

The Relationship between FinTech Industry Specialist and Audit Fees: Evidence from Taiwan's Financial Industry*

KUNG-HONG SHIH AND YA-CHING CHU⁺

Center for Innovative FinTech Business Models

⁺*Department of Accounting*

National Cheng Kung University

Tainan City, 701 Taiwan

E-mail: skh.ncku@gmail.com; R18041015@email.ncku.edu.tw⁺

With the popularization and rapid development of various core financial technologies, traditional financial service companies are facing the challenge of accelerated integration into the financial digital transformation. The digitalization of business in the financial industry not only increases the cost of corporate governance, such as risk control management and technology supervision, but also poses a major challenge to audit firms responsible for external compliance audits, such as that to the International Standards on Auditing. This study explores the impact of financial digitalization on accounting firms' industry specialist features and audit fees using a sample of financial industry in Taiwan. The evidence supports the conclusion that the relationship between audit fees and financial industry specialist audit firms is positive, but it also shows a negative relationship with the TechFin industry specialist audit firm. Particularly, this study finds a positive and significant relationship between audit fees and both financial and TechFin industry specialist audit firms, which demonstrates the knowledge spillover effect of audits. Finally, this study fills the gap in the literature on the relationship between industry specialist audit firms and audit fees in the financial industry and provides a new direction for the future development of financial technology specialists in the audit market.

Keywords: digital transformation, FinTech, audit fees, industry specialist, knowledge spillover effect

1. INTRODUCTION

Since the rise of Bank 4.0 revolution in 2018, various financial technologies (*e.g.*, artificial intelligence, blockchain, cloud computing, data mining, and machine learning, hereafter referred to as FinTech) have been introduced into the financial services Eco-System. With the digitalization of Open Banking and multi-field data API sharing, FinTech-related firms must face increasingly severe operational threats such as inherent and control risks. In particular, Taiwan has strict financial franchising regulations and Personal Data Protection Act (PDPA) restrictions, requiring FinTech-related firms to bear high levels of technology regulatory risks and high costs of regulatory sandbox POC for various business model innovations. While the digital transformation of finance can create sizable business opportunities and enhance the competitive edge of companies in this industry, it also requires industry participants to undertake both, an in-depth research and development of

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⁺Corresponding author.

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fintech and a refinement of RegTech. Therefore, the Financial Regulatory Commission committed to promoting a technological transformation of the financial industry and encouraging cooperation between the financial and technology industries. According to a survey conducted by the Financial Supervisory Commission in 2021, the financial industry's investment in FinTech stood at 15.859 billion. The investment in 2022 was estimated at 31.215 billion, indicating that the investment continued to rise and digital transformation is actively helping to strengthen competitiveness¹.

Accounting professionals, as is known, provide a broad range of auditing and consulting services based on each industry's characteristics. To cope with the digital financial transformation of audit clients, the traditional audit planning or internal audit processes have undergone a radical change, accelerating a new digital financial audit revolution in the accounting industry. Following the trend of the Bank 4.0 revolution, cross-domain integrated professional audit teams (*e.g.*, accounting, information engineering, or big data analysis) jointly participate in the audit planning and internal control management tasks in the FinTech industry, which can better ensure audit efficiency and quality and create a more diverse and innovative FinTech audit know-how to give full play to the knowledge spillover effect. For instance, external financial confirmation procedures consumed considerable time in the past. These procedures can now be performed by accountants with substantial efficiency and accuracy by applying the blockchain technology. Furthermore, in the face of continuously evolving cloud-based digital financial services and products, experienced audit firms/accountants can efficiently implement intelligent risk assessment systems and plan AI-driven internal control and auditing tasks to ensure high-quality auditing and risk control services. Finally, if an audit firm/accountant with insufficient knowledge or outdated auditing techniques is appointed to audit a FinTech client, this may not only jeopardize the rights of stakeholders of audited clients but also cause significant social unrest (*e.g.*, P2P Lending Scam, Taiwan's im.B event).

Prior studies have found that when audit firms or auditors have more experience in auditing a specific industry, they can better understand the information related to the operation, accounting, and auditing of a specific business. Therefore, audit firms or auditors can become industry specialists with knowledge and experience in specific industries. However, due to economies of scale or audit quality differentiation effects, the impact of industry specialists on audit fees may vary. For instance, through the auditing technology and professional knowledge of industry specialists, they can be widely used in the auditing of specific industries to achieve economies of scale, thereby improving audit efficiency, saving audit costs, and reducing audit fees to attract customers [31]. On the contrary, the audit quality differentiation effect is that industry experts can provide high-quality audit services in the audit market to differentiate themselves from other competitors, resulting in higher audit fees [13, 15]. Furthermore, in research on industry specialist and audit fees, the financial industry's operational decision-making is usually different from that of other industries, or this regulated industry is excluded from the discussion. However, at its current stage of rise, not only does FinTech have a substantial impact on the industry, but it has also created a new industry ecology and business model. The operational changes in financial products and services arising from FinTech inevitably affect the professional ability of audit firms or auditors and scope of auditing. Therefore, this study uses the case of Taiwan's financial industry to examine the relationship between a financial and/or tech-

¹ https://www.fsc.gov.tw/ch/home.jsp?id=96&parentpath=0,2&mcustomize=news_view.jsp&dataserno=202208180003&toolsflag=Y&dttable=News

nology finance (hereafter referred to as TechFin) industry specialist audit firm and audit fees under digital transformation.²

Consistent with prior literature on the audit quality differentiation effect, the evidence of this study shows a positive relationship between audit fees and financial industry specialist audit firms. A significant negative relationship is found between audit fees and TechFin industry specialist audit firms, indicating that in a competitive market for audit services, TechFin industry specialist audit firms, as new participants, may adopt a low-balling strategy to attract new customers, resulting in relatively lower audit fees. Finally, it is important to note that there is positive and significant evidence of the relationship between audit fees and an audit firm that is both a financial and TechFin industry specialist. The empirical results suggest that an audit firm with both financial and TechFin industry specialist not only has a professional knowledge of financial industry characteristics but it also understands how the industry applies FinTech, that is, the audit knowledge has a spillover effect, thereby increasing audit fees.

This study makes the following contributions. First, prior studies did not include the regulated financial industry in exploring issues in accounting research. This study fills this gap in the literature using Taiwan's financial industry as a case to examine the relationship between industry specialist audit firms and audit fees. The rise of FinTech in recent years has affected the financial industry's need to provide diversified services and face a brand-new digital transformation². Traditional auditing can no longer satisfy the financial industry's needs and more professional knowledge and technologies in FinTech-related fields are required to make the entire audit process more efficient and complete. Consequently, the empirical results of this study can provide a new direction for the development of FinTech industry specialists in the audit market.

The remaining part of the paper proceeds as follows: Section 2 present a literature review and hypotheses development. Section 3 explains the data and research method. Section 4 analyzes the results. Section 5 concludes this paper.

2. RELATED LITERATURE AND HYPOTHESES DEVELOPMENT

The audit fee not only represents the level of effort of the auditors in the complexity of the audit work, but it is also related to the auditor's role in the information and insurance functions. The degree of industry specialization depends on the understanding and experience of the accounting firm or auditor in the specific industry being audited, and their ability to make accurate judgments on financial reports. Research on audit fees and industry specialists has not reached consistent conclusions. One line of research is based on [33] competition and differentiation theory, according to which industry specialization can be regarded as a differentiation strategy, and industry specialist auditors or audit firms can provide a more sustainable competitive advantage than non-industry expert auditors or audit firms. Therefore, industry experts are more capable of providing superior services and charge higher audit fees than non-industry experts (*e.g.*, [1, 13, 15, 19, 30]).

² The reasons for this study to emphasize the impact of CPA/audit firm-level industry expert research on the financial industry's audit quality in the face of FinTech trends, rather than focusing on CPA/audit individual-level industry experts, are as follows. The audit practices of the Big Four CPA/audit firms in Taiwan are mostly conducted by a team of industry-specific experts with systematic audit planning, to meet the internal control of audit quality within the firm, the principle and secondary certified public accountants will follow the regular case rotation planning conducted by the firm for all partner accountants. Therefore, it is more objective and fairer to assess whether the audit team is an industry expert at the CPA/audit firm level.

The effect of economies of magnitude is the subject of another study. When industry professionals develop economies of scale by gaining experience in auditing clients with similar characteristics, they can save money and reduce audit fees [29]. Similar to the findings of [5, 22, 26], they found that employing industry specialists reduces audit fees because of shared efficiency. [25] found that when industry-specialized firms reach economies of scale, they pass on savings to clients, resulting in relatively low audit fees. According to [2, 4], professional auditors are more competent and efficient; they require less time and effort to conduct audits. Therefore, under shared efficiency, not only is audit efficiency enhanced but professional knowledge may also reduce working time, resulting in a decrease in audit fees.

Advancements in science and technology have affected the traditional financial industry. To compete in the market, the traditional financial industry has introduced technology into its core business. To cope with the digital financial transformation of audit clients, the traditional audit planning or internal audit process has undergone a radical change, accelerating a new digital financial audit revolution in the accounting industry. At this time, based on industrial specialization, experts in TechFin are familiar with introducing professional knowledge and techniques into the financial industry and have become new entrants in the audit financial industry. Therefore, TechFin industry specialists can use their professional knowledge to provide differentiated audit services and charge higher audit fees. However, DeAngelo [14] showed that in a competitive audit market, audit firms would have low balling to win new clients and earn future quasi-rents, which would result in a discount for the first audit contract. Since 2009, when audit fees became public information in Taiwan, there has been increased competition in the Taiwanese audit market [28]. For new entrants in the TechFin industry specialist cross into the financial industry, there may be market entry barriers and negatively impact brand recognition. Based on the above, there is a positive or negative relationship between accounting firms' industry expertise and audit fees, and this study establishes the following hypotheses:

H1a: Financial industry specialist audit firms and audit fees are related.

H1b: TechFin industry specialist audit firms and audit fees are related.

Faced with the challenges posed by Fintech, the financial industry's business policy cannot be limited to traditional financial services; rather, a new business model must be developed to meet the needs of consumers through technology. Therefore, an audit firm that specializes in both the financial and technology industries can not only assist the financial industry in cross-field integration, but also distinguish it from other competitors through multiple audit services. [11] found that audit teams with client-specific experience can provide value-added services and make extra efforts for clients, thereby having higher audit fees. Therefore, according to the audit quality differentiation effect, an industry expert audit firm can not only provide customers with specific requirements or heterogeneous projects to highlight their high-quality audit services, but also continue to invest resources in the development of new auditing technologies, thereby charging higher audit fees. Accordingly, this study proposes the following hypothesis:

H2: Both financial and TechFin industry specialist audit firms and audit fees are positive.

3. RESEARCH DESIGN AND SAMPLE SELECTION

3.1 Variable Measure-Industry Specialist Audit Firm

To measure a financial industry specialist audit firm, this study uses the definition of financial industry specialist audit firms by [20, 27], that is, calculates and ranks the market share of each audit firm in the financial industry based on the total client assets. If an audit firm secures the largest proportions based on total client assets in the financial industry, it is considered a financial industry specialist audit firm³. Next, to measure an industry specialist audit firm in the TechFin industry, this study uses information from the *Industrial Value Chain Information Platform*⁴, which provides a list of companies associated with the FinTech industry chain. We use the information of this platform to find companies related to FinTech applications and technologies. Finally, we define these three industries that software service, communication equipment, and information channel industries as the TechFin industry⁵. Like the calculation for the financial industry specialist, we compute and rank the market shares of audit firms in these three industries based on the total assets of clients. If an audit firm secures the largest proportions based on the total assets of clients in the three industries, it is a TechFin industry specialist audit firm⁶.

3.2 Empirical Models

To examine the relationship between industry specialist audit firms and audit fees, we follow prior literature [7, 23, 35] and develop the following regression model:

$$LNAF_{i,t} = \alpha_0 + \alpha_1 FSPEC_{i,t} + \alpha_2 TFSPEC_{i,t} + \alpha_3 FTFSPEC_{i,t} + \alpha_4 SIZE_{i,t} + \alpha_5 LEV_{i,t} + \alpha_6 LOSS_{i,t} + \alpha_7 ROA_{i,t} + \alpha_8 BIGN_{i,t} + \sum_{j=1}^{j=7} YEAR_{ij} + \varepsilon_{i,t} \quad (1)$$

where $LNAF$ is the natural logarithm of the audit fees. This study mainly refers to [12, 16, 32], find that taking the natural logarithm of audit fees can reduce the impact of residual heterogeneity.

$FSPEC$ is a dummy variable, equals 1 if a firm hires a financial industry specialist audit firm, and 0 otherwise; $TFSPEC$ is a dummy variable, equals 1 if a firm hires a

³ Operationally, we first calculate that an audit firm's industry specialization is determined by its share of clients' total assets in the financial industry, and the audit firm's market share for firm j audited by audit firm i is given by $\frac{\sum_{j=1}^J \sqrt{A_{ij}}}{\sum_{i=1}^I \sum_{j=1}^J \sqrt{A_{ij}}}$. A_{ij} represents the total assets for firm j audited by audit firm i . Next, we rank auditor firms based on their proportion of total assets audited. The audit firm with the greatest market share is identified as a specialist in the financial industry.

⁴ <https://ic.tpex.org.tw/introduce.php?ic=5200>

⁵ Since the technical application of FinTech on the digital platform of information technology includes various basic computing technologies (such as artificial intelligence, big data, cloud computing, blockchain, etc.), tools or services (e.g., data analysis, information security, etc.), as well as traditional or emerging financial application services (for example, payments, digital banking, etc.). According to the *Industrial Value Chain Information Platform*, the majority of participants in the financial technology industry value chain can be found in the information service industry, software industry, telecommunications service providers, and payment industry. In this study, therefore, the software service, communication equipment, and information channel industries are listed as a technology financial industry.

⁶ In robustness test, this study also uses the alternative measure of industry specialist for empirical analysis.

TechFin industry specialist audit firm, and 0 otherwise. *FTFSPEC* is a dummy variable, equals 1 if a firm hires an audit firm is both a financial and TechFin industry specialist, and 0 otherwise. This study explores the influence of the above three different types of industry specialists on audit fees. Since the financial industry specialist audit firm (*FSPEC*) or the TechFin industry specialist audit firm (*TFSPEC*) has a positive or negative effect on the audit fee, this study does not predict the direction of these two variables. Both a financial and TechFin industry specialist audit firm (*FTFSPEC*), which provides different audit products in the audit market, which can be differentiated from other competitors, and then audit fees are higher. We expect the coefficients of *FTFSPEC* to be positive.

We also refer to the literature and incorporate control variables into the model. *SIZE* denotes the natural logarithm of the total assets used to measure firm size. When a firm is larger, more costs must be invested in the audit; thus, the audit fee will be higher. This study expects this variable to positively impact audit fees [9, 35]. *LEV* denotes total liabilities divided by total assets, which is used to measure corporate financial leverage. When the *LEV* is higher, the client's financial structure is less stable, which increases audit risk, and the audit fee increases accordingly [10]. However, [21] argue that restrictive clauses in debt contracts can prevent managers from engaging in activities against a firm's interests, thereby reducing audit risk. Therefore, this study does not predict a relationship between debt ratio and audit fees.

LOSS is a dummy variable that equals one if a firm's net income is negative and zero otherwise. *ROA* is profit before tax divided by total assets and is used to measure operating performance. When the return on assets of an audited client is low, or losses occur, the company's operating risk increases, leading to an increase in audit risk. Therefore, an audit firm may increase audit fees to subsidize the assumed risks [3]. However, the literature also points out that it is difficult for audit firms to increase audit fees when audited clients suffer losses [12], so this study does not predict the relationship between these two variables and audit fees.

BIGN is an indicator variable that equals 1 if a firm is audited by a Big 4 audit firm and 0 otherwise. [24] point out that accounting firms with better reputations have better audit quality. Therefore, this study is expected to be audited by Big 4, and the audit fee is relatively high. Finally, we include year dummy variables to control for year fixed effects.

3.3 Sample Selection

This study uses the Taiwan Stock Exchange (TWSE) and Taipei Exchange (TPEX) stocks from the financial industry, include financial holding companies and the banking industry, the securities and futures industry, and the insurance industry, as the research sample. All empirical data are obtained from the Taiwan Economic Journal's (TEJ) TEJ IFRS and TEJ AUDIT databases. We obtain an initial sample of 328 firm-year observations between 2014 and 2021, excluding firms with incomplete audit information and missing financial data. The final sample consists of 310 firm-year observations for the entire sample period.⁷

⁷ Since 2014, Taiwan's Financial Supervisory Commission has introduced a series of financial technology development policies and announced 2014 the "first year of financial technology" in Taiwan. The latest audit fee data available from TEJ is 2021. Consequently, the research period begins in 2014 and ends in 2021.

4. EMPIRICAL RESULT

4.1 Descriptive Statistics

Table 1 presents the descriptive statistics for each variable in the study. The average audit fee (*AF*) is 4,600 thousand. On average, approximately 66% of the financial service companies in the sample hire a financial industry specialist audit firm (*FSPEC*), approximately 73% engage a TechFin industry specialist audit firm (*TFSPEC*), and approximately 54% choose both a financial and TechFin industry specialist audit firm (*FTFSPEC*) for audits. Deloitte has the highest percentage among the three industry specialist audit firms. The average firm size (*SIZE*) of the financial industry is 19.602. The mean of *LEV* is 0.819, while the mean of *ROA* is 0.016. The net income of approximately 6.5% of the financial service firms is negative (*LOSS*). Most financial service firms are audited by the Big 4 audit firms. All continuous variables were winsorized at the top and bottom one percentiles to reduce the impact of extreme values.

Table 1. Descriptive statistics.

Variable	N	Mean	Std.Dev.	Q1	Median	Q3
AF	310	4,600.023	3,143.624	2,456.000	3,700.000	6,300.000
LNAF	310	8.203	0.699	7.806	8.216	8.748
FSPEC	310	0.655	0.476	0.000	1.000	1.000
TFSPEC	310	0.726	0.447	0.000	1.000	1.000
FTFSPEC	310	0.539	0.499	0.000	1.000	1.000
SIZE	310	19.602	2.266	17.413	20.146	21.562
LEV	310	0.819	0.177	0.731	0.904	0.931
LOSS	310	0.065	0.246	0.000	0.000	0.000
ROA	310	0.016	0.019	0.006	0.008	0.018
BIGN	310	0.932	0.252	1.000	1.000	1.000

Variable Definitions: *AF*: the audit fees(in thousands); *LNAF*: the natural logarithm of the audit fees; *FSPEC*: a dummy variable, equals 1 if a financial industry specialist audit firm, and 0 otherwise; *TFSPEC*: a dummy variable, equals 1 if a TechFin industry specialist audit firm, and 0 otherwise; *FTFSPEC*: a dummy variable, equals 1 if both a financial and TechFin industry specialist audit firm, and 0 otherwise; *SIZE*: the natural logarithm of total assets; *LEV*: total liabilities/total assets; *LOSS*: a dummy variable which equals 1 if a firm's net income is negative, and 0 otherwise; *ROA*: profits before tax/ total assets; *BIGN*: an indicator variable which equals 1 if a firm is audited by a Big 4 audit firm, and 0 otherwise.

4.2 Correlation Analysis

Table 2 reports correlation coefficients of the variables. Pearson correlations appear below the diagonal, whereas Spearman correlations appear above the diagonal. Overall, there is a positive and significant relationship between audit fees (*LNAF*) and a financial industry specialist audit firm (*FSPEC*), which is consistent with prior research on the audit quality differentiation effect [13, 15]. A positive and significant relationship also exists at the 0.01 level between audit fees (*LNAF*) and an audit firm that is both a financial and TechFin industry specialist (*FTFSPEC*), which is consistent with the expectations of this study. There is a positive relationship with audit fees when the products of an industry specialist accounting firm are heterogeneous. Among the control variables, the correlation

coefficients between *SIZE* and *LEV* as well as between *LEV* and *ROA* are relatively high, whereas the correlation between the other control variables is less than 0.6, indicating that there is no significant multicollinearity problem among the control variables. Nonetheless, this study uses the variance inflation factor (VIF) to examine if the OLS regression model causes a multicollinearity problem. The VIF of all the independent variables in subsequent regression models was lower than 8, suggesting that there is no multicollinearity in this study's empirical model.

Table 2. Correlation matrix.

Variables	LNAF	FSPEC	TFSPEC	FTFSPEC	SIZE	LEV	LOSS	ROA	BIGN
LNAF	1.000	0.432***	0.113**	0.307***	0.470***	0.387***	-0.005	-0.255***	0.348***
FSPEC	0.451***	1.000	0.299***	0.785***	0.334***	0.379***	-0.141**	-0.255***	0.371***
TFSPEC	0.097*	0.299***	1.000	0.664***	0.237***	0.191	-0.221***	-0.115	0.439***
FTFSPEC	0.320***	0.785***	0.664***	1.000	0.284***	0.280***	-0.178***	-0.192***	0.291***
SIZE	0.531***	0.297***	0.223***	0.245***	1.000	0.815***	-0.081	-0.510***	0.300***
LEV	0.492***	0.360***	0.059***	0.228***	0.842***	1.000	-0.022	-0.718***	0.116**
LOSS	-0.013	-0.141**	-0.221***	-0.178***	-0.096*	-0.145**	1.000	-0.231***	-0.138**
ROA	-0.318***	-0.202***	-0.030**	-0.155***	-0.567***	-0.602***	-0.316***	1.000	0.078
BIGN	0.341***	0.371***	0.439***	0.291***	0.302***	0.354***	-0.138**	-0.081	1.000

Notes:

1. Variable Definitions: LNAF: the natural logarithm of the audit fees FSPEC: a dummy variable, equals 1 if a financial industry specialist audit firm, and 0 otherwise; TFSPEC: a dummy variable, equals 1 if a TechFin industry specialist audit firm, and 0 otherwise; FTFSPEC: a dummy variable, equals 1 if both a financial and TechFin industry specialist audit firm, and 0 otherwise; SIZE: the natural logarithm of total assets; LEV: total liabilities/total assets; LOSS: a dummy variable which equals 1 if a firm's net income is negative, and 0 otherwise; ROA: profits before tax/ total assets; BIGN: an indicator variable which equals 1 if a firm is audited by a Big 4 audit firm, and 0 otherwise.
2. ***, **, and * indicate statistical significance at 1%, 5%, and 10% levels, respectively.

4.3 Regression Results

Table 3 shows the regression results of this study. The coefficients of *FSPEC* in Columns (1) and (4) of Table 3 are positive and statistically significant (Coeff. = 0.415, *t*-statistic = 5.20; Coeff. = 0.243, *t*-statistic = 1.83), indicating that financial industry in Taiwan is audited by a financial industry specialist audit firm and audit fees is positive.

The findings align with previous research on the impact of audit quality differentiation, as demonstrated by [12, 15]. That is, compared with non-industry experts, industry specialists perform higher audit quality and hence charge higher audit fees.

The coefficients of *TFSPEC* are negative and statistically significant, as shown in Columns (2) and (4) of Table 3 (Coeff. = -0.182, *t*-statistic = -2.16; Coeff. = -0.416, *t*-statistic = -3.92). The results indicate a negative relationship between the hiring of a TechFin industry specialist audit firm by Taiwan's financial industry and audit fees. The study concluded that technological progress has promoted the innovation of financial businesses and services, and for new entrants to the financial industry, TechFin industry specialist audit firms may attract new clients with relatively low audit fees. The result of this study is consistent with the findings of [8], which suggest that industry specialist accounting firms or auditors engage in low-balling competition for audit fees in initial audits.

Table 3. Results of industry specialist and audit fees.

Variable	Predict Sign	(1) Coeff. (<i>t</i> -Statistic)	(2) Coeff. (<i>t</i> -Statistic)	(3) Coeff. (<i>t</i> -Statistic)	(4) Coeff. (<i>t</i> -Statistic)
Intercept		5.026*** (13.37)	4.928*** (13.21)	5.030*** (13.44)	5.015*** (13.44)
FSPEC	+/-	0.415*** (5.20)			0.243* (1.83)
TFSPEC	+/-		-0.182** (-2.16)		-0.416*** (-3.92)
FTFSPEC	+			0.243*** (3.16)	0.282** (1.77)
SIZE	+	0.117*** (4.21)	0.127*** (4.67)	0.112*** (4.13)	0.128*** (4.56)
LEV	+/-	0.258 (0.74)	0.279 (0.81)	0.466 (1.46)	0.046 (0.12)
LOSS	+/-	0.283*** (2.83)	0.114 (1.02)	0.271** (2.43)	0.173* (1.67)
ROA	+/-	1.699 (0.83)	-0.863 (-0.41)	1.032 (0.64)	0.287 (0.14)
BIGN	+	0.319*** (3.43)	0.680*** (7.08)	0.432*** (5.08)	0.606*** (6.65)
Year		Included	Included	Included	Included
Adjusted R ²		0.3652	0.3107	0.3261	0.3852
N		310	310	310	310

Notes:

1. Variable Definitions: FSPEC: a dummy variable, equals 1 if a financial industry specialist audit firm, and 0 otherwise; TFSPEC: a dummy variable, equals 1 if a TechFin industry specialist audit firm, and 0 otherwise; FTFSPEC: a dummy variable, equals 1 if both a financial and TechFin industry specialist audit firm, and 0 otherwise; SIZE: the natural logarithm of total assets; LEV: total liabilities/total assets; LOSS: a dummy variable which equals 1 if a firm's net income is negative, and 0 otherwise; ROA: profits before tax/ total assets; BIGN: an indicator variable which equals 1 if a firm is audited by a Big 4 audit firm, and 0 otherwise.
2. ***, **, and * indicate statistical significance at the 1, 5 and 10 percent levels, respectively. Significance levels are based on one-tailed tests for variables with directional predictions, and are based on two-tailed tests for those without directional predictions.
3. VIFs are all smaller than 8.

As shown in columns (3) and (4) of Table 3, the coefficients of *FTFSPEC* are significantly positive (Coeff. = 0.243, *t*-statistic = 3.16; Coeff. = 0.282, *t*-statistic = 1.77). This suggests that Taiwan's financial service firms engage industry specialist audit firms in both financial and TechFin domains, resulting in higher audit fees. In other words, when an audit firm is both a financial and TechFin industry specialist, it is not only familiar with the environment, laws, and regulations of the financial industry but also spends more time comprehending how the financial industry applies technology to the business scope. In addition, it is also necessary to pay attention to and concentrate on the new technology financial at all times to provide clients with specific or heterogeneous audit services to differentiate themselves from other competitors in the audit market; therefore, the audit fee is relatively high. Simunic [34] also pointed out that providing both audit and non-audit services to the audited client at the same time may have knowledge spillover effects, increasing the demand for audit services by the audited client, which in turn increases the audit fee.

Table 4. Results of industry specialist and audit fees – Alternative measure for industry specialist.

Variable	Predict Sign	(1) Coeff. (<i>t</i> -Statistic)	(2) Coeff. (<i>t</i> -Statistic)	(3) Coeff. (<i>t</i> -Statistic)	(4) Coeff. (<i>t</i> -Statistic)
Intercept		4.916*** (13.08)	4.931*** (13.20)	5.003*** (13.39)	4.963*** (13.21)
FSPEC	+/-	0.421*** (5.19)			0.207* (1.94)
TFSPEC	+/-		-0.226*** (-2.74)		-0.426*** (-3.83)
FTFSPEC	+			0.178** (2.32)	0.290** (1.98)
SIZE	+	0.122*** (4.37)	0.130*** (4.74)	0.113*** (4.17)	0.131*** (4.65)
LEV	+/-	0.299 (0.88)	0.217 (0.61)	0.477 (1.49)	0.055 (0.15)
LOSS	+/-	0.258*** (2.61)	0.073 (0.64)	0.267** (2.30)	0.139 (1.26)
ROA	+/-	2.379 (1.14)	-1.046 (-0.50)	0.940 (0.45)	0.523 (0.25)
BIGN	+	0.287*** (2.97)	0.705*** (7.52)	0.467*** (5.55)	0.605** (6.24)
Year		Included	Included	Included	Included
Adjusted R ²		0.3660	0.3188	0.3148	0.3858
N		310	310	310	310

Notes:

1. Variable Definitions: FSPEC: a dummy variable, equals 1 if a financial industry specialist audit firm, and 0 otherwise; TFSPEC: a dummy variable, equals 1 if a TechFin industry specialist audit firm, and 0 otherwise; FTFSPEC: a dummy variable, equals 1 if both a financial and TechFin industry specialist audit firm, and 0 otherwise; SIZE: the natural logarithm of total assets; LEV: total liabilities/total assets; LOSS: a dummy variable which equals 1 if a firm's net income is negative, and 0 otherwise; ROA: profits before tax/ total assets; BIGN: an indicator variable which equals 1 if a firm is audited by a Big 4 audit firm, and 0 otherwise.
2. ***, **, and * indicate statistical significance at the 1, 5 and 10 percent levels, respectively. Significance levels are based on one-tailed tests for variables with directional predictions, and are based on two-tailed tests for those without directional predictions.
3. VIFs are all smaller than 8.

Finally, in terms of control variables, the coefficient of *SIZE* is significantly positive, meaning that when the firm's size is larger, the audit firm needs to invest more resources and time to audit, and therefore the audit fee is higher. The coefficient of *BIGN* is significantly positive, which means that there is a positive correlation between the brand name of the audit firm and the audit fee.

4.4 Robustness Test-Alternative Measure for Industry Specialist

There are several ways to measure industry specialists in previous literature, such as if the accounting firm's market share exceeds a certain percentage [6, 18] or if the industry's market share ranks [17, 32]. To ensure that the empirical results of this study will not vary as a result of different measurements by industry specialists. In the robustness test,

this study calculates an accounting firm's market share based on the assets of its clients; if it exceeds 30%, it is an industry specialist accounting firm, and re-examines the empirical analysis. The empirical results are presented in Table 4, and the findings remain unchanged even when an alternative measure is used for industry specialist audit firms.

5. CONCLUSION

With the advancement of technology, FinTech has become a topic of substantial interest in recent years. FinTech primarily uses artificial intelligence, blockchain, cloud computing, big data, machine learning, among other technologies to bring innovative business models to the traditional financial industry and has developed a new financial Eco-System. As part of the digitalization trend, the development of FinTech is breaking the traditional financial service model and making the financial industry more efficient. Facing a new stage of digital transformation in the financial industry, audit firms or auditors need to understand the industry structure and a firm's operational risks. In particular, audit firms or auditors have mastery of the client's core technology applications, or whether the business of financial services and product promotion involves legal doubts about financial supervision or compliance with rules and regulations, even the adjustment of the audit schedule due to the application of new technologies in auditing. Audit work invariably has an impact on audit risk. Hence, it is imperative for audit firms and auditors engaged in financial reporting and auditing services within the financial sector to possess up-to-date verification technology, comprehensive knowledge, and substantial experience. These attributes are essential in order to deliver optimal external audit quality and effectively meet the expectations of stakeholders in the financial industry.

According to the empirical findings, there is a positive correlation between Taiwan's financial service firms employing financial industry specialist accounting firms and audit fees, which is consistent with the theory of competition and differentiation. This is because industry experts are better equipped to provide higher audit quality than non-industry experts, so audit fees are higher. In addition, there is a negative correlation between audit fees and TechFin industry specialist audit firms. This study suggests that in a competitive market for audit services, TechFin industry specialist audit firms, as new participants, may need to adopt a strategy of offering comparatively lower audit fees in order to attract new clients. Finally, the firms in the financial industry in Taiwan are audited by accounting firms with both a financial and TechFin industry specialists, and audit fees are positively correlated with these specialists. In other words, compared to non-industry specialists, industry experts have superior professional knowledge and experience, resulting in higher audit fees, which demonstrates the knowledge spillover effect of audits.

The study period covers the COVID-19 outbreak, and the reliance on FinTech applications and new digital financial services before and after the pandemic are worthy of more in-depth research in future studies. Moreover, compared to countries where CPA firms do not have a job rotation system, it is suggested that the impact of CPA individual-level industry experts on the quality of audits of the FinTech industry could be further studied. Lastly, it is suggested that future research could explore the contribution of non-audit services created by the FinTech trend for CPA firms, which is expected to help assess the overall industry expert knowledge spillover effect created by CPA firms.

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REFERENCES

1. S. Audoussert-Coulier, A. Jeny, and L. Jiang, "The validity of auditor industry specialization measures," *Auditing: A Journal of Practice & Theory*, Vol. 35, 2016, pp. 139-161.
2. B. K. Behn, J. H. Choi, and T. Kang, "Audit quality and properties of analyst earnings forecasts," *The Accounting Review*, Vol. 83, 2008, pp. 327-349.
3. T. B. Bell, W. R. Landsman, and D. A. Shackelford, "Auditors' perceived business risk and audit fees: Analysis and evidence," *Journal of Accounting Research*, Vol. 39, 2001, pp. 35-43.
4. T. D. Cairney and G. R. Young, "Homogenous industries and auditor specialization: An indication of production economies," *Auditing: A Journal of Practice & Theory*, Vol. 25, 2006, pp. 49-67.
5. E. Carson and N. Fargher, "Note on audit fee premiums to client size and industry specialization," *Accounting & Finance*, Vol. 47, 2007, pp. 423-446.
6. J. R. Casterella, J. R. Francis, B. L. Lewis, and P. L. Walker, "Auditor industry specialization, client bargaining power, and audit pricing," *Auditing: A Journal of Practice & Theory*, Vol. 23, 2004, pp. 123-140.
7. P. K. Chaney, D. C. Jeter, and L. Shivakumar, "Self-selection of auditors and audit pricing in private firms," *The Accounting Review*, Vol. 79, 2004, pp. 51-72.
8. C. S. Chen, F. C. Lin, and T. C. Yang, "The determinants of audit fee decreases: The perspective of corporate governance," *Taiwan Accounting Review*, Vol. 11, 2015, pp. 214-290. (In Chinese)
9. J. H. Choi, C. Kim, J. B. Kim, and Y. Zang, "Audit office size, audit quality, and audit pricing," *Auditing: A Journal of Practice & Theory*, Vol. 29, 2010, pp. 73-97.
10. M. A. Clatworthy and M. J. Peel, "The effect of corporate status on external audit fees: Evidence from the UK," *Journal of Business Finance & Accounting*, Vol. 34, 2007, pp. 169-201.
11. C. Contessotto, W. R. Knechel, and R. Moroney, "How do audit team industry and client-specific experience impact audit effort and audit fees?" *International Journal of Auditing*, Vol. 25, 2021, pp. 249-268.
12. A. T. Craswell and J. R. Francis, "Pricing initial audit engagements: A test of competing theories," *The Accounting Review*, Vol. 74, 1999, pp. 201-216.
13. A. T. Craswell, J. R. Francis, and S. L. Taylor, "Auditor brand name reputations and industry specializations," *Journal of Accounting and Economics*, Vol. 20, 1995, pp. 297-322.
14. L. E. DeAngelo, "Auditor size and audit quality," *Journal of Accounting and Economics*, Vol. 3, 1981, pp. 183-199.
15. M. L. DeFond, J. R. Francis, and T. J. Wong, "Auditor industry specialization and market segmentation: Evidence from Hong Kong," *Auditing: A Journal of Practice & Theory*, Vol. 19, 2000, pp. 49-66.

16. M. Ettredge and R. Greenberg, "Determinants of fee cutting on initial audit engagements," *Journal of Accounting Research*, Vol. 28, 1990, pp. 198-210.
17. A. Ferguson, J. R. Francis, and D. J. Stokes, "The effects of firm-wide and office-level industry expertise on audit pricing," *The Accounting Review*, Vol. 78, 2003, pp. 429-448.
18. A. Ferguson and D. Stokes, "Brand name audit pricing, industry specialization, and leadership premiums post-Big 8 and Big 6 mergers," *Contemporary Accounting Research*, Vol. 19, 2002, pp. 77-110.
19. S. Y. K. Fung, F. A. Gul, and J. Krishnan, "City-level auditor industry specialization, economies of scale, and audit pricing," *The Accounting Review*, Vol. 87, 2012, pp. 1281-1307.
20. F. A. Gul, S. Y. K. Fung, and B. Jaggi, "Earnings quality: Some evidence on the role of auditor tenure and auditors' industry expertise," *Journal of Accounting and Economics*, Vol. 47, 2009, pp. 265-287.
21. F. A. Gul and J. S. L. Tsui, "A test of the free cash flow and debt monitoring hypotheses: Evidence from audit pricing," *Journal of Accounting and Economics*, Vol. 24, 1997, pp. 219-237.
22. D. Hay and D. Jeter, "The pricing of industry specialisation by auditors in New Zealand," *Accounting and Business Research*, Vol. 41, 2011, pp. 171-195.
23. D. C. Hay, W. R. Knechel, and N. Wong, "Audit fees: A meta-analysis of the effect of supply and demand attributes," *Contemporary Accounting Research*, Vol. 23, 2006, pp. 141-191.
24. P. Healy and T. Lys, "Auditor changes following Big Eight mergers with non-Big Eight audit firms," *Journal of Accounting and Public Policy*, Vol. 5, 1986, pp. 251-265.
25. A. E. Hogan and D. C. Jeter, "Industry specialization by auditors," *Auditing: A Journal of Practice & Theory*, Vol. 18, 1999, pp. 1-17.
26. J. Khaksar, M. Salehi, and M. L. Dashtbayaz, "The relationship between political relations with audit quality and auditor industry expertise," *Journal of Public Affairs*, Vol. 22, 2022, e2780.
27. J. Krishnan, "Audit committee quality and internal control: An empirical analysis," *The Accounting Review*, Vol. 80, 2005, pp. 649-675.
28. K. F. Li, Y. S. Chen, and L. L. Chang, "Is the audit market of listed companies in Taiwan competitive? The perspective from audit fees," *Journal of Management and Systems*, Vol. 26, 2019, pp. 1-41. (Chinese)
29. B. W. Mayhew and M. S. Wilkins, "Audit firm industry specialization as a differentiation strategy: Evidence from fees charged to firms going public," *Auditing: A Journal of Practice & Theory*, Vol. 22, 2003, pp. 33-52.
30. H. Mohammadi, M. Salehi, M. Arabzadeh, and H. Ghodrati, "The effect of auditor narcissism on audit market competition," *Management Research Review*, Vol. 44, 2021, pp. 1521-1538.
31. B. M. O'Reilly and J. T. Reish, "Industry specialization by audit firms: What does academic research tell us?" *The Ohio CPA Journal*, Vol. 61, 2002, pp. 42-44.
32. Z. V. Palmrose, "Audit fees and auditor size: Further evidence," *Journal of Accounting Research*, Vol. 24, 1986, pp. 97-110.
33. M. E. Porter, "Technology and competitive advantage," *Journal of Business Stra-*

- tegy*, Vol. 5, 1985, pp. 60-78.
34. D. A. Simunic, "Auditing, consulting, and auditor independence," *Journal of Accounting Research*, 1984, pp. 679-702.
 35. D. A. Simunic, "The pricing of audit services: Theory and evidence," *Journal of Accounting Research*, Vol. 18, 1980, pp. 161-190.



Kung-Hong Shih received Ph.D. degree in Accounting at National Cheng Kung University. He is working as a CEO in Center for Innovative FinTech Business Models, National Cheng Kung University. His research interests include FinTech rating, PKYC applications, sustainability-linked FinTech, and the application of block chain in innovative business model.



Ya-Ching Chu is currently pursuing the Ph.D. degree in Accounting at National Cheng Kung University. Her research interests include management accounting and the application of financial technology in auditing.