that the fair-valued financial assets measured using Level 1 inputs take up the largest proportion. My descriptive statistics of *FVA1*, *FVA2*, *FVA3*, and *FVA123* are different from those of Ettredge *et al.* (2014) and a little similar to those of Alexeyeva and Mejia-Likosova (2016). In Ettredge *et al.*

(2014), the means of *FVA1*, *FVA2*, *FVA3*, and *FVA123* are respectively 0.01, 0.17, 0.01, and 0.19, and the ratios of fair-valued assets measured using Level 1 inputs, Level 2 inputs, and Level 3 inputs to total fair-valued assets are respectively 5.3%, 89.4%, and 5.3%, implying for U.S. publicly banks from 2008 through 2011 that fair-valued assets measured using Level 2 inputs present the largest proportion. On the other hand, in Alexeyeva and Mejia-Likosova (2016), the means of *FVA1*, *FVA2*, *FVA3*, and *FVA123* are respectively 0.17, 0.10, 0.05, and 0.31, and the ratios of fair-valued assets measured using Level 1 inputs, Level 2 inputs, and Level 3 inputs to total fair-valued assets are respectively 52%, 32%, and 16%. This denotes for European publicly listed banks from 2008 through 2013 that fair-valued assets measured using Level 1 inputs take up the largest proportion.

The mean (median) value for *CG* is 3.636 (4), denoting the proportion of better CG performing companies is less than that of poorer CG performing companies. Moreover, the mean value for *BIG4* is 0.889, implying around 90% of sample firms are audited by the Big 4 auditors. The mean (median) values for *ROA* and *LEV* are 4.592 (4.360) and 0.422 (0.428), indicating that the average number of *ROA* for samples is 4.6%, and the amount of liabilities is 42% of assets. Furthermore, the mean (median) values for *CURRENT* and *INHERENT* are 3.318 (1.891) and 0.300 (0.281), respectively. Finally, the mean value for *TWSE* is 0.609. This denotes among all sample companies that TWSE listed firms account for 61%.

4.2 Correlation analyses

Table 3 lists the Pearson product-moment correlation of Equation (1), Equation (2), and Equation (3) and presents that *LNFEE* significantly and negatively correlates with *FVA1* and *FVA123*, but does not significantly (significantly and positively) correlate with *FVA2* (*FAV3*). This means *LNFEE* and *FVA123* have significantly negative correlations, implying my empirical results do not support H1. In addition, *LNFEE* and *FAV1 (FVA2* and *FAV3)* have significantly negatively (insignificantly and significantly positively) correlations, implying only *FAV3* has a significantly positively correlation. Therefore, my findings potentially support H2. Finally, *CG* significantly and positively correlates with

Table 2

Descriptive statistics (N=5,979)

Variable	Mean	Median	Std. Dev.	Minimum	Maximum
LNFEE	14.982	14.931	0.561	13.754	16.784
FVA1	0.036	0.003	0.071	0	0.409
FVA2	0.004	0	0.016	0	0.114
FVA3	0.013	0	0.032	0	0.194
FVA123	0.053	0.017	0.091	0	0.493
CG	3.636	4	1.875	1	7
LNASSET	15.715	15.486	1.485	13.030	20.114
BIG4	0.889	1	0.315	0	1
LOSS	0.177	0	0.382	0	1
STDRET	9.783	8.288	6.177	1.712	33.607
INTANGIBLE	1.609	0.207	3.989	0	25.224
ROA	4.592	4.360	7.082	-19.633	27.605
LEV	0.422	0.428	0.180	0.060	0.833
CURRENT	3.318	1.891	14.295	0.077	711.495
INHERENT	0.300	0.281	0.188	0	0.955
TWSE	0.609	1	0.488	0	1

LNFEE: Natural logarithm of audit fees. *FVA1*: Fair-valued financial assets measured using Level 1 inputs divided by total assets. *FVA2*: Fair-valued financial assets measured using Level 2 inputs divided by total assets. *FVA3*: Fair-valued financial assets measured using Level 3 inputs divided by total assets. *FVA123*: Sum of *FVA1*, *FVA2*, and *FVA3*. *CG*: Proxy for CG performance. Because FSC separates observations into seven rankings, above 5%, 6%~20%, 21%~35%, 36%~50%, 51%~65%, 66%~80%, and 81%~100%, I code *CG* of the "above 5%" group as 7, of the "6%~20%" group as 6, of the "21%~35%" group as 5, of the "36%~50%" group as 4, of the "51%~65%" group as 3, of the "66%~80%" group as 2, and of the "81%~100%" group as 1. *LNASSET*: Natural logarithm of total assets. *BIG4*: Dummy variable coded as 1 for firms audited by the Big 4 auditors and 0 otherwise. *LOS*S: Dummy variable coded as 1 for firms with a net loss and 0 otherwise. *STDRET*: A firm-specific standard deviation of 12-month returns ending at the fiscal year-end. *INTANGIBLE*: Percentage of intangible assets divided by total assets. *ROA*: Ratio of net income divided by total assets. *LEV*: Ratio of total debts divided by total assets. *CURRENT*: Ratio of total current assets to total current liabilities. *INHERENT:* Sum of inventory and account receivables to total assets. *TWSE*: Dummy variable equal to 1 for a TWSE listed firm and 0 otherwise.

LNFEE, indicating better CG performance enhances audit fees. Thus, the regression results of this work are inconsistent with H3. However, by simply looking at the significance of the correlation coefficients between the two variables it is not possible to accurately confirm whether this paper's hypotheses are supported, because the correlation coefficients between the two variables do not control the effect of other variables. Therefore, I use regression analysis to explore the hypotheses in greater detail.

4.3 Regression analyses

The empirical results for Equation (1), Equation (2), and Equation (3) are in Table 4. The coefficient of *FVA123* is -0.452 in Equation (1), which is significantly negative (p-value = 0.025). Therefore, the results do not support H1, indicating that the proportion of total fair-valued financial assets is negatively associated with audit fees for the non-banking industry. The findings are not consistent with the findings in Ettredge *et al.* (2014), who reveal that the proportion of total fair-valued assets is positively associated with audit fees for the banking industry.

To further explain why my results are inconsistent with the evidence of Ettredge *et al.* (2014) and do not support H1, I compare the means of *FVA1*, *FVA2*, *FVA3*, and *FVA123* and the ratios of fair-valued assets measured using Level 1 inputs, Level 2 inputs, and Level 3 inputs to total fair-valued assets of these two studies. The means of *FVA1*, *FVA2*, *FVA3*, and *FVA123* and the ratios of fair-valued assets measured using Level 1 inputs, Level 2 inputs, and Level 3 inputs to total fair-valued assets of my paper are respectively 0.036, 0.004, 0.013, 0.053, 68%, 7.5%, and 24.5%. On the other hand, the numbers in Ettredge *et al.* (2014) are 0.01, 0.17, 0.01, 0.19, 5.3%, 89.4%, and 5.3%. This denotes for Taiwanese non-banking firms that fair-valued assets measured using Level 1 inputs have the largest proportion, but for U.S. publicly listed banks from 2008 through 2011 their fair-valued assets measured using Level 2 inputs have the largest proportion. Furthermore, the ratio of fair-valued assets measured using Level 1 inputs to total fair-valued assets in my paper is 13 times that in Ettredge *et al.* (2014).

Summarizing the above discussions and descriptive statistics, I speculate that

Table 3
Pearson correlation (N=5,979)

Variable	LNFEE	FVA1	FVA2	FVA3	FVA123	CG	LNASSET	BIG4	LOSS	STDRET	INTANGIBLE	ROA	LEV	CURRENT	INHERENT	TWSE
LNFEE	1															
FVA1	-0.139**	1														
FVA2	-0.003	0.019	1													
FVA3	0.039**	-0.115***	-0.016	1												
FVA123	-0.132***	0.850*	0.243**	0.517**	1											
CG	0.3270*	-0.029**	0.003	-0.059**	-0.043***	1										
LNASSET	0.668***	-0.029**	-0.006	-0.060***	-0.050*	0.376**	1									
BIG4	0.265**	-0.060*	-0.001	-0.037*	-0.061***	0.183***	0.101**	1								
LOSS	-0.120***	-0.017	0.035***	0.026**	0.008	-0.151***	-0.231**	-0.048**	1							
STDRET	-0.021	-0.052**	0.033**	0.019	-0.026**	-0.069***	-0.121**	0.022	0.103**	1						
INTANGIBLE	0.149**	-0.057***	0.008	-0.028*	-0.058**	0.113**	0.080	0.054**	0.035***	-0.000	1					
ROA	0.085**	0.023*	-0.029**	-0.025*	-0.001	0.184***	0.166**	0.075**	-0.658**	0.012	-0.045***	1				
LEV	0.295**	-0.257***	-0.008	-0.132**	-0.251***	0.033*	0.388**	0.016	0.001	0.002	0.008	-0.125***	1			
CURRENT	-0.114***	-0.002	0.002	-0.003	-0.003	-0.061***	-0.101***	-0.048***	0.080***	0.001	-0.015	-0.035***	-0.188***	1		
INHERENT	0.028**	-0.032**	-0.050***	-0.022*	-0.030**	-0.055***	0.015***	-0.044***	-0.146***	-0.018	-0.156***	0.074***	0.332***	-0.066***	1	
TWSE	0.324**	0.049**	-0.028*	0.002	0.0280	-0.009	0.506**	0.049**	-0.121***	-0.119***	-0.013	0.068***	0.129**	0.004	0.005	1

1. The definitions of variables appear in Table 2.

2.***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

fair-valued assets measured using Level 1 inputs are a critical factor to decrease the positive association between audit fees and the proportion of total fair-valued assets. My conjecture is consistent with a hypothesized scenario in which audit effort increases with the difficulty of verifying asset fair values; e.g., Ettredge *et al.* (2014) state that managers have to provide assumptions and estimates and choose among estimation approaches. My conjecture is also consistent with the evidence of Equation (2), in which the coefficient of *FVA1* is significantly negative (p-value = 0.000), the coefficient of *FVA2* is not significant (p-value = 0.812), and the coefficient of *FVA3* is significantly positive (p-value = 0.016). Thus, evaluation difficulties are less substantial with fair-valued assets using Level 1 inputs and are most pronounced for fair values evaluated using Level 3 inputs. This conjecture aligns with related literature, such as Alexeyeva and Mejia-Likosova (2016) who state that the predominance of Level 1 inputs' assets may weaken the strong influence of Level 3 inputs' assets, while Black *et al.* (2018) document that Level 1 estimates rely on quoted prices in active markets for identical assets and liabilities, which are easily obtainable and verifiable. Thus, my study finds a negative relation between audit fees and the proportion of total fair-valued assets.

From Table 4 the empirical results of Equation (2) show that the coefficient of *FVA1* is -0.612, which is significantly negative (p-value = 0.000), the coefficient of *FVA2* is -0.008, which is not significant (p-value = 0.812), and the coefficient of *FVA3* is 0.375, which is significantly positive (p-value = 0.016). An F test reports significant differences between the coefficients of *FVA1* and *FVA3* and between *FVA2* and *FVA3* (F = 33.16; p-value < 0.0001, and F = 2.79; p-value = 0.085). Therefore, only *FVA3* has a positive correlation to *LNFEE*, and the result supports that *FVA1*, *FVA2*, and *FVA3* have a different impact on audit fees. Thus, the findings support H2, indicating that the positive association between audit fees and the proportion of fair-valued financial assets is more pronounced for fair-valued financial assets using Level 3 inputs for the non-banking industry.

Finally, from Table 4 the estimated coefficients of *CG* in Equation (1), Equation (2), and Equation (3) are all significantly positive at the 1% level (p-value < 0.0001), indicating better CG performing companies pay higher audit fees,

thus supporting the demand perspective. From this demand perspective, a well-governed firm requires better reporting quality to ensure compliance with higher financial reporting levels (Muniandy, 2007), thus leading to higher audit fees. In other words, a firm with better CG performance should demand higher audit quality, like more accurate fair value measurement, leading auditors to put forth more efforts that spur an increase in audit fees. Thus, even the estimated coefficient of *FVA123* in Equation (3) is significantly negative at the 10% level (p-value = 0.053), because the estimated coefficient of *CG* supports a demand perspective; therefore, *FVA123*CG* is 0.001 and insignificant (p-value = 0.193), implying the empirical results do not support H3 - that is, CG performance does not impact the association between audit fees and the proportion of total fair-valued financial assets for the non-banking industry.

The regression results are in accordance with Alexeyeva and Mejia-Likosova (2016), because the coefficients of *LNASSET* and *INTANGIBLE* in Equation (1), Equation (2), and Equation (3) are all significantly positive, showing that larger size companies and companies with a higher percentage of intangible assets pay more audit fees. Furthermore, the coefficients of *LNASSET*, *BIG4*, and *STDRET* in Equation (1), Equation (2), and Equation (3) are all significantly positive, which are consistent with Ettredge *et al.* (2014). Finally, the coefficients of *TWSE* in Equation (1), Equation (2), and Equation (3) are all significantly positive (p-value = 0.031, 0.033, and 0.031), which are in accordance with researches using Taiwanese observations.

5. Additional and endogeneity analysis

5.1 Separate FVA123 into FVA1 and FVA23

The literature indicates that audit complexity and risk are mainly affected by the level of subjectivity when estimating the fair-value number. The degree of this impact also directly relates to the level of uncertainty when auditors evaluate fair-value estimates. Among the three levels of inputs measured at fair value, subjectivity is primarily included in Level 2 and Level 3 inputs. In other words,

Table 4

Empirical results for equation (1), equation (2), and equation (3) (N=5,979)

Variable	Equation (1)		Equation (2)		Equation (3)	
	Parameter Estimate	*Pr* > |t|	Parameter Estimate	*Pr* > |t|	Parameter Estimate	*Pr* > |t|
Intercept	10.517	< 0.0001***	10.517	< 0.0001***	10.517	< 0.0001***
FVA123	-0.452	0.025**	-	-	-0.439	0.053*
FVA1	-	-	-0.612	0.000***	-	-
FVA2	-	-	-0.008	0.812	-	-
FVA3	-	-	0.375	0.016**	-	-
CG	0.017	< 0.0001***	0.017	< 0.0001***	0.017	< 0.0001***
*FVA123*CG*	-	-	-	-	0.001	0.193
LNASSET	0.244	< 0.0001***	0.244	< 0.0001***	0.244	< 0.0001***
BIG4	0.325	< 0.0001***	0.325	< 0.0001***	0.325	< 0.0001***
LOSS	0.027	0.148	0.027	0.146	0.027	0.146
STDRET	0.005	< 0.0001***	0.005	< 0.0001***	0.005	< 0.0001***
INTANGIBLE	0.004	0.000***	0.004	0.000***	0.004	0.000***
ROA	-0.002	0.016**	-0.002	0.016**	-0.002	0.016**
LEV	0.071	0.051*	0.071	0.049**	0.071	0.052**
CURRENT	-0.002	< 0.0001***	-0.002	< 0.0001***	-0.002	< 0.0001***
INHERENT	0.016	0.610	0.015	0.642	0.016	0.614
TWSE	0.029	0.031**	0.029	0.033**	0.029	0.031**
INDUSTRY			YES			
YEAR			YES			
Adjusted R^2	0.496		0.495		0.495	
F Value	326.52		293.86		309.29	

1. For the definitions of the variables, please refer to Table 2.

2. ***, **, and * indicate significance at the 1%, 5%, and 10% levels under a two-tailed test, respectively.

3. The VIF value of all variables is less than 2.

when a firm has a higher proportion of fair-valued assets using Level 2 and Level 3 inputs, increasing audit fees occur. Ettredge *et al.* (2014) and Goncharov *et al.* (2014) both show a positive influence of Level 2 and Level 3 assets on audit fees,

but a direct positive influence of Level 1 inputs on audit cost is only reported in the literature by the former paper. According to the above discussions and evidence, I assert that the degree of subjectivity and uncertainty of fair-valued assets using Level 2 and Level 3 inputs is different from those of Level 1 inputs. Thus, in the first additional test, I modify Equation (1) to Equation (4) by separating *FVA123* into *FVA1* and *FVA23* and re-run Equation (4) to test whether the impact of *FVA1* on *INFEE* is different from that of *FVA23*.

From Table 5 the estimated coefficient of *FVA1* is -0.703, which is significant at the 1% level (p-value < 0.0001), indicating the proportion of fair-valued financial assets using Level 1 inputs is significantly and negatively associated with audit fees. The estimated coefficient of *FVA23* is 0.201, which is significant at the 10% level (p-value = 0.098), implying that the proportion of fair-valued assets using Level 2 and Level 3 inputs is significantly and positively associated with audit fees. Summarizing the above evidence, my findings are consistent with the results of Goncharov *et al.* (2014), who report that audit fees decrease with a firm's exposure to fair-valued assets using Level 1 inputs and increase with a firm's exposure to more difficult-to-measure (i.e., fair-valued assets using Level 2 and Level 3 inputs) fair values. The empirical results in Section 5.1 also support my conjecture in Section 4.3, which documents that fair-valued assets measured using Level 1 inputs are an important factor to lower the positive association between the proportion of total fair-valued financial assets and audit fees.

5.2 Re-running equation (1), equation (2), and equation (4) by deleting observations with FVA123 = 0

Among my samples, 428 companies have a value of 0 for *FVA123*. To avoid the skewed distribution problem, I delete observations with *FVA123* = 0 and re-run Equation (1), Equation (2), and Equation (4) to re-explore my hypotheses.

Table 6 reports the empirical results. The findings after deleting observations with *FVA123* = 0 are mostly consistent with my main tests. First, the coefficient of *FVA123* is -0.509, which is significantly negative (p-value = 0.011). The results still do not support H1, implying that the proportion of total fair-valued financial

Table 5
Empirical results for equation (4) - separating FVA123 into FVA1 and FVA23

Variable	Parameter Estimate	*Pr* > |t|
Intercept	10.513	< 0.0001***
FVA1	-0.713	< 0.0001***
FVA23	0.201	0.098*
CG	0.017	< 0.0001***
LNASSET	0.243	< 0.0001***
BIG4	0.325	< 0.0001***
LOSS	0.027	0.147
STDRET	0.005	< 0.0001***
INTANGIBLE	0.010	< 0.0001***
ROA	-0.002	0.016**
LEV	0.071	0.052*
CURRENT	-0.002	< 0.0001***
INHERENT	0.016	0.611
TWSE	0.029	0.031**
INDUSTRY	YES	
YEAR	YES	
N	5,979	
Adjusted R^2	0.497	
F Value	329.01	

1. For the definitions of variables, please refer to Table 2. FVA23: Sum of FVA2 and FVA3.
2. ***, **, and * indicate significance at the 1%, 5%, and 10% levels under a two-tailed test, respectively.
3. The VIF value of all variables is less than 2.

assets is negatively associated with audit fees. The empirical results of Equation (2) show that the coefficient of *FVA1* is -0.704, which is significantly negative (p-value = 0.000), the coefficient of *FVA2* is -0.009, which is not significant (p-value = 0.801), and the coefficient of *FVA3* is 0.389, which is significantly positive (p-value = 0.012). The F test reports significant differences between the coefficients

of *FVA1* and *FVA3* and between *FVA2* and *FVA3* (F = 37.85; p-value < 0.0001, and F = 2.70; p-value = 0.097). Therefore, the findings still support H2, denoting that the positive association between audit fees and the proportion of fair-valued financial assets is more pronounced for fair-valued financial assets using Level 3 inputs.

Finally, the estimated coefficient of *FVA1* in Equation (4) is -0.701, which is significant at the 1% level (p-value = 0.000) and consistent with prior findings. However, the estimated coefficient of *FVA23* is 0.112 (p-value = 0.398), which is not significant and is inconsistent with results, including observations with *FVA123* = 0.

5.3 Changing several variables in equation (1), equation (2), and equation (3)

The literature shows that non-audit services require auditors' additional efforts, which eventually increase their audit fees (e.g., Hay *et al.*, 2006b). Industry specialist auditors also charge higher audit fees for highly complex firms, because of differentiated quality of audit. Other factors, like the difference in auditors between the current year and the previous year, may impact audit fees. Therefore, I modify the independent variable in Equation (1), Equation (2), and Equation (3) from the natural logarithm of audit fees to the natural logarithm of audit and non-audit fees. I further add two new variables, industry specialist auditors (*SPECIALIST*) and auditors switching (*ASWITCH*), in the third additional analysis. Empirical results are in Table 7.

From Table 7 the coefficient of *FVA123* is -0.030 in Equation (1) and significantly negative (p-value = 0.006). Therefore, the results do not support H1, indicating that the proportion of total fair-valued financial assets is negatively associated with audit fees for the non-banking industry. The findings are consistent with other findings when I define dependent variable by the natural logarithm of audit fees. The empirical results of Equation (2) show that the coefficient of *FVA1* is -0.048, which is significantly negative (p-value = 0.064), the coefficient of *FVA2* is 0.224, which is not significant (p-value = 0.756), and the coefficient of *FVA3* is

Table 6

Empirical results for equation (1), equation (2), and equation (4) by deleting observations with FVA123 = 0 (N=5,551)

	Equation (1)		Equation (2)		Equation (3)	
Variable	Parameter Estimate	*Pr* > |t|	Parameter Estimate	*Pr* > |t|	Parameter Estimate	*Pr* > |t|
Intercept	10.672	< 0.0001***	10.673	< 0.0001***	10.672	< 0.0001***
FVA123	-0.509	0.011**	-	-	-	-
FVA1	-	-	-0.704	0.000***	-0.701	0.000***
FVA2	-	-	-0.009	0.801	-	-
FVA3	-	-	0.389	0.012**	-	-
FVA23	-	-	-	-	0.112	0.398
CG	0.016	< 0.0001***	0.016	< 0.0001***	0.016	< 0.0001***
LNASSET	0.251	< 0.0001***	0.251	< 0.0001***	0.252	< 0.0001***
BIG4	0.344	< 0.0001***	0.344	< 0.0001***	0.344	< 0.0001***
LOSS	0.019	0.153	0.019	0.152	0.019	0.150
STDRET	0.006	< 0.0001***	0.006	< 0.0001***	0.006	< 0.0001***
INTANGIBLE	0.005	0.000***	0.005	0.000***	0.005	0.000***
ROA	-0.004	0.012**	-0.004	0.011**	-0.004	0.012**
LEV	0.062	0.046**	0.062	0.045**	0.062	0.045**
CURRENT	-0.002	< 0.0001***	-0.002	< 0.0001***	-0.002	< 0.0001***
INHERENT	0.015	0.503	0.015	0.503	0.015	0.501
TWSE	0.025	0.026**	0.025	0.027**	0.025	0.027**
INDUSTRY	YES		YES		YES	
YEAR	YES		YES		YES	
Adjusted R^2	0.490		0.496		0.489	
F Value	312.43		290.56		319.56	

1. For the definitions of variables, please refer to Table 2 and Table 5.

2. ***, **, and * indicate significance at the 1%, 5%, and 10% levels under a two-tailed test, respectively.

3. The VIF value of all variables is less than 2.

0.009, which is significantly positive (p-value = 0.002). They are consistent with the main tests. This means even if I change the dependent variable from the natural logarithm of audit fees to the natural logarithm of audit and non-audit fees, only *FVA3* has a positive correlation to audit and non-audit fees. This result supports

H2, denoting that the positive association between audit fees and the proportion of fair-valued financial assets is more pronounced for fair-valued financial assets using Level 3 inputs for the non-banking industry.

Finally, the estimated coefficients of *CG* in Equation (1), Equation (2), and Equation (3) are all significantly positive at the 1% level (p-value < 0.0001). This implies better CG performing companies pay higher audit and non-audit fees, which still supports the demand perspective and is consistent with prior results.

5.4 Empirical results for the pre-COVID-19 and post-COVID-19 period

My study next investigates the influence of the COVID-19 epidemic in the last additional test. I therefore separate my sample period into two sub-periods - (1) the pre-COVID-19 period (2016 to 2019) and (2) the post-COVID-19 period (2020 to 2021) - and re-run Equation (1), Equation (2), and Equation (3).

In untabulated analyses the results show during the pre-COVID-19 period (2016 to 2019) that the coefficient of *FVA123* is -0.411, which is significantly negative (p-value =0.035), while the coefficient of *FVA123* during the post-COVID-19 period (2020 to 2021) is -0.461, which is also significantly negative (p-value =0.020). Therefore, no matter for the pre- or post-COVID-19 period, the results still do not support H1, implying the proportion of total fair-valued financial assets is negatively associated with audit fees for the non-banking industry in Taiwan. The coefficients of *FVA123*CG* during the two periods are both not significant (p-value = 0.354 and 0.456), and thus both do not support H3, indicating the results are consistent with the main test.

During the pre-COVID-19 period the coefficient of *FVA1* is -0.601, which is significantly negative (p-value < 0.0001), the coefficient of *FVA2* is -0.011, which is not significant (p-value = 0.706), and the coefficient of *FVA3* is 0.352, which is significantly positive (p-value = 0.008). An F test reports significant differences between the coefficients of *FVA1* and *FVA3* and between *FVA2* and *FVA3* (F = 29.85; p-value < 0.0001, and F = 3.82; p-value = 0.050). The findings during the pre-COVID-19 period therefore support H2 and are consistent with the main

Table 7

Empirical results for changing several variables in equation (1), equation (2), and equation (3) (N=5,979)

Variable	Equation (1)		Equation (2)		Equation (3)	
	Parameter Estimate	*Pr* > |t|	Parameter Estimate	*Pr* > |t|	Parameter Estimate	*Pr* > |t|
Intercept	8.032	< 0.0001***	8.029	< 0.0001***	8.040	< 0.0001***
FVA123	-0.030	0.006***	-	-	-0.020	0.012**
FVA1	-	-	-0.048	0.064*	-	-
FVA2	-	-	0.224	0.756	-	-
FVA3	-	-	0.009	0.002***	-	-
CG	0.213	< 0.0001***	0.214	< 0.0001***	0.215	< 0.0001***
*FVA123*CG*	-	-	-	-	-0.024	0.402
LNASSET	1.021	< 0.0001***	1.021	< 0.0001***	1.022	< 0.0001***
BIG4	1.178	< 0.0001***	1.167	< 0.0001***	1.171	< 0.0001***
LOSS	0.075	0.698	0.069	0.721	0.073	0.706
STDRET	0.049	< 0.0001***	0.048	< 0.0001***	0.049	< 0.0001***
INTANGIBLE	0.030	0.004***	0.031	0.004***	0.030	0.004***
ROA	-0.019	0.037**	-0.019	0.039**	-0.019	0.037**
LEV	0.892	0.019**	0.873	0.022**	0.884	0.020**
CURRENT	-0.015	0.000***	-0.015	0.022**	-0.015	0.000***
INHERENT	1.289	0.000***	1.337	< 0.0001***	1.281	0.000***
SPECIALIST	-0.090	0.034**	-0.089	0.037**	-0.090	0.034**
ASWITCH	-1.060	0.366	-1.089	0.353	-1.041	0.374
TWSE	-0.052	0.714	-0.040	0.777	-0.051	0.718
INDUSTRY	YES		YES		YES	
YEAR	YES		YES		YES	
Adjusted R^2	0.172		0.173		0.172	
F Value	62.97		57.77		60	

1. For the definitions of variables, please refer to Table 2. SPECIALIST: Industry specialist auditors, which I define as the average of the sum of the market share (measured by the number of firms) of two auditors. ASWITCH: Dummy variable equal to 1 for a firm with auditors switching and 0 otherwise.

2. ***, **, and * indicate significance at the 1%, 5%, and 10% levels under a two-tailed test, respectively.

3. The VIF value of all variables is less than 2.

examination, indicating that the positive association between audit fees and the proportion of fair-valued financial assets is more pronounced for fair-valued financial assets using Level 3 inputs for the non-banking industry.

The untabulated results of Equation (2) during the post-COVID-19 period

show that the coefficient of *FVA1* is -0.659, which is significantly negative (p-value = 0.000), the coefficient of *FVA2* is -0.008, which is not significant (p-value = 0.855), and the coefficient of *FVA3* is 0.381, which is also not significant (p-value = 0.132). An F test reports significant differences between the coefficients of *FVA1* and *FVA3*, but no significant differences between the coefficients of *FVA2* and *FVA3*. As such, the findings during the post-COVID-19 period do not support H2 and are inconsistent with the main examination. To sum up, the empirical results during the pre-COVID-19 and post-COVID-19 periods present a few inconsistencies between each other, implying the COVID-19 epidemic has little impact on the association between fair-valued measurement and audit fees for the non-banking industry in Taiwan.

5.5 Endogeneity analysis

The estimations of Equation (1), Equation (2), and Equation (3) may suffer from the problem of endogeneity. For instance, it is likely that this study has omitted some unobservable variables that simultaneously affect fair-valued measurement and audit fees. Therefore, I employ the fixed-effect model to mitigate the endogeneity that arises from omitted unobservable variables, like in Conyon and He (2011) and Zhang *et al.* (2014).

According to the untabulated results of Equation (1) after using the fixed-effect model, the coefficient of *FVA123* is -0.002, which is significantly negative (p-value = 0.052). The results still do not support H1, implying that the proportion of total fair-valued financial assets is negatively associated with audit fees for the Taiwan non-banking industry. In addition, based on the untabulated results of Equation (2), the coefficient of *FVA1* is -0.004, which is significantly negative (p-value = 0.051), the coefficient of *FVA2* is -0.163, which is not significant (p-value = 0.464), and the coefficient of *FVA3* is 0.004, which is significantly positive (p-value = 0.016). In addition, an F test reports significant differences between the coefficients of *FVA1* and *FVA3* and between *FVA2* and *FVA3* ($F = 34.01$; p-value < 0.0001, and $F = 2.80$; p-value = 0.085). The findings thus support H2, indicating that the positive association between audit fees and the proportion of fair-valued

financial assets is more pronounced for fair-valued financial assets using Level 3 inputs for the Taiwan non-banking industry.

Finally, the estimated coefficient of *FVA123*CG* in Equation (3) is 0.001, which is not significant (p-value = 0.589), denoting the empirical results still do not support H3 and are consistent with prior results. Summarizing the above, all findings of the fixed-effect model are consistent with my regression tests, which appear in Section 4.3 Regression Analyses.

6. Discussion and conclusions

Although IASB and FASB have moved over several years toward increased use of fair value measurements for financial instruments, academics do not know much about how fair value measurements affect audit fees. Indeed, few studies have explored the correlation between fair value measurements and audit fees for the banking industry, aside from Alexeyeva and Mejia-Likosova (2016)and Ettredge *et al.* (2014). Goncharov *et al.* (2014) and Sangchan *et al.* (2020) explore European and Australian real estate companies, respectively, and show that audit fees are lower for firms having an above-average proportion of fair-valued assets versus those using the depreciation cost method. Yao *et al.* (2015) use the Australian non-banking industry as their sample and investigate the association between fair value measurement of "non-financial" assets and audit fees.

Summarizing the above discussions, the real estate industry is only one kind of non-banking industry. The research targets of Yao *et al.* (2015) and my paper are different, because I explore the relation between fair value measurements of "financial" assets and audit fees, but Yao *et al.* (2015) examine the relation between fair value measurements of "non-financial" assets and audit fees. My paper offers additional implications to academics and practitioners, because I take a sample of all non-banking listed companies in Taiwan over the period 2016-2021 to explore the relation between fair value measurements of "financial" assets and audit fees and further examine the moderating impact of CG performance.

This paper presents that the proportion of total fair-valued financial assets is negatively associated with audit fees. Among them, the proportion of fair-valued

financial assets using Level 1 inputs is significantly negatively associated with audit fees, that of fair-valued financial assets using Level 2 inputs is not significantly associated with audit fees, and that of fair-valued financial assets using Level 3 inputs is significantly positively associated with audit fees. In addition, my results show that CG performance has no significant impact on the association between the proportion of total fair-valued assets and audit fees.

The findings of my work complement the literature and provide implications for adopting fair-value accounting, which I now discuss. First, this paper fills the gap in the literature on the relation between fair value measurements of financial assets and audit fees for the whole non-banking industry. I find for the non-banking industry that fair-valued financial asset estimates using Level 3 inputs positively affect audit fees, which agree with Alexeyeva and Mejia-Likosova (2016)and Ettredge *et al.* (2014). This implies that fair-valued assets estimates using Level 3 inputs both for the banking and non-banking industries have greater levels of complexity and risk that require more audit effort.

Second, my result of the negative relationship between the proportion of total fair-valued financial assets and audit fees does not agree with Alexeyeva and Mejia-Likosova (2016)and Ettredge *et al.* (2014). From my empirical findings, it is the proportion of fair-valued assets measured using Level 1 inputs and not industry classification (whether banking or non-banking) that determines the association between audit fees and fair-valued measurement.

Third, my study provides supporting evidence for understanding the impact of CG performance on audit effort expended on the evaluation of fair-valued financial assets. These results should be of interest to regulators and financial institutions that are applying a fair-value approach to the evaluation of assets. Based on the findings herein, for the non-banking industry, CG performance positively impacts audit fees, thus supporting the demand perspective of CG performance. However, CG performance has no significant impact on the association between the proportion of total fair-valued financial assets and audit fees.

In summary, my findings contribute to the understanding of audit fee

determinants in the audit literature for the non-banking industry. This research validates the compliance cost concerns expressed by audit preparers of the non-banking industry. Moreover, it provides interesting evidence relevant to the increased use of fair value measurements for financial instruments in this industry.

Several areas left unexplained in my work are worth exploring in a future study. First, I consider the moderating effects of CG performance, and so it would be interesting to evaluate other factors, such as firms audited by Big4 or non-Big4. Second, a study can introduce a more complex setting that analyzes the issues of my paper on different industries and compare them to each other.

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