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財務報導系統在新冠疫情期間是否正常運作?來自財報誤述可能性之證據

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摘要

本研究探討新冠疫情爆發後財務報表誤述可能性是否產生變化。透過分析美國上市公司，本研究發現相較於未受影響的公司，受新冠疫情影響的公司其財務報表誤述可能性顯著降低，且此效果在總部位於疫情嚴重州別的公司中更為顯著。這些結果顯示監理機關、企業與會計師透過強化監督機制與採用數位科技，共同因應財務報導挑戰，使財務報導系統在疫情期間得以正常運作。此外，本研究進一步發現儘管高槓桿公司在新冠疫情衝擊下操縱盈餘以避免違反債務契約條款的誘因較高，但這些受影響的高槓桿公司在疫情後維持與疫情前相同的財務報表誤述可能性。

關鍵詞：新冠疫情、財務報導、F-score、財報誤述可能性

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Does the Financial Reporting System Function Properly during Covid-19? Evidence from the Likelihood of Misstatement

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Abstract

This study investigates whether financial misstatement likelihood changed following the COVID-19 pandemic. Analyzing U.S. listed companies, this study finds firms affected by COVID-19 experienced a significant reduction in misstatement likelihood compared to unaffected firms, with the effect more pronounced among companies headquartered in severely impacted states. These results suggest regulators, companies, and auditors collectively addressed financial reporting challenges through enhanced monitoring and digital technology adoption, enabling proper financial reporting system function during the pandemic. Notably, despite COVID-19 causing adverse cash flow shocks that potentially increased high-leverage firms' incentives to manipulate earnings to avoid debt covenant violations, this study finds affected high-leverage firms maintained the same misstatement likelihood post-pandemic as before.

Keywords: COVID-19; Financial reporting; F-score; Likelihood of misstatement

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1. Introduction

The COVID-19 pandemic and associated containment measures have disrupted economic realities for companies across all industries worldwide, creating significant challenges for financial statement preparers and auditors (IFAC 2020; Radigan 2020). An unprecedented level of uncertainty about economic conditions, future earnings, and other fundamental elements of financial reporting has emerged. During these challenging times, complete and high-quality financial information disclosure remains crucial (IOSCO 2020). Sagar Teotia, Chief Accountant at the U.S. Securities and Exchange Commission (SEC), emphasized that investors need high-quality financial information more than ever during the COVID-19 crisis. The Office of the Chief Accountant has repeatedly issued statements highlighting the importance of maintaining high-quality financial reporting for investors throughout the pandemic. Consequently, regulators, companies, and auditors have collectively developed emergency response measures to address these financial reporting challenges. Do these measures enable proper functioning of the financial reporting system during the pandemic? This study addresses this question by investigating whether misstatement likelihood has changed following the onset of the pandemic.

The COVID-19 pandemic has posed unprecedented threats to business survival, resulting in significant financial reporting challenges for companies worldwide. The pandemic has increased the complexity and uncertainty of accounting estimates, particularly in areas such as accounts receivable valuation and asset impairment (Joshi 2020). COVID-19 restrictions have fundamentally altered financial statement preparation and audit processes, forcing both managers and auditors to pivot to remote work. Managers, responsible for financial statement preparation, face challenges in exercising significant judgment and providing fair presentation of entity performance and position (IFAC 2020). They must rapidly adopt digital technologies while confronting increased difficulties in maintaining effective internal controls over financial reporting. Auditors simultaneously face challenges in assessing entities' going concern status and obtaining sufficient appropriate audit evidence to form opinions (Albitar et al. 2021; ACCA 2020; Joshi 2020). They report difficulties gathering audit evidence, increased audit risk, and inability to meet reporting deadlines (ACCA 2020). Social distancing measures have transformed audit methodologies, and while auditors implement alternative procedures as optimal solutions during the pandemic, the inability to work on-site limits effective information exchange and increases difficulties in collecting direct

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evidence needed for verification (Gong et al. 2022).

In response to COVID-19's significant impacts, regulators are closely monitoring and addressing pandemic-related issues affecting investors and capital markets. Both the Financial Accounting Standards Board (FASB) and the International Accounting Standards Board (IASB) have issued guidance on key accounting and disclosure requirements to help companies navigate financial reporting complexities during the pandemic (FASB 2020; IASB 2020). Specifically, managers are expected to disclose underlying assumptions and perform sensitivity analyses for key accounting estimates while exercising significant judgment (Deloitte 2020). Despite travel restrictions limiting traditional audit fieldwork, auditors have implemented alternative procedures such as remote auditing and technology-enabled solutions (IAASB 2020). When conducting remote audits, auditors take additional precautions and leverage technological advancements to maintain policies, procedures, and quality standards comparable to on-site work. Furthermore, regulators have conditionally extended report filing deadlines, allowing managers and auditors to benefit from these extensions.[1] Therefore, with regulators, companies, and auditors collectively addressing financial reporting challenges posed by the pandemic, their heightened attention and concerted efforts may mitigate the incentives and risks of financial misstatements arising from the pandemic.

With regulators, companies, and auditors collectively addressing financial reporting challenges posed by the pandemic, it is crucial to evaluate whether these efforts maintain proper functioning of financial reporting systems and ensure continued credible financial reporting. This study examines a sample of U.S. firms to investigate whether misstatement likelihood changed following the COVID-19 outbreak. Using March 1, 2020—when former U.S. President Donald Trump declared the COVID-19 outbreak a national emergency—as a key date, this study defines affected firms as U.S. companies with 10-K filing deadlines between March 1, 2020, and August 31, 2020, as their financial statement preparation and audit procedures were impacted by the pandemic. For difference-in-differences design, this study establishes a control group of U.S. companies with 10-K filing deadlines between September 1, 2019, and February 28, 2020, whose financial statement

[1] The U.S. SEC Order provides companies with a 45-day extension to file reports. The United Kingdom, Denmark, Latvia, and Poland allow an extra three months for filing the annual reports for listed entities. Japan's FSA extended the deadlines of certain mandatory documents to September 30, 2020.

臺灣人文社會期刊資料庫

preparation and audit procedures occurred before the pandemic's impact.

This study examines the likelihood of misstatements rather than actual misstatements because misstatements typically take two to three years to be revealed (Cunningham et al. 2019; Pittman et al. 2023). Using the likelihood of restatement reflects potential control risks, not just problems that have already been exposed, while restatement itself only captures issues that have already come to light. To evaluate whether the emergency response measures that regulators, companies, and auditors collectively implemented maintained the proper functioning of financial reporting systems, employing likelihood of restatement provides a timely assessment of their effectiveness, offering deeper insights into how reporting controls adapted throughout the crisis period. Following prior research (Chahine et al. 2021; Cunningham et al. 2019; Dechow et al. 2011; Fang et al. 2016; McGuire et al. 2012; Pittman et al. 2023), this study uses the F-score as a proxy for accounting misstatement probability. Analyzing the period from September 1, 2018, to August 31, 2020, this study finds that affected firms experienced a significantly greater reduction in misstatement likelihood post-outbreak compared to unaffected firms. When dividing the sample into subsamples based on COVID-19 case severity by state, this study observes this phenomenon is more pronounced in severely affected states. These results suggest that mechanisms including regulators' immediate guidance and close supervision, combined with managers' and auditors' digital transformation efforts, have enabled financial reporting systems to function properly during the COVID-19 pandemic.

In addition, given that the COVID-19 pandemic caused adverse cash flow shocks and increased firms' default risk, highly leveraged companies might have strong incentives to manipulate earnings to avoid debt covenant violations during the pandemic-induced recession. After dividing the sample based on pre-COVID-19 leverage magnitude, this study finds that affected firms with high leverage exhibit similar misstatement likelihood in the post-outbreak period compared to the prior period. This suggests that despite the strong pressure on highly leveraged firms to manipulate earnings during the pandemic, they maintained the same financial reporting quality as they did before the crisis.

This study contributes to the literature in several ways. The COVID-19 pandemic created an unprecedented level of uncertainty across global markets. During these challenging times, complete and high-quality financial information disclosure became increasingly critical (IOSCO 2020). While many recent studies have predominantly focused on stock market reactions to COVID-19 (Albuquerque et al. 2020; Ding et al. 2021; Heyden and Heyden 2021; Hsu and Liao 2021), some

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studies examine the pandemic's impact on earnings management and audit quality. Gong et al. (2022) document a decrease in audit quality by analyzing discretionary accruals and restatements, while Xiao and Xi (2021) investigate earnings management practices among Chinese listed firms. This study extends the existing literature by addressing whether financial reporting systems maintained proper functioning during the pandemic through examining changes in misstatement likelihood. Specifically, this study investigates changes in likelihood of restatement to assess whether the emergency response measures collectively implemented by regulators, companies, and auditors provided effective reporting controls throughout the pandemic period. The findings indicate that despite the pandemic's disruptive impact on companies' economic realities, misstatement likelihood did not deteriorate. This suggests that regulators, companies, and auditors responded promptly and effectively to the financial reporting challenges posed by the pandemic, enabling financial reporting systems to function normally despite the extraordinary circumstances.

2. Literature review and research question

2.1 Covid-19 related literature

The Covid-19 pandemic abruptly and severely constricted global economic activity. Covid-19 has created an unprecedented level of uncertainty about the economy, and presents practical challenges for preparers of financial statements and auditors (IFAC 2020). For example, Covid-19 increases the challenge in obtaining the sufficient appropriate audit evidence needed to form an opinion. From ACCA's Covid-19 global survey, a quarter of respondents said they're experiencing difficulties in gathering audit evidence, and 27% said they saw an increased audit risk relating to valuation of assets, completeness of liabilities or going concern issues (ACCA 2020). In addition, since many companies have difficulties to meet reporting deadlines, regulators in many countries have extended reporting deadlines. For example, U.S. SEC Order provides companies with a 45-day extension to file reports. The United Kingdom, Denmark, Latvia, Poland, allow an extra 3 months for filing the annual reports for listed entities. Japan's FSA extends the deadlines of certain mandatory documents to September 30, 2020.

Covid-19 has raised concerns about a future economic recession. A growing number of studies are looking at every aspect of the pandemic in the areas of accounting, business, finance, and related subjects.Covid-19 related studies mostly

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focus market reactions to the pandemic (Albuquerque et al. 2020; Ding et al. 2021; Heyden and Heyden 2021; Hsu and Liao 2021). Specifically, stock reactions to COVID-19 were negative and significant (Heyden and Heyden 2021; Hsu and Liao 2021). Corporate characteristics, such as pre-pandemic financial conditions, international exposure to COVID-19 matters, family control, and CSR or ESG activities, are significantly associated with market reactions (Albuquerque et al. 2020; Ding et al. 2021). Conversely, some studies do not find evidence that CSR affected stock returns during the crash period (Bae et al. 2021; Demers et al. 2021). In addition, stock reactions also reflect investors' risk attitudes toward the Covid-19 pandemic; specifically, investors anticipated the real economic effects of the pandemic to be amplified by financial channels (Amstad et al. 2020; Ramelli and Wagner 2020).

Beck and Beck (2022) examine how the implementation of Accounting Standards Update (ASU) 2016-13 affected banks' loan loss allowances during the COVID-19 pandemic. They find that the new accounting standard achieved its objective of making banks' allowances more sensitive to rapidly changing economic conditions such as those experienced during the COVID-19 pandemic. While Beck and Beck (2022) focus on the effect of the implementation of Accounting Standards Update during the pandemic, this study tries to supplement the relevant literature by investigating whether emergency response measures collectively developed by regulators, companies, and auditors enabled proper functioning of the financial reporting system during the pandemic. This study addresses this question by investigating whether misstatement likelihood has changed following the onset of the pandemic.

2.2 Impact of Covid-19 on financial reporting

The COVID-19 pandemic has posed unprecedented threats to business survival, resulting in significant financial reporting challenges for companies worldwide. The pandemic has dramatically increased the complexity and uncertainty of accounting estimates, particularly affecting accounts receivable valuation and asset impairment (Joshi 2020). COVID-19 restrictions have fundamentally transformed financial statement preparation and audit processes, forcing a rapid pivot to remote work environments for both managers and auditors.

Managers responsible for financial statement preparation face unprecedented challenges in exercising significant judgment and providing fair presentation of entity performance (IFAC 2020). They must rapidly adopt digital technologies while

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addressing increased difficulties in maintaining effective internal controls. Simultaneously, managers might feel pressure to manage earnings upward to rebuild investor confidence during the pandemic (Lassoued and Khanchel 2021; Xiao and Xi 2021). Research shows that European firms were more likely to engage in income-increasing earnings management during the COVID-19 outbreak (Lassoued and Khancel 2021), while Chinese listed firms in severely affected regions demonstrated increased manipulation of accrual-based earnings (Xiao and Xi 2021).

Auditors face equally significant challenges in assessing entities' going concern status and obtaining sufficient appropriate audit evidence (Albitar et al. 2021; ACCA 2020; Joshi 2020). They report difficulties gathering audit evidence, increased audit risk, and inability to meet reporting deadlines (ACCA 2020). Social distancing measures have transformed audit methodologies, and while auditors implement alternative procedures, the inability to work on-site limits effective information exchange and complicates direct evidence collection (Gong et al. 2022). Gong et al. (2022) provide evidence that audit quality, measured by discretionary accruals and restatements, decreased after COVID-19 restrictions were implemented.

The pandemic's psychological impact further complicates the situation. Ding et al. (2021) note that individuals require time to adapt to new circumstances such as work-from-home arrangements, lockdowns, and health practices. People experiencing social isolation and future uncertainty may feel anxious and depressed, potentially reducing their decision-making capacity (Ding et al. 2021). This psychological effect might cause auditors to produce lower-quality audits. Collectively, the increasing complexity of financial reporting, growing difficulties in audit procedures, and negative psychological effects could decrease audit quality.

Conversely, research suggests that individuals who experience disruptive life events consistently make more pessimistic risk estimates and risk-averse choices (Bourveau and Law 2021). The direct experience of disruption changes individual risk perception (Lerner et al. 2003; Bourveau and Law 2021). Therefore, the COVID-19 pandemic might decrease auditors' risk tolerance and increase their risk perception. Pittman et al. (2023) indicates that audit quality is sensitive to audit partners' risk tolerance, suggesting auditors might invest more effort to achieve higher audit quality when perceiving elevated client risk. For example, auditors may perform more alternative procedures and utilize various technology tools (IAASB 2020), potentially increasing audit quality through the COVID-19 experience.

In response to these challenges, regulators have closely monitored and

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addressed pandemic-related issues affecting investors and capital markets. Both FASB and IASB issued guidance on key accounting and disclosure requirements to help companies navigate financial reporting complexities (FASB 2020; IASB 2020). Managers are expected to disclose underlying assumptions and perform sensitivity analyses for key accounting estimates while exercising significant judgment (Deloitte 2020). Despite travel restrictions limiting traditional audit fieldwork, auditors have implemented alternative procedures including remote auditing and technology-enabled solutions (IAASB 2020). When conducting remote audits, auditors take additional precautions and leverage technological advancements to maintain quality standards comparable to on-site work. Regulators have also conditionally extended report filing deadlines, providing critical flexibility to managers and auditors. Beyond these collective efforts, an additional factor may have contributed to reduced misstatement likelihood during COVID-19: the attribution of poor performance to macro-level events rather than managerial failures. During normal periods, poor firm performance is often attributed to managers' decisions, creating strong incentives for earnings manipulation to preserve reputation. However, during the pandemic, poor performance was more readily attributed to external, uncontrollable circumstances, reducing the reputational costs of reporting poor performance and decreasing managers' incentives to engage in material misstatements.

From the above discussion, it remains an empirical question whether financial reporting systems functioned appropriately during COVID-19. Since likelihood of restatement can reflect potential control risks rather than just problems already exposed, this study investigates changes in restatement likelihood to assess whether financial reporting systems maintained proper functioning throughout the pandemic. Therefore, this study addresses the following research question:

RQ: Does likelihood of restatement change after COVID-19?

3. Research design

3.1. Sample

This study uses a sample of U.S. firms because the U.S. has the highest cumulative number of confirmed cases as a result of COVID-19 based on the statistics provided by WHO. On March 1, 2020, former U.S. president Donald Trump proclaimed that the COVID-19 outbreak in the United States constitutes a national emergency, so this study defines affected firms as U.S. companies with

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10-K filing deadlines during March 1, 2020, to August 31, 2020.[2] To employ a difference-in-differences design, the control group is defined as U.S. companies with 10-K filing deadlines before the COVID-19 outbreak (from September 1, 2019, to February 28, 2020). The sample selection starts with all U.S nonfinancial listed firms from Compustat. The sample period is from September 1, 2018, to August 31, 2020. Such a sample period ensures a balanced one-year period both prior to and after the outbreak. This study requires firms to have a valid CIK identifier to obtain audit-related data from Audit Analytics. Then, this study excludes observations with insufficient data to calculate the variables used in the regression. To ensure that this study does not capture changes in synchronicity due to firms entering and leaving the sample, this study deletes observations that only exist in year $t-1$ (from September 1, 2018, to August 31, 2019) or in year t (from September 1, 2019, to August 31, 2020).[3] The final sample includes 6,170 observations for 2,713 affected firms and 372 unaffected firms.

3.2. Measurement of the likelihood of misstatement

This study uses the F-score to measure the likelihood of misstatements (Chahine et al. 2021; Cunningham et al. 2019; Dechow et al. 2011; Fang et al. 2016; McGuire et al. 2012; Pittman et al. 2023). The F-score is the predicted probability of accounting misstatements, from Dechow et al. (2011) (Table 7, Panel A), scaled by the unconditional probability of having accounting misstatements. The dependent variable *FSCORE* is calculated based on the coefficients obtained from Dechow et al.'s (2011) first model, including accruals quality and financial performance measures. Values greater than one indicate a higher probability of misstatement than the unconditional expectation.

3.3. Regression model

This study develops the following regression model to examine whether the likelihood of misstatement changed after the COVID-19 outbreak:

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[2] According to the SEC's filing deadlines, large accelerated filers (accelerated filers and non-accelerated filers) should file Form 10-K within 60 days (75 days and 90 days) after the end of the fiscal year.

[3] This study also ran the regression using the full sample (i.e., including observations that only exist in year $t-1$ or year t), and the main results remained unchanged.

臺灣人文學術期刊資料庫

$$\begin{aligned} FSCORE = {} & \beta_0 + \beta_1 TREAT + \beta_2 POST + \beta_3 TREAT \times POST + \beta_4 SIZE \\ & + \beta_5 ROA + \beta_6 LEV + \beta_7 LOSS + \beta_8 MB + \beta_9 LAGACCR \\ & + \beta_{10} CFO + \beta_{11} VOLATILITY + \beta_{12} BIG4 + \beta_{13} AUDCHANGE \\ & + \beta_{14} RES + \beta_{15} MW + \beta_{16} GC + IndustryFixedEffects \end{aligned} \quad (1)$$

where *FSCORE* represents the predicted probability of accounting misstatements from Dechow et al. (2011) (Model 1, Table 7, Panel A), scaled by the unconditional probability of having accounting misstatements. The F-score model includes seven the following variables. RSST accruals is a comprehensive measure of total accruals that captures changes in working capital, net noncash operating assets, and net financial obligations, reflecting the overall quality of accruals. Change in receivables measures year-over-year changes in accounts receivable scaled by average total assets, capturing potential aggressive revenue recognition practices. Change in inventory reflects year-over-year changes in inventory scaled by average total assets, indicating potential overstatement of inventory values or manipulation of cost of goods sold. % Soft assets represents the percentage of total assets that are neither cash nor property, plant, and equipment, capturing assets whose values are more subject to managerial discretion and estimation (e.g., intangibles, goodwill, deferred charges). Change in cash sales captures the growth rate in cash-basis sales, which can signal transaction-based earnings management such as channel stuffing or premature revenue recognition. Change in return on assets measures the year-over-year change in profitability, where declining performance may create incentives for misstatement. Actual issuance is an indicator variable equal to 1 if the firm issued debt or equity securities during the year, reflecting capital market pressures that may incentivize earnings manipulation. Values greater than 1 indicate a higher probability of misstatement than the unconditional expectation, while values less than 1 indicate a lower probability. *TREAT* is an indicator variable that equals one for affected firms and zero otherwise. U.S. companies with 10-K filing deadlines after the COVID-19 outbreak (from March 1, 2020, to August 31, 2020) are defined as affected firms, while U.S. companies with 10-K filing deadlines before the COVID-19 outbreak (from September 1, 2019, to February 28, 2020) are defined as unaffected firms. *POST* is a time-period indicator variable that equals one for the period of September 1, 2019, to August 31, 2020 (year t) and zero for the period of September 1, 2018, to August 31, 2019 (year $t-1$). This six-month split around the outbreak date ensures a balanced distribution of firms across treatment and control groups while maintaining clear temporal separation. Firms in both

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groups experience similar macroeconomic conditions during their respective fiscal years, with the key difference being whether their financial reporting and audit processes occurred predominantly before or after the pandemic outbreak. The main coefficient of interest is β_3, the coefficient on the interaction term $TREAT \times POST$, which measures changes in the likelihood of misstatements for affected firms from year t to year $t-1$ relative to contemporaneous changes in the likelihood of misstatements among unaffected firms. β_3 is expected to be positive if the pandemic's increased complexity, audit difficulties, and negative psychological effects may have reduced audit quality, potentially leading to higher misstatement rates among affected firms (Gong et al. 2022). Conversely, β_3 is expected to be negative if heightened risk perception during the pandemic may have reduced auditors' risk tolerance, prompting them to invest additional effort through enhanced procedures and technological solutions to maintain or improve audit quality (Pittman et al. 2023).

Following Cunningham et al. (2019), Fang et al. (2016), and McGuire et al. (2012), this study includes in the model firm size (*SIZE*), earnings performance (*ROA*), leverage (*LEV*), net loss (*LOSS*), market-to-book ratio (*MB*), accounting accruals (*LAGACCR*), operating cash flows (*CFO*), operating cash flows volatility (*VOLATILITY*), auditor (*BIG4*), auditor switches (*AUDCHANGE*), restatement announcements (*RESTATE*), internal control weakness (*MW*), and audit opinion (*GC*). Finally, the regression includes industry fixed effects. Variable definitions are detailed in the Appendix.

4. Empirical results

4.1. Summary statistics

Table 1 presents the descriptive statistics for affected firms and unaffected firms. Table 1 reports mean values for each variable in the pre- (*POST* = 0) and post-periods (*POST* = 1) along with a differences in means test. This study finds a significant univariate difference in the likelihood of misstatement (*FSCORE*) for affected firms. That is, affected firms have a significantly lower likelihood of misstatement during the COVID-19 outbreak than before the pandemic. This preliminarily supports that financial reporting system works properly during the pandemic.

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Table 1 Summary statistics

Variables	Affected Firms			Unaffected Firms		
	Pre Mean	Post Mean	Diff.	Pre Mean	Post Mean	Diff.
FSCORE	0.936	0.845	0.000	1.032	1.079	0.459
FSCORE1	0.939	0.846	0.000	1.027	1.091	0.294
FSCORE2	1.029	0.929	0.000	1.145	1.207	0.415
SIZE	6.276	6.364	0.223	5.247	5.309	0.758
ROA	−0.186	−0.210	0.215	−0.218	−0.253	0.586
LEV	0.312	0.378	0.000	0.255	0.261	0.823
LOSS	0.455	0.492	0.006	0.409	0.446	0.300
MB	3.930	3.574	0.423	5.530	4.152	0.252
LAGACCR	−0.079	−0.072	0.493	−0.134	−0.100	0.337
CFO	−0.071	−0.080	0.464	−0.073	−0.098	0.514
VOLATILITY	0.130	0.105	0.006	0.125	0.118	0.726
BIG4	0.665	0.661	0.709	0.452	0.454	0.941
AUDCHANGE	0.056	0.057	0.860	0.057	0.054	0.873
RESTATE	0.072	0.053	0.004	0.067	0.051	0.352
MW	0.142	0.126	0.102	0.215	0.204	0.719
GC	0.108	0.134	0.003	0.161	0.151	0.687
n	2,713	2,713		372	372	

Note: This table presents descriptive statistics for affected firms and unaffected firms with available data for the analyses in year *t* (8/1/2019–7/31/2020) and in year *t*−1 (8/1/2018–7/31/2019). All variables are defined in the Appendix. Reported p-values in the Diff. column are based on t-tests for differences in the means.

4.2. Whether likelihood of misstatement changed after COVID-19

Table 2 shows the regression results from investigating whether likelihood of misstatement changed after COVID-19. Continuous variables are winsorized at the 1% level, and all reported t-statistics are corrected for heteroscedasticity using the White standard errors. The variance inflation factor in the regression model is below ten, which is below the acceptable limit. As indicated in Column (1), the coefficient on *TREAT*× *POST* is −0.1186, which is statistically significant (p = 0.046). This implies that affected firms decrease the likelihood of misstatement to a greater extent relative to unaffected firms in the post-outbreak period. It suggests that auditors' risk tolerance might decrease after Covid-19, so auditors might invest more effort such as performing more alternative procedures and utilizing various technology tools to achieve higher audit quality when perceiving elevated client risk (Pittman et al. 2023). Moreover, regulators' close monitoring and timely guidance on financial reporting requirements during the pandemic likely contributed to this reduction in misstatements.

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Table 2 Changes in the likelihood of misstatement in the pre- and post-COVID-19 periods

Variables	(1) *FSCORE*	(2) *FSCORE1*	(3) *FSCORE2*
TREAT	−0.056	−0.059	−0.072
	(0.194)	(0.128)	(0.132)
POST	0.024	0.032	0.020
	(0.677)	(0.538)	(0.752)
TREAT × *POST*	−0.119**	−0.134**	−0.127*
	(0.046)	(0.013)	(0.053)
SIZE	0.058***	0.063***	0.070***
	(0.000)	(0.000)	(0.000)
ROA	−0.512***	−0.336***	−0.661***
	(0.000)	(0.000)	(0.000)
LEV	−0.092***	−0.011	−0.052
	(0.002)	(0.681)	(0.183)
LOSS	−0.165***	−0.132***	−0.195***
	(0.000)	(0.000)	(0.000)
MB	0.001	−0.001	−0.000
	(0.344)	(0.356)	(0.954)
LAGACCR	0.495***	0.439***	0.725***
	(0.000)	(0.000)	(0.000)
CFO	0.089	−0.017	0.135
	(0.332)	(0.854)	(0.367)
VOLATILITY	0.064	0.079	0.215*
	(0.313)	(0.304)	(0.072)
BIG4	−0.065***	−0.065***	−0.085***
	(0.005)	(0.003)	(0.002)
AUDCHANGE	−0.041	−0.045	−0.071
	(0.315)	(0.223)	(0.126)
RESTATE	−0.024	−0.002	−0.029
	(0.544)	(0.959)	(0.489)
MW	0.231***	0.159***	0.221***
	(0.000)	(0.000)	(0.000)
GC	0.048	0.017	0.011
	(0.308)	(0.681)	(0.833)
Constant	0.585***	0.417***	0.473***
	(0.001)	(0.001)	(0.001)
Industry FE	YES	YES	YES
Observations	6,170	5,710	5,688
Adjusted R^2	0.254	0.264	0.278

Note: This table presents whether the likelihood of misstatement changed after the COVID-19 pandemic. The models control for industry fixed effects. All variables are defined in the Appendix. ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively, using two-tailed tests.

Further, this study conducts a placebo test to test the validity of the parallel trend assumption. A fake treatment group is defined as companies with 10-K filing deadlines during December 1, 2019 to February 28, 2020, and the control group is defined as companies with 10-K filing deadlines during September 1, 2019 to

臺灣人學學術期刊資訊網

November 30, 2019. Therefore, the pseudo *POST* equals one for observations in year t (September 1, 2019 to February 28, 2020), and zero for observations in year t-1 (September 1, 2018 to February 28, 2019). The untabulated result suggests that the coefficient on *TREAT*× *POST* is insignificant (β = 0.0090, p = 0.975). In the absence of COVID-19, these two groups exhibit a similar trend in changes in the likelihood of misstatement.

4.3. Changes in the likelihood of misstatements conditional on severe vs. non-severe states

Considering that the pandemic situation in some states is more severe than in others, this study further divides the sample into observations in severe and non-severe states. Based on confirmed cases reported to the Centers for Disease Control and Prevention (CDC), the percentage of cumulative confirmed cases is calculated as the number of cumulative cases in the state divided by the total number of cumulative confirmed cases in the United States. California, Texas, Florida, and New York have higher percentages of cumulative cases than other states.[4] The result in Column (1) of Table 3 indicates that coefficient on *TREAT*× *POST* is negative and significant (β = −0.1785, p = 0.083) for the severe states, while Column (2) shows that the coefficient is negative but not significant (β = −0.0886, p = 0.205) for the non-severe states. That is, the decrease in the likelihood of misstatement by affected firms from the post-outbreak period to the previous period is significantly greater than that of unaffected firms, mainly in the severe states.

[4] Since our sample period ends on July 31, 2020, this study calculates the cumulative percentage of cases until July 31, 2020. The total cumulative cases in the U.S. on July 31, 2020, was 4,733,632. The cumulative percentages of cases for California, Texas, Florida, and New York were 12.23%, 8.89%, 9.82%, and 8.84%, respectively, while cumulative percentages for other states were all below 5%.

臺灣會計學術期刊資料庫

Table 3 Changes in the likelihood of misstatement in the pre- and post COVID-19 periods, by state severity

Variables	(1) *Severe States*	(2) *Non-Severe States*
TREAT	−0.029	−0.068
	(0.712)	(0.177)
POST	0.048	0.014
	(0.627)	(0.839)
TREAT × *POST*	−0.179*	−0.089
	(0.083)	(0.205)
SIZE	0.068***	0.055***
	(0.000)	(0.000)
ROA	−0.406***	−0.534***
	(0.000)	(0.000)
LEV	−0.041	−0.129***
	(0.289)	(0.001)
LOSS	−0.109***	−0.184***
	(0.007)	(0.000)
MB	0.006*	0.000
	(0.054)	(0.978)
LAGACCR	0.659***	0.423***
	(0.000)	(0.000)
CFO	−0.067	0.124
	(0.676)	(0.209)
VOLATILITY	0.111	0.064
	(0.191)	(0.434)
BIG4	−0.108***	−0.036
	(0.006)	(0.215)
AUDCHANGE	0.115	−0.092**
	(0.236)	(0.022)
RESTATE	−0.139**	0.007
	(0.047)	(0.873)
MW	0.361***	0.183***
	(0.000)	(0.000)
GC	0.067	0.006
	(0.398)	(0.920)
Constant	0.055	0.995***
	(0.673)	(0.000)
Industry FE	YES	YES
Observations	2,092	4,078
Adjusted R^2	0.295	0.264

Note: This table presents the regression results of changes in the likelihood of misstatement on severe and non-severe states. This study defines severe states as states with a higher percentage of cumulative cases based on CDC data. Severe states are California, Texas, Florida, and New York. The models control for industry fixed effects. All variables are defined in the Appendix. ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively, using two-tailed tests.

These results imply that these mechanisms such as regulator's immediate guidance and closely supervision and managers' and auditors' efforts to digital transformation make financial reporting system function properly.

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4.4. Changes in the likelihood of misstatements conditional on the magnitude of leverage

The COVID-19 pandemic caused adverse cash flow shocks that increased default risk, potentially creating strong incentives for high-leverage companies to manipulate earnings to avoid debt covenant violations. To examine this possibility, this study further divides the sample based on the median absolute value of leverage in the pre-COVID-19 period. Column (2) of Table 4 shows that the coefficient on *TREAT*× *POST* is negative and significant ($\beta = -0.1832$, p = 0.018) for firms with low leverage, indicating that these firms experienced a significant decrease in misstatement likelihood during the pandemic. In contrast, Column (1) shows that the coefficient on *TREAT*× *POST* is negative but insignificant for high-leverage firms, suggesting that affected firms with high leverage maintained similar misstatement likelihood in the post-outbreak period as in the prior period.

This finding suggests that despite facing heightened pressure to manipulate earnings during the pandemic, high-leverage firms did not increase their financial misstatements. Several factors may explain this result. First, the collective efforts by regulators, auditors, and companies to address pandemic-related reporting challenges—including enhanced guidance, extended filing deadlines, and increased monitoring—may have been particularly effective in constraining potential manipulation by high-risk firms. Second, high-leverage firms may have faced greater scrutiny from lenders, creditors, and auditors during the pandemic, making earnings manipulation more difficult to execute without detection. Third, many debt covenants include force majeure or pandemic-related provisions that provided temporary relief, reducing the immediate pressure to manipulate earnings. Finally, regulatory forbearance and government support programs during the pandemic may have alleviated some of the financial distress that would otherwise have created incentives for misstatement.

臺灣大學學術期刊資料庫

Table 4 Changes in the likelihood of misstatement in the pre- and post COVID-19 periods conditional on the magnitude of leverage

Variables	(1) *High Leverage*	(2) *Low Leverage*
TREAT	−0.134**	0.003
	(0.049)	(0.953)
POST	−0.038	0.066
	(0.666)	(0.363)
TREAT × *POST*	−0.053	−0.183**
	(0.561)	(0.018)
SIZE	0.025***	0.071***
	(0.001)	(0.000)
ROA	−0.344***	−0.670***
	(0.003)	(0.000)
LEV	−0.090***	0.116
	(0.004)	(0.595)
LOSS	−0.183***	−0.187***
	(0.000)	(0.000)
MB	0.004	0.001
	(0.327)	(0.514)
LAGACCR	0.442***	0.564**
	(0.000)	(0.000)
CFO	0.075	0.108
	(0.631)	(0.210)
VOLATILITY	0.036	0.043
	(0.773)	(0.522)
BIG4	−0.061	−0.092**
	(0.095)	(0.002)
AUDCHANGE	0.036	−0.068
	(0.556)	(0.197)
RESTATE	−0.044	−0.017
	(0.400)	(0.769)
MW	0.176***	0.260***
	(0.000)	(0.000)
GC	0.039	−0.012
	(0.526)	(0.855)
Constant	1.499***	0.229*
	(0.000)	(0.098)
Industry FE	YES	YES
Observations	3,086	3,084
Adjusted R^2	0.275	0.293

Note: This table presents the regression results of changes in the likelihood of misstatement conditional on the magnitude of leverage. The models control for industry fixed effects. All variables are defined in the Appendix. ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively, using two-tailed tests.

臺灣大學學術期刊資料庫

4.5 Sensitivity analyses

4.5.1 Alternative measures of the F-score

This study uses alternative F-scores based on other sets of the coefficient estimates provided in Dechow et al. (2011). *FSCORE1* is measured based on Dechow et al.'s (2011) second model, consisting of nonfinancial measures and off-balance-sheet activities. *FSCORE2* is calculated based on Dechow et al.'s (2011) third model, including market-based measures. Columns (2) and (3) of Table 2 provide the regression results using *FSCORE1* and *FSCORE2*, respectively. The coefficients on *TREAT*× *POST* in Columns (2) and (3) are negative and significant (β = −0.1337, p = 0.013; β = −0.1267, p = 0.053). This is consistent with the main results.

4.5.2 Alternative settings of treatment group

As robustness checks, this study classifies firms as treatment and control group based on their fiscal year ended dates and 10-K filing dates. First, *TREAT1* equals one for companies with fiscal year ended during March 1, 2020 to August 31, 2020, and zero for companies with fiscal year ended during September 1, 2019 to February 28, 2020. The untabulated result suggests that the coefficient on *TREAT1* × *POST* is negative and significant (β = -0.1296, p = 0.009). Second, *TREAT2* equals one if companies file their annual reports during March 1, 2020 to August 31, 2020, and zero if companies file their annual reports during September 1, 2019 to February 28, 2020. The untabulated result suggests that the coefficient on *TREAT2* × *POST* is negative and significant (β = -0.0514, p = 0.042). These results are consistent with the main results.

4.5.3 Comparing the likelihood of misstatement between the pre-COVID-19 and post-COVID-19 periods

As robustness checks, this study compares the likelihood of misstatement between the pre- and post-COVID-19 periods. The variable *POSTCOVID19* equals one for the post-COVID-19 period (from March 1, 2020, to February 28, 2021) and zero for the pre-COVID-19 period (from March 1, 2019, to February 28, 2020). The results are presented in Table 5. The coefficient on *POSTCOVID19* is negative and significant (β = −0.1108, p < 0.001), suggesting that the likelihood of misstatement is significantly lower in the post-COVID-19 period than in the pre-COVID-19 period. This is consistent with the finding that the likelihood of misstatement decreases during the COVID-19 outbreak.

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Table 5 Comparing the likelihood of misstatement between the pre-COVID-19 and post-COVID-19 periods

Variables	
POSTCOVID19	−0.111**
	(0.000)
Control variables	YES
Industry FE	YES
Observations	5,798
Adjusted R^2	0.257

Note: This table presents the results of comparing the likelihood of misstatement between the pre-COVID-19 and post-COVID-19 periods. The variable POSTCOVID19 equals one for the post-COVID-19 period (March 1, 2020, to February 28, 2021) and zero for the pre-COVID-19 period (March 1, 2019, to February 28, 2020). The models control for industry fixed effects. All other variables are defined in the Appendix. ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively, using two-tailed tests.

5. Conclusions

COVID-19 created practical challenges for companies in preparing financial statements and for auditors in obtaining sufficient audit evidence needed to form an opinion. During these challenging times, disclosing complete and high-quality financial information became critically important (IOSCO 2020). As regulators, companies, and auditors collectively sought ways to address the financial reporting challenges raised by the pandemic, investigating whether these efforts enabled the financial reporting system to function properly during this period became essential. Therefore, this study examines whether the likelihood of misstatements changed in the wake of COVID-19.

The empirical findings indicate that affected firms, on average, experienced a significant reduction in the likelihood of misstatement in the post-outbreak period relative to the prior period, and this reduction was greater than that experienced by unaffected firms. Given that the pandemic's severity varied across states, this study further divides the sample into severe and non-severe states. The findings show that this reduction in misstatement likelihood was more pronounced among affected firms headquartered in severely affected states. These results suggest that collective efforts—including regulators' immediate guidance and close supervision, as well as managers' and auditors' digital transformation initiatives—enabled the financial reporting system to function properly during the pandemic.

The COVID-19 pandemic also caused adverse cash flow shocks and increased firms' default risk. Considering that high-leverage companies might have had strong incentives to manipulate earnings to avoid debt covenant violations during the recession, this study further divides the sample based on the magnitude of leverage in the pre-COVID-19 period. The results show that affected firms with high leverage maintained a similar likelihood of misstatements in the post-outbreak period as in

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the prior period. This finding indicates that, despite facing strong incentives to manipulate earnings under pandemic pressures, high-leverage firms maintained the same financial reporting quality as they had before the pandemic.

This study documents that the collective efforts of regulators, auditors, and companies effectively mitigated financial misstatement risks during the COVID-19 pandemic. Future research could extend this work by separately examining the specific contributions of regulatory guidance, remote auditing practices, and internal control improvements, providing valuable insights for maintaining reporting quality during future crises.

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Appendix: Variable definitions

FSCORE	=	Predicted probability of accounting misstatements in year *t* from Dechow et al.'s (2011) first model of Table 7 scaled by the unconditional probability of having accounting misstatements.
FSCORE1	=	Predicted probability of accounting misstatements in year *t* from Dechow et al.'s (2011) second model of Table 7 scaled by the unconditional probability of having accounting misstatements.
FSCORE2	=	Predicted probability of accounting misstatements in year *t* from Dechow et al.'s (2011) third model of Table 7 scaled by the unconditional probability of having accounting misstatements.
TREAT	=	One for U.S. companies with 10-K filing deadlines during March 1 to August 31, 2020 (affected firms) and zero for U.S. companies with 10-K filing deadlines during September 1, 2019 to February 28, 2020 (unaffected firms).
POST	=	One for observations in year *t* (from September 1, 2019, to August 31, 2020) and zero for observations in year *t*−1 (from September 1, 2018, to August 31, 2019).
SIZE	=	Natural logarithm of total assets at the end of year *t*.
ROA	=	Earnings before extraordinary items in year *t* divided by total assets at the end of year *t*.
LEV	=	Total debt divided by total assets at the end of year *t*.
LOSS	=	One if net income in year *t* is less than zero, and zero otherwise.
MB	=	Market value of assets divided by book value of assets at the end of year *t*.
LAGACCR	=	Total current accruals in year *t*−1 divided by total assets at the end of year *t* −1.
CFO	=	Cash flow from operations in year *t* divided by total assets at the end of year *t*.
VOLATILITY	=	Standard deviation of *CFO* over the prior three years (*t*−2 to *t*).
BIG4	=	One if the auditor is a Big 4 firm in year *t*, and zero otherwise.
AUDCHANGE	=	One if the company changes auditors in year *t*, and zero otherwise.
RESTATE	=	One if the company announced a restatement during fiscal year *t*, and zero otherwise.
MW	=	One if the company or the auditor disclosed a material weakness under SOX 404(a)/404(b) in year *t*, and zero otherwise.
GC	=	One if the auditor issued a going concern opinion in year *t*, and zero otherwise.

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