

The Influence of Climate-Related Disclosures on Audit Pricing: Insights from TCFD Adoption

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Abstract

This study examines how signing the TCFD framework impacts audit fees, using 8,535 Taiwanese firms from 2015 to 2022. To address sample selection bias, Propensity Score Matching is applied. Results reveal a significant positive relationship between TCFD adoption and audit fees, driven by disclosure complexity and specialized auditing expertise. This research offers insights into firms, regulators, and practitioners on the cost implications of climate-related disclosures and audit pricing.

Keywords: Task force on climate-related financial disclosures (TCFD), Climate-related disclosures, Audit fee

1. Introduction

This study examines the impact of signing the Task Force on Climate-related Financial Disclosures (TCFD) framework on audit fees. The motivation stems from the growing importance of TCFD, as highlighted by regulators, academics, standard setters, and practitioners. Established by the Financial Stability Board (FSB) in 2015, the TCFD develops voluntary, consistent climate-related financial risk disclosure guidelines for companies to provide information to investors, lenders, insurers, and other stakeholders. Its relevance spans financial stability, market efficiency, transparency, accountability, and sustainable development. While TCFD adoption enhances the disclosure of climate and sustainability information, it also brings both benefits and challenges. Advantages include improved transparency, strengthened risk management, strategic planning, and enhanced brand image, whereas challenges involve increased disclosure costs, workload, complexity, and potential rises in audit fees.

In Taiwan, the Financial Supervisory Commission (FSC) announced in August 2023 that listed companies with capital exceeding NTD 10 billion must comply with International Sustainability Standards Board (ISSB) standards by 2026. This aligns Taiwanese companies with global sustainability trends. Against this backdrop, this study investigates Taiwanese firms, addressing the cost-benefit trade-offs of TCFD adoption, particularly its effect on audit fees. This study makes several contributions to the existing literature. First, to the best of our knowledge, this study

investigates for the first time the effect of signing a TCFD on a firm's audit fee. Second, the number of firms in Taiwan that have signed TCFDs is substantially less than those that have not signed them, so the results of my study can serve as a reference for firms in deciding whether or not to sign TCFDs.

2. Literature Review

2.1 Audit Fee and Climate Risk

The literature on audit fees and their determinants highlights a range of influencing factors, from the complexity of the audited entity to the provision of non-audit services and, more recently, the role of ESG performance (Fields et al., 2004; Asante-Appiah & Lambert, 2023). Simunic (1980) explored audit industry competitiveness, challenging the perception of monopolization by large firms and providing empirical evidence of price competition, laying the foundation for subsequent research on audit fee determination.

Recent studies have examined the influence of climate risk on audit fees, with findings consistently indicating a positive association. Yu et al. (2023) demonstrated that firms in countries with stricter auditing regulations, greater information opacity, and lower climate risk adaptability face higher audit fees. Similarly, Truong et al. (2020) found that U.S. firms in drought-affected areas incur higher audit costs. Hartlieb and Eierle (2022) reported that clients exposed to natural disasters and societal climate change awareness face elevated fees due to auditors perceiving climate risks as systematic business risks. Yang et al. (2023) observed that physical and transition climate risks significantly increase audit fees, with pronounced effects on energy firms, state-owned enterprises, and large firms.

However, scholars diverge on whether climate risk disclosures impact audit fees. Gao and Calderon (2023) highlighted that unclear climate disclosures are associated with higher fees. Alshahrani et al. (2024) confirmed a significant positive relationship between climate disclosure performance and audit pricing, moderated by corporate governance characteristics.

2.2 Audit Fee and Regulation and Transparency

Previous studies have explored the impact of information transparency and regulation on audit fees. Danielsen et al. (2007) found a negative relationship between transparency and audit fees, as higher fees often reflect the greater risk auditors face when auditing opaque firms. Fields et al. (2004) demonstrated that regulatory changes, such as the enactment of the FDICIA in 1991, increased audit fees due to stricter requirements. Similarly, Charles et al. (2010) showed that the Sarbanes-Oxley Act of 2002 heightened the link between financial reporting risk and audit fees.

While audit fees are known to rise with climate risk, there is no consensus regarding the impact of climate risk disclosures. Although TCFD is not mandatory, its extensive disclosure requirements enhance transparency but also increase complexity, necessitating auditors to validate information and assess climate-related risks. These factors, alongside the specialized expertise required, may lead to higher audit fees for firms adopting TCFD.

Therefore, this study aims to examine the relationship between audit fees and signing the TCFD and propose the following hypothesis:

H1a: Companies signing TCFD would increase audit fee.

H1b: Companies signing TCFD would decrease audit fee.

3. Research Method

Following Simunic (1980) and Huang et al. (2015), this paper applies the following OLS regression model to investigate H1a and H1b.

$$Audit\ Fee_{i,t} = \alpha_0 + \alpha_1 TCFD_Sign_{i,t-1} + \alpha_k Controls_{i,t-1} + Industry\ Effect + Year\ Effect + \varepsilon_i$$

The detailed variable definitions and control variables can be found in Appendix A.

Audit fee data, TCFD signing data and financial data were obtained from the Taiwan Economic Journal (TEJ).

Table 1. Sample Selection

Panel A: Sample Selection	
Number of public listed companies samples (2015 to 2022)	13,873
Deleted: Missing data of financial data and audit fee	(5,338)
	8,535
Panel B: Sample by Year Classification	
Year	
2015	754

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2016	834
2017	904
2018	956
2019	1,062
2020	1,107
2021	1,438
2022	1,480

Panel C: Sample by TCFD Signing Classification

Signing TCFD	88
Not Signing TCFD	8,847

Table 1 presents the sample selection process, year distribution, and TCFD signing distribution. Panel A of Table 1 shows the sample selection process, with a final sample size of 8,535. Panel B of Table 1 shows the number of firms in each year. Panel C of Table 1 shows the number of firms categorized by whether they have signed the TCFD.

Audit Fee

AF_rank_com = audit fees paid by the company (on a scale from 1(lowest) to 6(highest)).

NAF_rank_com = non-audit fees paid by the company (on a scale from 1(lowest) to 6(highest)).

TF_rank_CPA = total audit fees charged by auditors to the company (on a scale from 1(lowest) to 6(highest)).

LNAF_Com = the natural logarithm of actual number of audit fees paid by the company.

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LNNAF_Com = the natural logarithm of actual number of non-audit fees paid by the company.

TCFD_Sign = 1 if the company signs TCFD, and 0 otherwise.

Control Variables

BIG4 = 1 if Big 4 auditors, and 0 otherwise.

Opinion = opinion of independent auditors' report, 1 if it is unqualified opinion, and 0 otherwise.

GC = 1 if audit report is modified for going concern, and 0 otherwise.

Restate = 1 if there is a restatement in the current or prior year, and 0 otherwise.

LNTA = natural logarithm of total assets.

Liq = liquidity measured by company's current assets by company's current liabilities.

DA = debt-to-assets ratio measured by company's total debts divided by company's total assets.

ROA = return on assets measured by company's total assets divided by company's total liabilities

MB = market-to-book ratio measured by company's book value divided by company's market value

Lev = company's leverage measured by total liabilities divided by total assets.

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4. Finding and Discussion

Table 2. Descriptive Statistics

	N	Mean	STD	P5	P25	Median	P75	P95
<i>AF_rank_com</i>	8535	2.255	1.093	1.000	2.000	2.000	3.000	5.000
<i>NAF_rank_com</i>	8535	1.131	0.672	1.000	1.000	1.000	1.000	2.000
<i>TF_rank_CPA</i>	8535	2.556	1.244	1.000	2.000	2.000	3.000	6.000
<i>LNAF_Com</i>	8535	8.027	0.548	7.193	7.666	7.990	8.325	9.008
<i>LNNAF_Com</i>	8535	5.804	1.314	3.401	5.075	5.892	6.646	7.886
<i>TCFD_Sign</i>	8535	0.010	0.101	0.000	0.000	0.000	0.000	0.000
<i>BIG4</i>	8535	0.885	0.319	0.000	1.000	1.000	1.000	1.000
<i>Opinion</i>	8535	0.933	0.251	0.000	1.000	1.000	1.000	1.000
<i>GC</i>	8535	0.004	0.063	0.000	0.000	0.000	0.000	0.000
<i>Restate</i>	8535	0.002	0.046	0.000	0.000	0.000	0.000	0.000
<i>LNTA</i>	8535	15.560	1.485	13.463	14.534	15.354	16.382	18.413
<i>Liq</i>	8535	2.732	2.768	0.936	1.430	1.915	2.924	7.060
<i>DA</i>	8535	0.423	0.180	0.129	0.286	0.427	0.552	0.722
<i>ROA</i>	8535	8.533	8.887	-5.070	3.530	7.950	13.460	23.820
<i>MB</i>	8535	0.953	0.591	0.208	0.521	0.835	1.267	2.095
<i>Lev</i>	8535	0.310	0.184	0.052	0.170	0.288	0.424	0.654

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Notes: All variables on both are winsorized at the 1st and 99th

Table 2 reports descriptive statistics. Audit fee is greater than non-audit fee. The mean values of companies signing TCFD (TCFD_SIGN) is 0.01, reporting only a small number of companies have adopted the framework.

Table 3. Correlation Coefficient

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1)AF_rank_corp		0.350* **	0.872* **	0.914* **	0.471* **	0.152* **	0.256* **	- 0.084* **
(2)NAF_rank_corp	0.356* **		0.440* **	0.339* **	0.446* **	0.232* **	0.094* **	- 0.025* *
(3)TF_rank_CPA	0.902* **	0.443* **		0.901* **	0.643* **	0.158* **	0.280* **	- 0.073* **
(4)LNAF_Corp	0.927* **	0.322* **	0.901* **		0.498* **	0.146* **	0.262* **	- 0.089* **
(5)LNNAF_Corp	0.482* **	0.369* **	0.638* **	0.509* **		0.134* **	0.269* **	0.009
(6)TCFD_SIGN	0.234* **	0.251* **	0.223* **	0.216* **	0.157* **		0.037* **	0.027* *
(7)BIG4	0.218* **	0.064* **	0.242* **	0.260* **	0.286* **	0.037* **		0.033* **

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(8)Opinion	- 0.082* **	-0.02*	- 0.073* **	- 0.087* **	0.008	0.027* *	0.033* **	
(9)GC	- 0.045* **	-0.010	- 0.045* **	- 0.055* **	- 0.047* **	-0.006	- 0.100* **	- 0.035* **
(10)Restate	0.045* **	0.021* *	0.041* **	0.040* **	0.030* **	-0.005	0.001	- 0.018*
(11)LNTA	0.661* **	0.308* **	0.671* **	0.675* **	0.436* **	0.229* **	0.102* **	- 0.099* **
(12)Liq	- 0.222* **	- 0.061* **	- 0.218* **	- 0.261* **	- 0.159* **	- 0.035* **	-0.016	0.023* *
(13)DA	0.251* **	0.096* **	0.249* **	0.262* **	0.169* **	0.038* **	- 0.030* **	- 0.032* **
(14)ROA	0.126* **	0.064* **	0.152* **	0.158* **	0.154* **	0.059* **	0.147* **	0.029* **
(15)MB	0.097* **	-0.002	0.068* **	0.109* **	- 0.045* **	-0.005	- 0.048* **	- 0.135* **
(16)Lev	0.044* **	0.018*	0.047* **	0.038* **	0.044* **	-0.016	- 0.043* **	0.016
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)

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(1)AF_rank_co rp	- 0.056* **	0.048* **	0.584* **	- 0.252* **	0.254* **	0.138* **	0.095* **	0.074* **
(2)NAF_rank_ corp	-0.011	0.017	0.323* **	- 0.137* **	0.136* **	0.084* **	0.001	0.039* **
(3)TF_rank_C PA	- 0.057* **	0.040* **	0.603* **	- 0.237* **	0.242* **	0.172* **	0.067* **	0.065* **
(4)LNAF_Corp	- 0.064* **	0.040* **	0.621* **	- 0.262* **	0.257* **	0.165* **	0.112* **	0.066* **
(5)LNNAF_Co rp	- 0.052* **	0.032* **	0.418* **	- 0.147* **	0.161* **	0.171* **	- 0.048* **	0.061* **
(6)TCFD_SIG N	- 0.100* **	-0.005	0.158* **	- 0.050* **	0.040* **	0.066* **	-0.002	-0.012
(7)BIG4	- 0.100* **	0.001	0.090* **	- 0.029* **	0.151* **	0.056* **	- 0.030* **	-
(8)opinion	- 0.035* **	- 0.018* **	0.098* **	- 0.044* **	0.032* **	0.035* **	- 0.112* **	0.017
(9)GC		0.038* **	- 0.085* **	- 0.057* **	0.076* **	- 0.098* **	- 0.075* **	0.067* **

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(10)Restate	0.038* **		0.029* **	-0.006	0.008	-	0.021*	-0.012	-0.006
(11)LNTA	- 0.092* **	0.020*		- 0.321* **	0.352* **	0.190* **	0.236* **	0.095* **	
(12)Liq	-0.018	-0.010	- 0.229* **		- 0.765* **	0.097* **	- 0.055* **	- 0.531* **	
(13)DA	0.086* **	0.007	0.347* **	- 0.581* **		- 0.148* **	0.045* **	0.677* **	
(14)ROA	- 0.140* **	-0.017	0.207* **	- 0.118* **	- 0.128* **		- 0.255* **	- 0.097* **	
(15)MB	- 0.062* **	-0.005	0.258* **	- 0.065* **	0.047* **	- 0.197* **		- 0.031* **	
(16)Lev	0.099* **	-0.004	0.076* **	- 0.437* **	0.683* **	- 0.118* **	- 0.056* **		

Notes: ***, **, and * denote two-tailed statistical significance at 1%, 5%, and 10%, respectively. Pearson correlation coefficients are shown in the lower left and Spearman's rank correlation coefficients are shown in the upper right.

The results in Table 3 show that there is a significant positive correlation between the signing of TCFD by the company and both the audit and non-audit fees of the company. The correlation coefficients between the independent variables are between 0.7 and -0.7; therefore, there does not exist collinearity issue.

Table 4. Regression Result

Dependent Variable					
	<i>AF_rank_com</i>	<i>NAF_rank_com</i>	<i>TF_rank_CPA</i>	<i>LNAF_com</i>	<i>LNNAF_com</i>
<i>TCFD_Sign</i>	0.877*** [10.52]	1.232*** [17.78]	0.758*** [8.10]	0.319*** [8.04]	0.486*** [4.03]
<i>BIG4</i>	0.409*** [15.29]	0.029 [1.31]	0.542*** [18.08]	0.273*** [21.46]	0.862*** [22.26]
<i>Opinion</i>	-0.067* [-1.69]	-0.007 [-0.21]	-0.090** [-2.04]	-0.040** [-2.12]	-0.004 [-0.06]
<i>GC</i>	0.217 [1.63]	0.125 [1.13]	0.359** [2.41]	0.101 [1.60]	0.093 [0.49]
<i>Restate</i>	0.699*** [3.94]	0.236 [1.60]	0.676*** [3.40]	0.273*** [3.23]	0.640** [2.49]
<i>LNTA</i>	0.490*** [67.95]	0.134*** [22.45]	0.575*** [71.10]	0.245*** [71.42]	0.397*** [37.98]
<i>Liq</i>	-0.030*** [-7.69]	0.001 [0.30]	-0.031*** [-7.05]	-0.022*** [-12.05]	-0.028*** [-4.96]
<i>DA</i>	0.148* [1.85]	-0.045 [-0.67]	0.083 [0.92]	0.129*** [3.39]	-0.090 [-0.78]

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<i>ROA</i>	-0.010***	-0.002**	-0.010***	-0.004***	-0.003**
	[-9.64]	[-2.13]	[-7.89]	[-7.32]	[-2.06]
<i>MB</i>	-0.122***	-0.079***	-0.182***	-0.055***	-0.193***
	[-7.20]	[-5.62]	[-9.57]	[-6.76]	[-7.85]
<i>Lev</i>	-0.137**	0.054	-0.075	-0.138***	0.172*
	[-2.08]	[0.98]	[-1.02]	[-4.40]	[1.80]
<i>Intercept</i>	-5.001***	-0.889***	-5.775***	4.351***	-0.187
	[-37.15]	[-7.94]	[-38.24]	[67.97]	[-0.96]
Year F.E.	YES	YES	YES	YES	YES
Industry F.E.	YES	YES	YES	YES	YES
Adj. R-squared	0.532	0.142	0.545	0.578	0.319
N	8535	8535	8535	8535	8535

Notes: ***, **, and * denote two-tailed statistical significance at 1%, 5%, and 10%, respectively. The value in brackets reveals the t value

Table 4 provides the ordinary least squares (OLS) regression results to test the association between Audit fee and TCFD signing. There are five different calculations of audit fee. The results showcase that in each sort of audit fee, that they all have a significantly positive association with sign TCFD. These results support the H1a. All the VIF of independent variables are less than 4; therefore, there exists no collinearity issue.

Table 5. Propensity Score Matching

Dependent Variable					
	<i>AF_rank_com</i>	<i>NAF_rank_com</i>	<i>TF_rank_CPA</i>	<i>LNAF_com</i>	<i>LNNAF_com</i>
<i>TCFD_Sign</i>	0.600*** [3.19]	0.935*** [3.28]	0.437** [2.55]	0.350*** [5.08]	0.510** [2.34]
<i>LNTA</i>	0.857*** [11.72]	0.471*** [4.26]	0.741*** [11.15]	0.375*** [14.01]	0.400*** [4.72]
<i>Liq</i>	-0.266** [-2.53]	-0.207 [-1.3]	-0.301*** [-3.15]	-0.147*** [-3.82]	-0.162 [-1.33]
<i>DA</i>	0.812 [0.92]	1.103 [0.83]	0.143 [0.18]	-0.125 [-0.39]	0.520 [0.51]
<i>ROA</i>	0.016 [1.11]	0.008 [0.38]	0.014 [1.06]	0.005 [0.90]	-0.014 [-0.83]
<i>MB</i>	-0.391* [-1.91]	-0.766** [-2.47]	-0.186 [-1.00]	-0.128* [-1.7]	-0.254 [-1.07]
<i>Lev</i>	0.292 [0.43]	-1.700* [-1.66]	1.367** [2.22]	0.140 [0.56]	0.746 [0.95]
<i>Intercept</i>	-13.307*** [-7.88]	-5.579** [-2.18]	-8.124*** [-5.29]	1.940*** [3.14]	0.842 [0.43]

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Year F.E.	YES	YES	YES	YES	YES
Industry F.E.	YES	YES	YES	YES	YES
Adj. R-squared	0.661	0.321	0.654	0.727	0.359
N	176	176	176	176	176

Notes: ***, **, and * denote two-tailed statistical significance at 1%, 5%, and 10%, respectively. The value in brackets reveals the t value

Table 5 is to address the issue of sample selection bias, as the majority of companies in the sample have not adopted the TCFD framework, this study employs Propensity Score Matching (PSM) with One-to-One Matching. This method allows for a more accurate estimation of the causal effect of the treatment variable. After matching, the paired samples share identical characteristics for variables that influence audit fees. Specifically, all matched firms engage Big 4 auditors, the independent auditors' reports express unqualified opinions, the audit reports are not modified for going concern issues, and there are no financial statement restatements in the current or prior year. Table 5 reveals the same results as table 4, which indicates that the results support H1a.

5. Conclusion

This study utilizes data from 8,535 Taiwanese companies from 2015 to 2022 and shows that signing a TCFD will increase a company's audit and non-audit fees. From the perspective of corporate transparency, previous literature has shown that as a company becomes more transparent, it can reduce its audit fees (Danielsen et al., 2007). Although signing the TCFD can increase the disclosure of financial risks associated with climate change, resulting in increased corporate transparency, the results still show that signing the TCFD will increase audit fees. From the perspective of adopting a new standard, prior literature has shown that the adoption of SOX resulted in higher audit fees (Raghunandan and Rama, 2006). Although the TCFD is currently signed voluntarily and its regulatory effect is not as strong as that of a decree, the results show that the audit fees of firms increased significantly after signing the TCFD.

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