Blockchain Adoption and Audit Quality*

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Abstract

This study examines the impact of blockchain adoption in the corporate setting. Specifically, we provide comprehensive empirical support to recent theory (Cao, Cong, and Young, 2024) proposing that blockchain adoption positively affects endogenous audit quality and client misstatements. Exploiting the exogenous implementation of blockchain technology in bank confirmations in China, our study documents a significant reduction in regulatory penalties for financial misstatements, driven by auditors' enhanced ability to identify and correct past financial errors, especially in revenue and expense recognition. Additionally, we find that the benefits of blockchain adoption are more pronounced in non-specialist industries, state-owned enterprises, and firms with smaller audit committees or fewer independent directors and apply regardless of whether a large auditor audits the firm, suggesting that blockchain adoption also levels the plain field of audit quality across auditors with different capacities and financial resources. Moreover, blockchain adoption induces efficiency, translating to lower audit fees, higher non-audit service fees, reduced audit costs, and more timely audit reporting. Overall, this study provides a novel contribution to the literature examining the economic consequences of emerging technologies in auditing, tests several predictions of recently proposed theory, and offers insights into potential applications and future directions of blockchain in the corporate setting.

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Keywords: Blockchain adoption, audit quality, misreporting, audit efficiency, monitoring.

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1 Introduction

Accurate financial reporting is essential for healthy financial markets (Beyer, Cohen, Lys, and Walther, 2010; Leuz and Wysocki, 2016), and regulatory agencies continually seek ways to enhance reporting integrity (Pan, Shroff, and Zhang, 2023). Since firms may misreport financial information, one of the main costs of ensuring high-quality reporting is the verification of transactions by auditors (Cao, Cong, and Yang, 2024). In some banking systems, auditors rely heavily on manual data collection methods (e.g., digitizing transaction prints or accounting books), which can be cumbersome and prone to delays. Data verification is often performed through physical documents or direct contact with transaction counterparties, leading to slower, less efficient processes. The reliance on manual methods also heightens the possibility of overlooked discrepancies and reduces overall audit accuracy. More importantly, knowing these verification challenges, firms may have incentives to manipulate financial information.[1] Exploring a unique setting intended to increase verification transparency and quality—a blockchain-based bank confirmation platform[2] implemented in a staggered manner in China—this study presents new evidence on how technology adoption can positively influence various stakeholders in the audit process, particularly in reducing information asymmetry and opportunistic behavior.

Guided by Cao et al. (2024), we test the following predictions regarding whether blockchain adoption: (i) enhances audit quality; (ii) levels the playing field of audit quality across auditors with different resources; and (iii) improves audit efficiency. Consistent with theoretical predictions, we empirically document that the introduction of a blockchain platform leads to fewer misstatements and financial errors, particularly in revenue and expense recognition, inventory valuation, and equity and liability confirmations. These results are robust across alternative specifications, including accrual-based accounts. We also find that blockchain adoption facilitates information acquisition, especially for smaller auditors and auditors without industry specialization. Finally, audit fees decreases and audit information became more timely following blockchain adoption, suggesting overall improvement in operational efficiencies.

Despite growing efforts (e.g., Chen, Hu, Wang, and Wu, 2023; Dong, 2024; Lee, Pinto, Rabetti, and Sadka, 2024; Moore, 2024), analyzing the impact of blockchain technology in the corporate setting is empirically challenging because adoption is often measured indirectly. An advantage of our setting is that it allows us to identify both firms and auditors exposed to the blockchain platform, based on the staggered implementation of this technology by more than a hundred banks in China—nearly the entire bank sector operating with publicly listed firms.

[1]Out of 76 administrative penalty decisions issued by the China Securities Regulatory Commission (CSRC) between 2014 and 2023, 63.2% of the decisions cited deficiencies in executing bank confirmation procedures, involving 61.8% of listed companies and 28.9% of accounting firms.

[2]Hereafter "blockchain platform" for simplicity.

This permit us to use the variation in adoption time across banks as an instrument to document the causal effect of blockchain adoption on audit quality.[3]

Bank confirmation refers to a process where an auditing firm directly requests banking institutions to verify relevant information upon receiving authorization from the audited entity. The bank then queries, verifies, and responds to the auditor with the necessary written information.[4] This process, involving multiple stakeholders, is one of the core procedures in independent audits conducted by certified public accountants. While highly probative and reliable, it plays a critical role in identifying errors and fraud in the audited entity's financial statements.[5] However, in practice, the traditional process has been criticized for its inefficiency, suboptimal effectiveness, high resource demands, and susceptibility to fraud.

To address these challenges, on August 10, 2020, the Ministry of Finance and the China Banking and Insurance Regulatory Commission jointly issued the Notice on Further Regulating Bank Confirmation and Reply Procedures, encouraging qualified banking institutions and third-party platforms to promote the digitalization of the confirmation process. Following this policy, the Chinese Institute of Certified Public Accountants partnered with the China Banking Association, the China Internet Finance Association, and the China Financial Certification Authority to develop three third-party digital platforms based on blockchain technology.[6] When integrated into the digital platform, blockchain allows accounting firms, audited entities, and banking institutions to conduct confirmation-related tasks transparently and independently. This streamlines the confirmation process, eliminates the impact of human error, reduces communication costs associated with confirmation information, and maximizes the authenticity of the data.

Theoretically, blockchain can enhance audit quality by using timestamps and its structured ledger to trace historical records and transaction flows, allowing for verification on a per-transaction basis (Brandin and Abrishami, 2021). This capability reduces human interference in multi-stakeholder environments, facilitates investigations, and enhances accountability for specific issues. As a result, blockchain helps mitigate opportunistic behavior before and after transactions, improving audit quality by standardizing the bank confirmation process.[7] However, adopting such emerging technologies also presents challenges for auditors, who must overcome barriers related to training

[3]We identify the firms utilizing the blockchain platform based on the principle that both the relevant audit firms and banking financial institutions must have access to the platform. This ensures that banking institutions are able to process electronic confirmation requests and audit firms can issue and receive bank confirmations online.

[4]Financial Industry Standard of the People's Republic of China, Digital Confirmation Bank Application Data Specification (JR/T 0235-2021). See https://tinyurl.com/56m4cmuy.

[5]Interview with a representative of the Chinese Institute of Certified Public Accountants (CICPA) regarding the joint notice by the Ministry of Finance and the China Banking and Insurance Regulatory Commission on regulating bank confirmation work. See https://tinyurl.com/t728dcke.

[6]As of the latest available data, these platforms have been officially adopted and are operational among nearly the entire setting of auditingfirms and banking institutions.

[7]For instance, Song, Wen, Yu, and Gu (2023) suggests that integrating blockchain into the lifecycle management of state-owned assets further supports the value of blockchain in digital systems.

and specialized knowledge (e.g., Kokina and Davenport, 2017; Raschke, Saiewitz, Kachroo, and Lennard, 2018).

Recent theory (Cao et al. (2024)) proposes that integrating federated blockchains with secure multi-party computation addresses critical challenges in financial reporting and auditing. This framework leverages blockchain technology to enable transparent, verifiable, and efficient reporting of financial transactions by facilitating decentralized cross-party verification while safeguarding data privacy. Cao et al. (2024) model highlights that such an integration not only enhances the reliability and transparency of financial data but also aligns with the increasing demand for secure and tamper-proof audit processes in the digital age. By mitigating information asymmetry between firms and auditors, this approach reduces opportunities for earnings management and financial misreporting, thereby improving audit quality and fostering stakeholder trust. Building on these theoretical insights, our study empirically tests the predictions of this model. Specifically, we examine whether adopting blockchain across several players in the corporate setting leads to measurable improvements in financial reporting quality, reduces instances of earnings manipulation, and enhances audit reliability. We also investigate the broader implications of these technologies in leveling the plain field across auditors with various capacities and financial resources.

Our comprehensive empirical analysis provides robust support for the theory, revealing that blockchain adoption significantly enhances financial reporting and auditing quality. Specifically, we find that blockchain adoption substantially reduces accrual-based earnings management, with auditors demonstrating a higher likelihood of accepting audit outcomes. This adoption leads to a marked decrease in financial statement errors, particularly in annual reports, with notable improvements in liability recognition, asset and inventory valuation, and equity recognition. The risk of regulatory penalties stemming from financial misstatements is also significantly diminished. Furthermore, the platform enhances auditors' ability to detect and correct prior financial errors, with these effects being more pronounced in current-year financial statements and annual reports. The most affected areas include revenue recognition, earnings recognition, and cost/expense valuation, highlighting the platform's broad role in error prevention and its targeted effectiveness in error identification.

Our heterogeneity analysis further reveals that the positive effects of blockchain on audit quality are more pronounced in sectors where audit firms lack industry specialization. These benefits are observed regardless of whether the company is audited by one of the top ten domestic auditing firms. Additionally, the blockchain platform's impact is more significant for companies with lower audit fees, higher non-audit service fees, state-owned enterprises, smaller audit committees, and fewer independent directors. Importantly, the platform reduces audit fees and shortens audit completion times. Altogether, these results suggest that blockchain adoption also levels the plain field of audit quality.

Finally, we examine whether blockchain adoption enhances operational efficiencies for auditors exposed to the technology. To do so, we utilize two key proxies: auditors' revenue as an indicator of audit efficiency and audit delays as a measure of timeliness. Our analysis reveals that both proxies experience a significant decline following the adoption of blockchain platforms. These findings suggest that blockchain adoption in corporate settings facilitates operational efficiencies for audit firms leveraging the technology. By automating routine processes, improving data accessibility, and enhancing the accuracy of financial records, blockchain reduces the time and resources auditors need to complete their tasks. These efficiencies not only streamline audit workflows but may also translate into cost savings. This evidence highlights the potential of blockchain technology to revolutionize traditional audit practices and underscores its broader implications for the auditing profession.

This study makes two primary academic contributions. First, we contribute to the fast-growing literature examining the economic implications of blockchain adoption in the corporate setting. While several benefits of blockchain adoption have been theorized—such as improved inventory efficiency, financial reporting, audit quality, and firm performance (e.g., Chod, Trichakis, Tsoukalas, Aspergren, and Weber (2020); Schmidt and Wagner (2019); Cao et al. (2024); Cui, Gaur, and Liu (2024))—empirical studies supporting these theories remain scarce because identifying firms exposure to blockchain technology is challenging. Therefore, a nascent literature often relies on inferences from indirect proxies, such as conference call transcripts, 10-K filings, the enactment of blockchain-favorable state laws, patent initiation, and software acquisition (e.g., Chen et al. (2023); Dong (2024); Lee et al. (2024); Moore (2024)). We complement these studies by exploiting advantage a direct identification of blockchain adoption in the context of a bank verification platform. This blockchain platform connects auditors to firm-bank-related information, including cash holdings, securities investments, and operational expenses. As such, our study provides a more nuanced examination of the economic channels through which blockchain adoption impacts market participants, offering valuable insights into the economic implications of blockchain adoption in the corporate setting.

Second, this study contributes to the literature on the economic consequences of emerging technologies in auditing. Previous research mainly focused on how these technologies reduce communication costs (Pincus, Tian, Wellmeyer, and Xu, 2017) and enhance data analysis capabilities through artificial intelligence and big data (Kokina and Davenport, 2017; Raschke et al., 2018). Advances in artificial intelligence and decentralized ledger technologies may also benefit audit processes (e.g., Deloitte (2018)).[8] However, due to confidentiality requirements, budgetary constraints, and coordination cost constraints, the application of these technologies has been mostly limited to individual stakeholders within the audit process. Our study provides comprehensive empirical support for the benefits of decentralized ledger technologies predicted by Cao et al. (2024). By leveraging the exogenous implementation of blockchain technology, we uncover a significant improvement in audit quality, driven by auditors' improved capacity to detect and correct prior financial misstatements, particularly in revenue and expense recognition. Fur-

[8] See also https://www.aicpa-cima.com/topic/audit-assurance/blockchain-and-digital-assets?.

thermore, blockchain adoption enhances audit efficiency, as evidenced by lower audit fees, increased non-audit service revenues, reduced audit costs, and more timely reporting. Notably, our findings suggest that blockchain technology helps level the playing field across auditors with differing capacities and financial resources.

To the best of our knowledge, this is the first study to empirically examine the impact of blockchain adoption on audit quality. Our findings offer valuable insights for auditors, regulators, and organizations seeking to leverage blockchain technology to enhance corporate governance and operational efficiency. However, our contributions are not without limitations. First, we focus on the economic implications of permissioned blockchain adoption, which may differ from the effects associated with permissionless decentralized ledger technologies, such as those in decentralized finance (e.g., Harvey and Rabetti (2024)).[9] Additionally, our study centers on firms, auditors, and banks operating in a context where information opacity is likely more prevalent than in more developed and institutionalized markets. Lastly, our analysis emphasizes a more granular and less concentrated auditing market. The effects of blockchain adoption on auditing quality in more concentrated markets may be less pronounced than those observed in our study, possibly due to reduced competitive pressures in such environments.

2 Institutional Background and Hypothesis Development

2.1 Blockchain-based bank confirmation platform

The primary objective of the bank confirmation process is to verify accounts and ensure the authenticity and accuracy of financial information. The bank confirmation response process involves a comprehensive reconciliation between the bank and the audited entity under the independent supervision of an auditor. As illustrated in Figure 1, the specific steps are as follows: when conducting the confirmation, the certified public accountant (CPA) registers the confirmation details, which are then stamped and authorized by the audited entity. The confirmation is delivered to the bank either by mail or personally by the CPA. After the bank verifies the information, the confirmation is either mailed back to the audit firm or retrieved by the CPA using valid credentials and delivered to the audit firm. The confirmation inquiry typically includes details of the audited entity's deposits, loans, guarantees, foreign exchange contracts, and financial products. This process involves three key parties: the audited entity, the banking institution, and the audit firm, each of whom has a vested interest in the outcome of the confirmation.

[Figure 1]

[9] DeFi has attracted growing interest in academic research (e.g., Amiram, Jørgensen, and Rabetti (2022); Lyandres, Palazzo, and Rabetti (2022); Cong, Landsman, Maydew, and Rabetti (2023); Cong, Prasad, and Rabetti (2023); Parlour (2023); Amiram, Lyandres, and Rabetti (2024); Bhambhwani and Huang (2024); Bourveau, Brendel, and Schoenfeld (2024); Cong, Harvey, Rabetti, and Wu (2024); De Simone, Jin, and Rabetti (2024); Du and Wang (2024); Gefen, Rabetti, Sun, and Zhang (2024); Luo and Yu (2024)).

Although bank confirmations are a frequently executed and resource-intensive audit procedure, they have long been troubled by inefficiencies, poor effectiveness, high resource consumption, and vulnerability to fraud in practical application.[10] Lou (2024) analyzed 76 administrative penalty decisions issued by the China Securities Regulatory Commission (CSRC) between 2014 and 2023, targeting accounting firms and their certified public accountants. Of these, 48 decisions cited deficiencies in executing bank confirmation procedures involving 47 listed companies and 22 accounting firms. Furthermore, the proportion of administrative penalty decisions citing inadequate bank confirmation procedures exceeded 50% annually. Recent violations related to bank confirmation processes are summarized in Appendix A.

Janvrin, Caster, and Elder (2010) examined evidence from the U.S. Securities and Exchange Commission (SEC) Accounting and Auditing Enforcement Releases (AAER). They found cases where management requested that auditors refrain from confirming certain accounts and instances of collusion between audit clients, suppliers, customers, and related parties, leading to failure to verify responses. Paper-based confirmations are a major cause of inefficiency and poor quality in bank confirmation processes (Phillips, Leising, Harris, and Businessweek, 2012; Elder, Janvrin, and Caster, 2014). Moreover, the role of auditors in detecting fraud has evolved significantly with the advancement of technology (Brody, Hess, Li, and Turner, 2022).

Notice 12, issued in 2020, mandated that all banking institutions centralize their confirmation processes by January 1, 2023, to regulate the development of the bank confirmation process and address issues such as difficulties in obtaining confirmations and inaccuracies in responses. Furthermore, it encouraged banking institutions and third-party platforms to promote the digitalization of confirmations, stipulating that digital confirmations carry the same legal validity and probative value as paper-based ones. A prime example of this digitalization is the third-party confirmation platform, which uses blockchain technology as its foundational infrastructure. The interaction between the various operational steps and the blockchain process is illustrated in Figure 2.

[Figure 2]

Blockchain technology's immutability, distributed nature, and traceability can effectively address the shortcomings of traditional bank confirmation processes. Its distributed structure enables stakeholders to perform confirmation-related tasks independently, reducing communication costs. The immutability and traceability features ensure the secure preservation of records, enhancing the authenticity of confirmation information while emphasizing post-event accountability and enabling mutual supervision among institutions on the blockchain. This fosters trust between organizations through institutional mechanisms and reputational effects (Song and Mao,

[10]These issues have been highlighted through various policy documents, announcements, and news reports, including sources such as Construction of Bank Electronic Confirmation Platforms in the Context of Blockchain (see https://tinyurl.com/ytuaccxm) and Standardizing Bank Confirmation Procedures to Improve Audit Quality—Summary of the Hunan CPA Bank Confirmation Symposium.

2022). Compared to conventional electronic platforms, blockchain platforms not only reduce information asymmetry among stakeholders Akerlof (1970), but also mitigate agency problems Jensen and Meckling (1976), with the potential to signal credibility to relevant parties Spence (1973).

As of December 31, 2023, the Chinese Institute of Certified Public Accountants, in collaboration with the China Banking Association, the China Internet Finance Association, and the China Financial Certification Authority, established three third-party electronic bank confirmation platforms based on blockchain technology. 465 accounting firms and 2,036 banking financial institutions have officially connected to these platforms.[11] The distribution of accounting firms and financial institutions by year of connection and across platforms is presented in Table 1, Panel A.

[Table 1]

The China Banking Association platform has the highest number of connected accounting firms, with 443 firms. Regarding the nature of the connected banks, the distribution across different platforms is shown in Panel B. The platform under the China Internet Finance Association has the highest number of connected banks, primarily rural commercial banks and village banks. The number of financial institutions connected to the China Banking Association and China Financial Certification Authority platforms is roughly equal; however, the China Banking Association platform has the highest number of commercial banks. Given the closer relationships between listed companies and commercial banks, the China Banking Association platform, which was the first to launch, has the most detailed disclosures and the most significant number of connected commercial banks. Therefore, this paper primarily uses data from this platform, supplemented by news reports and manual updates from other platforms' disclosures, to examine the impact of blockchain platforms on the audit quality of listed companies.

2.2 Hypothesis development

Digital technologies have impacted audit procedures, including risk assessment, audit planning, audit sampling, and evidence collection (Alles and Gray, 2020; Huang and Vasarhelyi, 2019; Kane, Palmer, Phillips, Kiron, and Buckley, 2016). However, the overall impact of these technologies on audit quality remains inconclusive. On the one hand, several studies have highlighted the benefits of digital technologies in improving efficiency (Pincus et al., 2017), strengthening process controls (Dowling and Leech, 2014), reducing audit risk (Caster, Elder, and Janvrin, 2021), and enhancing auditors' professional skills and knowledge (Lamboglia, Lavorato, Scornavacca, and Za, 2020). On the other hand, some research suggests that digital technologies may hinder auditors' ability to detect

[11] For further details, refer to the announcement on the connection of accounting firms and financial institutions to the electronic blockchain platform, available at https://tinyurl.com/ysnutt8d.

financial fraud (Bible, Graham, and Rosman, 2005), contribute to the deterioration of auditors' expertise and experience (Sutton, Arnold, and Holt, 2018), and increase the likelihood of system errors (Caster et al., 2021). Thottoli, Ahmed, and Thomas (2022) found a significant positive correlation between the characteristics of emerging technologies (such as technology adoption, challenges, and ease of use) and audit practices, while perceived benefits showed a negative correlation with audit practices.

Analyzing the impact of digital technologies on audit quality requires a detailed exploration of specific technological characteristics. Early financial and enterprise systems were limited to internal applications within firms or audit teams. These systems improved audit quality and reduced costs by increasing the frequency and flexibility of interactions between submitters and reviewers; however, they may have also compromised reviewer independence and quality (Pincus et al., 2017; Dowling and Leech, 2014). With advances in technology, emerging tools such as big data, artificial intelligence (AI), and blockchain have gradually been adopted (Brown-Liburd, Issa, and Lombardi, 2015; Cao, Chychyla, and Stewart, 2015; Kokina and Davenport, 2017; Tiberius and Hirth, 2019). Big data analytics and AI have improved auditors' judgment, quality, and efficiency (Cao et al., 2015; Brown-Liburd et al., 2015; Kokina and Davenport, 2017; Raschke et al., 2018). However, adopting these emerging technologies also presents challenges related to auditor training and expertise (Earley, 2015; Tiberius and Hirth, 2019).

To address these challenges, a recent theory proposes a framework of permissions-blockchain adoption in the auditing setting. Cao et al. (2024) examines the dynamics of financial reporting and auditing in traditional contexts and those employing distributed ledger technology.[12] The study contends that permissioned blockchains represent more than a mere database enhancement; they introduce significant economic implications. Furthermore, federated blockchains and secure encryption mechanisms can mitigate data privacy concerns without necessitating a trusted third party, thereby facilitating the integration of disparate auditing processes across audit teams and firms. Importantly, Cao et al. (2024) highlights that regulators can play a crucial role in promoting the systematic adoption of these innovations, capitalizing on the positive externalities associated with their use to enhance social welfare. Their model provides a foundational framework for further investigation into the costs and implications of blockchain adoption.

Remarkably, the model predicts that clients' misreporting probability and auditing fees for blockchain-adopting auditors are lower in the all-adoption equilibrium (i.e., implemented by regulators) than those in the partial adoption equilibrium (i.e., with large auditors as first movers), which are, in turn, lower than those in the no-adoption equilibrium.

Although many auditing tasks associated with transaction-based accounts can be effectively automated using blockchain technology, companies often have discretionary items, such as accruals, that may not be automatically

[12] Note that the theory is generalizable to other decentralized ledger technologies.

verifiable due to their reliance on auditors' experience, discretion, and industry expertise. Nonetheless, blockchain adoption may also yield indirect benefits for discretionary auditing.

As auditors integrate blockchain into their processes, the volume of a client's transaction-based accounts that require conventional verification diminishes. In contrast, discretionary accounts continue to necessitate traditional auditing methods.[13] In other words, with the adoption of blockchain, auditors can shift their focus away from routine, non-discretionary tasks and allocate more resources to discretionary accounts. As auditors devote a greater proportion of their resources to discretionary auditing, they enhance the ability to catch mistakes in non-discretionary accounts. Consequently, clients are compelled to minimize misstatements by improving the final reporting quality. Rooted on these proposed direct and indirect benefits of blockchain adoption, our central testable hypothesis formulates:

H1: Blockchain adoption enhances audit quality.

Additionally, as noted by Cao et al. (2024), competition among auditors may lead to partial adoption equilibria, where first-mover advantages result in higher auditing fees that are suboptimal from a societal perspective. Thus, regulators can be crucial in facilitating this technology's coordination and widespread adoption. Blockchain consortium is a government-driven initiative in our setting, reducing the first-mover advantage concern raised in Cao et al. (2024). Since full equilibria are expected to generate the highest payoffs in social welfare, blockchain adoption can level the playing field among auditors of different sizes and with different financial resources. With that, our complementary hypothesis naturally emerges:

H2: Blockchain adoption levels the playing field of audit quality.

Given the expected benefits of permissioned blockchain adoption on overall audit quality, auditors are likely to improve operational efficiencies by reducing the need for manually handling tedious and laborious processes, leading to lower client audit fees and faster audit processes (e.g., reduced delays). Naturally, emerging our last hypothesis:

H3: Blockchain adoption enhances operational efficiency.

Furthermore, we anticipate the benefits of blockchain adoption on audit fees to be increasing in clients' opacity

[13] This argument is formally proposed in an extension of Cao et al. (2024) model.

because lower transparency demands more effort from auditors, translating to higher resource allocation costs and an increased probability of misstatements. Although we empirically examine this economic implication later in this study, we refrain from formulating a dedicated hypothesis to tie our main results more closely to Cao et al. (2024) theory.Section 4 formally tests these hypotheses.

3 Methodology

3.1 Setting

This study focuses on listed companies in the Shanghai and Shenzhen A-share markets to examine the impact of using a blockchain-based bank confirmation service platform on the audit quality of financial reports. Since the platform was officially launched on December 18, 2020, and to ensure data stability and comparability, the sample period spans from 2018 to 2023. According to the operational principle that banking financial institutions must connect to the platform to process electronic confirmation requests, and accounting firms must also connect to issue and receive confirmations online[14], this paper identifies listed companies using the platform for bank confirmations by ensuring both the relevant accounting firm and the bank are connected to the platform.

The study manually collects and organizes information on the connection dates, batches, and access forms for accounting firms and banking financial institutions joining the blockchain-based bank confirmation service platform. This data is supplemented and cross-referenced with news reports and official announcements from the websites of accounting firms and banks. Ultimately, the time when the accounting firm and the bank connected to the platform is matched with the corresponding listed company. Since confirmation requests include information related to the audited entity's deposits, loans, guarantees, foreign exchange contracts, and financial products, this study identifies the banks with business relationships with listed companies by analyzing the loan information of listed companies.

The financial data of listed companies, audit data from accounting firms, bank loan data from listed companies, and financial data from banks are all sourced from the CSMAR database. After excluding financial firms, companies with missing or abnormal key financial data, and firms that were designated as "ST" or delisted during the study period, the final sample consists of 1,631 listed companies, totaling 5,282 observations. Of these, the "company-year" observations where both the company's accounting firm and its bank were connected to the blockchain platform amount to 1,812. All continuous variables were winsorized at the 1% level to mitigate the influence of outliers.

[14]Refer to Notice on the Connection of 9 Accounting Firms, Including Shanghai Zhizhen and Gongzheng Tianye, to the Blockchain-Based Bank Confirmation Service Platform, available at https://tinyurl.com/yc8yyt9p.

3.2 Model specification

We use a difference-in-differences approach with multiple periods. The treatment group consists of listed companies whose respective accounting firms and banks are connected to the blockchain platform. The control group comprises companies that have not yet achieved this dual connection.

$$\text{AuditQuality}_{it} = \alpha + \beta_1 \text{PostTreated}_{it} + \theta_{it} + \Lambda_{it} + \epsilon_{it} \tag{1}$$

In Equation (1), *AuditQuality* represents the audit quality-related variable for firm i in year t. θ is a vector of controls for firm characteristics. Λ is a vector of year, firm, audit firm, and bank fixed effects. ϵ is the error term. Based on existing literature (DeFond and Zhang, 2014; Rajgopal, Srinivasan, and Zheng, 2021), audit quality can be measured from audit outputs and inputs. Given that the strengths of blockchain technology lie in its ability to provide traceable oversight and reduce communication costs, thereby improving the accuracy of on-chain information, variables directly related to financial reporting are more likely to reflect the effectiveness of the blockchain platform. This study primarily measures audit quality from the perspective of audit outputs, using three proxies: financial restatements, accrual-based earnings management, and audit opinions. In further analysis, the study also examines audit inputs by evaluating whether the blockchain platform impacts auditors' workload and audit efficiency, as measured by audit fees and delays.

As the core function of blockchain is to ensure data accuracy and reliability, we first measure audit quality in the view of financial reporting accruacy using financial error corrections. Correction_after is the total number of restated accounting items over two years after the release of financial reports in year t. Correction_before is the total number of restated accounting items over two years prior to the release of financial reports in year t. The two variables measure financial errors occurrence and the detection of past financial errors before and after blockchain platform adoption, respectively. In further analysis, we classify financial restatements by financial information attributes, investigating which specific items in the financial statements are most affected. This allows us to explore the mechanisms through which platform adoption improves the accuracy of financial information.

To capture earnings management within the framework of accounting standards, this paper then uses total accruals (*Accrual*) and discretionary accruals (*DAccrual*) as dependent variables, measuring audit quality from the perspective of the financial reporting quality of listed companies.

Audit opinion is currently the only direct communication between auditors and shareholders regarding the audit process and its results, which timely reflect the auditor's opinion on the financial information. To capture audit opinion, we use unmodified opinion (*UAO*) as an indicator variable that equals one for company years in which auditors give unqualified opinion without explanatory notes or disclaimers.

PostTreated is an indicator variable that equals one for company-years in which a focal bank adopts the blockchain-based confirmation platform. Θ is a vector of control variables, which are selected based on prior literature (Hope and Langli, 2010; Krishnan, Wen, and Zhao, 2011; Michas, 2011; Lennox and Li, 2012; Chiu, Teoh, and Tian, 2013; Omer, Shelley, and Tice, 2020; Rajgopal et al., 2021; Fan, Gunn, Li, and Shao, 2022). In Equation (1), the control variables include company size, leverage ratio, whether the company incurred a net loss in the previous year, sales growth, operating cash flow, affiliation with one of the top ten domestic accounting firms, price-to-book ratio, issuance of stocks or bonds, return on assets, audit fee, whether companies have valid internal control, and oversea income ratio.

The specific measurements of each variable are described in Table 2 and dedicated variable definition table at the Appendix. To control for biases caused by omitted variables, this paper includes the year, firm, accounting firm, and bank fixed effects. Additionally, standard errors in the regression model are clustered at the industry level to enhance the robustness of the empirical results.

3.3 Summary statistics

Table 2 reports the descriptive statistics for the main variables used in this study.

[Table 2]

The median and mean values of the accrual-based earnings management variables are relatively close, indicating that the distribution of these variables is reasonably uniform, which minimizes potential bias in the empirical results. The mean value of *Accrual* is −0.018, with a standard deviation of 0.08, suggesting significant variation in total accruals across companies, reflecting diversity in accounting practices. The wide range between the minimum and maximum values further indicates that some firms may have adopted extreme accounting policies, such as making substantial adjustments to accrual items. The mean value of DAccrual is −0.005, with a standard deviation of 0.075, which shows that while most firms tend to have negative discretionary accruals, there is still a certain degree of positive manipulation. This demonstrates considerable variation in earnings management behaviors across firms. The mean value of using the blockchain platform is 0.325, indicating that approximately 32.5% of the sample companies have adopted the blockchain platform for bank confirmations.

4 Empirical Analysis

4.1 Testing hypothesis I: Audit quality

This section provides empirical support to Cao et al. (2024) prediction that blockchain adoption spurs audit and financial reporting quality, reducing firms' incentives to misreport while allowing auditors to allocate resources from automated cash transactions to more complex accrual accounts. Thus, it also impacts auditors' fees and causes operational delays.

4.1.1 Financial errors

An increase in audit quality is expected to be associated with decreased financial errors. Financial errors reveal an ex-post signal of reduced financial reporting quality (e.g., Cao, Myers, and Omer, 2012; Chiu et al., 2013; Christensen, Glover, Omer, and Shelley, 2016). This paper first uses the total number of restated accounting items over two years after the release of financial reports in year t (*Correction_after*) to examine whether the occurence of financial errors decreases after adopting the blockchain platform. We then use the total number of restated accounting items over two years prior to the release of financial reports in year t (*Correction_before*) to examine whether blockchain platform help correcting existing financial errors in financial reports.

Following Equation (1), the explanatory variable remains the adoption of the blockchain platform (*PostTreated*). Following prior research (e,g, Omer et al., 2020; Fan et al., 2022; Ashraf, Choudhary, and Jaggi, 2024), the control variables include company size, leverage ratio, issuance of stocks or bonds, affiliation with one of the top ten domestic accounting firms, price-to-book ratio, return on assets, audit fee, whether companies have valid internal control, and oversea income ratio. Cases involving adjustments due to changes in accounting policies or other reclassifications have been excluded from the sample.

[Table 3—Panel A]

Table 3 Panel A reports the regression results. Column (1)-(3) present the regression result when the dependent variable is *Correction_after*, including bank fixed effect, audit firm fixed effect and both of them, respectively. Column (1)-(3) shows that the coefficients for *PostTreated* are negative and significant at the 5% level or better. These coefficients indicate that the incidence of financial errors is lower after adopting blockchain platform. Column (4)-(6) present the regression result when the dependent variable is *Correction_before*, including bank fixed effect, audit firm fixed effect and both of them, respectively. Column (4)-(6) shows that the coefficients for *PostTreated* are positive and significant at the 10% level or better. These coefficients indicate that the detection and correction of past financial errors is higher after blockchain adoption.

4.1.2 Discretionary accounts

Table 3—Panel B reports the results of tests on the impact of adopting the blockchain platform on total accruals (*Accrual*) and discretionary accruals (*DAccrual*) for listed companies, measuring audit quality from the perspective of audit output and capturing broader earnings management phenomena. Column (1)-(3) present the regression result when the dependent variable is *Accrual*, including bank fixed effect, audit firm fixed effect and both of them, respectively. Column (1)-(3) shows that the coefficients for *PostTreated* are negative and significant at the 5% level or better. Column (4)-(6) present the regression result when the dependent variable is *DAccrual*, including bank fixed effect, audit firm fixed effect and both of them, respectively. Column (4)-(6) shows that the coefficients for *PostTreated* are negative and significant at the 5% level or better. These coefficients indicate that accrual-based financial reporting quality improves after introducing blockchain platform.

[Table 3—Panel B]

We conduct a parallel trend test using four years before and three years after adopting the blockchain platform. The year before the adoption is the reference benchmark, with the results presented in 3.

[Figure 3]

Before adopting the blockchain platform, the audit quality trends for the treatment and control groups are relatively similar, satisfying the parallel trend assumption. Within three periods after platform adoption, there is a significant decline in financial errors correction (*Correction_after*), total accruals (*Accrual*) and discretionary accruals (*DAccrual*), and significant increase in financial error detection (*Correction_before*). Theses treads indicate an improvement in audit quality. However, the relative improvement in audit quality compared to the control group disappears by one or two years after shock year. This may be due to the shorter sample period, as there is relatively limited data for 2023.

A potential concern that one might have is that the audit quality improvement can be the results of continuous improvement of bank confirmation related policies, especially the Ministry of Finance's requirement for banks to centralize their confirmation operations. To mitigate such endogeneity concerns, we conduct two placebo tests, in which: a) we define pseudo blockchain adoption year as two years before treatment year for the sample firms and examine audit quality around these placebo years, and b) we analyze audit quality improvement in ‚Äúfalse‚Äù treatment group, i.e., firms influenced by banks that set up centralized bank confirmation processing center but that do not use blockchain technology. The results are shown in Table 4. Panel A presents the results with pseudo blockchain adoption year. Panel B presents the results with pseudo treatment group. In both cases, we observe that placebo tests yield no significant effects, or negative audit quality effects, which confirm the robustness of the earlier conclusions.

[Table 4]

4.1.3 Financial restatement consequences

Given that using blockchain decreases financial errors in financial reports as stated in section 4.1.1, this section further examines the severity of these financial errors and the direction of restatement adjustments. We measure the severity of financial errors using whether the restatements of year *t*'s financial reports are exposed by media or disclosed by regulatory agencies (*Exposed*) and whether the restatements of year *t*'s financial reports are penalized by regulators (*Penalty*). We measure the directions of restatements' earnings adjustments using a dummy indicating upward adjustment for the restated financial statements (*RestatementUp*) and a dummy indicating downward adjustment for the restated financial statements (*RestatementDown*).

[Table 5]

Table 5 reports the regression results. We find that the coefficient for *PostTreated* is negative and significant at the 10% level (coef. = −0.010; t-stat. = −1.86) in column (1), where we proxy for the importance of financial errors using *Exposed*. Column (2) repeats the analyses using *Penalty* as the proxy for financial error importance. We find that the coefficient for *PostTreated* is negative and significant at the 10% level (coef. = −0.009; t-stat. = −1.75). These coefficients suggest that the exposure and penalty of financial errors decreases after adopting blockchain in bank confirmation. Column (3) shows that the coefficient for *PostTreated* is negative but not significant (coef. = −0.001; t-stat. = −0.17) when the dependent variable is *RestatementUp*. Column (4) shows that the coefficient for *PostTreated* is negative and significant at the 1% level (coef. = −0.020; t-stat. = −2.69) when the dependent variable is *RestatementDown*. These coefficients suggest that blockchain adoption mitigates the case in which earnings are overvalued and adjusted downward in restatements.

4.1.4 Financial restatement items

Based on the evidence that the blockchain platform improves the accuracy of financial information by reducing and correcting financial errors, we categorize financial restatements by financial items to further examine whether different items are affected to varying degrees.

The classification of restatement items is sourced from the CSMAR database, with the financial items listed in Appendix C. The bank confirmation process covers 15 specific areas, including bank deposits, bank loans, closed accounts, entrusted loans, guarantees, bank acceptances that have been accepted but not yet paid, discounted but not yet matured commercial bills, collected commercial bills, unfulfilled irrevocable letters of credit, unfulfilled foreign exchange contracts, securities or other property documents under custody, unmatured bank wealth management products, supplemental explanations, and any other significant matters deemed necessary for confirmation by the certified public accountant. The correspondence between bank confirmation content and the classification of financial restatement items is provided in Appendix C. This section uses the number of times that each item is restated over two years after the release of financial reports in year *t* (*Item1 - Item 20_after*) and the number of times that each item is restated over two years before the release of financial reports in year *t* (*Item1 - Item 20_before*) as dependent variables. The analysis examines financial information restatements made in year *t* and those related to previous financial information corrections in year t, using Equation (1)—the results report which financial restatement items are most affected by adopting the blockchain platform.

We first analyze the restatements of financial items over two years after the release of financial reports (*Item1 - Item 20_after*) before and after blockchain application. To avoid the interference of accounting policy adjustment, we exclude financial restatement caused by "*Application of Incorrect Accounting Policies*," "*Accounting Policy Change*," and "*Accounting Estimate Change*." After dropping items that do not clearly correspond to bank confirmation contents (*Litigation Cases*; *Internal Controls*; *Restructuring*; *Reclassification*) and items lacking sufficient sample (*Tax Rate Adjustment/Tax Reimbursement*; *Change in Qualification or Certification*; *Related Parties/Related Transactions*; *Equity/Shareholders*; *Profit Distribution/Dividend Distribution*; *Related Parties/Related Transactions*; *Entrusted Wealth Management*; *Significant Guarantees*), we finally reports seven items (*Item1-Item5_after*; *Item19-Item20_after*) in Table 6—Panel A. The control variables remain consistent with those in previous sections. We include audit firm fixed effect, firm fixed effect and year fixed effect. Results remain unchanged when including bank fixed effect instead of audit firm fixed effect or keeping both of the two effects (untabulated).

[Table 6—Panel A]

In Table 6—Panel A, Columns (1)-(7) all present negative coefficient for *PostTreated*. Columns (1)-(3) and Columns (6)-(7) shows that the negative coefficients for *PostTreated* are significant at the 10% level or better. These coefficients indicate that the financial items are restated less after using blockchain platform. Considering both economic significance and relevance, the degree of impact blockchain exerts across the seven reported financial items in Table 6—Panel A, from highest to lowest, is as follows: *item20_after* ("*Liability Confirmation*"), *Item1_after* ("*Revenue Recognition/Profit Recognition*"), *Item3_after* ("*Asset/Inventory Valuation*"), *Item19_after* ("*Equity Recognition*"), *Item2_after* ("*Cost/Expense Valuation*"). These categories correspond to the following bank confirmation items: "*Bank Loans, Accepted but Unpaid Bank Acceptance Bills*," "*Accepted but Unpaid Bank Acceptance Bills, Discounted but Unmatured Commercial Bills*," "*Bank Deposits, Custodied Securities, or Other Proprietary Documents*," "*Custodied Securities or Other Proprietary Documents*," "*Bank Loans, Account Cancellations*." Based on industry practice, these results largely align with the content of bank confirmation processes, further validating the role of the blockchain platform in reducing financial restatements.

After analyzing how blockchain influence the number of times that different items in financial reports are restated after their release (*Correction_after*), we examine the detection and restatements for different items in past financial reports (*Correction_before*). We analyze the restatements of financial items over two years before the release of financial reports (*Item1 - Item 20_before*) before and after blockchain application. Same as the specification in Table 6—Panel A, we finally reports seven items (*Item1-Item5_before*; *Item19-Item20_before*) in Table 6—Panel B. The control variables remain consistent with those in previous sections. We include audit firm fixed effect, firm fixed effect and year fixed effect. Results remain unchanged when including bank fixed effect instead of audit firm fixed effect or keeping both of the two effects (untabulated).

[Table 6—Panel B]

In Table 6—Panel B, Column (1) shows that the coefficient for *PostTreated* is positive and significant at the 5% level. The result indicate that the existing errors in *item1_before*, which is item "*Revenue Recognition/Profit Recognition*" in past financial reports and "*Accepted but Unpaid Bank Acceptance Bills, Discounted but Unmatured Commercial Bills*" in corresponding bank confirmation contents, is more likely to be detected and corrected after introducing blockchain technology. This highlights the blockchain platform's broad role in not only reducing financial error occurrence but also correcting existing errors in past financial statements.

4.1.5 Auditor opinion

Although financial restatements and accrual-based measures are great proxies for audit quality, restatements are rare and do not account for manipulations of financial statements within accounting standards framework (e.g., DeFond and Zhang, 2014; Rajgopal et al., 2021). Accrual-based measures are prone to potential bias and errors (e.g., Kothari, Leone, and Wasley, 2005; Ball, Kothari, and Nikolaev, 2012). To enhance the structural robustness of the analysis, we use audit opinions as an alternative measure of audit quality, which is the only direct communication between auditors and shareholders regarding the audit process and its results, offering a real-time reflection of the auditors' views on the financial information.

Following prior research (Chan and Wu, 2011; DeFond, Wong, and Li, 2000; Chan, Lin, and Mo, 2006; Wang, Wong, and Xia, 2008), we categorize audit opinions into two groups: modified opinion and unmodified opinion.

Modified opinion include instances in which an auditor issues an adverse opinion, a qualified opinion, and a unqualified opinion but with explanatory notes, or disclaimers. Unmodified opinion include the instance in which an auditor issues a standard unqualified opinion. We use unmodified audit opinion (*UAO*) as a independent variable to measure how auditors agree with firms' financial information. The indicator variable equals one when a client receives an unqualified opinion for year t's financial statements, and 0 otherwise.

Following prior research (e.g., Francis and Yu, 2009; Hope and Langli, 2010; Lennox and Li, 2012; Jia and Gao, 2023), the control variables in this section have been adjusted based on the original control variables from Equation (1). The revised control variables include company size, leverage ratio, issuance of stocks or bonds, affiliation with one of the top ten domestic accounting firms, return on assets, audit fee, whether companies have valid internal control, O-score for bankruptcy risk, changes in leverage, operating cash flow, sales growth, whether the company incurred a net loss in the previous year.

[Table 7]

The regression results are presented in Table 7. Column (1)-(3) present the regression result when the dependent variable is unmodified audit opinion (*UAO*), including bank fixed effect, audit firm fixed effect and both of them, respectively. The coefficients for *PostTreated* are positive and significant at the 1% level, indicating that auditors are more likely to agree with firms' financial reports after using blockchain platform.

4.2 Testing hypothesis II: Leveling the playing field

This section provides empirical support to the second hypothesis that full equilibria should level the playing field for auditors regardless of expertise and financial resources.

4.2.1 Industry specialization of accounting firms

A considerable body of literature explores the relationship between auditor industry specialization and audit quality (e.g., DeFond and Zhang, 2014; Lennox and Wu, 2022). On the one hand, auditors with a higher degree of specialization within a particular industry, particularly those affiliated with specialized accounting firms, can often deliver superior audit services to clients. This is primarily due to their enhanced expertise and reputational incentives (e.g., Chin and Chi, 2009; Reichelt and Wang, 2010). On the other hand, psychological studies suggest that professionals with extensive experience in a specific domain may be more susceptible to cognitive fixation than their less experienced counterparts (Dane, 2010; Dekeyser, He, Xiao, and Zuo, 2024). Furthermore, while digitalizing audit processes has enhanced auditors' professional skills and knowledge (Lamboglia et al., 2020), it may also contribute to the erosion of professional expertise (Sutton et al., 2018). Given these mixed effects, industry specialization might play a moderating role in determining how adopting blockchain in the blockchain platform influences audit quality. However, the direction of this moderating effect remains ambiguous.

To this end, the sample is divided into two groups based on the auditor industry specialization variable MarketShare: industry specialists and non-specialists. Given that knowledge and experience tend to be shared and disseminated within the same accounting firm (Bedard and Johnstone, 2010; Chin and Chi, 2009), industry specialization is measured at the firm level. deangelo1981auditor argues that auditors with larger market shares are more likely to be industry experts, as they can allocate more resources to industry-specific training and accumulate experience through a broader client base. Following the studies of Krishnan (2003) and Wei (2014), this paper uses the market share of the accounting firm within an industry as a proxy for industry specialization. Data is acquired from the China Research Data Services Platform (CNRDS), and the calculation formula is:

$$MarketShare_{i,t} = \frac{\text{Total Assets of listed companies audited by firm } i \text{ in industry } K}{\text{Total assets of all listed companies in industry } K} \tag{2}$$

In line with the methodologies of Chin and Chi (2009); Zerni (2012), and Li, Du, and Zhang (2021), the variable takes a value of 1 when *MarketShare* is above the 90th percentile, indicating that the accounting firm has industry specialization, and 0 otherwise. Based on this, the sample is split into two subsamples: firms with industry specialization and firms without. The main regression model is then re-estimated for each subsample.

[Table 8—Panel A]

Table 8—Panel A reports the results of the heterogeneity analysis, examining the impact of audit firm industry specialization on the effect of the blockchain platform in improving audit quality. Column (1)-(4) presents the regression result when the dependent variable is *Accrual*, *DAccrual*, *Correction_after*, *Correction_ before*, respectively. Sub-panel A1 shows the regression results of samples where audit firms have industry specialization. Sub-panel A2 shows the regression results of samples where audit firms lack industry specialization. We find that the coefficients for *PostTreated* are generally more significant in the sample without audit firm industry specialization. The results suggest that the positive effect of the blockchain platform on audit quality is more pronounced when audit firms do not have industry specialization, which aligns with findings in the existing literature suggesting that audit digitalization can enhance auditors' professional skills and knowledge (Lamboglia et al., 2020).

4.2.2 Big Four accounting firms

Whether a company is audited by one of the Big Four accounting firms is a commonly used proxy for auditor size, an important measure of auditor characteristics. The Big Four firms, due to their size and access to superior resources in terms of technology, training, and infrastructure, are generally able to deliver higher-quality audits (e.g., Francis, Maydew, and Sparks, 1999; Khurana and Raman, 2004; Lawrence, Minutti-Meza, and Zhang, 2011; DeFond, Erkens, and Zhang, 2016). Compared to smaller firms, the Big Four are also perceived to be more independent, as they face more significant reputational risks, have less reliance on revenue from a single client, and are subject to higher litigation risks due to their larger income base (e.g., Palmrose, 1988; Bonner, Palmrose, and Young, 1998; Khurana and Raman, 2004; Skinner and Srinivasan, 2012). Despite having more resources, Lowe, Bierstaker, Janvrin, and Jenkins (2018) found that the likelihood of the Big Four adopting IT technologies is not significantly higher than non-Big Four firms. In fact, non-Big Four firms have taken a leading role in some specific IT technology applications.

[Table 8—Panel B]

Table 8—Panel B reports the results of the heterogeneity analysis regarding whether the use of the blockchain platform improves audit quality, depending on whether the auditing firm belongs to the international Big Four. Column (1)-(4) presents the regression result when the dependent variable is *Accrual*, *DAccrual*, *Correction_after*, *Correction_before*, respectively. Sub-panel B1 shows the regression results of samples where audit firms belongs to the international Big Four. Sub-panel B2 shows the regression results of samples where audit firms does not belong to the international Big Four. We find that the coefficients for *PostTreated* are generally more significant in the sample where audit firms does not belong to the international Big Four. The results suggest that the positive effect of the blockchain platform on audit quality is more pronounced when audit firms are not among the international Big Four audit firms.

4.2.3 Audit Firm Rotation

Audit firm rotation influence audit quality through auditor independence and auditor expertise. Proponents argue that potentially unrestricted tenure enhances the social and economic bonds between auditors and management, blinds auditors with routine and overfamiliarity, and aggravates audit market oligopoly (e.g., Cameran, Prencipe, and Trombetta, 2016; Bleibtreu and Stefani, 2018). Opponents point to a lack of client-specific knowledge, costly auditor switching, and the lame-duck effect caused by auditor rotation (e.g., Bell, Causholli, and Knechel, 2015; Lennox and Wu, 2018; Board, 2012). We divide the sample into two groups based on whether firms rotated their audit firms and repeat the baseline tests to examine how blockchain improve audit quality, depending on audit firm rotation.

[Table 8—Panel C]

Table 8—Panel C reports the results of the heterogeneity analysis, examining the impact of audit firm rotation on the effect of the blockchain platform in improving audit quality. Column (1)-(4) presents the regression result when the dependent variable is *Accrual*, *DAccrual*, *Correction_after*, *Correction_before*, respectively. Sub-panel C1 shows the regression results of samples where listed companies rotate their audit firms. Sub-panel C2 shows the regression results of samples where listed companies does not rotate their audit firms. We find that the coefficients for *PostTreated* are generally more significant in the sample listed companies did not rotate their audit firms. The results suggest that the positive effect of the blockchain platform on audit quality is more pronounced when audit firms are not rotated.

4.2.4 Nature of ownership of listed companies

Due to policy objectives and fiscal responsibilities, state-owned enterprises (SOEs) often rely on government support when facing financial difficulties. As a result, they lack profit-maximization incentives and exhibit lower demand for high-quality accounting information, leading to a less transparent accounting environment (Gul, Kim, and Qiu, 2010; Chen, Chen, Lobo, and Wang, 2010; Wang et al., 2008). Since SOEs prioritize achieving government social and political goals over purely commercial objectives, their weaker profit motives may reduce the incentive to manipulate accounting figures (Aharony, Lee, and Wong, 2000). However, this also implies that the signaling benefits of hiring high-quality auditors are lower for SOEs, making them more likely to engage smaller, lower-quality audit firms (Chen, Chen, Lobo, and Wang, 2011). The differing demand for accounting information and preferences in auditor selection may, on the one hand, influence SOEs' motivation to adopt the digital blockchain platform and, on the other hand, result in varying impacts of improved information quality on their audit quality.

[Table 8—Panel D]

Based on the nature of ownership, this paper divides the sample of listed companies into two subsamples: state-owned enterprises (SOEs) and non-state-owned enterprises (non-SOEs). Table 8—Panel D reports the results of the heterogeneity analysis on how the nature of ownership affects the impact of the blockchain platform on audit quality. Column (1)-(4) presents the regression result when the dependent variable is *Accrual*, *DAccrual*, *Correction_after*, *Correction_before*, respectively. Sub-panel D1 shows the regression results of SOE subsample. Sub-panel D2 shows the regression results of non-SOE subsample. We find that the coefficients for *PostTreated* are generally more pronounced in non-SOE subsample.

4.2.5 Proportion of independent directors

In research examining the relationship between audit committee characteristics (such as independence and types of expertise) and financial reporting quality (e.g., financial misstatements, earnings management, accounting conservatism, audit fees, auditor selection, and internal controls) (Badolato, Donelson, and Ege, 2014; Cheng, Felix, and Indjejikian, 2019; Farber, Huang, and Mauldin, 2018; Ashraf, Michas, and Russomanno, 2020; Omer et al., 2020; Liu, Lobo, and Yu, 2021; Myers, Schmardebeck, and Slavov, 2021), the composition of the audit committee is the most frequently studied perspective. This reflects the focus on committee members' independence and financial expertise (Abbott, Parker, and Peters, 2004; Alderman and Jollineau, 2020; Behrend and Eulerich, 2019; Lisic, Myers, Seidel, and Zhou, 2019). In this study, the independence and financial expertise of the audit committee are measured using two variables: the size of the audit committee (*AuditCom*) and the proportion of independent directors (*AuditDir*). This allows for an analysis of whether the audit committee's independence and expertise are moderating factors in improving audit quality through the blockchain platform.

[Table 8—Panel E]

Table 8—Panel E reports the heterogeneous effect of audit committee size (*AuditCom*) on the impact of the blockchain platform. The number of audit committee members is divided at the median, and the sample is split into two subsamples: large audit committees and small audit committees. The dependent variables are *Accrual*, *DAccrual*, *Correction_after*, *Correction_before*, representing the quality of financial reporting. Sub-panel E1 shows the regression results of subsample with larger audit committees. Sub-panel E2 shows the regression results of subsample with smaller audit committees. We find that the coefficients for *PostTreated* are generally more pronounced in the subsample with smaller audit committees.

[Table 8—Panel F]

Table 8—Panel F reports the heterogeneity analysis results on how the positive effect of the blockchain platform on audit quality varies across listed companies with different proportions of independent directors on the audit committee (*AuditDir*). Consistent with the results in Table8—Panel F, the overall effect of the platform is to improve audit quality, with the impact being more pronounced in the subsample where the proportion of independent directors on the audit committee is lower. Combining the results from Tables 10 and 11, it is evident that the positive effect of the blockchain platform on audit quality is more significant in firms where the audit committee has lower independence and fewer related knowledge resources. This highlights the platform's role in compensating for deficiencies in independence and knowledge costs.

4.3 Testing hypothesis III: Operational efficiency

Finally, as documented, improved audit quality may translate to audit efficiency; we expect to document an overall decrease in audit fees and faster audit processes.

4.3.1 Audit fee

One of the primary roles of the blockchain platform is to reduce costs and improve efficiency by decreasing the time and effort required from certified public accountants (CPAs). Audit fees can serve as a proxy for the workload of CPAs, reflecting both demand- and supply-side factors related to the audit process (Simunic, 1980). Therefore, this section uses audit fees as the dependent variable to measure audit quality from the perspective of audit input, examining whether the workload of CPAs changes after adopting blockchain. Prior literature suggests that improvements may influence audit fees in efficiency, although such improvements may not directly reflect enhancements in audit quality (Rajgopal et al., 2021). Studies on audit digitalization have found that adopting digital technology is often accompanied by reduced audit fees (Pincus et al., 2017; Fedyk, Hodson, Khimich, and Fedyk, 2022).

[Table 9]

Table 9 reports the regression results with audit fees scaled by total fees paid to an audit firm (*AuditFee*) as the dependent variable. Column (1)-(3) present the regression result including bank fixed effect, audit firm fixed effect and both of them, respectively. The coefficients for *PostTreated* are negative and significant at the 1% level, indicating a significant decrease in audit fee and thus a reduced audit workload after using blockchain platform.

4.3.2 Audit delay

Audit report delay refers to the time period from the fiscal year-end to the release date of the financial statements, which measures the timeliness of financial reporting (Ashton, Willingham, and Elliott, 1987; Abbott et al., 2004). The factors influencing audit delay can be divided into company-specific and audit-related factors (Ika and Ghazali, 2012). Company characteristics include size (Dyer and McHugh, 1975), performance and financial condition (Haw, Hu, Hwang, and Wu, 2003), and the complexity of business operations (Ashton, Graul, and Newton, 1989). Audit-related factors include the availability of auditor resources and the audit process (Behn, Choi, and Kang, 2006). Overall, these factors are directly or indirectly related to the efficiency of auditors' work. Therefore, this section uses audit delay as a variable to measure audit quality from the perspective of audit input, examining whether using the blockchain platform reduces auditors' workload and leads to more timely disclosure of the audit report. Following the approach of prior literature (Abernathy, Barnes, Stefaniak, and Weisbarth, 2017; Zhang, 2016), audit delay is calculated as the number of calendar days between the company's annual report disclosure date and the end of the fiscal year.

[Table 10]

Table 10 reports the regression results using audit delay (*AuditDelay*) as the dependent variable. *AuditDelay* is calculated as the number of calendar days between the end of the fiscal year and the release date of the company's annual reports, scaled by 365. Column (1)-(3) present the regression results when the dependent variable is audit delay in year *t* ($AuditDelay_{i,t}$), including bank fixed effect, audit firm fixed effect and both of them, respectively. Column (4)-(6) present the regression results when the dependent variable is audit delay in year *t+1* ($AuditDelay_{i,t+1}$), including bank fixed effect, audit firm fixed effect and both of them, respectively. The coefficients for *PostTreated* are not significant when the dependent variable is $AuditDelay_{i,t}$, but negative and significant at the 10% level or better when the dependent variable is $AuditDelay_{i,t+1}$. The results suggest that audit delays decrease after adopting the blockchain platform but with lagging effect. Blockchain application help improving timeliness of disclosures and greater audit efficiency.

5 Conclusion

This study provides comprehensive evidence of the transformative impact of blockchain adoption on the corporate audit process, offering robust empirical validation for Cao et al. (2024) predictions about its potential benefits. By analyzing the staggered implementation of a blockchain platform in China, we demonstrate that blockchain adoption significantly enhances audit quality, operational efficiency, and equity among auditors with varying resources. Specifically, blockchain reduces financial misstatements, particularly in areas such as revenue recognition, expense valuation, and liability confirmations, while facilitating more timely and cost-effective audit processes.

Our findings reveal that blockchain's functionalities standardize verification processes, improve transaction traceability, and reduce the potential for opportunistic behavior by firms. The observed improvements in audit efficiency—manifested in reduced audit fees and shortened audit delays—further highlight the technology's capacity to streamline workflows and enhance operational performance. Notably, blockchain adoption also addresses disparities in auditor resources, leveling the playing field by enabling smaller and less-specialized auditors to access and verify financial information more effectively. This democratization of audit quality highlights blockchain's potential to foster equity and transparency in financial markets. Our study offers valuable insights to auditors, regulators, and policymakers seeking to harness blockchain's potential to strengthen financial reporting integrity and foster trust in financial markets.

References

Abbott, L. J., S. Parker, and G. F. Peters (2004). Audit committee characteristics and restatements. *Auditing: A Journal of Practice & Theory 23*(1), 69–87.

Abernathy, J. L., M. Barnes, C. M. Stefaniak, and A. Weisbarth (2017). An international perspective on audit report lag: A synthesis of the literature and opportunities for future research. *International Journal of Auditing 21*(1), 100–127.

Aharony, J., C. W. J. Lee, and T. Wong (2000). Financial packaging of ipo firms in china. *Journal of Accounting Research 38*(1), 103–126.

Akerlof, G. A. (1970). The market for 'lemons': Quality uncertainty and the market mechanism. *The Quarterly Journal of Economics 84*(3), 488–500.

Alderman, J. and S. J. Jollineau (2020). Can audit committee expertise increase external auditors' litigation risk? the moderating effect of audit committee independence. *Contemporary Accounting Research 37*(2), 717–740.

Alles, M. and G. L. Gray (2020). Will the medium become the message? A framework for understanding the coming automation of the audit process. *Journal of Information Systems 34*(2), 109–130.

Amiram, D., B. N. Jørgensen, and D. Rabetti (2022). Coins for bombs: The predictability of on-chain transfers for terrorist attacks. *Journal of Accounting Research 60*(2), 427–466.

Amiram, D., E. Lyandres, and D. Rabetti (2024). Trading volume manipulation and competition among centralized crypto exchanges. *Management Science* (Forthcoming).

Ashraf, M., P. Choudhary, and J. Jaggi (2024). Are audit committees overloaded? evidence from the effect of financial risk management oversight on financial reporting quality. *Management Science*.

Ashraf, M., P. N. Michas, and D. Russomanno (2020). The impact of audit committee information technology expertise on the reliability and timeliness of financial reporting. *The Accounting Review 95*(5), 23–56.

Ashton, R. H., P. R. Graul, and J. D. Newton (1989). Audit delay and the timeliness of corporate reporting. *Contemporary Accounting Research 5*(2), 657–673.

Ashton, R. H., J. J. Willingham, and R. K. Elliott (1987). An empirical analysis of audit delay. *Journal of Accounting Research 25*(2), 275–292.

Badolato, P. G., D. C. Donelson, and M. Ege (2014). Audit committee financial expertise and earnings management: The role of status. *Journal of Accounting and Economics 58*(2–3), 208–230.

Ball, R., S. P. Kothari, and V. V. Nikolaev (2012). On estimating conditional conservatism. *The Accounting Review 88*(3), 755–787.

Bedard, J. C. and K. M. Johnstone (2010). Audit partner tenure and audit planning and pricing. *Auditing: A Journal of Practice & Theory 29*(2), 45–70.

Behn, B. K., J.-H. Choi, and T. Kang (2006). The impact of audit quality on analyst forecast accuracy and forecast dispersion. *The Accounting Review 81*(2), 327–349.

Behrend, J. and M. Eulerich (2019). Four decades of audit committee research: A bibliometric analysis (1977-2018). *Working Paper*.

Bell, T., M. Causholli, and R. Knechel (2015). Audit firm tenure, non-audit services, and internal assessments of audit quality. *Journal of Accounting Research 53*(3), 461–509.

Beyer, A., D. A. Cohen, T. Z. Lys, and B. R. Walther (2010). The financial reporting environment: Review of the recent literature. *Journal of Accounting and Economics 50*(2-3), 296–343.

Bhambhwani, S. and A. H. Huang (2024). Auditing decentralized finance. *British Accounting Review 56*(2), 101270.

Bible, L., L. Graham, and A. Rosman (2005). The effect of electronic audit environments on performance. *Journal of Accounting, Auditing & Finance 20*(1), 27–42.

Bleibtreu, C. and U. Stefani (2018). The effects of mandatory audit firm rotation on client importance and audit industry concentration. *The Accounting Review 93*(1), 1–27.

Board, P. C. A. O. (2012, October). Statement on public meeting on auditor independence and audit firm rotation. Speech presented by Jeannette M. Franzel, Board Member, PCAOB Public Meeting, Houston, TX. Accessed: date-of-access.

Bonner, S. E., Z. V. Palmrose, and S. M. Young (1998). Fraud type and auditor litigation: An analysis of sec accounting and auditing enforcement releases. *The Accounting Review 73*(4), 503–532.

Bourveau, T., J. Brendel, and J. Schoenfeld (2024). Decentralized finance (DeFi) assurance: Early evidence. *Review of Accounting Studies 29*, 2209–2253.

Brandin, R. and S. Abrishami (2021). Information traceability platforms for asset data lifecycle: blockchain-based technologies. *Smart and Sustainable Built Environment 10*(3), 364–386.

Brody, R. G., Z. Hess, Y. Li, and M. C. Turner (2022). Reducing fraud risks in the audit confirmation process. *Journal of Theoretical Accounting Research 18*(2), 27–43.

Brown-Liburd, H., H. Issa, and D. Lombardi (2015). Behavioral implications of big data's impact on audit judgment and decision making and future research directions. *Accounting Horizons 29*(2), 451–468.

Cameran, M., A. Prencipe, and M. Trombetta (2016). Mandatory audit firm rotation and audit quality. *European Accounting Review 25*(1), 35–58.

Cao, M., R. Chychyla, and T. Stewart (2015). Big data analytics in financial statement audits. *Accounting Horizons 29*(2), 423–429.

Cao, S. S., L. W. Cong, and B. Yang (2024). Distributed ledgers and secure multi-party computation for financial reporting and auditing. *Management Science* (Forthcoming).

Cao, Y., L. A. Myers, and T. C. Omer (2012). Does company reputation matter for financial reporting quality? evidence from restatements. *Contemporary Accounting Research 29*(3), 956–990.

Caster, P., R. J. Elder, and D. J. Janvrin (2021). An exploration of bank confirmation process automation: A longitudinal study. *Journal of Information Systems 35*(3), 1–16.

Chan, K. H., K. Lin, and P. K. Mo (2006). A political-economic analysis of auditor reporting and auditor switches. *Review of Accounting Studies 11*(1), 21–48.

Chan, K. H. and D. Wu (2011). Aggregate quasi rents and auditor independence: Evidence from audit firm mergers in china. *Contemporary Accounting Research 28*(1), 175–213.

Chen, H., J.-Z. Chen, G. J. Lobo, and Y. Wang (2010). Association between borrower and lender state ownership and accounting conservatism. *Journal of Accounting Research 48*(5), 973–1014.

Chen, H., J.-Z. Chen, G. J. Lobo, and Y. Wang (2011). Effects of audit quality on earnings management and cost of equity capital: Evidence from china. *Contemporary Accounting Research 28*(3), 892–925.

Chen, M. A., S. S. Hu, J. Wang, and Q. Wu (2023). Can blockchain technology help overcome contractual incompleteness? evidence from state laws. *Management Science 69*(11), 6540–6567.

Cheng, S., R. Felix, and R. Indjejikian (2019). Spillover effects of internal control weakness disclosures: The role of audit committees and board connections. *Contemporary Accounting Research 36*(2), 934–957.

Chin, C.-L. and H.-Y. Chi (2009). Reducing restatements with increased industry expertise. *Contemporary Accounting Research 26*(3), 729–765.

Chiu, P.-C., S. H. Teoh, and F. Tian (2013). Board interlocks and earnings management contagion. *The Accounting Review 88*(3), 915–944.

Chod, J., N. Trichakis, G. Tsoukalas, H. Aspergren, and M. Weber (2020). On the financing benefits of supply chain transparency and blockchain adoption. *Management Science 66*(10), 4378–4396.

Christensen, B. E., S. M. Glover, T. C. Omer, and M. K. Shelley (2016). Understanding audit quality: Insights from audit professionals and investors. *Contemporary Accounting Research 33*(4), 1648–1684.

Cong, L. W., W. Landsman, E. Maydew, and D. Rabetti (2023). Tax-loss harvesting with cryptocurrencies. *Journal of Accounting and Economics 76*(2), 101607.

Cong, L. W., E. Prasad, and D. Rabetti (2023). Financial and informational integration through decentralized oracle networks. *Working Paper*.

Cong, W., C. Harvey, D. Rabetti, and Z.-Y. Wu (2024). An anatomy of crypto-enabled cybercrimes. *Management Science* (Forthcoming).

Cui, Y., V. Gaur, and J. Liu (2024). Supply chain transparency and blockchain design. *Management Science 70*(5), 2705–3380.

Dane, E. (2010). Reconsidering the trade-off between expertise and flexibility: A cognitive entrenchment perspective. *Academy of Management Review 35*(4), 579–603.

De Simone, L., P. Jin, and D. Rabetti (2024). Tax avoidance with DeFi lending. *Working Paper*.

DeFond, M., D. H. Erkens, and J. Zhang (2016). Do client characteristics really drive the big n audit quality effect? new evidence from propensity score matching. *Management Science 63*(11), 3628–3649.

DeFond, M., T. J. Wong, and S. Li (2000). The impact of improved auditor independence on audit market concentration in china. *Journal of Accounting and Economics 28*(3), 269–305.

DeFond, M. and J. Zhang (2014). A review of archival auditing research. *Journal of Accounting and Economics 58*(2), 275–326.

Dekeyser, S., X. He, T. Xiao, and L. Zuo (2024). Auditor industry range and audit quality. *Journal of Accounting and Economics 77*(2–3), 101669.

Deloitte (2018). Blockchain: A game changer for audit. Accessed: 2024-12-17.

Dong, S. (2024). Market reaction to cryptocurrency disclosures. *Working Paper*.

Dowling, C. and S. A. Leech (2014). A big 4 firm's use of information technology to control the audit process: How an audit support system is changing auditor behavior. *Contemporary Accounting Research 31*(1), 230–252.

Du, K. and S. Wang (2024). Blockchain audits and insider trading in cryptocurrency markets. *Working Paper*.

Dyer, J. C. and A. J. McHugh (1975). Timeliness of australian annual-report. *Journal of Accounting Research 13*(2), 204–219.

Earley, C. E. (2015). Data analytics in auditing: opportunities and challenges. *Business Horizons 58*(5), 493–500.

Elder, R. J., D. J. Janvrin, and P. Caster (2014). Peregrine,Äîtwenty years of fraudulent cash balances. *Issues in Accounting Education 29*(2), 337–348.

Fan, Y., J. L. Gunn, C. Li, and J. Shao (2022). Financial reporting quality and auditor dismissal decisions at companies with common directors and auditors. *Contemporary Accounting Research 39*(3), 1871–1904.

Farber, D. B., S. X. Huang, and E. G. Mauldin (2018). Audit committee accounting expertise, analyst following, and market liquidity. *Journal of Accounting, Auditing & Finance 33*(2), 174–199.

Fedyk, A., J. Hodson, N. Khimich, and T. Fedyk (2022). Is artificial intelligence improving the audit process? *Review of Accounting Studies 27*(3), 938–985.

Francis, J. R., E. L. Maydew, and H. C. Sparks (1999). The role of big 6 auditors in the credible reporting of accruals. *Auditing: A Journal of Practice & Theory 18*(2), 17–34.

Francis, J. R. and M. D. Yu (2009). Big 4 office size and audit quality. *The Accounting Review 84*(5), 1521–1552.

Gefen, O., D. Rabetti, Y. Sun, and C. Zhang (2024). Code-washing: Evidence from open-source blockchain startups. *Working Paper*.

Gul, F. A., J.-B. Kim, and A. A. Qiu (2010). Ownership concentration, foreign shareholding, audit quality, and stock price synchronicity: Evidence from china. *Journal of Financial Economics 95*(3), 425–442.

Harvey, C. R. and D. Rabetti (2024). International business and decentralized finance. *Journal of International Business Studies. 55*, 840–863.

Haw, I.-M., B. Hu, L.-S. Hwang, and W. Wu (2003). Earnings management and corporate governance: The role of the board and the audit committee. *Journal of Accounting and Public Policy 22*(3), 353–381.

Hope, O.-K. and J. C. Langli (2010). Auditor independence in a private firm and low litigation risk setting. *The Accounting Review 85*(2), 573–605.

Huang, F. and M. A. Vasarhelyi (2019). Applying robotic process automation (rpa) in auditing: A framework. *International Journal of Accounting Information Systems 35*, 1–11.

Ika, S. R. and N. A. M. Ghazali (2012). Audit committee effectiveness and timeliness of reporting: Indonesian evidence. *Managerial Auditing Journal 27*(4), 403–424. Article publication date: 13 April 2012.

Janvrin, D., P. Caster, and R. J. Elder (2010). Enforcement release evidence on the audit confirmation process: Implications for standard setters. *Research in Accounting Regulation 22*(1), 1–17.

Jensen, M. C. and W. H. Meckling (1976). Theory of the firm: managerial behavior, agency costs and ownership structure. *Journal of Financial Economics 3*(4), 305–360.

Jia, Y. and X. Gao (2023). Auditor changes and management's issuance of earnings forecasts. *Contemporary Accounting Research 40*(1).

Kane, G. C., D. Palmer, A. N. Phillips, D. Kiron, and N. Buckley (2016). Aligning the organization for its digital future. *MIT Sloan Management Review 58*(1), 1–29.

Khurana, I. K. and K. Raman (2004). Litigation risk and the financial reporting credibility of big 4 versus non-big 4 audits: Evidence from anglo-american countries. *The Accounting Review 79*(2), 473–495.

Kokina, J. and T. H. Davenport (2017). The emergence of artificial intelligence: How automation is changing auditing. *Journal of Emerging Technologies in Accounting 14*(1), 115–122.

Kothari, S. P., A. J. Leone, and C. E. Wasley (2005). Performance matched discretionary accrual measures. *Journal of Accounting and Economics 39*(1), 163–197.

Krishnan, G. V. (2003). Does big 6 auditor industry expertise constrain earnings management? *Accounting Horizons 17*(Supplement), 1–16.

Krishnan, J., Y. Wen, and W. Zhao (2011). Legal expertise on corporate audit committees and financial reporting quality. *The Accounting Review 86*(6), 2099–2130.

Lamboglia, R., D. Lavorato, E. Scornavacca, and S. Za (2020). Exploring the relationship between audit and technology: A bibliometric analysis. *Meditari Accountancy Research 29*(5), 1233–1260.

Lawrence, A., M. Minutti-Meza, and P. Zhang (2011). Can big 4 versus non-big 4 differences in audit-quality proxies be attributed to client characteristics? *The Accounting Review 86*(1), 259–286.

Lee, S. W., J. Pinto, D. Rabetti, and G. Sadka (2024). Blockchain-induced supply chain transparency and firm performance: The role of capacity utilization.

Lennox, C. and B. Li (2012). The consequences of protecting audit partners' personal assets from the threat of liability. *Journal of Accounting and Economics 54*, 154–173.

Lennox, C. and J. Wu (2022). A review of china-related accounting research in the past 25 years. *Journal of Accounting and Economics 74*(2–3), 101539.

Lennox, C. S. and X. Wu (2018). A review of the archival literature on audit partners. *Accounting Horizons 32*(2), 1–35.

Leuz, C. and P. D. Wysocki (2016). The economics of disclosure and financial reporting regulation: Evidence and suggestions for future research. *Journal of Accounting Research 54*(2), 525–622.

Li, S., Y. Du, and X. Zhang (2021). Auditor industry expertise and corporate innovation: An analysis based on the management information environment perspective. *Audit Research* (1), 106–115.

Lisic, L. L., L. A. Myers, T. A. Seidel, and J. Zhou (2019). Does audit committee accounting expertise help to promote audit quality? evidence from auditor reporting of internal control weaknesses. *Contemporary Accounting Research 36*(4), 2521–2553.

Liu, X., G. J. Lobo, and H. C. Yu (2021). Is audit committee equity compensation related to audit fees? *Contemporary Accounting Research 38*(1), 740–769.

Lou, Y. (2024). Analysis of the reasons for bank confirmation failures and optimization strategies: Based on the csrc administrative penalty decisions from 2014 to 2023. *China Certified Public Accountant 2*, 77–81.

Lowe, D. J., J. L. Bierstaker, D. J. Janvrin, and J. G. Jenkins (2018). Information technology in an audit context: Have the big 4 lost their advantage? *Journal of Information Systems 32*(1), 87–107.

Luo, M. and S. Yu (2024). Financial reporting for cryptocurrency. *Review of Accounting Studies 29*, 1707–1740.

Lyandres, E., B. Palazzo, and D. Rabetti (2022). ICO success and post-ICO performance. *Management Science 68*(12), 8658–8679.

Michas, P. N. (2011). The importance of audit profession development in emerging market countries. *The Accounting Review 86*(5), 1731–1764.

Moore, A. (2024). Blockchain supply chain technology and corporate disclosure. *Working Paper*.

Myers, L. A., R. Schmardebeck, and S. Slavov (2021). Audit committee chair succession and financial reporting quality: Does firm-specific knowledge matter? *Working Paper*.

Omer, T. C., M. K. Shelley, and F. M. Tice (2020). Do director networks matter for financial reporting quality? evidence from audit committee connectedness and restatements. *Management Science 66*(8), 3361–3388.

Palmrose, Z.-V. (1988). An analysis of auditor litigation and audit service quality. *The Accounting Review 63*(1), 55–73.

Pan, Y., N. Shroff, and P. Zhang (2023). The dark side of audit market competition. *Journal of Accounting and Economics 75*(1), 101520.

Parlour, C. A. (2023). How safe is DeFi? Systemic risk and fragility. Key Note Talk at the 2023 Global AI Finance Research Conference.

Phillips, M., M. Leising, A. Harris, and B. Businessweek (2012). Why did it take 20 years to catch this man? *Bloomberg Businessweek* (July 30-August 5), 24–25.

Pincus, M., F. Tian, P. Wellmeyer, and S. X. Xu (2017). Do clients' enterprise systems affect audit quality and efficiency? *Contemporary Accounting Research 34*(4), 1975–2021.

Rajgopal, S., S. Srinivasan, and X. Zheng (2021). Measuring audit quality. *Review of Accounting Studies 26*(2), 559–619.

Raschke, R. L., A. Saiewitz, P. Kachroo, and J. B. Lennard (2018). Ai-enhanced audit inquiry: A research note. *Journal of Emerging Technologies in Accounting 15*(2), 111–116.

Reichelt, K. J. and D. Wang (2010). National and office-specific measures of auditor industry expertise and effects on audit quality. *Journal of Accounting Research 48*(3), 647–686.

Schmidt, C. G. and S. M. Wagner (2019). Blockchain and supply chain relations: A transaction cost theory perspective. *Journal of Purchasing and Supply Management 25*(4), 100552.

Simunic, D. A. (1980). The pricing of audit services: Theory and evidence. *Journal of Accounting Research 18*, 161–190.

Skinner, D. J. and S. Srinivasan (2012). Audit quality and auditor reputation: Evidence from japan. *The Accounting Review 87*(5), 1737–1765.

Song, H., W. Wen, M. Yu, and Y. Gu (2023). Research on the full lifecycle management of administrative and institutional state-owned assets based on blockchain. *Accounting Research 5*, 137–150.

Song, X. and J. Mao (2022). Research on the process of inter-organizational trust building based on blockchain: A case study of digital supply chain finance models. *China Industrial Economics 11*, 174–192.

Spence, M. (1973). Job market signaling. *The Quarterly Journal of Economics 87*(3), 355–374.

Sutton, S. G., V. Arnold, and M. Holt (2018). How much automation is too much? keeping the human relevant in knowledge work. *Journal of Emerging Technologies in Accounting 15*(2), 15–25.

Thottoli, M. M., E. R. Ahmed, and K. V. Thomas (2022). Emerging technology and auditing practice: Analysis for future directions. *European Journal of Management Studies 27*(1), 99–119.

Tiberius, V. and S. Hirth (2019). Impacts of digitization on auditing: A delphi study for germany. *Journal of International Accounting, Auditing and Taxation 37*, 100288.

Wang, Q., T. J. Wong, and L. Xia (2008). State ownership, the institutional environment, and auditor choice: Evidence from china. *Journal of Accounting and Economics 46*(1), 112–134.

Wei, C. (2014). Auditor industry expertise and client tax avoidance. *Auditing Research 2*, 74–83.

Zerni, M. (2012). Audit partner specialization and audit fees: Some evidence from sweden. *Contemporary Accounting Research 29*(1), 312–340.

Zhang, C. (2016). The effectiveness of corporate information disclosure on investor protection: An empirical analysis of annual report disclosures of chinese listed companies from 2001 to 2013. *Economic Review* (1), 132–146.

Figures

Figure 1. Framework.
The figure depicts the workflow of the bank confirmation process that engages three primary stakeholders: the audited entity, banking institutions, and the accounting firm.

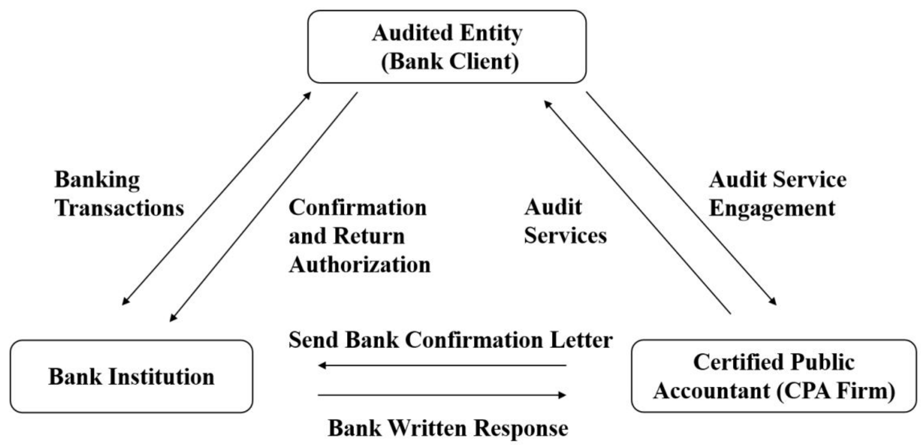


Figure 2. Business Interactions.
This figure depicts business interactions with the blockchain platform.

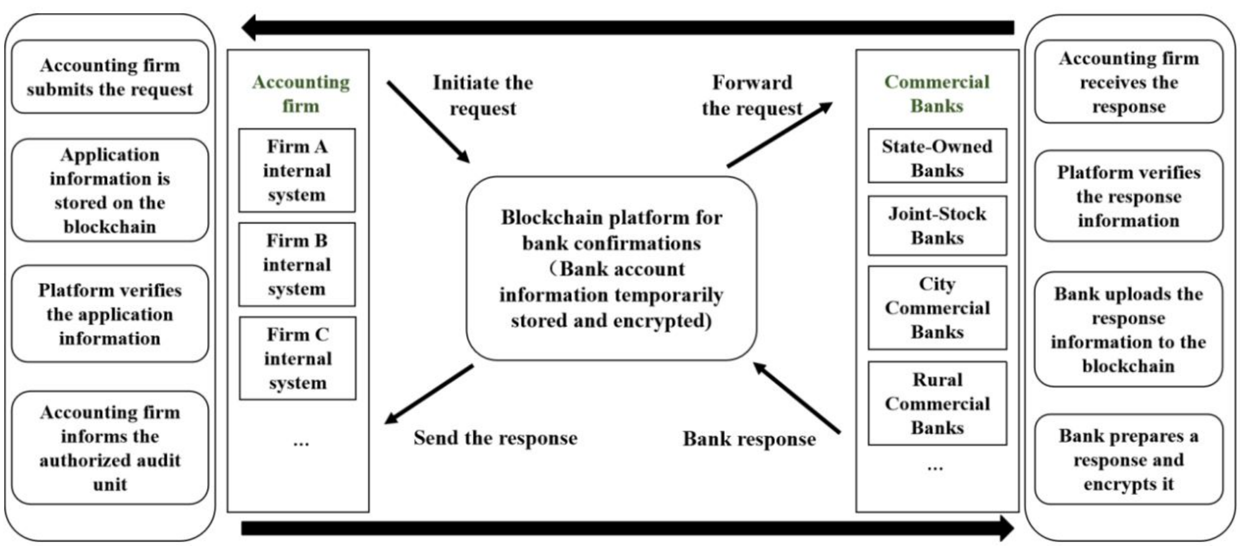
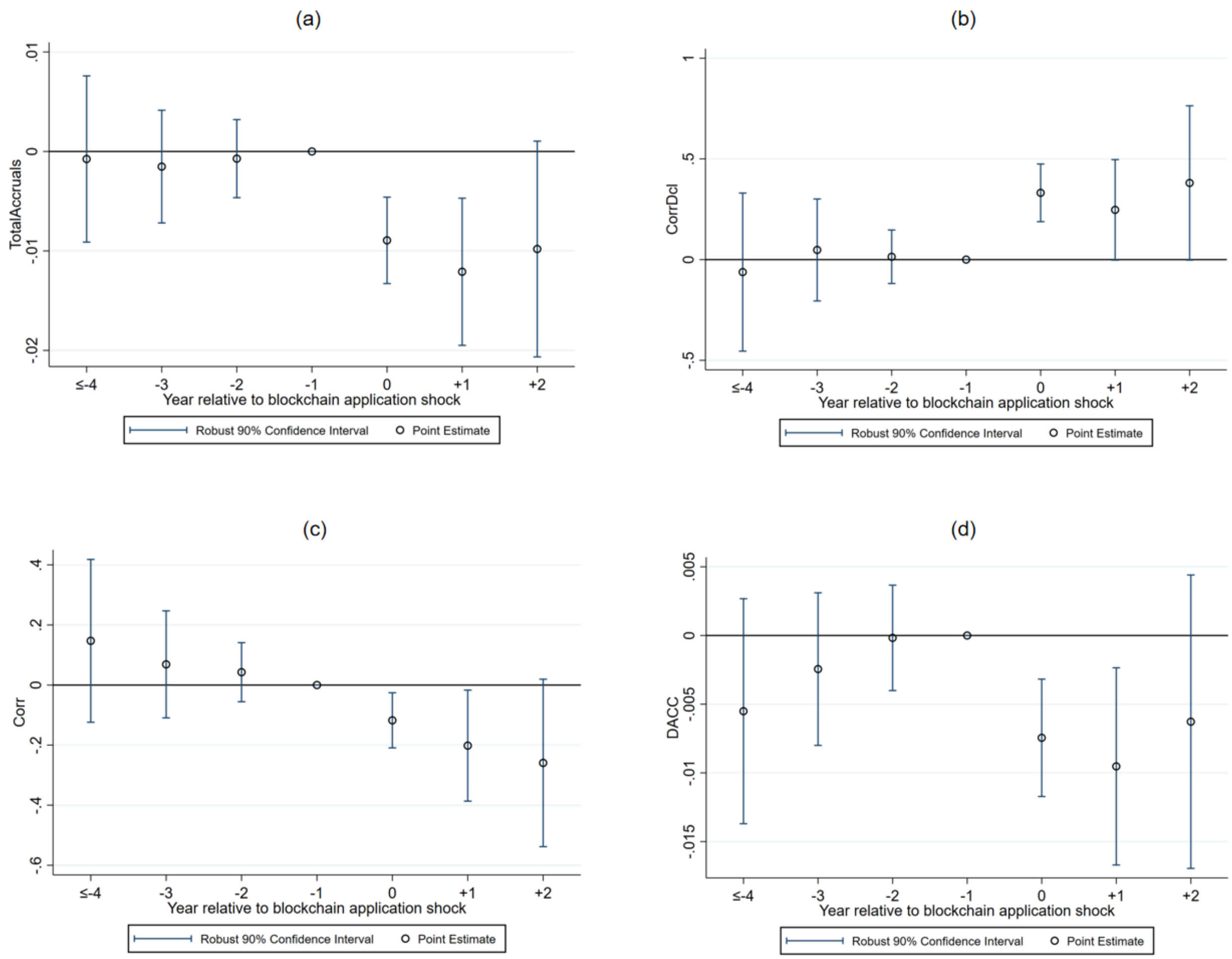


Figure 3. Parallel Trends.
This figure shows a visual DiD examination of the effect of the blockchain-based confirmation platform application on firms' correction of accounting errors (i.e., financial restatement) for the treatment sample relative to the control sample from two years before the shock three years after. Panel (a) depicts the dynamic effects of the shock on total error correction . Panel (b) depicts the dynamic effects of the shock on error correction that is not delayed. Panel (c) depicts the dynamic effects of the shock on error correction that is delayed. Panel (d) depicts the dynamic effects of the shock on error correction for annual reports. Panel (d) depicts the dynamic effects of the shock on error correction for quarterly reports.



Tables

Table 1. Sample distribution. This table reports the distribution of accounting firms and banking institutions on different blockchain-based bank confirmation platforms in China (platforms established by China Banking Association, China Internet Finance Association, and China Financial Certification Authority, respectively).

Panel A

	Accounting Firms				Banking Institutions			
	China Banking Association		China Internet Finance Association	China Financial Certification Authority	China Banking Association		China Internet Finance Association	China Financial Certification Authority
Year	**N**	**%**	**N**	**N**	**N**	**%**	**N**	**N**
2021	12	2.12	-	-	1	0.93	-	-
2022	141	24.96	-	-	21	19.44	-	-
2023	118	20.88	-	-	55	50.93	-	-
2024/09	294	52.04	-	-	31	28.70	-	-
Total	565	100	251	118	108	100	1,769	301

Panel B

	China Banking Association		China Internet Finance Association		China Financial Certification Authority	
Banking Institutions	**N**	**%**	**N**	**%**	**N**	**%**
Commercial Banks	87	80.56%	48	2.71%	77	25.58%
Village Banks	14	12.96%	327	18.49%	94	31.23%
Rural Commercial Banks	1	0.93%	1120	63.31%	58	19.27%
Rural Cooperative Banks	0	0.00%	19	1.07%	3	1.00%
Rural Credit Cooperatives	1	0.93%	255	14.41%	68	22.59%
Finance Companies	5	4.63%	0	0.00%	1	0.33%
Total	108	100%	1,769	100%	301	100%

Table 2. Summary statistics. This table reports summary statistics of the main variables included in the analysis. The sample consists of observations from 1,617 publicly traded companies in the Chinese A-share market from 2018 to 2023. *Accrual*, is calculated as operating income minus net cash flows from operations, scaled by total assets at the beginning of the year. *DAccrual*, is discretionary accruals estimated by the cross-sectional modified Jones model (Jones, 1991; Kothari et al. (2005); DeFond and Zhang (2014)). *Correction_after*, is the total number of restated accounting items over two years after the release of financial reports in year t. *Correction_before*, is the total number of restated accounting items over two years prior to the release of financial reports in year t. *PostTreated*, is an indicator variable that equals one for firm-years where both the audit firm and bank adopt the blockchain platform and years afterwards, and 0 othewise. *Size*, is the natural log of total assets as of the end of fiscal year t. *Leverage*, is the total debt divided by total assets as of the end of fiscal year t. *Issuance*, is the proportion of equity and debt issued by the company in year t relative to total assets. *Top10*, is an indicator variable that equals one for top 10 audit firms in China, and 0 otherwise. *MTB*, is the market-to-book ratio, measured as the market value of equity divided by the book value of equity as of the end of fiscal year t. *CFO*, is calculated as net cash flows from operations scaled by total assets as of the end of fiscal year t. *ChangeSales*, is the annual change in sales revenue as of the end of fiscal year t scaled by lagged sales revenue. *Loss*, is an indicator variable that equals 1 if the firm has negative income before extraordinary items in the year t-1 and 0 otherwise. *ROA*, is the return on assets calculated as net income scaled by total assets as of the end of fiscal year t. *AuditFee*, is the audit fees scaled by total fees paid to an audit firm. *InternalControl*, is an indicator variable that equals 1 if the firm has valid internal controls based on its internal control evaluation reports, and 0 otherwise. *Foreign*, is the portion of oversea revenue divided by total revenues. All continuous variables are winsorized at the 1% and 99% levels. Appendix B provides further details on all variables used in this study.

Variable	**N**	**Mean**	**SD**	**Min**	**p25**	**Median**	**p75**	**Max**
Accrual	6306	−0.015	0.074	−0.257	−0.052	−0.015	0.022	0.222
DAccrual	6,306	−0.003	0.066	−0.221	−0.036	−0.001	0.033	0.181
Correction_after	5,025	0.160	0.635	0.000	0.000	0.000	0.000	4.400
Correction_before	5,025	0.114	0.603	0.000	0.000	0.000	0.000	4.700
PostTreated	6,306	0.346	0.476	0.000	0.000	0.000	1.000	1.000
Size	6,306	22.680	1.203	20.287	21.832	22.554	23.416	26.186
Leverage	6,306	0.479	0.187	0.102	0.343	0.477	0.608	0.936
Issuance	6,306	0.001	0.009	0.000	0.000	0.000	0.000	0.073
Top10	6,306	0.501	0.500	0.000	0.000	1.000	1.000	1.000
MTB	6,306	0.003	0.003	0.000	0.001	0.002	0.003	0.019
CFO	6,306	0.051	0.063	−0.141	0.016	0.049	0.085	0.240
ChangeSales	6,306	0.061	0.186	−0.458	−0.027	0.037	0.121	0.915
Loss	6,306	0.125	0.331	0.000	0.000	0.000	0.000	1.000
ROA	5,025	0.025	0.076	−0.387	0.008	0.031	0.061	0.201
AuditFee	5,025	0.858	0.126	0.591	0.753	0.840	1.000	1.000
InternalControl	5,025	0.989	0.104	0.000	1.000	1.000	1.000	1.000
Foreign	5,025	0.160	0.223	0.000	0.000	0.049	0.246	0.911

Table 3. Blockchain Adoption and Audit Quality. The table represents the DiD coefficients for the following regression:

$$\text{AuditQuality}_{it} = \alpha + \beta_1 \text{PostTreated}_{it} + \theta_{it} + \Lambda_{it} + \epsilon_{it}$$

The outcome variables are *Correction_after*, *Correction_before*, *Accrual* and *DAccrual*. *Correction_after* is the total number of restated accounting items over two years after the release of financial reports in year t. *Correction_before* is the total number of restated accounting items over two years prior to the release of financial reports in year t. *Accrual* is calculated as operating income minus net cash flows from operations, scaled by total assets at the beginning of the year. *DAccrual* is discretionary accruals estimated by the cross-sectional modified Jones model. The main independent variable is *PostTreated*, which is an indicator variable that equals one for firm-years where both the audit firm and bank adopt the blockchain platform and years afterwards, and 0 othewise. We include bank, audit firm, firm and year fixed effects. The Appendix provides all other variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are in parentheses, with standard errors clustered at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Financial Errors

	Correction _after	**Correction _after**	**Correction _after**	**Correction _before**	**Correction _before**	**Correction _before**
Variable of interest:	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
PostTreated	-0.072^{**}	-0.087^{***}	-0.076^{**}	0.075^{**}	0.075^{**}	0.074^{*}
	(−2.29)	(−2.75)	(−2.44)	(1.98)	(2.04)	(1.94)
Controls:						
Size	0.006	0.021	0.015	0.010	−0.006	0.004
	(0.08)	(0.29)	(0.20)	(0.18)	(−0.10)	(0.07)
Leverage	0.262	0.184	0.236	0.210	0.228	0.229
	(1.51)	(0.99)	(1.33)	(1.39)	(1.44)	(1.43)
Issuance	0.879	0.955	0.812	0.734	0.683	0.671
	(0.89)	(0.95)	(0.79)	(0.78)	(0.76)	(0.72)
Top10	0.006	−0.027	0.007	−0.033	−0.031	−0.032
	(0.22)	(−1.05)	(0.26)	(−1.24)	(−1.33)	(−1.20)
MTB	−1.254	3.425	−0.818	1.423	5.130	2.283
	(−0.21)	(0.49)	(−0.14)	(0.23)	(0.89)	(0.36)
ROA	-0.688^{***}	-0.827^{***}	-0.724^{***}	0.014	−0.035	0.003
	(−2.87)	(−3.07)	(−2.93)	(0.08)	(−0.19)	(0.02)
AuditFee	−0.007	0.027	−0.000	0.023	0.027	0.026
	(−0.03)	(0.12)	(−0.00)	(0.14)	(0.15)	(0.15)
InternalControl	-0.390^{**}	-0.311^{*}	-0.345^{*}	−0.132	−0.114	−0.123
	(−2.13)	(−1.68)	(−1.94)	(−0.94)	(−0.79)	(−0.88)
Foreign	−0.154	−0.162	−0.155	−0.086	−0.087	−0.053
	(−0.77)	(−0.78)	(−0.75)	(−0.49)	(−0.49)	(−0.30)
Bank FE	No	Yes	Yes	No	Yes	Yes
Audit Firm FE	Yes	No	Yes	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	5,025	5,025	5,025	5,025	5,025	5,025
Adj. r^2	0.211	0.187	0.211	0.056	0.052	0.059

Table 3—Continuation. Panel B.

Panel B: Discretionary Accounts

Panel B	**Accrual**	**Accrual**	**Accrual**	**DAccrual**	**DAccrual**	**DAccrual**
Variable of interest:	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
PostTreated	−0.006**	−0.008***	−0.008***	−0.006**	−0.007***	−0.007***
	(−2.066)	(−2.862)	(−2.835)	(−2.216)	(−2.884)	(−2.756)
Controls:						
Size	0.054***	0.055***	0.056***	0.045***	0.046***	0.047***
	(8.677)	(8.586)	(8.660)	(8.566)	(8.494)	(8.868)
Leverage	−0.345***	−0.348***	−0.348***	−0.285***	−0.290***	−0.292***
	(−20.574)	(−19.469)	(−20.326)	(−18.232)	(−17.866)	(−18.703)
Issuance	0.173*	0.172*	0.171*	0.193**	0.181*	0.188**
	(1.738)	(1.742)	(1.687)	(2.074)	(1.916)	(1.966)
Top10	0.005**	0.004*	0.005**	0.003	0.002	0.003
	(2.046)	(1.925)	(2.087)	(1.459)	(0.878)	(1.458)
MTB	4.192***	4.063***	4.071***	3.347***	3.330***	3.345***
	(6.020)	(5.767)	(5.831)	(5.418)	(5.483)	(5.568)
CFO	−0.860***	−0.868***	−0.869***	−0.766***	−0.776***	−0.777***
	(−38.180)	(−38.318)	(−38.683)	(−38.342)	(−38.471)	(−39.199)
ChangeSales	0.062***	0.063***	0.063***	0.019***	0.020***	0.020***
	(9.167)	(9.211)	(9.263)	(3.421)	(3.653)	(3.598)
Loss	0.015***	0.015***	0.016***	0.014***	0.015***	0.015***
	(4.987)	(4.659)	(5.132)	(5.081)	(4.900)	(5.269)
Bank FE	No	Yes	Yes	No	Yes	Yes
Audit Firm FE	Yes	No	Yes	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	6,306	6,306	6,306	6,306	6,306	6,306
Adj. r^2	0.607	0.609	0.612	0.549	0.552	0.558

Table 4. Placebo tests. The table presents the placebo effect of the adoption of blockchain platform on accrualbased earnings management and financial error correction. In Panel A, the treatment years are replaced by pre-treatment 2 years. In Panel B, the treatment sample is replaced by companies whose related banks established Centralized Bank Confirmation Processing Center instead of using blockchain-based bank confirmation platform. We include audit firm, firm and year fixed effects. The Appendix provides all other variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are in parentheses, with standard errors clustered at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Pseudo Adoption Year (Pre-treatment 2 years)

	Accrual	**DAccrual**	**Correction_after**	**Correction_before**
	(1)	**(2)**	**(3)**	**(4)**
PostTreated	0.005*	0.006**	0.041	−0.053
	(1.883)	(2.267)	(1.00)	(−1.337)
Controls	Yes	Yes	Yes	Yes
Bank FE	No	No	No	No
Audit Firm FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	6,306	6,306	5,025	5,025
Adj. r^2	0.607	0.549	0.210	0.056

Panel B: Pseudo Treatment (Centralized Bank Confirmation Processing Center)

	Accrual	**DAccrual**	**Correction_after**	**Correction_before**
Pseudo_Treat_Platform	−0.001	−0.001	0.024	−0.054*
	(−0.375)	(−0.468)	(0.62)	(−1.88)
Controls	Yes	Yes	Yes	Yes
Bank FE	No	No	No	No
Audit Firm FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	6,306	6,306	5,025	5,025
Adj. r^2	0.607	0.549	0.210	0.056

Table 5. Blockchain Adoption and Financial Restatement Consequences. This table reports estimates for the following DiD regression:

$$\text{Restatement}_{it} = \alpha + \beta_1 \text{PostTreated}_{it} + \theta_{it} + \Lambda_{it} + \epsilon_{it}$$

The outcome variables are *Exposed*, *Penalty*, *RestatementUp* and *RestatementDown*. *Exposed* is an indicator variable that equals one if the restatements of year t's financial reports are exposed by media or disclosed by regulatory agencies, and 0 otherwise. *Penalty* is an indicator variable that equals one if the restatements of year t's financial reports are penalized by regulators, and 0 otherwise. *RestatementUp* is an indicator variable that equals one if a company adjusts earnings upward for the restated financial statements, and 0 otherwise. *RestatementDown* is an indicator variable that equals one if a company adjusts earnings downward for the restated financial statements, and 0 otherwise. The main independent variable is *PostTreated*, which is an indicator variable that equals one for firm-years where both the audit firm and bank adopt the blockchain platform and years afterwards, and 0 othewise. We include audit firm, firm and year fixed effects. The Appendix provides all other variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are in parentheses, with standard errors clustered at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Exposed	**Penalty**	**RestatementUp**	**RestatementDown**
Variable of interest:	**(1)**	**(2)**	**(3)**	**(4)**
PostTreated	−0.010*	−0.009*	−0.001	−0.020***
	(−1.86)	(−1.75)	(−0.17)	(−2.69)
Controls:				
Size	−0.007	−0.005	−0.007	−0.002
	(−0.76)	(−0.62)	(−1.00)	(−0.21)
Leverage	0.047	0.023	0.021	0.041
	(1.31)	(0.74)	(0.67)	(1.04)
Issuance	0.122	0.104	−0.017	0.389
	(1.16)	(1.01)	(−0.08)	(1.52)
Top10	−0.000	0.001	0.001	0.004
	(−0.08)	(0.34)	(0.41)	(0.69)
MTB	−1.222	−1.261	1.151	−1.430
	(−1.09)	(−1.16)	(1.08)	(−1.00)
ROA	0.050	0.020	0.024	0.010
	(1.09)	(0.48)	(0.75)	(0.20)
AuditFee	−0.006	−0.019	0.014	−0.025
	(−0.27)	(−1.06)	(0.90)	(−0.64)
InternalControl	0.022	−0.002	−0.022	0.010
	(0.70)	(−0.07)	(−1.03)	(0.33)
Foreign	0.042	0.028	0.025**	0.088*
	(1.21)	(0.87)	(1.99)	(1.95)
Bank FE	No	No	No	No
Audit Firm FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	5,025	5,025	5,025	5,025
Adj. r^2	0.553	0.536	0.330	0.516

Table 6. Blockchain Adoption and Financial Restatements. This table reports estimates for the following DiD regression:

$$\text{Restatement}_{it} = \alpha + \beta_1 \text{PostTreated}_{it} + \theta_{it} + \Lambda_{it} + \epsilon_{it}$$

In Panel A, the outcome variables are the number of times that each item is restated over two years after the release of financial reports in year t (*Item1_before-Item5_before*; *Item19_before-Item20_before*). In panel B, the number of restatements are calculated based on the number of restatements for past financial reports (instead of the number of times one financial report is restated after its release). The outcome variables are the number of times that each item is restated over two years before the release of financial reports in year t (*Item1_after-Item5_after*; *Item19_after-Item20_after*). Definitions of each financial item (Item_1-Item_21) are listed in Appendix C. The main independent variable is *PostTreated*, which is an indicator variable that equals one for firm-years where both the audit firm and bank adopt the blockchain platform and years afterwards, and 0 othewise. We include audit firm, firm and year fixed effects. The Appendix provides all other variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are in parentheses, with standard errors clustered at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Financial Restatements (Several Accounts)

	Item1_after	**Item2_after**	**Item3_after**	**Item4_after**	**Item5_after**	**Item19_after**	**Item20_after**
Variable of interest:	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
PostTreated	-0.030^{***}	-0.018^{*}	-0.024^{**}	-0.013	-0.004	-0.024^{**}	-0.031^{***}
	(-2.64)	(-1.90)	(-2.20)	(-1.58)	(-0.97)	(-2.45)	(-3.16)
Controls:							
Size	-0.023	-0.015	-0.001	0.010	0.010	-0.014	-0.001
	(-1.40)	(-1.07)	(-0.09)	(0.74)	(0.96)	(-1.04)	(-0.04)
Leverage	0.079	0.029	0.079	-0.018	0.011	0.052	0.031
	(1.37)	(0.59)	(1.37)	(-0.52)	(0.30)	(1.06)	(0.72)
Issuance	0.111	-0.177	0.237	-0.297^{**}	-0.250^{**}	0.500^{*}	0.305
	(0.31)	(-0.75)	(0.80)	(-2.12)	(-2.04)	(1.74)	(1.42)
Top10	0.007	0.001	0.001	-0.001	0.002	0.002	-0.001
	(0.87)	(0.12)	(0.11)	(-0.12)	(0.42)	(0.31)	(-0.22)
MTB	-0.068	-0.233	1.954	-1.225	-0.285	0.782	1.615
	(-0.03)	(-0.15)	(0.91)	(-0.85)	(-0.25)	(0.44)	(1.13)
ROA	-0.030	0.023	-0.043	0.002	0.027	-0.093	-0.014
	(-0.39)	(0.38)	(-0.56)	(0.04)	(0.53)	(-1.50)	(-0.27)
AuditFee	-0.037	-0.073	-0.037	-0.036	0.037^{*}	-0.066	-0.036
	(-0.63)	(-1.41)	(-0.68)	(-1.14)	(1.85)	(-1.18)	(-0.74)
InternalControl	-0.051	-0.079	-0.119^{*}	-0.042	-0.007	-0.070	-0.039
	(-0.85)	(-1.59)	(-1.75)	(-0.80)	(-0.15)	(-1.43)	(-0.87)
Foreign	0.045	0.049	0.127^{**}	0.005	-0.000	0.134^{**}	0.129^{**}
	(0.89)	(1.02)	(2.53)	(0.14)	(-0.01)	(2.58)	(2.47)
Bank FE	No	No	No	No	No	No	No
Audit Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	5,025	5,025	5,025	5,025	5,025	5,025	5,025
Adj.r^2	0.235	0.258	0.211	0.170	0.129	0.284	0.260

Table 6—Continuation. Panel B.

Panel B: Past Financial Restatements (Several Accounts)

	Item1 _before	**Item2 _before**	**Item3 _before**	**Item4 _before**	**Item5 _before**	**Item19 _before**	**Item20 _before**
Variable of interest:	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
PostTreated	0.049**	0.015	0.010	−0.006	0.010	0.005	−0.009
	(2.57)	(1.46)	(0.52)	(−0.62)	(0.98)	(0.48)	(−0.82)
Controls:							
Size	−0.021	−0.006	−0.008	0.005	0.037**	−0.028**	−0.017
	(−0.81)	(−0.53)	(−0.31)	(0.33)	(2.13)	(−2.34)	(−1.56)
Leverage	0.078	0.010	0.134*	0.013	−0.001	0.111***	0.099***
	(0.96)	(0.27)	(1.65)	(0.28)	(−0.03)	(2.78)	(2.63)
Issuance	−0.297	−0.129	0.292	0.111	−0.234	−0.046	0.154
	(−0.44)	(−0.41)	(0.54)	(0.37)	(−0.82)	(−0.30)	(1.31)
Top10	−0.025	−0.012	−0.030*	−0.005	0.000	−0.014	−0.014
	(−1.41)	(−1.33)	(−1.74)	(−0.53)	(0.04)	(−1.62)	(−1.60)
MTB	1.378	1.960	2.928	0.910	0.133	1.000	−0.468
	(0.34)	(0.94)	(0.67)	(0.38)	(0.08)	(0.47)	(−0.25)
ROA	−0.300*	−0.104	−0.214	0.023	−0.048	−0.093	−0.014
	(−1.94)	(−1.52)	(−1.51)	(0.37)	(−0.63)	(−1.50)	(−0.27)
AuditFee	0.097	0.023	0.092	−0.026	−0.006	0.103**	0.111***
	(1.05)	(0.48)	(1.05)	(−0.64)	(−0.11)	(2.20)	(2.71)
InternalControl	−0.108	−0.079	−0.109	0.004	−0.013	−0.058	0.007
	(−0.80)	(−1.22)	(−0.81)	(0.06)	(−0.21)	(−1.20)	(0.24)
Foreign	−0.028	0.043	−0.083	0.005	−0.032	0.019	0.055
	(−0.28)	(0.89)	(−0.79)	(0.12)	(−0.56)	(0.46)	(1.21)
Bank FE	No	No	No	No	No	No	No
Audit Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	5,025	5,025	5,025	5,025	5,025	5,025	5,025
Adj.r^2	0.100	0.125	0.076	0.085	0.105	0.085	0.094

Table 7. Blockchain Adoption and Unmodified Audit Opinion. The table represents the DiD coefficients for the following regression:

$$\text{UAO}_{it} = \alpha + \beta_1 \text{PostTreated}_{it} + \theta_{it} + \Lambda_{it} + \epsilon_{it}$$

The outcome variable is Unmodified Audit Opinion (*UAO*), which is an indicator variable that equals one when a client receives an unqualified opinion without explanatory notes or disclaimers for year t's financial statements, and 0 otherwise. The main independent variable is *PostTreated*, which is an indicator variable that equals one for firm-years where both the audit firm and bank adopt the blockchain platform and years afterwards, and 0 othewise. We include audit firm, firm and year fixed effects. The Appendix provides all other variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are in parentheses, with standard errors clustered at the industry level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Unmodified Audit Opinion (UAO)		
Variable of interest:	**(1)**	**(2)**	**(3)**
PostTreated	0.036***	0.041***	0.038***
	(2.961)	(4.589)	(4.650)
Controls:			
Size	0.063***	0.049***	0.053**
	(3.945)	(3.033)	(2.863)
Leverage	−0.448**	−0.374*	−0.403**
	(−2.643)	(−2.114)	(−2.520)
Issuance	0.088	0.012	0.104
	(0.515)	(0.063)	(0.567)
Top10	0.008	0.006	0.007
	(0.701)	(0.780)	(0.516)
ROA	0.735***	0.649***	0.652***
	(5.890)	(3.654)	(3.742)
AuditFee	−0.101	−0.091	−0.093
	(−1.104)	(−0.950)	(−1.187)
InternalControl	0.592***	0.596***	0.608***
	(12.045)	(12.370)	(12.857)
OScore	0.025	0.018	0.020
	(1.477)	(0.951)	(1.148)
ChangeLev	0.122***	0.110**	0.119**
	(2.977)	(2.300)	(2.772)
CFO	0.052	0.056	0.025
	(0.444)	(0.476)	(0.244)
ChangeSales	0.023	0.020	0.022
	(1.656)	(1.341)	(1.220)
Loss	−0.014	−0.012	−0.014
	(−0.513)	(−0.471)	(−0.536)
Bank FE	No	Yes	Yes
Audit Firm FE	Yes	No	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	3,652	3,652	3,652
Adj.r^2	0.471	0.482	0.497

Table 8. Cross-Sectional Tests. Panel A: Audit Firm Industry Specialization. The table presents the DiD regression results when conditioning on audit firms' industry specialization. Audit firms with industry specialization and audit firms without specialization are divided based on audit firms' industry market share (MarketShare). MarketShare above the 90th percentile is considered as auditors with industry specialization. The Appendix provides all other variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are in parentheses, with standard errors clustered at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Audit firm industry specializations

	Accrual (1)	**DAccrual** (2)	**Correction_after** (3)	**Correction_before** (4)
	Sub-panel A1 (with industry specialization)			
PostTreated	0.011	0.007	0.035	0.038
	(0.967)	(0.553)	(0.60)	(0.61)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Audit Firm FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	391	391	363	363
Adj. r^2	0.626	0.447	0.539	0.067
	Sub-panel A2 (w/o industry specialization)			
PostTreated	−0.008**	−0.007**	−0.089**	0.071
	(−2.408)	(−2.333)	(−2.18)	(1.09)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Audit Firm FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	4,867	4,867	3,875	3,875
Adj. r^2	0.628	0.581	0.318	0.034

Table 8—Continuation. Panel B: Audit Firm Size. The table presents the DiD regression results when conditioning on whether audit firms are among the international big four. The Appendix provides all other variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are in parentheses, with standard errors clustered at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel B: Audit Firm Size

	Accrual (1)	**DAccrual** (2)	**Correction_after** (3)	**Correction_before** (4)
Sub-panel B1: Big Four				
PostTreated	0.004	−0.008	0.017	0.002
	(0.428)	(−0.957)	(0.61)	(0.03)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Audit Firm FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	353	353	311	311
Adj. r^2	0.690	0.630	0.279	0.024
Sub-panel B2: Not Big Four				
PostTreated	−0.007**	−0.007**	−0.078**	0.120**
	(−2.559)	(−2.462)	(−2.11)	(2.00)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Audit Firm FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	5,931	5,931	4,694	4,694
Adj. r^2	0.610	0.558	0.338	0.041

Table 8—Continuation. Panel C: Audit Firm Rotation. The table presents the DiD regression results when conditioning on audit firm rotation. The Appendix provides all other variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are in parentheses, with standard errors clustered at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel C: Audit Firm Rotation

	Accrual (1)	**DAccrual** (2)	**Correction_after** (3)	**Correction_before** (4)
Sub-panel C1: Audit Firm (Rotated)				
PostTreated	0.004	−0.003	0.987	0.846
	(0.099)	(−0.077)	(0.44)	(0.90)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Audit Firm FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	164	164	134	134
Adj. r^2	0.604	0.592	0.517	0.018
Sub-panel C2: Audit Firm (Not Rotated)				
PostTreated	−0.008***	−0.008***	−0.073*	0.121**
	(−2.891)	(−2.687)	(−1.77)	(1.98)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Audit Firm FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	4,859	4,859	3,923	3,923
Adj. r^2	0.646	0.582	0.317	0.092

Table 8—Continuation. Panel D: Ownership Structure. The table presents the DiD regression results when conditioning on firms' ownership structure (SOE). The Appendix provides all other variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are in parentheses, with standard errors clustered at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel D: Ownership Structure

	Accrual (1)	**DAccrual** (2)	**Correction_after** (3)	**Correction_before** (4)
Sub-panel D1: Enterprises (State-Owned)				
PostTreated	—0.008**	—0.007	—0.017	0.200
	(—2.155)	(—1.636)	(—0.20)	(1.54)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Audit Firm FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	2,202	2,202	1,534	1,534
Adj. r^2	0.683	0.618	0.312	0.114
Sub-panel D2: Enterprises (Not State-Owned)				
PostTreated	—0.008*	—0.009**	—0.075*	0.102*
	(—1.961)	(—2.312)	(—1.86)	(1.88)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Audit Firm FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	3,631	3,631	3,104	3,104
Adj. r^2	0.606	0.549	0.367	0.036

Table 8—Continuation. Panel E: Audit Committee Size. The table presents the DiD regression results when conditioning on firms' audit committee size. Large audit committee size and small audit committee size are divided based on the median values. The Appendix provides all other variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are in parentheses, with standard errors clustered at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel E: Audit Committee Size

	Accrual (1)	**DAccrual** (2)	**Correction_after** (3)	**Correction_before** (4)
	Sub-panel E1: Audit Committee (Large)			
PostTreated	−0.002	−0.001	−0.016	0.319**
	(−0.206)	(−0.147)	(−0.19)	(2.37)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Audit Firm FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	761	761	605	605
Adj. r^2	0.693	0.666	0.291	0.270
	Sub-panel E2: Audit Committee (Small)			
PostTreated	−0.009***	−0.009***	−0.092**	0.070
	(−2.868)	(−2.702)	(−2.30)	(1.19)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Audit Firm FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	4,825	4,825	3,877	3,877
Adj. r^2	0.621	0.562	0.334	0.035

Table 8—Continuation. Panel F: Proportion of Independent Directors on the Audit Committee. The table presents the DiD regression results when conditioning on proportion of independent directors on the audit committee. High proportion of independent directors and low proportion of independent directors are divided based on the median values. The Appendix provides all other variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are in parentheses, with standard errors clustered at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel F: Proportion of Independent Directors on the Audit Committee

	Accrual	**DAccrual**	**Correction_after**	**Correction_before**
	(1)	**(2)**	**(3)**	**(4)**
Sub-panel F1: Independent Directors (High Proportion)				
PostTreated	−0.003	−0.006	0.068	−0.052
	(−0.304)	(−0.770)	(0.60)	(−0.55)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Audit Firm FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	2,153	2,153	1,747	1,747
Adj. r^2	0.574	0.529	0.396	0.140
Sub-panel F2: Independent Directors (Low Proportion)				
PostTreated	−0.009***	−0.008**	−0.023	0.149**
	(−2.748)	(−2.535)	(−0.53)	(2.26)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Audit Firm FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	3,408	3,408	2,723	2,723
Adj. r^2	0.683	0.630	0.367	0.079

Table 9. Blockchain Adoption and Audit Fees. The table represents the DiD coefficients for the following regression:

$$\text{AuditFee}_{it} = \alpha + \beta_1 \text{PostTreated}_{it} + \theta_{it} + \Lambda_{it} + \epsilon_{it}$$

The outcome variable is *AuditFee*, which is audit fees scaled by total fees paid to an audit firm. The main independent variable is *PostTreated*, which is an indicator variable that equals one for firm-years where both the audit firm and bank adopt the blockchain platform and years afterwards, and 0 othewise. We include bank, audit firm, firm and year fixed effects. The Appendix provides all other variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are in parentheses, with standard errors clustered at the industry level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	AuditFee		
Variable of interest:	**(1)**	**(2)**	**(3)**
PostTreated	−0.091***	−0.100***	−0.089***
	(−2.979)	(−4.139)	(−3.157)
Controls:			
Size	0.095	0.078	0.084
	(1.378)	(1.155)	(1.308)
Leverage	−0.277	−0.265	−0.263
	(−0.816)	(−0.908)	(−0.857)
Top10	0.068**	0.040	0.070**
	(2.518)	(0.804)	(2.254)
ROA	−0.126	−0.195	−0.192
	(−0.513)	(−0.912)	(−0.843)
ChangeSales	0.089	0.102	0.100
	(0.932)	(1.115)	(1.050)
Loss	0.000	−0.008	−0.001
	(0.022)	(−0.335)	(−0.031)
Foreign	−0.173	−0.100	−0.142
	(−0.963)	(−0.537)	(−0.773)
Current	−0.365	−0.353	−0.387
	(−0.908)	(−0.891)	(−0.984)
Quick	0.030	0.033	0.031
	(0.620)	(0.770)	(0.717)
UAO	−0.068	−0.031	−0.041
	(−0.585)	(−0.277)	(−0.423)
Bank FE	No	Yes	Yes
Audit Firm FE	Yes	No	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	4,872	4,872	4,872
Adj.r^2	0.811	0.809	0.811

Table 10. Blockchain Adoption and Audit Delay. The table represents the DiD coefficients for the following regression:

$$\text{AuditDelay}_{it} = \alpha + \beta_1 \text{PostTreated}_{it} + \theta_{it} + \Lambda_{it} + \epsilon_{it}$$

The outcome variable is $AuditDelay_{i,t}$ (columns (1)-(2)) and $AuditDelay_{i,t+1}$ (columns (3)-(4)). *AuditDelay* is the number of calendar days between the end of the fiscal year and the release date of the company's annual reports, scaled by 365, measured as a number between 0 and 1. The main independent variable is *PostTreated*, which is an indicator variable that equals one for firm-years where both the audit firm and bank adopt the blockchain platform and years afterwards, and 0 othewise. We include bank, audit firm, firm and year fixed effects. The Appendix provides all other variable definitions. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are in parentheses, with standard errors clustered at the industry level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	$\mathbf{AuditDelay_{i,t}}$			$\mathbf{AuditDelay_{i,t+1}}$		
Variable of interest:	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
PostTreated	0.017*	0.008	0.015	−0.033***	−0.031*	−0.032***
	(1.754)	(0.754)	(1.544)	(−4.839)	(−2.080)	(−3.012)
Controls:						
Size	0.117***	0.109***	0.107***	0.122***	0.103***	0.117***
	(7.560)	(5.084)	(4.999)	(8.513)	(7.655)	(8.919)
Leverage	0.170**	0.235***	0.227***	−0.017	0.031	−0.029
	(2.235)	(3.283)	(2.974)	(−0.183)	(0.317)	(−0.313)
Top10	0.011	0.032**	0.012	0.026	0.034**	0.027*
	(0.515)	(2.445)	(0.496)	(1.685)	(2.282)	(1.836)
ROA	−0.767***	−0.696***	−0.718***	−0.078	−0.070	−0.097
	(−6.996)	(−6.442)	(−6.195)	(−0.656)	(−0.669)	(−0.843)
ChangeSales	−0.044	−0.050	−0.047	0.001	0.007	0.009
	(−1.354)	(−1.521)	(−1.534)	(0.063)	(0.429)	(0.480)
Loss	−0.005	−0.009	−0.006	−0.034***	−0.037***	−0.033***
	(−0.609)	(−0.999)	(−0.627)	(−3.560)	(−4.581)	(−3.410)
Foreign	0.177**	0.150**	0.163**	−0.029	−0.021	−0.028
	(2.862)	(2.820)	(2.815)	(−0.392)	(−0.254)	(−0.365)
Current	−0.176	−0.211**	−0.166	−0.221***	−0.227***	−0.232***
	(−1.738)	(−2.162)	(−1.618)	(−3.672)	(−3.384)	(−3.443)
Quick	0.017	0.017	0.017	0.001	0.005	0.005
	(1.435)	(1.229)	(1.375)	(0.111)	(0.599)	(0.515)
UAO	−0.053	−0.060	−0.049	−0.016	−0.007	−0.008
	(−1.466)	(−1.706)	(−1.174)	(−0.970)	(−0.293)	(−0.385)
Bank FE	No	Yes	Yes	No	Yes	Yes
Audit Firm FE	Yes	No	Yes	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	4,212	4,212	4,212	4,212	4,212	4,212
Adj. r^2	0.529	0.531	0.531	0.574	0.575	0.576

Appendix A: Example of Penalty Cases

Bank confirmation penalty cases. This table reports several cases of bank confirmation penalties.

Penalized Entity	Cases
Accounting Firm	In July 2023, the Zhejiang Provincial Department of Finance imposed administrative penalties on CPA Zhu for violations including "failing to control the bank confirmation process."[15]
	Hangzhou Deyi Accounting Firm was disciplined by the Zhejiang Certified Public Accountants Association for failing to carry out confirmation procedures for bank deposits, accounts receivable, and short-term loans without justifying.[16]
Audited Entity	In 2019, listed company Kangde Xin misled the CPA by mixing accrued and real balances through a fund pool business. The China Securities Regulatory Commission (CSRC) required Beijing Bank Xidan Branch to explain whether there was collusion with Kangde's management in fraudulent activities and to assess the internal controls of bank deposits and the confirmation process.[17]
	In June 2016, Shandong Xinlv Food Co., Ltd. falsified 1,054 bank receipts and fabricated RMB 5.47 billion in bank receipts. Zhongxingcai Guanghua Accounting Firm only confirmed 34 out of 44 accounts at the company's normal and closed bank accounts, resulting in a fine of RMB 500,000.[18]
Bank	On June 28, 2022, Xiamen International Bank was fined RMB 13.81 million for 21 illegal activities, including "issuing false confirmation responses to the accounting firm."[19]
	In December 2020, Beijing Bank Xidan Branch was fined RMB 3.5 million for "issuing false confirmation letters and deposit certificates."

Appendix B: Variable Definitions

Variable	Definition
AuditDelay	The number of calendar days between the end of the fiscal year and the release date of the company's annual reports, scaled by 365, measured as a number between 0 and 1.
AuditFee	Audit fees scaled by total fees paid to an audit firm.
Correction_after	The total number of restated accounting items over two years after the release of financial reports in year t.
Correction_before	The total number of restated accounting items over two years prior to the release of financial reports in year t.
Exposed	An indicator variable that equals one if the restatements of year t's financial reports are exposed by media or disclosed by regulatory agencies, and 0 otherwise.
Penalty	An indicator variable that equals one if the restatements of year t's financial reports are penalized by regulators, and 0 otherwise.
RestatementUp	An indicator variable that equals one if a company adjusts earnings upward for the restated financial statements, and 0 otherwise.
RestatementDown	An indicator variable that equals one if a company adjusts earnings downward for the restated financial statements, and 0 otherwise.
Accrual	Calculated as operating income minus net cash flows from operations, scaled by total assets at the beginning of the year.
DAccrual	Discretionary accruals estimated by the cross-sectional modified Jones model.
UAO	An indicator variable that equals one when a client receives an unqualified opinion without explanatory notes or disclaimers for year t's financial statements, and 0 otherwise.
Item1 - Item20_after	The number of times that each item is restated over two years after the release of financial reports in year t. How each restated item corresponds with the bank confirmation contents is shown in Appendix C.
Item1 - Item20_before	The number of times that each item is restated over two years before the release of financial reports in year t. How each restated item corresponds with the bank confirmation contents is shown in Appendix C.
PostTreated	An indicator variable that equals one for firm-years where both the audit firm and bank adopt the blockchain platform and years afterwards, and 0 otherwise.
MarketShare	The market share of the audit firm, calculated as total assets of listed companies audited by audit firm i in industry K/total assets of all listed companies in industry K.
SOE	Equals 1 if the firm is a state-owned enterprise (SOE), and 0 otherwise.
AuditCom	The natural logarithm of the number of members on the company's audit committee.
AuditDir	The ratio of independent directors to the total number of members on the company's audit committee.
Top10	An indicator variable that equals one for top 10 audit firms in China, and 0 otherwise.
Size	The natural log of total assets as of the end of fiscal year t.
ROA	Return on assets, calculated as net income scaled by total assets as of the end of fiscal year t.
ChangeLev	The ratio of the annual change in leverage to the lagged leverage, where the leverage is calculated as total liabilities scaled by total assets as of the end of fiscal year t.
CFO	Calculated as net cash flows from operations scaled by total assets as of the end of fiscal year t.
ChangeSales	The annual change in sales revenue as of the end of fiscal year t scaled by lagged sales revenue.
OScore	Financial distress that is calculated using Ohlson (1980).
Institution	The total number of shares held by institutional investors at the end of year t divided by the total number of outstanding shares.
Issuance	The proportion of equity and debt issued by the company in year t relative to total assets.
InternalControl	An indicator variable that equals 1 if the firm has valid internal controls based on its internal control evaluation reports, and 0 otherwise.
Leverage	Total debt divided by total assets as of the end of fiscal year t.
Loss	An indicator variable that equals 1 if the firm has negative income before extraordinary items in the year t-1 and 0 otherwise.
MTB	Market-to-book ratio, measured as the market value of equity divided by the book value of equity as of the end of fiscal year t.
Current	Total current assets divided by total assets as of the end of fiscal year t.
Quick	The quick ratio that is calculated as: (total current assets - inventory)/total current liabilities, as of the end of fiscal year t.
Foreign	The portion of oversea revenue divided by total revenues.

Appendix C: Classification of Financial Restatements

Classification of Financial Restatements and Corresponding Bank Confirmation Contents. This table reports ...

Item	Classification of Financial Restatements	Corresponding Bank Confirmation Contents	Corresponding Independent Variables
1	Revenue Recognition and Profit Recognition	Accepted but Unpaid Bank Acceptance Bills, Discounted but Unmatured Commercial Bills	Item1_after,Item1_before
2	Cost/Expense Valuation	Bank Loans, Account Cancellations	Item2_after,Item2_before
3	Asset/Inventory Valuation	Bank Deposits, Custodied Securities, or Other Proprietary Documents	Item3_after,Item3_before
4	Cash Flow	Bank Deposits, Bank Loans, Account Cancellations	Item4_after,Item4_before
5	Restructuring (Mergers/Divisions)	N/A	Item5_after,Item5_before
6	Tax Rate Adjustment/Tax Reimbursement	Bank Deposits, Bank Loans	Item6_after,Item6_before
7	Change in Qualification or Certification	Custodied Securities or Other Proprietary Documents	Item7_after,Item7_before
8	Application of Incorrect Accounting Policies	N/A	Item8_after,Item8_before
9	Accounting Policy Change	N/A	Item9_after,Item9_before
10	Accounting Estimate Change	N/A	Item10_after,Item10_before
11	Litigation Cases	N/A	Item11_after,Item11_before
12	Internal Controls	N/A	Item12_after,Item12_before
13	Related Parties/Related Transactions (e.g., Shareholder Loans, Accounts Receivable)	Bank Deposits, Bank Loans, Accepted but Unpaid Bank Acceptance Bills	Item13_after,Item13_before
14	Reclassification	N/A	Item14_after,Item14_before
15	Equity/Shareholders	Bank Deposits	Item15_after,Item15_before
16	Profit Distribution/Dividend Distribution	Bank Deposits	Item16_after,Item16_before
17	Entrusted Wealth Management	Bank Deposits, Unmatured Bank Wealth Management Products	Item17_after,Item17_before
18	Significant Guarantees	Guarantees	Item18_after,Item18_before
19	Equity Confirmation	Custodied Securities or Other Proprietary Documents	Item19_after,Item19_before
20	Liability Confirmation	Bank Loans, Accepted but Unpaid Bank Acceptance Bills	Item20_after,Item20_before
21	Other	N/A	Item21_after,Item21_before