

# **Analysts' Uncertainty, Stock Return Synchronicity, and Audit Fees**

Yi-Mien Lin

Professor, Department of Accounting  
National Chung Hsing University, Taiwan

Ding-Chieh Yang

CPA, PricewaterhouseCoopers, Taiwan

Jing-Chi Chen

PhD candidate and Instructor  
Department of Finance, Insurance and Real Estate  
University of Memphis, USA

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## **Abstract**

Analyst forecasts play a vital role in disseminating market information and promoting market efficiency. Stock return synchronicity, which captures the correlation between individual stock price movements and the overall market trend, reflects the interconnectedness of stocks and broader market dynamics. This study investigates the impact of analyst forecast uncertainty and stock return synchronicity on firms' audit fees and examines whether stock return synchronicity moderates the positive relationship between forecast uncertainty and audit fees. The findings reveal that higher analyst forecast uncertainty is associated with increased audit fees, regardless of whether the audit is conducted by a Big Four firm. Similarly, greater stock return synchronicity is linked to higher audit fees. These results highlight the significant role of market complexities in shaping audit costs. Additional analyses indicate that elevated audit fees may attract long-term institutional investors while discouraging short-term ones, underscoring the dual influence of audit fees on institutional investor.

**Keywords:** Analysts' Uncertainty, Stock return synchronicity, Audit fees, Institutional investors

## **1. Introduction**

Audit fees are a critical component of the auditing process, as audits require substantial investment in skilled personnel, time, and resources. Adequate and reasonable audit fees not only facilitate the smooth execution of audits but also reflect the quality of auditing and the standards of corporate governance. Audit quality depends on factors such as the expertise of audit personnel, the robustness of methodologies, and the completeness of data, with audit fees playing a vital role in ensuring these elements are well-balanced. Moreover, audit fees serve as an indicator of transparency. Their allocation and use should be publicly disclosed, subjected to scrutiny, and provide valuable insights to investors for informed decision-making.

Several factors influence the determination of audit fees. For instance, Gul, Khedmati, Lim, and Navissi (2018) indicate that financially distressed firms often incur higher audit fees, underscoring the potential of audit fees as a benchmark for evaluating a firm's overall quality.

Analyst forecasts, on the other hand, are a key source of information uncertainty, impacting both firms and investors. For firms, such uncertainty can hinder decision-making and increase costs as additional resources are required to manage risks. For investors, uncertainty complicates risk assessment, leading to conservative strategies, market withdrawal, increased stock price volatility, and diminished confidence. Reducing uncertainty and improving transparency and accuracy in information are therefore essential for both firms and investors. Analyst forecasts help investors evaluate a firm's profitability, growth potential, and risks, enhancing investment efficiency. They also assist firms in understanding market demand, competition, and industry trends, supporting strategic planning. Ren, Zhong, and Wan (2022) find that firms without analyst forecasts are more prone to fraudulent activities, often due to financial irregularities or opaque information that hampers accurate predictions. Furthermore, unethical practices such as bribery or coercion of analysts can undermine the accuracy of forecasts. Therefore, fostering transparency is essential to attract analyst attention

and prevent fraudulent activities.

Market risk is a significant factor for management, corporate governance, and investors, as it affects strategic planning, investment decisions, and market assessments. This study uses stock return synchronicity, the correlation between individual stock price movements and overall market trends, as a measure of market risk. High synchronicity is often linked to increased emotional volatility, lower market efficiency, and higher risk tolerance, making it a negative indicator. Song (2015) emphasizes that reliable accounting disclosures help reduce information gaps. They provide investors with better access to information, prevent management from hiding negative news, and lower the risk of stock price crashes. While digitalization has improved how information is shared and boosted trading efficiency, it has also increased market synchronicity. Chen, Gharagozloo, Darougar, and Shi (2022) find that while electronic and programmatic trading enhance efficiency, they intensify synchronicity and may impair investors' ability to interpret market information. Chen and Doukas (2023) further observe that high synchronicity causes investors to focus excessively on short-term trends, neglecting long-term strategies and leading to poor decisions.

Audit fees serve as an indicator of corporate governance and risk management, showcasing a firm's commitment to transparency and risk awareness. Analyst forecast uncertainty highlights internal challenges and risks, while stock return synchronicity reflects market perceptions of industry trends and broader risk factors. In highly synchronized markets, firms often prioritize risk management and strengthen audit efforts to enhance investor confidence through reliable financial reporting. This study investigates the impact of analyst forecast uncertainty on audit fees and explores whether stock return synchronicity influences audit fees. Additionally, it examines whether stock return synchronicity amplifies the relationship between analyst forecast uncertainty and audit fees.

The findings reveal that higher levels of analyst forecast uncertainty are consistently

associated with increased audit fees, both across the full sample and specifically among firms audited by Big Four accounting firms. Similarly, greater stock return synchronicity is correlated with higher audit fees. These results underscore the significant impact of analyst uncertainty and stock return synchronicity on audit costs, emphasizing the importance of addressing market environment complexities during the audit process. As such, auditors and firm management should carefully consider these factors when making decisions to ensure the audit process remains effective and efficient.

The additional analysis explores how institutional investors mediate the relationship between analyst forecast uncertainty, stock return synchronicity, and audit fees. With their resources and expertise, institutional investors improve market efficiency, stabilize stock prices, and enhance financial transparency, thereby lowering fraud risk. However, Yang, Wu, and Yu (2021) indicate that distracted institutional investors may weaken their oversight of financial statements, increasing audit risks. To capture the nuanced impacts of institutional investors, this study distinguishes between long-term and short-term investors. Long-term investors focus on firm fundamentals and long-term growth, accepting short-term volatility for stable returns. Short-term investors target market fluctuations for quick profits, taking on higher risks. These differing strategies and risk tolerances affect corporate governance and audit fees differently. The results show that higher analysts' uncertainty indicates financial instability. Long-term investors see this as risky, reducing investment and lowering audit fees, while short-term investors view it as an arbitrage opportunity, increasing audit fees. Higher stock price synchronicity enhances market efficiency, attracting long-term investors and raising audit fees, but reducing short-term investors' activity and lowering audit fees.

Previous studies have advanced understanding of how corporate governance and risk factors influence analyst forecasts. For example, Li and Nwaeze (2018) find that increased firm disclosures, while sometimes reducing transparency, can improve forecast accuracy.

Huajing, Chen, Krishnan, and Sami (2014) observe that goodwill impairments can negatively impact forecast accuracy. Additionally, Ren, Zhong, and Wan (2022) note the potential fraud risks associated with the absence of analyst forecasts, often due to analysts' inability to make predictions. However, these studies mainly focus on the isolated effects of governance and risk factors on analyst forecasts. To provide a comprehensive perspective, we include analyst forecast uncertainty and its interaction with audit fees. This analysis aims to enhance understanding of the links between corporate governance, risk management, and analyst forecasts, contributing to the literature on audit fees.

This study examines the impact of analysts' uncertainty and stock return synchronicity on corporate audit fees. It also analyzes whether stock return synchronicity strengthens the positive link between forecast uncertainty and audit fees. Chen and Doukas (2023) note that high synchronicity heightens investor biases, affecting decisions, while Song (2015) finds that better information disclosure reduces synchronicity, limits herd behavior, and supports better decision-making. Jiang, Zhou, and Zhang (2019) emphasize analysts' role in influencing synchronicity and their market importance. This study contributes to the literature by examining how stock return synchronicity affects audit fees and interacts with forecast uncertainty, filling gaps in understanding the link between market efficiency and corporate governance.

Yang, Wu, and Yu (2021) emphasize the important role of institutional investors in corporate governance, noting that poor oversight can increase audit risks. Their involvement is crucial for ensuring transparency, preventing fraud, and affecting audit fees. Zhu, Wu, Zhang, and Yu (2018) show that institutional investors influence stock price volatility, highlighting their significance and potential impact on stock return synchronicity. This study investigates how long-term and short-term institutional investors affect the relationship between analyst forecast uncertainty, audit risks, and audit fees, as well as the role of stock

return synchronicity. It highlights how institutional investor behavior influences audit fees and addresses a gap in the literature on institutional investor horizons

The remainder of this paper is organized as follows: Section 2 reviews the relevant literature and formulates the hypotheses. Section 3 details the research design, including regression models and data collection methods. Section 4 presents the empirical findings and analysis. Section 5 concludes with a summary of the findings and suggestions.

## **2. Hypothesis Development**

### **2.1 The Impact of Analyst Forecast Uncertainty on Audit Fees**

Analysts play a pivotal role in the capital market by providing investors with forecasts of a firm's future performance, serving as a critical reference for investment decisions. They also facilitate the rapid absorption of information by market participants, reducing volatility and enhancing overall market efficiency. Chan and Hameed (2006) suggest that stocks with higher analyst coverage have lower price synchronicity. This suggests that analysts help incorporate firm-specific information into stock prices, improving market efficiency. The effect is even stronger in markets with weaker institutional frameworks. Moreover, analysts can influence audit quality both directly and indirectly. Previous research has recognized analyst uncertainty as an indicator of audit quality and examined its relationship with audit market. Brockbank, Do, and Lawson (2023) find that higher audit market concentration is associated with lower analyst forecast consistency. This inconsistency makes it more challenging for auditors to obtain accurate information, ultimately compromising audit quality.

Analyst forecasts can also influence a firm's level of information disclosure. When a firm provides more detailed, accurate, and timely information to analysts, it enhances the market's understanding of the firm, reduces information asymmetry, and supports auditors in efficiently and accurately assessing firm risks. This, in turn, improves audit quality and

satisfies investors' demand for reliable information. Li and Nwaeze (2018) highlight that XBRL improves analysts' understanding of financial positions by providing detailed information on product portfolios, market share, and competition. It reduces information asymmetry and enhances forecast accuracy and consistency by offering insights into pricing strategies and inventory levels.

At the firm level, analyst forecasts can drive firms to focus more on governance and internal controls, as these factors influence analysts' predictions of future performance. To receive favorable evaluations, firms may implement stricter oversight measures. Ji, Lu, Qu, and Richardson (2019) find that when publicly listed firms began disclosing the effectiveness of their internal controls under the Sarbanes-Oxley Act, analyst accuracy and consistency significantly improved. This not only enhanced investors' decision-making efficiency but also reduced costs and risks, leading to more cautious investment decisions. Corporate governance also extends to issues involving top executives. Marquez-Illescas and Zhou (2023) discover that narcissistic CEOs are more likely to exaggerate performance, resulting in overly optimistic and inaccurate analyst forecasts. This occurs because narcissistic CEOs are prone to providing misleading or inconsistent information, which undermines analysts' evaluations.

The presence of analysts acts as a deterrent for firms, discouraging them from engaging in non-compliant behavior. Ren, Zhong, and Wan (2022) find a positive correlation between missing analyst forecasts and both the likelihood and severity of fraud. Analysts enhance corporate transparency, strengthen oversight, and raise investor awareness. Without their forecasts, investors lack a comprehensive understanding of the firm, reducing their vigilance against fraud. Additionally, regulatory bodies are less able to effectively monitor the firm, creating opportunities for fraudulent activities.

Analyst forecasts play a pivotal role in both corporate and auditing contexts. They help auditors identify potential risks early, enhance audit efficiency, and improve audit quality by



facilitating better communication with management. From a corporate perspective, analyst forecasts encourage management to prioritize financial transparency, ensuring the accuracy and completeness of disclosed information. Greater transparency helps auditors gain a deeper understanding of the firm's operations, enabling more effective risk assessments. However, when analyst forecast uncertainty is high, it signals greater informational asymmetry or increased risk regarding the firm's future performance. Such uncertainty requires auditors to dedicate additional resources and effort to evaluate the firm's financial statements, internal controls, and potential risks, leading to higher audit fees. Building on this, the study uses audit fees as a proxy for audit quality to explore the impact of analyst forecast uncertainty on audit processes and fees. Therefore, we propose the following hypothesis:

H1: Higher analyst forecast uncertainty is associated with higher audit fees.

## **2.2 The Impact of Stock Return Synchronicity on Audit Fees**

Stock return synchronicity reflects how closely a stock's price movements align with market or industry trends. High synchronicity indicates that stock prices are driven more by broader factors than firm-specific information, requiring auditors to allocate additional time and resources to evaluate firm-specific risks. An and Zhang (2013) suggest that higher stock price synchronicity is linked to greater crash risk, likely due to insufficient information transparency, which can lead to the sudden release of accumulated negative news. However, institutional investors can weaken this link, as their monitoring role enhances information disclosure and helps reduce crash risk.

Song (2015) find that improved accounting disclosures reduce synchronicity by enhancing transparency, enabling investors to access firm-specific information more easily and make informed decisions. Digitalization, a growing global trend, also influences synchronicity. Chen, Gharagozloo, Darougar, and Shi (2022) note that digitalization

accelerates information flow, increasing synchronicity by enhancing market liquidity and encouraging frequent trading. Furthermore, Li, Liu, Chen, and Wang (2022) find that relaxed market regulations improve transparency and reduce synchronicity, while Bissessur and Hodgson (2012) show that adopting IFRS reduces synchronicity by improving financial disclosure and comparability.

Given the relationship between synchronicity, transparency, and disclosure, this study examines how stock return synchronicity impacts audit fees. High stock return synchronicity often reflects reduced firm-specific transparency, increasing the complexity of risk assessments for auditors. To address these challenges, firms may need to enhance their disclosures, improving transparency to facilitate the audit process. Enhanced transparency not only enables auditors to better understand a firm and identify risks but also mitigates the challenges posed by higher synchronicity. Therefore, we propose the following hypothesis:

H2: Firms with higher stock return synchronicity incur higher audit fees.

Higher stock return synchronicity may signal increased market risk and volatility, often stemming from external factors (e.g., political instability) or internal factors (e.g., corporate governance issues, financial statement opacity). These conditions complicate analysts' evaluations, leading to greater forecast uncertainty. This uncertainty, in turn, affects audit processes, requiring auditors to implement more extensive and resource-intensive procedures to manage increased risks and account for market fluctuations. As synchronicity rises, auditors may need to allocate additional resources to mitigate uncertainty, driving up audit fees.

Jiang, Zhou, and Zhang (2019) emphasize the critical role of analysts in the capital market, showing a positive relationship between analysts' information acquisition capabilities and stock return synchronicity. This suggests that analysts not only interpret information but also actively influence synchronicity, highlighting a potential interaction between stock return synchronicity, analyst forecast uncertainty, and audit fees. Furthermore, Devos, Hao, Prevost,

and Wongchoti (2015) suggest that in low-synchronicity markets, investors react strongly to analyst rating revisions as valuable firm-specific information. Conversely, high-synchronicity markets lead investors to focus more on market-wide signals and less on analysts' opinions. This diminished reliance on firm-specific insights may exacerbate informational asymmetry and further challenge both analysts and auditors.

Building on these insights, this study examines how stock return synchronicity interacts with the relationship between analyst forecast uncertainty and audit fees. High stock return synchronicity often reflects market-wide risks or reduced firm-specific transparency, which can amplify analysts' forecast uncertainty by complicating their ability to assess firm-specific risks. This heightened uncertainty poses additional challenges for auditors, who must adopt more cautious and resource-intensive approaches to evaluate a firm's condition and address potential risks. Furthermore, increased synchronicity may signal greater market volatility or structural risks, requiring auditors to expand their scope of work and allocate more resources to manage these complexities. Such conditions can drive up audit fees as auditors strive to ensure audit quality in a less predictable environment. Therefore, we form the following hypothesis:

H3: Stock return synchronicity amplifies the positive relationship between analyst forecast uncertainty and audit fees.

### **2.3 The Mediating Role of Institutional Investors**

Institutional investors play a pivotal role in corporate governance and market dynamics, significantly influencing audit risk, stock return synchronicity, and market efficiency. Yang, Wu, and Yu (2021) emphasize that institutional investors enhance transparency and prevent fraud, but distractions or ineffective oversight can elevate audit risks and fees. Zhu, Wu, Zhang, and Yu (2018) note that institutional ownership impacts market prices and stock return

synchronicity, with higher synchronicity often reflecting increased market risk or reduced transparency. This suggests that higher synchronicity may complicate analysts' evaluations and audit processes due to the challenges in accessing firm-specific information. Yan and Zhang (2009) classify institutional investors into short-term (TRA) and long-term (DED) categories, finding that short-term investors prioritize quick returns, while long-term investors focus on sustainable growth.

Additionally, Zhu, Huang, and Bradford (2022) show that institutional investors often work to curb excessive executive compensation, thereby improving governance and resource efficiency. Bushee (2001) highlights that short-term investors prioritize immediate profits, while long-term investors emphasize long-term value creation and sustainable growth, even at the expense of short-term gains. These contrasting behaviors influence the relationships among analyst forecast uncertainty, stock return synchronicity, and audit fees. Long-term investors, with their emphasis on transparency and governance, may amplify the connection between synchronicity, uncertainty, and audit fees by demanding higher audit quality. Conversely, short-term investors, focused on immediate gains, may attenuate this effect. In additional analysis, this study investigates how institutional investors mediate these relationships, providing valuable insights into their role in shaping corporate behavior, market dynamics, and audit practices.

### **3. Research Methodology**

#### **3.1 Empirical Model**

To test H1, this study utilizes an Ordinary Least Squares (OLS) regression model to assess whether higher analyst forecast uncertainty leads to increased audit fees. This analysis examines whether greater uncertainty from analysts heightens audit risk, which can negatively impact audit quality and increase the auditors' workload. The empirical model is based on the

approach of Hasan, Micale, and Wu (2024), with the dependent variable being the audit fees of firm  $i$  in year  $t$ .

$$AuditFee_{it} = a_0 + a_1 AnalystUncertain_{it} + Controls + IndustryFE + YearsFE + \varepsilon_{it} \quad (1)$$

where audit fees (*AuditFee*), is defined as the natural logarithm of the audit fees for firm  $i$  in year  $t$ . Analyst uncertainty (*AnalystUncertain*), is calculated as the standard deviation of all analyst earnings forecasts for firm  $i$  in year  $t$ , divided by the absolute value of analyst forecast consensus (mean) for the same period. This measure captures the relative uncertainty in analyst forecasts. IndustryFE controls for industry fixed effect and YearFE is year fixed effects.

Moreover, two models are employed for this analysis. Model (1-1) includes a variable accounting for big four audit firms to capture the potential influence of auditor type, while Model (1-2) excludes the big four audit firm variable to test the robustness of the results without the auditor type factor. This approach ensures a comprehensive evaluation of the relationship between analyst forecast uncertainty and audit fees, accounting for key fixed effects and auditor type considerations.

*Controls* refers to a set of control variables drawn from the frameworks of Hasan, Micale, and Wu (2024), Chen and Doukas (2023), and Ge and Kim (2020). These variables are summarized as follows. Big four audit firm (*Big4<sub>it</sub>*) is a dummy variable equal to 1 if the firm was audited by a big four audit firm in the previous fiscal year, and 0 otherwise. Unqualified audit opinion (*UnqualifiedOpinion<sub>it</sub>*) is a dummy variable equal to 1 if the firm received an unqualified audit opinion during the fiscal year, and 0 otherwise. Auditor change (*AuditorChange<sub>it</sub>*) is a dummy variable equal to 1 if the firm hired a new auditor during the fiscal year, and 0 otherwise.

Moreover, firm characteristics variables include the following control variables. R&D expenditures (*RDExp*) is the ratio of research and development expenses to total assets. Cash

dividends (*Dividend*) is a dummy variable equal to 1 if the firm paid cash dividends during the fiscal year, and 0 otherwise. Operating cash flow (*OCF*) is operating cash flow divided by total assets. Firm size (*Size*) is the natural logarithm of total assets. Current ratio (*CurrentRatio*) is the ratio of current assets to current liabilities. Inventory ratio (*InventoryRatio*) is the ratio of inventory to total assets. Leverage (*Leverage*) is the ratio of long-term debt to total assets. Current assets ratio (*CARatio*) is the ratio of current assets to total assets. Growth (*Growth*) is calculated as the difference between net sales of the current year and the previous year, divided by the net sales of the current year. Return on assets (*ROA*) is net income divided by total assets. Loss firm (*LOSS<sub>it</sub>*) is a dummy variable equal to 1 if the firm reported negative recurring net income in the previous fiscal year ( $t-1$ ), and 0 otherwise. Appendix summarizes the definitions of all variables used in the study.

Next, we examine hypothesis H2, the impact of stock return synchronicity on audit fees, specifically investigating whether excessive synchronization with the market—considering stock return synchronicity—leads auditors to be influenced by market noise and thus require more audit work. This study references the OLS empirical model from Hasan, Micale, and Wu (2024). Model (2-1) incorporates variables related to big four accounting firms, while Model (2-2) excludes such variables. The empirical model is presented as follows:

$$AuditFee_{it} = b_0 + b_1 Synchronicity_{it} + Controls + IndustryFE + YearFE + \varepsilon_{it} \quad (2)$$

where the stock return synchronicity (*Synchronicity<sub>it</sub>*) is measured using the natural logarithm of  $[(1-R^2)/R^2]$  for firm *i* in period *t*, which serves as an indicator of the firm's stock risk. Here,  $R^2$  is the regression statistic derived from regressing the firm's weekly returns on the weekly returns of the two-digit SIC industry and the market over a 52-week period ending at the close of the previous fiscal year. *Controls* represent a set of control variables, consistent with those in Model (1).

To test hypothesis H3, an OLS regression is employed to examine whether the impact of analyst uncertainty on firm audit fees becomes more pronounced after considering stock return synchronicity. The empirical model is based on Hasan, Micale, and Wu (2024), with the dependent variable being the audit fees of the firm in period  $t$ . Model (3-1) includes variables related to big four accounting firms, while Model (3-2) excludes these variables. The model is presented as follows:

$$\begin{aligned} \text{AuditFee}_{it} = & c_0 + c_1 \text{AnalystUncertain}_{it} + c_2 \text{Synchronicity}_{it} \\ & + c_3 \text{AnalystUncertain}_{it} * \text{Synchronicity}_{it} + \text{Controls} \\ & + \text{IndustryFE} + \text{YearFE} + \varepsilon_{it} \end{aligned} \quad (3)$$

An additional analysis examines the impact of long-term institutional investors on the relationship between analyst uncertainty, stock return synchronicity, and audit fees. Specifically, it investigates whether long-term institutional investors influence the positive correlation between analyst uncertainty and audit fees, as well as the positive correlation between stock return synchronicity and audit fees. The empirical model is based on Yan and Zhang (2009), and the model is presented as follows:

$$\begin{aligned} \text{AuditFee}_{it} = & d_0 + d_1 \text{AnalystUncertain}_{it} + d_2 \text{DedicatedINST}_{it} \\ & + d_3 \text{AnalystUncertain}_{it} * \text{DedicatedINST}_{it} + \text{Controls} \\ & + \text{IndustryFE} + \text{YearFE} + \varepsilon_{it} \end{aligned} \quad (4)$$

$$\begin{aligned} \text{AuditFee}_{it} = & d_0 + d_1 \text{Synchronicity}_{it} + d_2 \text{DedicatedINST}_{it} \\ & + d_3 \text{Synchronicity}_{it} * \text{DedicatedINST}_{it} + \text{Controls} \\ & + \text{IndustryFE} + \text{YearFE} + \varepsilon_{it} \end{aligned} \quad (5)$$

where  $\text{DedicatedINST}_{it}$  represents the proportion of shares held by long-term institutional investors in firm  $i$  at the end of year  $t$ , calculated as the number of shares held by long-term institutional investors (based on equivalent shareholding proportions) divided by the total number of shares held by all institutional investors. **Controls** refer to a set of control variables consistent with those in Model (1). Moreover, we also examine the impact of short-term institutional investors on the relationship between analyst uncertainty, stock return

synchronicity, and audit fees. The empirical model replaces the variable for long-term institutional investors ( $DedicatedINST_{it}$ ) in Equations (4) and (5) with the variable for short-term institutional investors ( $TransientINST_{it}$ ). Here,  $TransientINST_{it}$  represents the proportion of shares held by short-term institutional investors in firm  $i$  at the end of period  $t$ , calculated as the number of shares held by short-term institutional investors (based on equivalent shareholding proportions) divided by the total number of shares held by all institutional investors.

The aforementioned institutional investor variables are categorized into two types: long-term institutional investor holdings ( $DedicatedINST$ ) and short-term institutional investor holdings ( $TransientINST$ ). The stock turnover rate, as defined by Gaspar, Massa, and Matos (2005), is used to measure the investment horizon of institutional investors. This definition is widely adopted in the literature as the primary method to differentiate institutional investors based on their investment horizons. It calculates the churn rate ( $ChurnR$ ) of institutional investors over a given period:

$$ChurnR_{g,t} = \frac{\sum_{i=1}^{N_{g,t}} |S_{g,i,t}P_{i,t} - S_{g,i,t-1}P_{i,t-1} - S_{g,i,t-1}\Delta P_{i,t}|}{\sum_{i=1}^{N_{g,t}} \frac{S_{g,i,t}P_{i,t} + S_{g,i,t-1}P_{i,t-1}}{2}}$$

where  $g$  denote the institutional investor,  $i$  represent the Firm invested in by the institutional investor, and  $t$  denote the  $t$  period.  $N_{g,t}$  is the number of firms in the stock portfolio of institutional investor  $g$  during period  $t$ .  $S_{g,i,t}$  represents the number of shares of firm  $i$  held by institutional investor  $g$  at the end of period  $t$ .  $P_{i,t}$  is the stock price of firm  $i$  at the end of period  $t$ . In the calculation of churn rate above, the numerator in the formula for calculating the churn rate ( $ChurnR_{g,t}$ ) represents the absolute value of the total change in the value of institutional investor  $g$ 's stock portfolio caused by stock transactions during period  $t$ . The denominator is the average total value of institutional investor  $g$ 's stock portfolio during period  $t$ . Thus, the churn rate ( $ChurnR_{g,t}$ ) reflects the stock turnover rate of institutional investor  $g$ 's



portfolio in period  $t$ . Gaspar, Massa, and Matos (2005) set the analysis period to one quarter and define the average annual churn rate as follows:

$$AVG\_ChurnR_{g,t} = \frac{1}{4} \sum_{r=1}^4 ChurnR_{g,t-r+1}$$

Yan and Zhang (2009) divide the average churn rate of institutional investors into tertiles (33.33% and 66.67% quantiles), creating three equal groups. Those in the top one-third, exhibiting the highest stock turnover rates, are classified as short-term institutional investors, while those in the bottom one-third, exhibiting the lowest stock turnover rates, are classified as long-term institutional investors. According to Yan and Zhang (2009), long-term institutional investor holdings (DedicatedINST) and short-term institutional investors (TransientINST) are defined as the proportion of shares held by long-term and short-term institutional investors, classified based on the average churn rate, relative to the total shares held by all institutional investor.

### 3.3 The Data

The variable data for the firm samples in this study spans the research period from 1996 to 2023, covering a total of 28 years. The criteria for sample selection are as follows: (1) The sample consists of publicly listed firms in the United States that remained listed throughout the research period. (2) The sample includes firms with annual data available in the Compustat database. (3) Firms with incomplete or missing data are excluded. (5) Firms in the financial, insurance, securities industries, and utilities sectors are excluded. Moreover, this study utilizes data from the U.S. capital markets. Financial and accounting data are sourced from the Compustat database, stock price data are obtained from DataStream, and institutional investor holdings data are derived from 13F filings.

Table 1 presents the sample size and industry analysis, summarizing the number of samples obtained during the research period from 1996 to 2023. After excluding firms in the

financial, insurance, securities industries, and utilities sectors, the sample size consists of 18,890 observations. As shown in Table 1, the industry with the largest number of samples is Business Equipment, accounting for 17.6% of the total. The second-largest industry is Healthcare, Medical Equipment, and Drug, with a proportion of 16.05%, followed by Wholesale, Retail, and Some Services, which accounts for 15.11%.

Table 1 around here

## 4. Empirical Results

### 4.1 Descriptive Statistics

Table 2 presents the descriptive statistics for the empirical models (1) to (4) in this study. From the table, the mean value of audit fees (*Auditfee*) is 12.934, which is lower than the median value of 18.276, indicating a right-skewed distribution. This suggests that audit fees in the sample are generally low. The mean value of analyst uncertainty (*AnalystUncertain*) is -5.393, which is lower than the median value of 1, also indicating a right-skewed distribution. This suggests that the level of analyst uncertainty in the sample is generally low. The mean value of stock return synchronicity (*Synchronicity*) is 1.533, which is lower than the median value of 9.061, indicating a right-skewed distribution. The mean value of long-term institutional investor holdings (*DedicatedINST*) is 0.412, which is lower than the median value of 1. This suggesting that the proportion of long-term institutional investor holdings in the sample is generally low. Similarly, the mean value of short-term institutional investor holdings (*TransientINST*) is 0.29, also lower than the median value of 1, indicating that the proportion of short-term institutional investor holdings in the sample is generally low.

If the correlation coefficient between variables exceeds 0.6, it indicates a high correlation and a potential risk of multicollinearity. This study uses Pearson correlation coefficient analysis to examine the empirical models (1) to (5). The untabulated results show that analyst

uncertainty (*AnalystUncertain*), stock return synchronicity (*Synchronicity*), long-term institutional investors (*DedicatedInst*), and short-term institutional investors (*TransientInst*) are all positively correlated with the dependent variable, audit fees (*Auditfee*). Additionally, the correlation coefficients between all pairwise variables are below 0.51, suggesting that there is no significant risk of multicollinearity among the variables.

Table 2 around here

## 4.2 Regression Results Analysis

### 4.2.1 Analyst Uncertainty and Audit Fees

Table 3 presents the empirical results for the impact of analyst uncertainty (*AnalystUncertain*) on audit fees (*Auditfee*), testing whether H1 (a positive correlation between analyst uncertainty and audit fees) is supported. In Column (1) of Table 3, the empirical results for the effect of analyst uncertainty on audit fees are shown. The coefficient for *AnalystUncertain* is 0.1056, with a t-value of 7.31, indicating a significant positive relationship. This result suggests that as analyst uncertainty increases, audit fees also rise. In other words, analyst uncertainty contributes to higher audit fees for firms. This finding aligns with the expected direction, and thus, the empirical results support H1. Moreover, Column (2) of Table 3 presents the results for the effect of analyst uncertainty on audit fees, excluding the variable indicating whether firms are audited by Big Four accounting firms. The coefficient for *AnalystUncertain* 0.0859, with a t-value of 5.18, again indicating a significant positive relationship. This result also demonstrates that higher analyst uncertainty leads to increased audit fees, consistent with the expected direction. Therefore, the results support H1.

From Table 3, it is evident that among the control variables, Firm size (*Size*), return on assets (*ROA*), Firm losses (*Loss*), and operating cash flow (*OCF*) show a significant positive correlation with the dependent variable, audit fees (*AuditFee*). This indicates that increases in

these factors are associated with higher audit fees. Conversely, inventory ratio (*Inventoryratio*), financial leverage (*Leverage*), current asset ratio (*CAratio*), auditor changes (*AuditorChange*), and research and development expenses (*RDExp*) exhibit a significant negative correlation with audit fees. This suggests that increases in these factors lead to a reduction in audit fees. Additionally, Table 4 examines the impact of prior-period analyst uncertainty on audit fees. The findings are consistent with those in Table 3, further supporting Hypothesis H1.

Tables 3 and 4 around here

#### **4.2.2 Stock Return Synchronicity and Audit Fees**

Table 5 presents the empirical results for the impact of stock return synchronicity (*Synchronicity*) on audit fees (*AuditFee*) to test whether H2 (a positive correlation between stock return synchronicity and audit fees) is supported. Column (1) in Table 5 shows the empirical results for the effect of stock return synchronicity on audit fees. From Column (1) of Table 10, the coefficient of *Synchronicity* is 0.4976, with a t-value of 14.48, indicating a significant positive correlation. This result suggests that higher stock return synchronicity leads to higher audit fees. In other words, stock return synchronicity increases the firm's audit costs. This finding is support H2. Moreover, Column (2) of Table 5 presents the results for the effect of stock return synchronicity on audit fees, excluding the variable indicating whether firms are audited by Big Four accounting firms. From Column (2), the coefficient of *Synchronicity* is 0.4413, with a t-value of 11.32, also indicating a significant positive correlation. This result shows that higher stock return synchronicity leads to increased audit fees, consistent with the expected direction. Thus, the results support H2.

Table 5 around here

#### **4.2.3 Effect of Stock Return Synchronicity on Analyst Uncertainty and Audit Fees**

Table 6 presents the empirical results for the impact of stock return synchronicity (Synchronicity) on the relationship between analyst uncertainty and audit fees, testing whether H3 (stock return synchronicity enhances the positive correlation between analyst uncertainty and audit fees) is supported. Column (1) of Table 6 shows the empirical results for the effect of stock return synchronicity on the relationship between analyst uncertainty and audit fees. From Column (1), the coefficient of the interaction term of *AnalystUncertain*×*Synchronicity* is 0.0619, with a t-value of 6.60, indicating a statistically significant positive correlation. This result suggests that higher stock return synchronicity increases both analyst uncertainty and audit fees. In other words, stock return synchronicity enhances the relationship between analyst uncertainty and audit fees in the firm. The result aligns with the expected direction, and the empirical findings support H3.

Column (2) of Table 6 examines the impact of stock return synchronicity on the relationship between analyst uncertainty and audit fees, excluding the variable indicating whether the firm is audited by Big Four accounting firms. From Column (2) of Table 6, the coefficient of the interaction term of *AnalystUncertain*×*Synchronicity* is 0.0371, with a t-value of 3.43, indicating a significant positive correlation. This result suggests that higher stock return synchronicity increases both analyst uncertainty and audit fees. In other words, stock return synchronicity enhances the relationship between analyst uncertainty and audit fees for firms. The result also support H3. Additionally, Table 7 examines the impact of stock return synchronicity on prior-period analysts' uncertainty and audit fees. The results are consistent with those in Table 6, further supporting H3.

Tables 6 and 7 around here

### 4.3 Additional Analysis

This study further explores the role of institutional investors with different holding strategies to gain a deeper understanding of how various types of institutional investors prioritize corporate

financial reporting quality and audit fees. The analysis incorporates models (1) and (2) while extending to models (4) and (5), which include variables for long-term and short-term institutional investors, for additional analysis. Column (1) in Table 8 shows the impact of analyst uncertainty on audit fees while accounting for the role of long-term institutional investors (*DedicatedINST*). The coefficient of the interaction term of *AnalystUncertain*×*DedicatedINST* is -0.1100, with a t-value of -3.82, indicating a statistically significant negative relationship. This finding suggests that higher levels of analyst uncertainty, often indicative of less stable financial conditions, reduce the likelihood of attracting long-term institutional investors. Such uncertainty may stem from less transparent or incomplete financial reporting or uncertainties within the firm's business environment. Regardless of the underlying cause, elevated analyst uncertainty impacts the investment decisions of institutional investors, making it less appealing for long-term institutional investors to invest in the firm.

Table 8, Column (2), examines the impact of stock return synchronicity on audit fees, considering the effect of long-term institutional investors (*DedicatedINST*). The coefficient of the interaction term of *Synchronicity*×*DedicatedINST* is 0.1880, with a t-value of 6.74, indicating a significant positive relationship. This result suggests that when stock prices respond more promptly to market information, it boosts investor confidence in the firm, particularly among long-term institutional investors. These investors tend to focus more on the Firm's fundamentals and are willing to hold investments for the long term. When they observe that a Firm's stock price accurately reflects market information in a timely manner, they are more likely to be interested in the firm's long-term value and invest accordingly. Higher stock return synchronicity means that stock prices can better reflect market signals, which reduces investment risk and attracts long-term institutional investors.

Column (1) of Table 9 analyzes the impact of analyst uncertainty on audit fees, considering short-term institutional investors (*TransientINST*). The interaction term

coefficient,  $AnalystUncertain \times TransientINST$ , is 0.2124 ( $t = 7.11$ ), indicating a significant positive relationship. Short-term institutional investors aim to profit from immediate market price fluctuations. However, when stock prices quickly reflect all available information, arbitrage opportunities and price volatility decrease, reducing their investment willingness. Moreover, Column (2) examines the impact of stock return synchronicity on audit fees, considering short-term institutional investors ( $TransientINST$ ). The interaction term coefficient,  $Synchronicity \times TransientINST$ , is -0.2039 ( $t = -6.67$ ), indicating a significant negative relationship. When stock prices quickly reflect market information, arbitrage opportunities diminish, reducing price volatility and decreasing the investment willingness of short-term institutional investors seeking short-term profits.

Tables 8 and 9 around here

## 5. Conclusions

This study aims to explore whether the uncertainty in analysts' forecasts affects companies' audit fees. Transparency and effective information disclosure are widely regarded as enhancing audit quality. Using audit fees as a proxy for audit quality, this study further examines whether stock price synchronicity influences auditing practices and, therefore, audit fee levels. Greater transparency helps auditors identify potential risks and issues within a company more effectively, allowing for more focused audit procedures. In additional analysis, the study investigates the impact of both analysts' uncertainty and stock price synchronicity on audit fees while considering the role of both short-term and long-term institutional investors to determine whether their presence modifies the main results. The findings indicate that higher levels of analyst uncertainty are consistently associated with increased audit fees, whether across the entire sample or specifically among firms audited by non-big four accounting firms. Similarly, greater stock return synchronicity is linked to higher audit fees.

These results underscore the significant impact of analyst uncertainty and stock return synchronicity on audit costs, emphasizing the importance of addressing market environment complexities during the audit process. As such, auditors and firm management should carefully consider these factors when making decisions to ensure the audit process remains effective and efficient.

Institutional investors play a pivotal role in corporate governance and market efficiency. An additional analysis explores how long-term and short-term institutional investors influence the relationship between analysts' uncertainty, stock price synchronicity, and audit fees. The results indicate that higher analysts' uncertainty signals financial instability in a company. Long-term institutional investors view this as increased risk, reducing their investment and showing a negative link with audit fees. In contrast, short-term investors see instability as a chance for arbitrage, resulting in a positive link with audit fees. Moreover, higher stock price synchronicity improves market efficiency by enabling faster responses to information. Long-term investors prefer such conditions and invest more, leading to a positive correlation with audit fees. Short-term investors, however, find fewer arbitrage opportunities in efficient markets, reducing their investment and showing a negative correlation with audit fees.

This study maintains rigor but acknowledges certain limitations. Audit fees are used as a measure of audit quality; future research could consider alternative metrics or additional proxies to enhance robustness. While this study examines the impact of institutional investors on audit fees, analyst uncertainty, and stock return synchronicity, other influencing factors remain unexplored. Future research could investigate the effects of institutional investors on other audit aspects and include other investor types, such as foreign and retail investors, for a more comprehensive analysis of investor influence on the audit process.



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## Appendix: Variable Definitions

Variable	Description
AuditFee	Audit fees. The natural logarithm of the audit fees for firm $i$ in year $t$ .
Synchronicity	Stock return synchronicity is measured using the natural logarithm of $[(1-R^2)/R^2]$ for firm $i$ in period $t$ , which serves as an indicator of the firm's stock risk. Here, $R^2$ is the regression statistic derived from regressing the firm's weekly returns on the weekly returns of the two-digit SIC industry and the market over a 52-week period ending at the close of the prior fiscal year.
AnalystUncertain	Analyst uncertainty. The standard deviation of all analyst earnings forecasts for firm $i$ in year $t$ , divided by the absolute value of the analyst forecast consensus (mean).
DedicatedINST	Long-term institutional investor holdings are defined as the proportion of shares held by long-term institutional investors, classified based on the average churn rate, relative to the total shares held by all institutional investor. For long-term institutional investors, the value is 1; and 0 otherwise.
Transien INST	Short-term institutional investor holdings are defined as the proportion of shares held by short-term institutional investors, also classified based on the average churn rate, relative to the total shares held by all institutional investors. For short-term institutional investors, the value is 1; and 0 otherwise.
Big4	Big four audit firm. A dummy variable equal to 1 if the firm was audited by a big four audit firm in the prior fiscal year, and 0 otherwise.
UnqualifiedOpinion	Unqualified opinion. A dummy variable equal to 1 if the firm received an unqualified audit opinion during the fiscal year, and 0 otherwise.
AuditorChange	Auditor change. A dummy variable equal to 1 if the firm hired a new auditor during the fiscal year, and 0 otherwise.
RDExp	R&D expenses. The ratio of research and development expenses to total assets.
Dividend	Cash dividends. A dummy variable equal to 1 if the firm paid cash dividends during the fiscal year, and 0 otherwise.
OCF	Operating cash flow. Measure as operating cash flow divided by total assets.
Size	Firm size. Measure as the natural logarithm of total assets.
CurrentRatio	Current ratio. The ratio of current assets to current liabilities.
CARatio	Current assets ratio. The ratio of current assets to total assets.
InventoryRatio	Inventory ratio. The ratio of inventory to total assets.
Leverage	Financial leverage. Measure as the ratio of long-term debt to total assets.
Growth	Sale growth. The difference between net sales of the current year and the previous year, divided by net sales of the current year.
ROA	Return on assets. Measure as net income divided by total assets.
LOSS	Loss firm. It is a dummy variable equal to 1 if the firm reported negative recurring net income in the previous fiscal year ( $t-1$ ), and 0 otherwise.

**Table 1 Sample analysis**

Industry Classification	Fama-French industry	Number of Samples	Percent
1	Consumer NonDurables	1,097	5.81
2	Consumer Durables	1,041	5.51
3	Manufacturing	1,528	8.09
4	Oil, Gas, and Coal Extraction and Products	1,406	7.44
5	Chemicals and Allied Products	1,224	6.48
6	Business Equipment	3,325	17.6
7	Telephone and Television Transmission	1,000	5.29
9	Wholesale, Retail, and Some Services	2,855	15.11
10	Healthcare, Medical Equipment, and Drug	3,031	16.05
12	Other -	2,383	12.62
Total		18,890	100

Notes:

This study adopts the Fama-French 12-industry classification method to categorize the sample from 1996 to 2023 into 12 industry groups. Companies in utilities (industry codes 4900-4949) and financial/insurance sectors (industry codes 6000-6999) are excluded, resulting in 10 industries for empirical analysis. After removing companies with incomplete data, the final dataset consists of 18,890 observations.

**Table 2 Descriptive statistics**

Variable	Mean	Std. Dev.	Q1	Median	Q3
Auditfee	12.934	1.854	5.704	13.06	18.276
AnalystUncertain	5.393	23.537	0.92	0.97	1
Synchronicity	1.533	1.024	2.228	1.408	9.061
DedicatedINST	0.412	0.492	0	0	1
TransientINST	0.293	0.455	0	0	1
Size	7.687	1.703	-3.65	7.597	13.773
CurrentRatio	2.411	2.087	0.011	1.862	55.747
InventoryRatio	0.109	0.124	0	0.079	0.875
Leverage	0.322	0.269	0	0.301	8.034
CARatio	0.445	0.213	0.003	0.427	1
Growth	0.001	0.709	5.213	0	15.052
AuditorChange	0.011	0.102	0	0	1
ROA	0.036	0.195	-11.849	0.05	3.139
LOSS	0.187	0.390	0	0	1
Big4	0.665	0.472	0	1	1
RDExp	0.001	0.013	-0.599	0	0
OCF	0.230	1.001	-12.456	0.099	51.874
Dividend	0.578	0.494	0	1	1
Observations	18,890				

Note:

1. Variable definitions: Auditfee represents audit fees. AnalystUncertain is calculated as the standard deviation of all analysts' earnings forecasts divided by the absolute value of the consensus forecast. Synchronicity measures stock price synchronicity, representing the risk associated with a company's stock. DedicatedINST and TransientINST classify institutional investors into long-term and short-term categories, respectively, based on the average annual churn rate. Size represents firm size, CurrentRatio is the ratio of current assets to total assets, InventoryRatio reflects the ratio of inventory to total assets, Leverage indicates financial leverage, CARatio is another measure of the ratio of current assets to total assets, ROA represents return on assets, Growth refers to sales growth, RDExp is the ratio of R&D expenditure to total assets, and OCF is the ratio of operating cash flows to total assets. LOSS is a binary variable set to 1 if the previous year's (t-1) recurring net income was negative and 0 otherwise. Dividend is a binary variable set to 1 if the firm paid cash dividends during the fiscal year and 0 otherwise. AuditorChange is a binary variable set to 1 if the company hired a new auditor during the fiscal year and 0 otherwise. Big4 is a binary variable set to 1 if the firm was audited by one of the big four accounting firms in the prior fiscal year and 0 otherwise.

2. Q1 represents the first quartile and Q3 represents the third quartile.

**Table 3 Effect of analysts' uncertainty on firm audit fees**

	Model (1-1)		Model (1-2)	
	Coef.	t-stat.	Coef.	t-stat.
AnalystUncertain	0.0859***	5.18	0.1056***	7.31
Big4	1.9314***	62.94		
Size	0.0248**	1.98	0.0192*	1.76
CurrentRatio	-0.0064	-0.62	-0.0031	-0.35
InventoryRatio	-1.6810***	-8.66	1.3344***	-7.89
Leverage	-0.4815***	-4.86	-0.7743***	-8.96
Growth	0.0244	0.51	0.0305	0.73
AuditorChange	-2.2563***	-11.85	-0.9725***	-5.82
ROA	1.3958***	9.23	0.9977***	7.56
LOSS	0.1529***	2.73	0.3847***	7.85
RDExp	-6.0728***	-4.06	-1.5064	-1.15
OCF	0.0322**	2.32	0.0038	0.31
Dividend	0.0374	1.01	0.0644**	1.99
Constant	11.3131***	56.07	10.3334***	58.53
Year fixed effect	Yes		Yes	
Industry fixed effect	Yes		Yes	
Number of obs.	12,567		12,567	
F value	42.50		43.65	
Adjusted R <sup>2</sup>	0.1294		0.1358	

Notes:

Variable definitions are the same as those in Table 2. Statistical significance is indicated as follows: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . The correlation coefficient between Big4 and Auditfee is  $0.470 < 0.7$ , indicating no multicollinearity. Model (1-1) includes the variable accounting for big four audit firms, while Model (1-2) excludes this variable.

**Table 4 Effect of prior analysts' uncertainty on firm audit fees**

	Model (1-1)		Model (1-2)	
	Coef.	t-stat.	Coef.	t-stat.
AnalystUncertain(t-1)	0.0479***	3.3	0.0315***	3.93
Big4	1.8050***	54.76		
Size	0.0365***	3.36	0.0137	1.12
CurrentRatio	0.0219**	2.51	0.0177*	1.8
InventoryRatio	-0.9260***	-6.22	-1.1246***	-6.72
Leverage	0.1700***	2.76	0.3234***	4.68
Growth	-0.3478**	-2.24	-0.2265	-1.3
AuditorChange	-0.8789***	-5.83	-2.0700***	-12.35
ROA	0.7235***	5.32	1.1468***	7.52
LOSS	0.0918*	1.79	-0.0330	-0.57
RDExp	1.2132	0.84	-2.3330	-1.43
OCF	-0.0022	-0.15	0.0127	0.77
Dividend	-0.0436	-1.32	-0.0235	-0.63
Constant	11.5293***	118	12.8781***	121.22
Year fixed effect	Yes		Yes	
Industry fixed effect	Yes		Yes	
Number of obs.	11,430		11,430	
F value	263.64		263.64	
Adjusted R <sup>2</sup>	0.2309		0.2309	

Note:

Variable definitions are the same as those in Table 2. Statistical significance is indicated as follows: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . The correlation coefficient between Big4 and Auditfee is  $0.470 < 0.7$ , indicating no multicollinearity. Model (1-1) includes the variable accounting for big four audit firms, while Model (1-2) excludes this variable.

**Table 5 Effect of stock return synchronicity on firm audit fees**

	Model (2-1)		Model (2-2)	
	Coef.	t-stat.	Coef.	t-stat.
Synchronicity	0.4976***	14.48	0.4413***	11.32
Big4	1.7940***	73.68		
Size	-0.0098	-1.15	-0.0337***	-3.51
CurrentRatio	-0.0006	-0.09	0.0105	1.28
InventoryRatio	-1.6661***	-11.85	-1.8127***	-11.36
Leverage	-0.0359	-0.73	0.0724	1.29
Growth	-0.0002	-0.01	-0.0182	-0.41
AuditorChange	-0.6355***	-5.55	-1.6537***	-12.83
ROA	0.3710***	3.29	0.9771***	7.67
LOSS	0.0268	0.68	-0.0281	-0.62
RDExp	-2.9034*	-1.70	1.2867	0.66
OCF	0.0016	0.13	0.0255*	1.83
Dividend	0.0598**	2.35	0.0585**	2.03
Constant	11.0311***	74.90	12.4029***	74.80
Year fixed effect	Yes		Yes	
Industry fixed effect	Yes		Yes	
Number of obs.	18,890		18,890	
F value	198.92		64.20	
Adjusted R <sup>2</sup>	0.3252		0.1309	

Note:

Variable definitions are the same as those in Table 2. Statistical significance is indicated as follows: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . The correlation coefficient between Big4 and Auditfee is 0.470, indicating no multicollinearity. Model (2-1) includes the variable accounting for big four audit firms, while Model (2-2) excludes this variable.



**Table 6 Effects of analysts' uncertainty and return synchronicity on audit fees**

	Model (3-1)		Model (3-2)	
	Coef.	t-stat.	Coef.	t-stat.
AnalystUncertain	0.0496**	2.40	0.0544**	2.29
Synchronicity	0.4170***	10.39	0.4429***	9.57
AnalystUncertain× Synchronicity	0.0619***	6.60	0.0371***	3.43
Big4	1.9609***	62.80		
Size	0.0251**	2.25	0.0434***	3.38
CurrentRatio	0.0004	0.04	-0.0007	-0.06
InventoryRatio	-1.3347***	-7.83	-1.6710***	-8.51
Leverage	-0.8053***	-9.11	-0.3976***	-3.91
Growth	0.0302	0.72	0.0166	0.34
AuditorChange	-0.9406***	-5.57	-2.2672***	-11.73
ROA	0.8831***	5.97	1.5886***	9.34
LOSS	0.4448***	8.63	0.2874***	4.84
RDExp	-5.3371**	-2.14	-3.0696	-1.07
OCF	0.0059	0.45	0.0329**	2.20
Dividend	0.0229	0.69	-0.0210	-0.55
Constant	10.7478***	59.55	11.4966***	55.36
Year fixed effect	Yes		Yes	
Industry fixed effect	Yes		Yes	
Number of obs.	12,009		12,009	
F value	139.46		44.00	
Adjusted R <sup>2</sup>	0.3563		0.1440	

Note:

This table provides the results analyzing the impact of analysts' forecast uncertainty and stock return synchronicity on audit fees. Variable definitions are the same as those in Table 2. Statistical significance is indicated as follows: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . The correlation coefficient between Big4 and Auditfee is 0.470, indicating no multicollinearity. Model (3-1) includes the variable accounting for big four audit firms, while Model (3-2) excludes this variable.

**Table 7 Prior analysts' uncertainty, stock return synchronicity, and audit fees**

	Model (3-1)		Model (3-2)	
	Coef.	t-stat.	Coef.	t-stat.
AnalystUncertain(t-1)	0.0755*	1.91	0.0392**	2.24
Synchronicity	0.0678***	2.93	0.0536***	10.39
AnalystUncertain(t-1)×Synchronicity	0.0059	0.29	-0.0059***	6.60
Big4	0.0452***	4.06		
Size	1.7926***	53.08	0.0282**	2.25
CurrentRatio	0.0236***	2.65	0.0212	0.04
InventoryRatio	-0.8119***	-5.34	-0.9551***	-7.83
Leverage	0.1772***	2.84	0.3539***	-9.11
Growth	-0.4055**	-2.38	-0.3161	0.72
AuditorChange	-0.8907***	-5.83	-2.0700***	-5.57
ROA	0.8477***	5.64	1.4724***	5.97
LOSS	0.1638***	3.04	0.0776***	8.63
RDExp	4.7776**	2.03	6.9542**	-2.14
OCF	0.0036	0.23	0.0186	0.45
Dividend	-0.0710**	-2.1	-0.0665	0.69
Constant	11.3550***	104.56	12.6493***	59.55
Year fixed effect	Yes		Yes	
Industry fixed effect	Yes		Yes	
Number of obs.	11,038		11,038	
F value	216.86		24.77	
Adjusted R <sup>2</sup>	0.2268		0.0293	

Note:

This table provides the results analyzing the impact of prior analysts' forecast uncertainty and stock return synchronicity on audit fees. Variable definitions are the same as those in Table 2. Statistical significance is indicated as follows: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . The correlation coefficient between Big4 and Auditfee is 0.470, indicating no multicollinearity. Model (3-1) includes the variable accounting for big four audit firms, while Model (3-2) excludes this variable.

**Table 8 Moderating effect of long-term institutional investors**

	AnalystUncertain (1)		Synchronicity (2)	
	Coef.	t-stat.	Coef.	t-stat.
AnalystUncertain	0.1505***	7.64		
Synchronicity			0.4229***	11.76
DedicatedINST	0.4331***	9.80	-0.0484	-0.86
AnalystUncertain× DedicatedINST	-0.1100***	-3.82		
Synchronicity× DedicatedINST			0.1880***	6.74
Big4	1.9285***	63.08	1.7901***	73.54
Size	0.0157	1.44	-0.0117	-1.38
CurrentRatio	-0.0065	-0.73	0.0008	0.11
InventoryRatio	-1.2380***	-7.33	-1.6203***	-11.55
Leverage	-0.7944***	-9.22	-0.0381	-0.77
Growth	0.0342	0.82	0.0013	0.03
AuditorChange	-0.9580***	-5.75	-0.6613***	-5.79
ROA	1.0382***	7.88	0.3701***	3.30
Loss	0.4003***	1.44	0.0286	0.72
RDExp	-1.7530	-1.35	-3.7314**	-2.18
OCF	0.0024	0.20	0.0014	0.11
Dividend	0.0675**	2.09	0.0499**	1.97
Constant	10.3125***	58.56	11.0163***	75.02
Year fixed effect	Yes		Yes	
Industry fixed effect	Yes		Yes	
Number of obs.	12,567		18,890	
F value	138.09		194.22	
Adjusted R <sup>2</sup>	0.3437		0.3293	

Note:

This table presents the results of the analysis examining the moderating role of long-term institutional investors in the relationship between analysts' uncertainty, stock return synchronicity, and audit fees. Variable definitions are the same as those in Table 2. Statistical significance is indicated as follows: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . The correlation between Big4 and Auditfee indicates no multicollinearity, as the correlation coefficient is below the threshold of concern (typically 0.7).

**Table 9 Moderating effect of short-term institutional investors**

	AnalystUncertain (1)		Synchronicity (2)	
	Coef.	t-stat.	Coef.	t-stat.
AnalystUncertain	0.0178	0.98		
Synchronicity			0.5248***	15.16
TransientINST	-0.4441***	-9.76	0.0956	1.50
AnalystUncertainx TransientINST	0.2124***	7.11		
Synchronicityx TransientINST			-0.2039***	-6.67
Big4	1.9527***	63.71	1.7881***	73.58
Size	0.0190*	1.75	-0.0097	-1.14
CurrentRatio	-0.0050	-0.56	-0.0010	-0.14
InventoryRatio	-1.2733***	-7.53	-1.6151***	-11.52
Leverage	-0.8341***	-9.66	-0.0272	-0.55
Growth	0.0374	0.90	0.0022	0.06
AuditorChange	-0.9595***	-5.76	-0.6472***	-5.67
ROA	1.0024***	7.61	0.4034***	3.59
LOSS	0.4181***	8.55	0.0336	0.85
RDExp	-1.3969	-1.07	-3.6156**	-2.12
OCF	0.0025	0.21	-0.0002	-0.02
Dividend	0.0501	1.55	0.0475*	1.87
Constant	10.5704***	59.58	10.9977***	74.36
Year fixed effect	Yes		Yes	
Industry fixed effect	Yes		Yes	
Number of obs.	12,567		18,890	
F value	138.19		194.20	
Adjusted R <sup>2</sup>	0.3438		0.3293	

Note:

This table presents the results of the analysis examining the moderating role of short-term institutional investors in the relationship between analysts' uncertainty, stock return synchronicity, and audit fees. Variable definitions are the same as those in Table 2. Statistical significance is: \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.