Blockchain Adoption and Audit Quality:

Evidence from Bank Confirmations Platform in China*

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Abstract

This study examines whether integrating blockchain technology into the bank confirmation process improves audit quality. Bank confirmations are codified in PCAOB AS 2310 and ISA 505 yet remain vulnerable to delays, document loss, and fabrication. We study the staggered implementation of a blockchain-based confirmation platform, originally developed by the China Banking Association and adopted by banks and audit firms in China. Using a mixed-methods approach that combines structured interviews with banks and auditors with archival analysis of 1,844 listed firms from 2017 to 2024, we examine both the determinants and consequences of platform adoption. Our setting exploits a key design feature: while banks and auditors voluntarily adopt the technology, audited entities are exposed only when both counterparties independently adopt it, generating plausibly exogenous variation in firm-level exposure. Interview evidence indicates that platform adoption reduces the risk of document tampering, interception, and transmission errors inherent in traditional confirmation procedures. Consistent with these mechanisms, the archival analysis shows that exposure to the platform is associated with improved financial reporting quality and fewer regulatory enforcement actions related to financial reporting. The effects are strongest in environments with relatively limited monitoring resources, consistent with blockchain-based verification substituting for the traditional advantages of scale, specialization, and relational familiarity. We also document reductions in audit report delay and audit fees following adoption. Overall, the findings provide evidence that integrating blockchain into a core audit procedure can strengthen verification mechanisms and improve the reliability and efficiency of the audit process.

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1 Introduction

Audit quality fundamentally depends on the integrity of audit evidence, and few audit procedures embody this dependence as directly as the bank confirmation (DeFond and Zhang, 2014; Knechel, Krishnan, Pevzner, Shefchik, and Velury, 2013; Francis, 2011; Christensen, Glover, Omer, and Shelley, 2016). Codified in PCAOB AS 2310 and ISA 505, external confirmations from banks provide third-party verification of cash balances, loan positions, and related financial information, evidence that auditors cannot easily corroborate through inspection of client records alone. Yet despite this evidentiary centrality, the traditional confirmation process, organized around sequential manual handoffs between auditors, banks, and audited entities, has long been criticized as slow, costly, and vulnerable to interception, document loss, and outright fabrication (Caster, Elder, and Janvrin, 2008). Regulators have repeatedly documented these vulnerabilities: between 2014 and 2023, more than 63% of administrative penalty decisions issued by the China Securities Regulatory Commission (CSRC) against audit firms cited deficiencies in bank confirmation procedures (Lou, 2024). Comparable concerns have been raised by the PCAOB in its inspection reports and by the AICPA in repeated revisions to U.S. confirmation standards (Caster et al., 2008; Janvrin, Caster, and Elder, 2010), suggesting that the underlying problem is institutional rather than jurisdictional.

This paper examines whether and how the use of a blockchain platform to facilitate bank confirmations between banks and audit firms improves audit quality for audited entities. We focus on China because it operates the world's largest banking system by total assets and the second-largest equity market by capitalization, making the integrity of its bank confirmation infrastructure a question of first-order importance for the global financial reporting ecosystem. Chinese regulators were also among the first in the world to operationalize blockchain-based confirmation infrastructure at scale, providing a uniquely informative institutional laboratory. Using a mixed-methods design that combines structured interviews with banks and audit firms with large-sample archival analysis of 1,844 listed firms from 2017 to 2024, we provide several insights. Interview evidence indicates that platform exposure substantially improved perceptions of confirmation integrity, with all interviewed audit firms reporting greater confidence in the authenticity of bank confirmation data. Immutability and traceability, the platform features most frequently identified as driving these improvements, are inherent to blockchain but absent from alternative electronic confirmation systems. Consistent with these mechanisms, our archival results show that exposure to the blockchain platform is associated with fewer regulatory penalties related to financial reporting, fewer financial restatements, and lower accrual-based earnings management. We also find that the improvements are more pronounced for firms audited by non-specialist auditors and firms with smaller banking relationships, consistent with

blockchain providing a technology-based substitute for the relational familiarity and institutional knowledge historically used to mitigate confirmation risk. Finally, we document operational improvements, including reductions in audit fees and shorter audit report delays.

During a bank confirmation, an audit firm directly requests that banks verify a firm's relevant financial information after receiving authorization from the audited entity. The bank queries its internal systems, verifies the relevant records, and responds to the auditor with written confirmation.[1] Because this procedure involves coordination among three stakeholders, the audited entity, the audit firm, and the bank, it constitutes one of the core evidentiary procedures in independent audits conducted by certified public accountants. Recognizing the long-standing limitations of the traditional process, regulators in China introduced a policy initiative to promote the digitization of bank confirmations. 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 banks and third-party platforms to digitize the confirmation process.[2] Following this initiative, the Chinese Institute of Certified Public Accountants partnered with several industry associations to develop third-party blockchain-based confirmation platforms.

A common misconception about these platforms is that they simply replace postal mail with electronic communication. In practice, the system introduces a fundamentally different trust architecture: rather than relying on the integrity of each participant in the confirmation chain, it relies on cryptographic verification at every transmission step. On the platform used in our setting, audit firms submit encrypted confirmation requests, which are hashed and recorded on the blockchain before being transmitted to the bank. The audited entity authorizes the request through its online banking system but cannot access or modify the bank's response. The bank retrieves the relevant information from its internal systems, prepares an encrypted reply, and similarly records a cryptographic hash of the response on the blockchain prior to transmission. At each stage, the platform recomputes and verifies the document hash against the on-chain record, ensuring that any alteration is immediately detected. This architecture removes the audited entity from the transmission pathway and creates a tamper-evident audit trail documenting every action in the confirmation process.[3]

Theoretically, the blockchain platform can enhance audit quality through several distinct, and likely complementary, channels. First, immutability and cryptographic verification reduce the scope for document

[1] 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.

[2] See the China Banking and Insurance Regulatory Commission, "Notice on Further Regulating Bank Confirmation and Reply Procedures" (CBIRC Office Notice No. 12 (2020)), which initiated reforms promoting standardized and digitalized bank confirmation processes.

[3] Interview with the Deputy Director of the Service Center for the Blockchain Platform for Bank Confirmations, China Banking Association, March 25, 2025.

tampering and post-hoc alteration (Brandin and Abrishami, 2021). Second, the elimination of the audited entity from the transmission pathway reduces the opportunity for client interference in confirmation responses. Third, multi-party recording of confirmation events introduces a form of decentralized supervision that does not exist under traditional procedures. Fourth, automated routing and processing accelerates confirmation turnaround, reducing operational frictions that historically constrained the procedure's evidentiary value. Because these channels are bundled into a single technological deployment, our empirical estimates should be interpreted as capturing the combined effect of these features rather than any single mechanism in isolation. This bundling concern is a general feature of audit-technology research, where data analytics, artificial intelligence, and blockchain platforms are typically adopted as integrated packages rather than as separable interventions (Bauer, Estep, and Malsch, 2019; Fedyk, Hodson, Khimich, and Fedyk, 2022a; Commerford, Dennis, Joe, and Ulla, 2022). We return to this point throughout the paper and discuss what features of our setting allow us to narrow, although not fully eliminate, the inference that blockchain-specific properties drive the documented effects.

Assessing whether exposure to blockchain technology is associated with improved audit quality presents three identification challenges. First, adoption in our setting is decided voluntarily by banks and auditors, raising concerns about selection into treatment (Heckman, 1979). Second, audit quality reflects a joint outcome of auditor reputation (DeAngelo, 1981; Craswell, Francis, and Taylor, 1995; Skinner and Srinivasan, 2012) and audited-entity reporting behavior (Healy and Wahlen, 1999; Dechow, Sloan, and Sweeney, 1996; DeFond and Zhang, 2014), making it difficult to isolate the underlying economic channel. Third, limited systematic evidence exists on how blockchain platforms operate in practice and why banks and auditors adopt them.

To address these challenges, we employ mixed empirical methods. First, we draw on structured interview evidence from audit firms and banks that adopted the platform, allowing us to qualitatively assess the determinants and consequences of adoption and to obtain institutional insights into the mechanisms through which exposure may enhance audit quality. Second, we exploit a distinctive feature of our setting that supports identification with archival data. Unlike banks' and auditors' voluntary decisions to adopt the blockchain platform, audited entities are exposed only when both their associated bank and their audit firm are independently connected to the platform. Because the regulatory intervention was explicitly motivated by concerns that firms could manipulate or interfere with traditional confirmation processes, audited entities are the focal point of the reform but are not the agents who select into the technology. This three-party structure provides a setting in which firm-level exposure to blockchain is plausibly exogenous, conditional

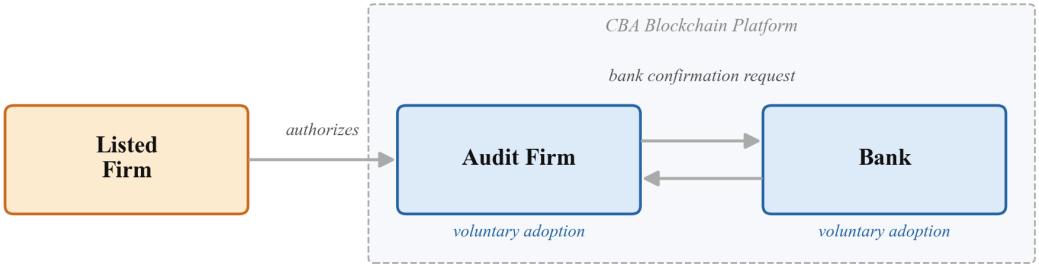


Figure 1. Identification Strategy - Panel A. *Panel A* illustrates the three-party structure of the bank confirmation process. Listed firms authorize audit firms to initiate the bank confirmation procedure. Banks and audit firms then jointly determine whether to conduct confirmations through the blockchain platform or through alternative confirmation systems. Listed firms enter the treatment group when both their associated bank *and* their audit firms are simultaneously connected to the blockchain platform.

on the staggered adoption timing of banks and auditors.[4]

Our empirical assessment proceeds in stages. Evidence from the structured interviews indicates that blockchain adoption substantially improved perceived audit quality along multiple dimensions. All interviewed audit firms reported increased confidence in the authenticity of bank confirmation data, and 90% reported reduced concerns about document tampering. No respondent indicated that the platform left audit quality unchanged or worse. The platform features most frequently identified as driving these improvements are *immutability* and *traceability*, two properties inherent to blockchain but absent from conventional electronic confirmation systems. These responses suggest that the platform addressed the core vulnerabilities of the traditional confirmation process, including the risks of falsification, document loss, and the inability to independently verify the integrity of confirmation responses.

Our archival analysis exploits staggered differences in adoption timing across banks and auditors to estimate audited entities' exposure to the blockchain platform and its association with audit quality. We document that exposure is associated with statistically and economically meaningful improvements in reporting outcomes: an 11.7 percentage point reduction in the probability of regulatory penalties tied to restated financial statements, a 12.8 percentage point decline in restatements that attracted regulatory or media scrutiny, and a 21.6 percentage point reduction in downward restatements (typically associated with prior earnings overstatements). Blockchain adoption is also associated with a 33% to 47% reduction in accrual-based earnings management relative to the baseline mean. For discretionary accruals, the estimated coefficients imply a 167% to 233% decrease relative to the sample mean, or about 8% to 11% of one standard deviation in standardized terms.

[4]Although audited entities' exposure to the blockchain platform is plausibly exogenous, it is possible that some firms avoid exposure by strategically selecting banks that are not connected to the blockchain system. Such behavior would most likely occur among private firms, whose information environments are generally more opaque to regulators. Private firms are not examined in our study.

To ensure that our results are not driven by confounding trends or model specification choices, we conduct an array of robustness analyses, including event-study specifications with formal tests of parallel pre-trends, placebo tests that assign pseudo-adoption dates to untreated observations and to periods preceding actual adoption, and alternative specifications with different fixed effects, clustering approaches, and outcome variable constructions. Across these analyses, the estimated effects remain qualitatively and quantitatively similar to our baseline results.

A natural concern is that the observed improvements may reflect digitization more broadly rather than blockchain-specific features such as immutability and decentralized verification. We approach this concern in two ways. First, we asked platform users (banks and auditors) about the factors driving their adoption decisions. Regulatory and policy guidance were the strongest factors influencing adoption for both groups. Among audit firms, the most frequently cited barrier was the need to ensure that their banking counterparties were also connected to the platform before electronic confirmation requests could be routed. This connectivity constraint is informative: the first two banks to adopt the platform both had well-developed digital infrastructure and prior experience with electronic banking, whereas the four banks that adopted relatively late used paper-based confirmations. Second, we exploit this heterogeneity in pre-adoption digital infrastructure to separate, to the extent possible, blockchain-specific effects from broader digitization effects in our archival analysis. We find that the effects are significant for both early adopters, where the blockchain treatment is more cleanly identified, and late adopters, where the coefficients are larger and likely capture combined digitization and blockchain effects. We caution, however, that the platform bundles multiple process changes, including cryptographic immutability, multi-party supervision, accelerated transmission, and removal of the audited entity from the confirmation pathway, that may move together in ways our design cannot fully separate. This limitation is shared with the broader audit-technology literature, where integrated technology platforms make it difficult to isolate the marginal contribution of any single feature (Fedyk et al., 2022a; Commerford et al., 2022; Bauer et al., 2019).

We next examine heterogeneity across audit firms. Because the blockchain platform standardizes verification, it should reduce the informational advantages historically associated with auditor scale and specialization. Structured interviews are consistent with this conjecture: 70% of audit firm respondents reported increased trust in confirmations from small and regional banks following adoption, and 100% reported a reduced professional skepticism burden when evaluating confirmation responses, likely because cryptographically verified data substitutes for the additional effort previously required to corroborate responses from less familiar banking counterparties. Empirical archival evidence corroborates this interpretation. Blockchain adoption effects on audit quality are more concentrated among firms audited by non-specialist auditors and

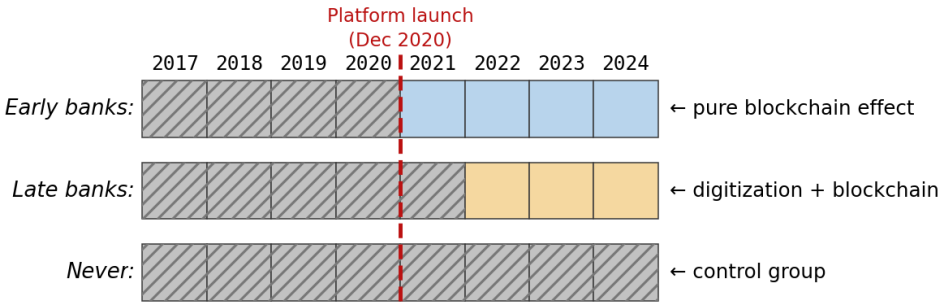


Figure 1. Identification Strategy - Panel B. The figure shows how staggered bank adoption timing generates the variation in exposure to digitization used in the difference-in-differences design. Early-adopting banks (2021–2022) had pre-existing digital infrastructure; their post-adoption period is more clearly exposed to the *blockchain treatment*. Late-adopting banks (2022–2024) had no prior digital system; their post-adoption period is also exposed to *digitization treatment*. Listed firms whose banks are not yet connected serve as the control group.

among firms with smaller or less prominent banking relationships. These findings are consistent with the platform providing a technological substitute for the industry knowledge and relational trust that specialist auditors historically relied upon to mitigate confirmation risk.

Finally, we examine operational efficiency. Both structured interviews and archival evidence support the conjecture that blockchain adoption reduces confirmation processing time and cost. All ten interviewed audit firms reported reductions in confirmation delivery delays and document loss following adoption, while bank respondents unanimously reported that confirmation processing times fell from *several weeks* under previous systems to *one to three business days*. In the archival sample, blockchain adoption is associated with a 7% to 8% reduction in audit fees, significant at the 5% level across all specifications, and with a significant reduction in audit report delay measured with a one-year lag. These patterns are consistent with blockchain platforms reducing audit labor costs and shortening reporting cycles.

Taken together, our mixed-methods evidence yields a consistent picture: exposure to the blockchain platform is associated with improvements in audit quality and audit efficiency, with the effects operating through the mitigation of structural vulnerabilities in the traditional confirmation process, namely falsification risk, document loss, and unverifiable transmission. These gains appear broadly distributed across the audit market rather than concentrated among already-sophisticated participants, suggesting that verification technologies of this type may help level the playing field between specialist and non-specialist auditors.

This paper makes three contributions to the auditing literature. First, we contribute to the literature on audit evidence and external confirmations. Despite the evidentiary centrality of bank confirmations under PCAOB AS 2310 and ISA 505, and despite decades of regulatory concern documented in PCAOB inspection reports, AICPA standard-setting activity, and Chinese regulatory enforcement, large-sample evidence on what

reforms to this procedure actually deliver has been essentially absent (Caster et al., 2008; Knechel et al., 2013). Using a mixed-methods design, we provide novel evidence that integrating blockchain into this core audit procedure is associated with measurable improvements in audit quality and reductions in regulatory enforcement related to financial reporting.

Second, we document that blockchain adoption reduces the dependence of audit quality on informational advantages traditionally associated with auditor specialization and scale. A well-established literature shows that auditor industry specialization and engagement scale are both associated with higher audit quality (Craswell et al., 1995; Balsam, Krishnan, and Yang, 2003; DeFond, Erkens, and Zhang, 2016; Francis and Yu, 2009). The mechanisms underlying this channel, including relational familiarity with counterparties, accumulated institutional knowledge, and reputational capital, have historically helped specialists mitigate confirmation risks. By introducing tamper-resistant records, traceability, and cryptographic verification, the blockchain platform provides a standardized technological mechanism that reduces the extent to which confirmation reliability depends on prior relationships or auditor specialization. This substitution result has direct implications for audit market competition and for the technology-investment decisions of non-specialist audit firms.

Third, we contribute to the growing literature on blockchain-enabled accounting infrastructure (as distinct from cryptocurrencies) and audit technology. Prior work has argued that distributed ledgers and smart contracts can enhance accounting systems by strengthening record integrity, enabling traceable verification, and automating rule-based controls and assurance procedures (e.g., Dai and Vasarhelyi, 2017; Coyne and McMickle, 2017; Schmitz and Leoni, 2019; Rozario and Vasarhelyi, 2018; Rozario and Thomas, 2019; Bellucci, Cesa Bianchi, and Manetti, 2022; Han, Shiwakoti, Jarvis, Mordi, and Botchie, 2023). Recent theory has formalized these mechanisms in a financial-reporting environment, showing that federated ledgers combined with secure multi-party computation can deliver privacy-preserving verification gains while also generating coordination frictions that can lead to under-adoption equilibria (Cao, Cong, and Yang, 2024). Complementary empirical studies document that blockchain adoption reshapes real-economy contracting and information flows, including alleviating frictions from contractual incompleteness and altering supply-chain coordination and disclosure incentives (Chen, Hu, Wang, and Wu, 2023; Lee, Pinto, Rabetti, and Sadka, 2024; Moore, 2024). We extend this literature by examining a distinct and consequential channel: the institutional deployment of blockchain in a core, regulated audit procedure with direct implications for financial reporting quality.

The paper proceeds as follows. Section 2 describes the institutional setting in detail, including the traditional bank confirmation process and its deficiencies, the policy response, the technical architecture

of the blockchain platform, and the economics of voluntary adoption. Section 3 presents our structured interview evidence, directly documenting the adoption decision function and the mechanisms through which blockchain affects audit quality. Section 4 develops our hypotheses. Sections 5 and 6 present the empirical analysis, and Section 7 concludes.

2 Institutional Background

2.1 Bank Confirmations: Process and Persistent Deficiencies

Bank confirmation is one of the most probative audit procedures available to external auditors. The process requires the auditor, upon receiving written authorization from the audited entity, to independently contact banks to verify the entity's account balances, loan positions, guarantees, and other key financial information.[5] Because the response originates from the bank rather than the audited entity, a properly conducted confirmation provides third-party corroboration of reported financial data and serves as a critical safeguard against misreporting. While highly probative, the confirmation is only as reliable as the process through which it is obtained.

In China, the traditional bank confirmation process involves three parties—the audited entities, the audit firm, and the bank—and typically unfolds across more than 10 sequential manual steps. The audit firm drafts the confirmation request, the audited entity applies its seal of authorization, and the request is delivered, primarily by postal mail or in person, to the bank.[6] Following internal verification, the bank prepares and returns its response through the same channels. Figure 2 illustrates this three-party workflow. This multi-step, often paper-based process is both slow and structurally fragile.

Lou (2024) analyzed 76 administrative penalty decisions issued by the China Securities Regulatory Commission (CSRC) between 2014 and 2023 against audit firms and their certified public accountants (CPAs). Of the 76 decisions, 48 (63.2%) cited deficiencies in the execution of bank confirmation procedures, involving 47 listed companies and 22 audit firms. These deficiencies fall into three categories: (i) *confirmation planning failures*, e.g., omitting bank accounts from the confirmation scope or failing to include off-balance-sheet guarantees; (ii) *process control failures*, e.g., allowing clients to control the physical delivery of confirmation requests (enabling substitution or fabrication of responses), or retaining non-original response documents; and (iii) *results-handling failures*, e.g., failing to investigate confirmation responses containing observable

[5] 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.

[6] It is worth noting that China has one of the largest and most efficient delivery services in the world (e.g., https://www.chinadaily.com.cn/a/202601/08/WS695eea15a310d6866eb328f2.html).

anomalies. Examples of the resulting enforcement actions are presented in Appendix A.

Several structural features make the traditional confirmation process particularly vulnerable to such problems. Because each confirmation must traverse more than ten manual handling points across at least three organizations, any of these handoffs can be exploited: a client can intercept outgoing requests and redirect them to a controlled entity, a bank employee can collude with management to fabricate responses, or a CPA can manufacture confirmations without ever contacting the bank. The reliance on postal mail further exacerbates these risks through delays, document losses, and opportunities for alteration during transit. Janvrin et al. (2010) document analogous patterns in U.S. enforcement actions, including instances of collusion between audit clients and counterparties that prevented independent verification.

2.2 Policy Response and the Three Blockchain Platforms

On August 10, 2020, the Ministry of Finance and the China Banking and Insurance Regulatory Commission (CBIRC) jointly issued the *Notice on Further Regulating Bank Confirmation Letters and Responses* (Notice 2020[12]). The Notice identifies the risks inherent in paper-based confirmation procedures and establishes a framework to address them. First, it requires all banks to *centralize* their confirmation processing by January 1, 2023, shifting authority from individual branches to headquarters-level operations systems. It further encourages banks and third-party platform operators to advance the digitalization of bank confirmation procedures, and explicitly affirms that digital confirmation responses carry the same legal validity as paper originals.

In response, the Chinese Institute of Certified Public Accountants (CICPA) partnered separately with three industry organizations to develop independent blockchain-based confirmation platforms: (i) the *China Banking Association* (CBA) platform, first operational on December 18, 2020; (ii) the *China Internet Finance Association* (CIFA) platform; and (iii) the *China Financial Certification Authority* (CFCA) platform. As of December 31, 2024, a total of 987 audit firms and 2,419 financial institutions had connected to at least one such platform.[7]

[Table 1]

Table 1 presents the distribution of adopting institutions by platform and year. Panel A shows that the CBA blockchain platform attracted 567 audit firms and 111 banks. The CIFA platform connected the most banks (1,863), but Panel B reveals that over 97% are rural commercial banks, rural credit cooperatives,

[7] For further details, see https://tinyurl.com/ysnutt8d.

and village banks with limited engagement in publicly listed company audits. In contrast, 80.2% of CBA-connected banks are commercial banks, the primary banking counterparts of listed A-share firms. Because the blockchain platform was launched first, serves the most relevant institutions, and provides the most detailed records of institutional connections, this study focuses on the CBA platform, supplemented with publicly available data from the other two platforms.

2.3 How the Blockchain Platform Works

A common misconception about blockchain platforms is that they merely replace postal mail with electronic mail. In fact, a blockchain system introduces a fundamentally different trust architecture: rather than relying on the goodwill of each party in the confirmation chain, it relies on *cryptographic verification* at every transmission step. Understanding this architecture is essential for distinguishing the effects of blockchain adoption from those of a generic shift to digital processes. Specifically, the confirmation process on the blockchain platform proceeds through eight sequential steps, each documented on the blockchain through cryptographic hashing.[8]

1. **Initiation:** the audit firm prepares the confirmation request using a standardized template and encrypts the document before submission.

2. **On-chain recording by the audit firm:** the audit firm generates a cryptographic hash value of the encrypted request—a fixed-length digital fingerprint—and stores it *permanently* on the blockchain. Any subsequent alteration of the document, however minor, produces a different hash, making tampering immediately detectable.

3. **Platform verification of the request:** the platform independently computes the hash of the received document and compares it to the on-chain record. Matching hashes confirm the document is unaltered; a mismatch halts transmission.

4. **Authorization by the audited entity:** the audited company logs into the bank's online banking system to authorize the confirmation request. The bank records this authorization on the blockchain. Critically, the audited entity cannot access or modify the bank's response.

5. **Response preparation by the bank:** the bank queries its internal systems, compiles the confirmation data, prepares the response document, and encrypts it.

[8] China Banking Association, *Exploration and Practice of Promoting the Digital Transformation of Bank Confirmations through Blockchain Technology*, available at https://www.china-cba.net/Index/show/catid/315/id/41362.html.

6. **On-chain recording by the bank:** the bank generates a hash of the encrypted response, stores it permanently on the blockchain, and transmits the encrypted response to the platform.

7. **Platform verification of the response:** the platform recalculates the hash of the received response and compares it to the bank's on-chain record. A match confirms the response is unaltered; a mismatch provides forensic proof of tampering, attributable to the responsible party.

8. **Decryption and review:** the audit firm downloads and decrypts the response using its private key. The decrypted response is the bank's direct, unmediated output to the query.

This architecture addresses the core vulnerabilities of the traditional process. The audited entity is entirely removed from the transmission pathway: it authorizes confirmation but cannot intercept, modify, or replace the bank's response. Once the bank's response is hashed and recorded on-chain, it cannot be altered without detection—by the bank, the audit firm, or the platform operator itself. The on-chain records provide a permanent audit trail of every action: who sent what, when, and in what form. If a dispute arises—for instance, if an auditor claims not to have received a response, or a bank denies having provided certain data—the blockchain provides definitive evidence.[9]

[Figure 3]

How blockchain surpasses conventional digital systems. Prior to blockchain platforms, some large banks offered conventional electronic confirmation systems—essentially web portal-based exchanges. However, these systems lacked a critical property: they depended on the integrity of the platform operator, as they provided no mechanism for participants to independently verify that documents had not been altered in transit. Table 2 compares the blockchain platform with conventional electronic confirmation systems feature by feature. The blockchain platform's three defining advantages—*tamper resistance*, *post-event traceability*, and *independent verifiability*—are not features of conventional electronic platforms. Our interview respondents (Section 3) identified these same features as the primary drivers of improved audit quality.

[Table 2]

[9]Interview with the Deputy Director of the Service Center for Blockchain Platform for Bank Confirmations, China Banking Association, March 25, 2025: "If a user receives a confirmation through the platform and then modifies the content, the modified file can be rehashed and compared with the original hash stored on the platform. If the hashes don't match, it clearly shows that the file was tampered with."

3 Structured Interview Evidence

To directly address questions about the adoption decision process, the mechanisms through which blockchain affects audit quality, and the role of pre-existing digitization in shaping adoption timing, we conducted structured interviews with platform participants. The interviews provide first-hand evidence from market participants that complements and validates our archival analysis.

3.1 Interview Design and Approach

Our target population consists of audit firms and banks that had connected to the CBA blockchain platform as of our data collection window (2017–2024). We interviewed representatives from *ten audit firms* and *six banks*. The ten interviewed audit firms include China's largest domestic audit practices, collectively accounting for a majority of audit engagements for listed A-share companies. The six interviewed banks represent a range of institution types, including large state-owned commercial banks, joint-stock banks, and city commercial banks. They also adopted the platform across different cohorts (2021–2023), enabling cross-sectional comparisons by institutional type and prior digitization level. All interviewed institutions had direct operational experience of both the pre-blockchain and post-blockchain confirmation processes.

The interview instrument consists of 18–19 structured questions covering: (i) platform and adoption characteristics (which platform used, year of adoption, and confirmation volumes), (ii) adoption motivations, (iii) pre-adoption digitization status and prior confirmation methods, (iv) operational changes following adoption, (v) perceived effects on audit quality and professional judgment, and (vi) the most important blockchain features in practice. Several questions allow for open-ended responses to capture qualitative evidence not constrained by pre-specified categories. The full interview instruments are provided in Appendices G (audit firm version) and H (bank version).

3.2 Adoption Motivations

Table 3 presents the adoption motivations reported by audit firms (Panel A) and banks (Panel B).

Why audit firms adopt. For audit firms, adoption eliminates the most severe operational risks of the traditional process. Under the traditional confirmation system, a single confirmation could take hours or even days to reach its destination; responses were routinely lost, delayed, or, in egregious cases, fabricated. The blockchain platform routes confirmation requests electronically to the bank's internal information system and automatically returns responses, eliminating manual intervention. Our structured interviews with ten audit

firms (Section 3) indicate that although *regulatory and policy guidance*, *internal digitization strategy*, and *industry association guidance (CICPA)* were universally identified as considerations for adoption, *regulatory and policy guidance* was ranked as the most important adoption driver (8 of 10).

[Table 3]

Why banks adopt. Among the interviewed banks, all five factors were frequently cited by respondents. *Regulatory and policy guidance* (3 of 6), *influence and demand from auditors* (2 of 6), and *industry association guidance* (1 of 6) were ranked as the most important factors. *Influence and demand from auditors* was the most universally cited factor (6 of 6, 100%), followed by *internal digital transformation strategy* (5 of 6, 83%) and *industry association guidance* (5 of 6, 83%). *Regulatory and policy guidance* and *competitive pressure from peer banks* were cited by 4 of 6 and 3 of 6 respondents (67%, 50%), respectively. Collectively, these responses indicate that adoption is driven by a combination of regulatory encouragement, institutional efficiency objectives, and competitive or client pressures.

Barriers to adoption. The structured interviews also document the principal frictions that slowed or complicated the CBA adoption process. Among audit firms, the most frequently cited barrier was *client coordination*—the need to ensure that the banking counterparties associated with each audit firm were connected to the platform before confirmation requests could be routed electronically (7 of 10, 70%). Network externalities thus constitute the dominant friction, as the platform's value to audit firms increases with the number of connected banks. Six of ten audit firms (60%) also mentioned *incomplete counterparty coverage* (some banks were not yet connected), *staff preference for traditional methods*, *training requirements*, and *technical integration challenges* as impediments; adoption *cost* was cited less frequently (4 of 10, 40%). Among banks, the leading friction was a preference for established confirmation methods (5 of 6, 83%), followed by incomplete counterparty coverage and client coordination challenges (3 of 6, 50% each). Together, these findings validate a gradual adoption trajectory consistent with coordination constraints relieved by the government-backed blockchain platform, as suggested in Cao et al. (2024).[10]

3.3 Pre-Adoption Digitization and Adoption Timing

A key identifying assumption in our empirical analysis is that banks adopting the platform earlier tended to have greater pre-existing digital infrastructure than those adopting it later. Table 4 tests this directly. Among

[10]The platform's confirmation scope covers 14 categories of financial information, including deposit accounts, loan balances, guarantees, foreign exchange contracts, and investment products. Some respondents noted that not all categories they wished to confirm were available electronically during the early adoption period, adding operational friction to the transition.

the two banks that adopted earliest (Banks K and P, which adopted in 2021 and early 2022, respectively), both had high pre-existing digitization—including advanced IT infrastructure and prior experience with electronic banking systems—before connecting to the blockchain platform. In contrast, the four banks that adopted in 2022 (Banks L, M, N, and O) had *no prior electronic confirmation system*; their confirmation process was entirely paper-based.

[Table 4]

This pattern has direct implications for our empirical identification strategy. For early-adopting banks with high pre-existing digitization, the blockchain platform represents a *marginal* technological change—from a conventional electronic system to a blockchain-based one. Improvements in audit quality in this group are more likely to capture the *pure effect of blockchain's specific features* (tamper resistance, traceability, and cryptographic verification). For late-adopting banks with no prior digital system, the platform simultaneously introduces two changes: a transition from paper-based to electronic processes, and the addition of blockchain-specific features. Accordingly, the effect for this group captures the *combined benefits of digitization and blockchain*. We find that both groups show significant effects, with late adopters exhibiting larger magnitudes, a pattern consistent with blockchain providing incremental value beyond digitization and not explained by digitization alone.

[Figure 4]

Interview evidence on audit firm pre-adoption digitization is similarly informative. Eight of the ten interviewed audit firms had pre-existing digital systems for other audit procedures (4 at a high level, 3 at a moderate level, and 1 at a basic level), while the other two had none. Despite this prior digitization on the audit-firm side, *all ten audit firms* had conducted bank confirmations via postal mail before joining the platform—indicating that the platform's value lay specifically in the auditing procedure of bank confirmations, not in general audit digitization.

3.4 Operational Changes Following Adoption

Table 5 presents audit firms' assessments of operational changes following blockchain platform adoption. For each category, the interviewed audit firm was asked if a particular factor had improved *Significantly*, *Slightly*, or presented *No Change*.

Risk reductions. Virtually all the interviewed audit firms reported significant decreases in confirmation-related risks following adoption: *forgery or tampering of confirmations* (9 of 10, 90%), *loss of confirmation documents* (10 of 10, 100%), *inability to identify parties responsible for confirmation errors* (7 of 10, 70%), *internal information leakage* (5 of 10, 50%), *collusion* (7 of 10, 70%), *data omissions or errors* (4 of 10, 40%), and *error rate in confirmation content* (5 of 10, 50%). These responses directly map to the mechanisms identified in Section 2.3: hash-based tamper detection eliminates undetected alteration, while electronic transmission eliminates postal delays and document loss.

Processing time and cost reduction. Bank respondents uniformly reported dramatic reductions in confirmation turnaround time and cost. Prior to adoption, confirmation responses typically required *several weeks*, reflecting postal transit times and multi-level internal bank review processes. Following adoption, processing times fell to *one to three business days* across all interviewed banks. As one bank representative explained: "The platform directs the request directly to the bank's information system, allowing the confirmation response to be sent back to the auditor automatically without manual intervention." This time reduction has direct implications for audit efficiency, which we test in Section 6. Audit firm respondents also reported dramatic reductions in confirmation processing time and cost following blockchain adoption: *delays in bank confirmation replies* (10 of 10, 100%), *time required to complete confirmations* (9 of 10, 90%), *cost required to complete confirmations* (9 of 10, 90%), and *manual follow-up and communication costs* (8 of 10, 80%).

[Table 5]

3.5 Effects on Audit Quality and Professional Judgment

Table 6 presents participants' assessments of changes in audit quality following blockchain adoption.

Trust in bank confirmation responses. Prior to blockchain adoption, the baseline level of trust in confirmations from small and regional banks was markedly low: five of the ten interviewed audit firms (50%) rated such confirmations as only *fairly reliable*, and the remaining five (50%) considered them *somewhat doubtful*—not a single respondent regarded them as highly reliable. Following adoption, this baseline shifted dramatically. Seven of ten interviewed audit firms reported that their trust in confirmations received from small and regional banks *significantly increased* following adoption, while two reported a slight increase—a unanimous improvement. This finding directly speaks to the mechanism underlying our hypothesis (H2) about leveling the playing field: small and regional banks—predominantly among late adopters—were historically the weakest link in the confirmation chain, because their paper-based processes were most susceptible to

manipulation and their responses were least reliably traceable. The blockchain platform's tamper-resistance and traceability features address this vulnerability directly, providing auditors with the same level of confidence in a small bank's response as in a major state-owned bank's response. This mechanism is consistent with our archival findings that the benefits of blockchain adoption are more pronounced for non-specialist auditors.

Professional judgment. All ten interviewed audit firms reported that blockchain adoption *increased their confidence in the authenticity of confirmation data* (10 of 10, 100%), nine of ten reported *reduced concerns about document tampering* (9 of 10, 90%), nine of ten reported *improved efficiency or reduced costs* (9 of 10, 90%), and six of ten reported an enhanced ability to identify or deter collusion (6 of 10, 60%). In other words, using the blockchain platform, auditors now have a credible technical basis for trusting the bank's response without the need for extensive supplementary procedures.

[Table 6]

Most valued platform features. When asked to identify the most important platform features, audit firm respondents most frequently cited *immutability* (9 of 10, 90%), *traceability* (9 of 10, 90%), and *faster and automated processing* (9 of 10, 90%). Critically, immutability and traceability are inherent properties of the blockchain architecture and are *not* features of conventional electronic platforms. This directly validates the premise that the observed improvements reflect blockchain-specific features rather than digitization alone.

Democratization of audit quality. Panel C of Table 6 reveals divergent perceptions of which audit firm type benefits the most. Among the audit firms, seven of ten (70%) believed that all types of audit firms benefit equally from blockchain adoption—a view consistent with the platform providing a uniform technological infrastructure that equalizes the integrity of confirmation evidence regardless of auditor size or resources. Only three of ten (30%) believed large firms benefit more. Among banks, however, the modal response was that large audit firms benefit most (3 of 6, 50%), with two banks (33%) viewing the benefits as equally distributed and one (17%) believing small firms gain the most. This divergence is itself informative: banks, as counterparties rather than end-users, may perceive the reputational and relationship advantages of large firms as persistent, even after the platform eliminates the underlying evidence-integrity gap. For the purpose of testing our third contribution—the democratization hypothesis—the audit firm respondents' near-consensus that benefits are universal provides direct interview support for the archival finding that improvements are

most pronounced among non-specialist auditors.[11]

4 Hypothesis Development

4.1 Theoretical Framework

The economic case for blockchain adoption improving audit quality rests on three well-established principles from information economics and auditing theory, each of which the bank confirmation platform directly addresses.

Reducing information asymmetry through tamper-resistant evidence. In the adverse selection framework Akerlof (1970), information asymmetries between firms and auditors create opportunities for strategic misrepresentation. The value of any audit evidence depends critically on its integrity: evidence that can be manipulated without detection provides only limited assurance (Simunic, 1980). The blockchain platform is designed to address a specific and historically prevalent form of evidence manipulation—the alteration or fabrication of bank confirmation responses—by making any such alteration cryptographically detectable. As the interview evidence confirms, this is perceived directly by practitioners: all ten interviewed audit firms reported increased confidence in the authenticity of confirmation data following blockchain adoption.

Reducing agency problems through accountability. In the agency framework Jensen and Meckling (1976), agents may take actions that harm principals when those actions are unobservable or unverifiable. The blockchain platform's on-chain audit trail makes every step in the confirmation process observable and attributable, shifting the cost-benefit calculation for opportunistic behavior. The deterrence mechanism is direct: the probability of detection approaches certainty for any manipulation of the confirmation process. Interview respondents explicitly identified this deterrence effect as a primary mechanism of quality improvement.

Efficiency gains through process automation. The audit market equilibrium studied by Simunic (1980) and the broader literature both predict that reductions in the cost of obtaining high-quality audit evidence will be reflected in lower audit fees and more timely reporting. The blockchain platform automates the

[11] The geographic uniformity of adoption corroborates this view: 70% of interviewed audit firms reported identical platform usage patterns across their regional branch offices, suggesting that the quality improvement was not concentrated in major commercial centers but broadly diffused across the audit market. Additionally, one audit firm (Firm H) noted in an open-ended response that the platform's efficiency gains reduced the volume of manual confirmation work, facilitating the reallocation of staff to higher-judgment audit procedures.

most time-consuming steps in the confirmation cycle. Our interview evidence quantifies this: confirmation turnaround time fell from several weeks to one to three business days—a direct reduction in audit labor costs.

Positioning relative to Cao et al. (2024). Recent theoretical work by Cao et al. (2024) examines the economic implications of blockchain adoption in financial reporting and auditing. While the formal model focuses on a comprehensive distributed-ledger setting that differs from the bank-confirmation-specific platform studied here, several of its core insights apply directly to our context. In particular, Cao et al. (2024) demonstrated that blockchain adoption reduces misreporting probabilities and lowers auditing costs in equilibrium, and they highlight the potential for a "leveling of the playing field" across auditors of varying size and resources—predictions we examine directly. Importantly, Cao et al. (2024) also noted that coordination failures can lead to partial adoption equilibria. The government-coordinated structure of the Chinese blockchain platform directly addresses this concern: by convening industry associations, banks, and audit firms within a unified regulatory framework, the platform mitigates first-mover disadvantages and coordination failures that might otherwise lead to suboptimal equilibria. We acknowledge that the bank confirmation platform is a narrower application than the full-scope distributed ledger envisioned in Cao et al. (2024). However, the economic mechanisms—tamper resistance reducing misreporting incentives, traceability enabling accountability, and automation reducing costs—are precisely those the theory predicts will improve audit quality.

Digital technologies have more broadly influenced audit procedures (Alles and Gray, 2020; Huang and Vasarhelyi, 2019; Kane, Palmer, Phillips, Kiron, and Buckley, 2016). Prior work highlights advantages in efficiency (Pincus, Tian, Wellmeyer, and Xu, 2017), process controls (Dowling and Leech, 2014), and risk assessment (Caster, Elder, and Janvrin, 2021), alongside potential drawbacks including reduced fraud detection (Bible, Graham, and Rosman, 2005) and erosion of expertise (Sutton, Arnold, and Holt, 2018). Assessing the impact of a specific technology requires attention to its particular features. Blockchain's defining properties—immutability, traceability, and decentralized verification—are distinct from prior digital audit tools and address a specific failure mode: the integrity of the confirmation evidence chain.

4.2 Hypotheses

Audit quality. Tamper-resistant confirmation evidence, enhanced traceability, and deterrence through accountability together reduce firms' incentives and opportunities to misreport. Auditors who receive blockchain-verified confirmation data can reallocate professional attention from confirming basic account

balances to more complex discretionary accounts, thereby improving audit quality across multiple dimensions. We thus predict:

H1: Blockchain platform adoption enhances audit quality.

Leveling the playing field. The confirmation platform provides a technology-based substitute for the relational safeguards that large, specialized auditors and prominent banking relationships already possess. By guaranteeing the integrity of confirmation responses, regardless of the bank's size or prior relationship with the auditor, the platform reduces the informational advantage of scale and specialization. The structured interview finding that 9 of 10 audit firms reported increased trust in confirmations from small and regional banks provides direct evidence of this mechanism. We thus predict:

H2: Blockchain platform adoption levels the playing field of audit quality across auditor types.

Operational efficiency. The dramatic reduction in confirmation processing time directly translates into lower audit labor costs for one of the most resource-intensive standard audit procedures. We thus predict:

H3: Blockchain platform adoption enhances audit operational efficiency.

Section 6 formally tests these three hypotheses.

5 Methodology

5.1 Setting

To test our hypotheses, we assess the financial reports of listed companies on the Shanghai and Shenzhen A-share markets. For improved data stability and comparability, the sample period spans from 2017 to 2024, covering both pre- and post-adoption periods, as the platform was officially launched on December 18, 2020. Based on the operational requirement that both banks and audit firms must be connected to the platform in order to send and receive electronic confirmations[12], firms are classified as exposed to the blockchain platform only when both their auditor and corresponding bank are connected to the system.

[12]Refer to "Notice on the connection of 9 audit firms, including Shanghai Zhizhen and Gongzheng Tianye, to the blockchain platform for bank confirmations," available at https://tinyurl.com/yc8yyt9p.

We manually collect and organize information on the connection dates, entry batches, and access forms for audit firms and banks that joined the blockchain platform for bank confirmations. The data is supplemented and verified using news and official announcements from the websites of audit firms and banks. We then determine the date at which both the audit firm and the bank associated with each listed company were connected to the platform. Since confirmation requests contain information on deposits, loans, guarantees, foreign exchange contracts, and investment products, we identify banks with business relationships to listed firms by analyzing their publicly disclosed loan data.

Financial data on listed companies, audit firm data, loan information, and bank-level financials are obtained from the CSMAR database. The final sample includes 1,844 listed companies and 9,046 firm-year observations after excluding financial firms, companies with missing or abnormal financial data, and those designated as "ST" or delisted during the sample period. Among these, 3,910 firm-year observations involve companies whose audit firms and banks were both connected to the blockchain platform. All continuous variables are winsorized at the 1% level to reduce the influence of outliers.

5.2 Model specification

We use a staggered difference-in-differences (DID) regression. The treatment group includes listed companies whose audit firms and banks were both connected to the blockchain platform, whereas the control group comprises companies whose audit firms and banks (or both) were not connected.

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

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. Our study primarily measures audit quality through audit outputs, using three proxies: financial restatements, accrual-based earnings management, and audit opinions. In further analysis, we also examine 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 begin by measuring audit quality in terms of financial reporting accuracy, using financial error corrections. *Correction* is the total number of restated accounting items two years after the release of financial reports in year t. In further analysis, we classify financial restatements by financial information attributes and investigate which specific items in the financial statements are most affected. This allows us to explore which financial statement components are most affected by blockchain adoption.

Specifically, to capture audit quality within the framework of accounting standards, our analysis uses total accruals (*Accrual*) and discretionary accruals (*DAccrual*) as dependent variables, measuring audit quality from the perspective of financial reporting quality in listed companies.

The audit opinion is currently the only direct communication between auditors and shareholders regarding the audit process and its results, and it reflects the auditor's opinion on the financial information in a timely manner. To capture audit opinion, we use unmodified opinion (*UAO*) as an indicator variable that equals one for firm-years with an unqualified opinion without explanatory notes or disclaimers.

PostTreated is an indicator variable that equals one for firm-years in which both the firm's audit firm and the firm's confirming bank are connected to the blockchain platform. Θ is a vector of control variables, which are selected based on the 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 audit firms, price-to-book ratio, issuance of stocks or bonds, return on assets, audit fee, whether companies have valid internal control, and overseas income ratio.

The detailed definitions of all variables are presented in Table 7 and in the variable definition table in the Appendix. To address potential biases arising from omitted variables, the regression models include year, firm, audit firm, and bank fixed effects. Moreover, standard errors are clustered at the industry level to improve the robustness of the empirical results.

5.3 Summary statistics

Table 7 presents the summary statistics for the key variables used in the empirical analysis. The sample comprises 9,046 firm-year observations, unless otherwise noted, and includes variables related to financial reporting quality, audit outcomes, and firm characteristics.

[Table 7]

The accrual-based variables, which are central to our measurement of earnings management, exhibit approximately symmetric distributions. The mean and median values of *Accrual* are –0.015, with a standard deviation of 0.073, suggesting notable variation in total accruals across firms. This variability reflects the diversity of accounting practices and firm-specific conditions. The wide spread between the minimum (–0.225) and maximum (0.222) values suggests that some firms engage in more aggressive or more conservative accrual adjustments. Similarly, Discretionary Accruals (*DAccrual*) has a mean of –0.003 and a standard deviation of 0.065, indicating that while most firms tend to report slightly negative discretionary accruals, a portion of the sample engages in upward earnings management. These patterns demonstrate considerable heterogeneity in earnings management across the sample, providing a suitable setting to test whether blockchain adoption is associated with reduced earnings management.

The variable *Correction*—defined as the total number of restated items over two years—has a mean of 0.057 and a standard deviation of 0.292, indicating that while most firms report no restatements, some experience substantial financial misreporting. These restatements are particularly relevant to the mechanisms explored in our study, as they provide an ex-post measure of financial reporting quality that blockchain-based confirmation procedures may help address.

The variable *PostTreated*, which captures whether both the audit firm and the bank for a given listed company have adopted the blockchain platform for bank confirmations in a given year, has a mean of 0.415. This indicates that approximately 41.5% of firm-year observations fall within the treatment group. The relatively balanced distribution of treatment and control observations supports the use of a difference-in-differences framework for identification.

Among firm-level characteristics, *Size* (log of total assets) averages 22.669, with a standard deviation of 1.205, suggesting a wide distribution of firm scales. *Leverage* averages 0.482, showing a moderate reliance on debt across firms. The relatively low mean of *Issuance* (0.002) suggests limited new financing activity. Operating cash flows (*CFO*) and *ChangeSales* also exhibit substantial variation (means of 0.048 and 0.055, respectively), suggesting differing financial health and volatility across firms. *InternalControl* has a mean of 0.986, indicating widespread reporting of effective internal controls. The variable *Foreign*, measuring the share of overseas revenue, has a mean of 0.161, suggesting that a significant portion of firms operate internationally, which may complicate audit processes and increase the relevance of blockchain-based verifications.

6 Empirical Analysis

6.1 Testing hypothesis I: Audit quality

This section tests the prediction by Cao et al. (2024) that blockchain adoption is associated with improvements in both audit quality and financial reporting quality. If the platform improves confirmation integrity, it may reduce firms' incentives to misreport and enable auditors to reallocate resources from routine cash transactions to more complex accrual-based accounts, with potential downstream effects on audit fees and operational delays.

6.1.1 Financial errors

We begin with financial reporting accuracy. Higher audit quality is expected to be associated with fewer financial reporting errors, which provide an ex-post indication of reduced reporting quality (e.g., Cao, Myers, and Omer, 2012; Chiu et al., 2013; Christensen et al., 2016). To test whether blockchain adoption reduces the occurrence of financial errors, this study uses the total number of restated accounting items within two years after the release of financial reports in year t (*Correction*). Since restatement data is collected up to June 2025, the sample includes annual reports from 2017 to 2023 to allow for an approximately two-year window for error detection and correction.[13]

Consistent with (1), our primary independent variable of interest is the adoption of the blockchain platform (*PostTreated*). Following prior studies (e.g., Omer et al., 2020; Fan et al., 2022; Ashraf, Choudhary, and Jaggi, 2024), we include a set of control variables: firm size, leverage ratio, issuance of equity or debt, affiliation with one of the top ten domestic audit firms, price-to-book ratio, return on assets, audit fees, effectiveness of internal controls, and the ratio of overseas income. Observations involving restatements due to changes in accounting policies or reclassifications are excluded from the sample.

[Table 8—Panel A]

Table 8—Panel A presents three regression specifications controlling for firm characteristics, audit firm identity, year, and bank fixed effects. The coefficient on *PostTreated* is consistently negative and statistically significant across all columns (–0.041 in Column 1, –0.034 in Column 2, and –0.035 in Column 3), with significance levels ranging from 5% to 10%. These results suggest that blockchain adoption is associated

[13] As a robustness test, we adopt an alternative specification using a one-year detection window, restricting the sample to annual reports from 2017 to 2024, and measuring audit quality by the number of restatements disclosed within one year after issuance. The results remain consistent with the main findings (untabulated).

with a material reduction in financial reporting errors. On the control variables, firms with validated internal controls (*InternalControl*) show significantly fewer restatements, while firms with higher *ROA* also tend to restate less frequently.

6.1.2 Discretionary accounts

We next assess whether blockchain adoption reduces accrual-based earnings management. Table 8—Panel B reports regression estimates where the dependent variables are total accruals *Accrual* (Columns 1–3) and discretionary accruals *DAccrual* (Columns 4–6). The key explanatory variable of interest is *PostTreated*, which equals one for firm-years after both the auditor and the confirming bank have adopted the blockchain platform. Across all six specifications, the coefficients on *PostTreated* are negative and statistically significant, indicating that firms exposed to blockchain adoption exhibit lower levels of accrual manipulation.

For total accruals (*Accrual*), the coefficients range from –0.005 to –0.007, with t-statistics between –2.105 and –2.630. For discretionary accruals (*DAccrual*) the effect is even more pronounced, with coefficients between –0.005 and –0.007 and higher t-statistics (up to –2.866). These results are consistent across specifications that include or exclude bank and audit firm fixed effects, confirming their robustness.

[Table 8—Panel B]

The magnitudes of the estimated coefficients on *PostTreated* are economically meaningful. In the accrual regressions, blockchain adoption is associated with a 33% to 47% reduction in accrual-based earnings management relative to the baseline mean (–0.015). In the discretionary accruals regressions, the estimated coefficients imply a 167% to 233% decrease relative to the average level of discretionary accruals. In standardized terms, this impact corresponds to a reduction of approximately 8% to 11% of one standard deviation of the discretionary accruals distribution (standard deviation = 0.065). The control variables behave largely as expected. Larger firms (*Size*) are associated with higher levels of accruals, likely due to more complex operations. Strong positive coefficients on market-to-book ratio (*MTB*) suggest that growth firms exhibit higher accrual activity, consistent with prior research. These magnitudes underscore the economic relevance of blockchain adoption and its association with improved accrual-based financial reporting quality.

6.1.3 Blockchain vs Digitization

To assess whether the observed improvements are more closely associated with blockchain-specific features rather than a general shift from manual to digital processes, we conduct subsample regressions for

early- and late-adopting banks. Given banks' strict data confidentiality requirements, the entry threshold for connecting to the blockchain platform is considerably higher for banks than for audit firms. Prior to joining third-party confirmation platforms, banks are typically required to conduct internal risk assessments aligned with regulatory expectations. The China Banking Association, in its self-regulatory capacity, has played a central role in defining key risk assessment criteria and coordinating the evaluation process to ensure secure and compliant platform integration. [14]

[Figure 4]

Based on this risk assessment, we expect that banks adopting the blockchain platform earlier are generally larger and more digitally advanced. Figure 4 provides support for this conjecture. Taking 2021 as the reference year, we calculate the average asset size and digitization intensity of banks by adoption year, from 2021 to 2024. The results reveal a clear downward trend: earlier adopters tend to be larger and more digitized. This pattern supports the identifying assumption that adoption timing reflects pre-existing differences in institutional capacity and technological readiness.

We next divide the sample into two subsamples—"Early Adoption" and "Late Adoption"—based on the timing of banks' blockchain adoption, and re-estimate the main regression for each subsample. Early adopters of blockchain are generally larger and more technologically advanced banks, with digital infrastructure already in place prior to adoption. As such, improvements in audit quality among early adopters are more likely to capture the pure effect of blockchain technology. Banks that adopt blockchain later tend to be smaller and less digitally mature. For these banks, blockchain adoption represents not only a transition to blockchain but also a broader shift from manual to digital processes. Therefore, we expect the late-adopting group to exhibit stronger effects, as it captures the combined benefits of both digitization and blockchain. We expect the estimated coefficient on blockchain adoption to be significantly negative in both groups, but larger in magnitude for late adopters.

Table 9 presents DiD regression results distinguishing between early and late adopters of the blockchain platform to explore heterogeneity in treatment effects by underlying digitization levels. Early adopters, defined as banks adopting the platform in 2021-2022 (Panel A) or 2022-2023 (Panel B), are generally larger institutions with more developed IT infrastructures. Late adopters (2023 in Panel A; 2024 in Panel B) are smaller banks with less advanced digital capabilities, for whom blockchain adoption reflects both a shift toward blockchain and a broader digitization transition.

[14] China Banking Association, *Coordinating Risk Assessments for Bank Access to Third-Party Confirmation Platforms*. Available at: https://www.china-cba.net/Index/show/catid/315/id/40276.html

Panel A presents the effect of blockchain platform adoption on financial reporting quality, measured by *Correction*, an indicator of subsequent error corrections. In both subsamples, the coefficient on *PostTreated* is negative and statistically significant at the 5% level, indicating that platform adoption is associated with fewer restatements. The absolute value of the coefficient is larger in the late-adopting group (–0.109) compared to the early-adopting group (–0.052), supporting the interpretation that late adopters benefit from both digitization and blockchain, while early adopters exhibit mainly blockchain-related effects.

[Table 9]

Panel B reports results using accrual-based measures of reporting quality (*Accrual* and *DAccrual*). Consistent with Panel A, the coefficient on *PostTreated* is significantly negative across all specifications. The coefficients for the 2024 adopters (Columns 3-4) are substantially larger in absolute value than those for the 2021-2023 adopters (Columns 1-2), with all coefficients significant at the 5% or 10% level. The absolute value of the coefficient is larger in the late-adopting group (–0.031 and –0.027) compared to the early-adopting group (–0.005 and –0.006). These findings further support the notion that late adopters experience greater improvements in audit quality following blockchain platform adoption, likely driven by the combined effects of digitization and blockchain implementation.

6.1.4 Robustness analyses

To assess robustness, we first conduct a parallel trends test using data from four years prior to and three years following blockchain platform adoption. The year preceding adoption serves as the reference benchmark, with the results presented in Figure 5.

[Figure 5]

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 error corrections (*Correction*), total accruals (*Accrual*), and discretionary accruals (*DAccrual*). These trends are consistent with an improvement in audit quality following adoption. However, the relative improvement compared to the control group attenuates beyond the first post-adoption year for *Correction*, which may reflect the shorter post-adoption period available in the data rather than a diminishing treatment effect.

[Online Appendix Table OA.1]

A potential concern is that the observed improvement in audit quality may be due to ongoing enhancements in bank confirmation policies, particularly the Ministry of Finance's directive requiring banks to centralize confirmation operations. To address this endogeneity concern, we conduct two placebo tests: (a) we assign a pseudo blockchain adoption year two years prior to the actual adoption year and examine audit quality trends around these placebo dates, and (b) we evaluate audit quality changes in a "false" treatment group—firms associated with banks that established centralized confirmation centers but did not adopt blockchain technology. Online Appendix Table OA.1 presents the results, controlling for audit firm, audited entity, and year fixed effects. Panel A shows the results using the pseudo adoption year, and Panel B shows the results for the false treatment group. In both cases we find no statistically significant effects, supporting the robustness of the main findings. Results remain consistent when replacing audit firm fixed effects with bank fixed effects or including both (untabulated).

6.1.5 Financial restatement consequences

Building on the evidence in Section 4.1.1 that blockchain adoption is associated with fewer financial reporting errors, this section further investigates the severity of these errors and the direction of the restatement adjustments. We measure financial reporting risks using four proxies: (i) whether a restatement was exposed to external scrutiny (e.g., media or regulatory bodies)(*Exposed*), (ii) whether the restatement led to a penalty (*Penalty*), (iii) whether the restatement led to upward adjustments in earnings (*RestatementUp*), and (iv) whether it led to downward adjustments (*RestatementDown*). Following our main test on financial errors, we use annual reports from 2017 to 2023 to provide an approximately 2-year window for error detection and correction.

[Table 10]

Table 10 reports the regression results in Columns (1) through (4). In Column (1), the coefficient on *PostTreated* is negative and statistically significant at the 5% level (coef. = –0.128; t = –2.39), with *Exposed* used as a proxy for the importance of financial errors, indicating that blockchain adoption is associated with a 13 percentage point reduction in the likelihood that restatements are exposed to regulatory or media attention. Similarly, Column (2) shows a negative and highly significant effect on *Penalty*, with a coefficient of –0.117 (t = –2.85), implying an 11.7 percentage point reduction in the probability that a firm receives a regulatory penalty due to restated financial statements. In Columns (3) and (4), we turn to the direction of the restatements. While the coefficient on *PostTreated* in the *RestatementUp* regression is positive (coef. = 0.037), it is not statistically significant, suggesting no systematic pattern of upward bias reduction. In the

RestatementDown regression (Column 4), we observe a large and significant negative coefficient (coef. = –0.216; t = –2.75), indicating that blockchain adoption is associated with a 21.6 percentage point decline in downward restatements. These coefficients suggest that blockchain adoption is associated with a lower likelihood that earnings are overvalued and subsequently restated downward. All models include audit firm, firm, and year fixed effects. The results remain consistent when substituting bank fixed effects for audit firm fixed effects or including both (untabulated).

Among the control variables, *Foreign* consistently shows a positive and significant association across all columns, suggesting that firms with greater foreign revenue exposure are more likely to experience restatement-related scrutiny and adjustments.

6.1.6 Financial restatement items

The effects of the blockchain platform on financial accuracy are not uniform across account types. Consistent with the scope of the bank confirmation process, the most affected restatement categories—ranked by economic and statistical significance—are *Asset/Inventory Valuation* (Item 3), *Liability Confirmation* (Item 20), *Equity Recognition* (Item 19), *Revenue/Profit Recognition* (Item 1), and *Cost/Expense Valuation* (Item 2). These categories map directly onto the financial data covered in bank confirmation requests (deposits, loans, guarantees, and securities), providing additional mechanism-consistent evidence that the estimated effects of blockchain adoption are concentrated in precisely the accounts most susceptible to confirmation-related misreporting. Full results by item are reported in Online Appendix Table OA.2.

Building on the evidence that exposure to the blockchain platform is associated with fewer financial reporting errors, we categorize financial restatements by financial items to further determine whether the effects vary across different financial statement components.

The classification of restatement items is obtained from the CSMAR database, a detailed list of financial items provided 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 CPA. The mapping between bank confirmation items and financial restatement categories is also presented in Appendix C. In this section, the dependent variables track the number of restatements for each item over the two years following the release of financial reports in year t (*Item1 - Item 20*). Based on Equation (1), we examine which financial items are most

affected by the adoption of the blockchain platform. Following our main test on financial errors, we use annual reports from 2017 to 2023 to allow for an approximately two-year window for error detection and correction.

To eliminate potential bias from accounting policy adjustments, we exclude financial restatements caused by "*Application of Incorrect Accounting Policies*," "*Accounting Policy Change*," and "*Accounting Estimate Change*." We further remove restatement items that lack a clear correspondence with bank confirmation content (e.g., *Litigation Cases*, *Internal Controls*, *Restructuring*, and *Reclassification*) and those with insufficient sample size (*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*, and *Significant Guarantees*). The final analysis focuses on seven items (*Item1-Item5_ after*; *Item19-Item20_after*), as reported in Table OA.2, and the control variables remain consistent with prior sections. All regressions include audit firm, firm, and year fixed effects. The results are robust to using bank fixed effects in place of audit firm fixed effects or including both (untabulated).

Online Appendix Table OA.2 reports that all coefficients on *PostTreated* across Columns (1)-(7) are negative. The coefficients on *PostTreated* in Columns (1)-(3) and (6)-(7) are statistically significant at the 1%, 5% and 10% levels, respectively. These findings indicate that financial items are restated less frequently among firms exposed to the blockchain platform. Considering both economic significance and significance, the financial items most affected by blockchain adoption, as reported in Online Appendix Table OA.2—Panel A and ranked from most to least impacted, are: *Item3* ("*Asset/Inventory Valuation*"), *Item20* ("*Liability Confirmation*"), *Item19* ("*Equity Recognition*"), *Item1* ("*Revenue Recognition/Profit Recognition*"), and *Item2* ("*Cost/Expense Valuation*"). These categories correspond to the following bank confirmation items: "*Bank Deposits, Custodied Securities, or Other Proprietary Documents*," "*Bank Loans, Accepted but Unpaid Bank Acceptance Bills*," "*Custodied Securities or Other Proprietary Documents*," "*Accepted but Unpaid Bank Acceptance Bills, Discounted but Unmatured Commercial Bills*," and "*Bank Loans, Account Cancellations*." These patterns are broadly consistent with industry practices and the typical scope of bank confirmation procedures, reinforcing the interpretation that blockchain adoption is associated with fewer financial restatements in confirmation-relevant accounts. We include audit firm fixed effects, firm fixed effects, and year fixed effects. Results remain unchanged when including bank fixed effects instead of audit firm fixed effects, or when keeping both effects (untabulated).

6.2 Testing Hypothesis II: Leveling the Playing Field

This section tests H2: whether blockchain adoption is associated with a reduction in the informational advantage of size and specialization, consistent with a leveling of the playing field in audit quality. The primary test focuses on auditor industry specialization—the dimension most directly linked to the interview-confirmed mechanism of increased trust in confirmations from smaller banking relationships. Additional heterogeneity analyses (Big Four vs. non-Big Four auditors, audit firm rotation, state vs. non-state ownership, audit committee size, and proportion of independent directors) are reported in Online Appendix Tables OA.4 through OA.8. In each case, the pattern is consistent: the estimated effects of blockchain adoption are stronger in the subgroup with fewer pre-existing informational resources or governance safeguards, supporting the interpretation that the platform helps level the playing field.

6.2.1 Industry specialization of audit 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 one hand, auditors with greater industry specialization, particularly those affiliated with specialized audit firms, tend to deliver higher-quality audit services. This is primarily due to their superior expertise and stronger reputational incentives (e.g., Chin and Chi, 2009; Reichelt and Wang, 2010). On the other hand, psychological studies suggest that extensive domain-specific experience can lead to cognitive fixation, potentially impairing professional judgment (Dane, 2010; Dekeyser, He, Xiao, and Zuo, 2024). Furthermore, although the digitization of audit processes has improved auditors' professional skills and knowledge (Lamboglia, Lavorato, Scornavacca, and Za, 2020), it may simultaneously erode professional expertise over time (Sutton et al., 2018). Given these mixed effects, auditor industry specialization may moderate the relationship between blockchain platform adoption and audit quality. However, the direction of this moderating effect remains indeterminate.

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 expertise and experience are often shared within the same audit firm (Bedard and Johnstone, 2010; Chin and Chi, 2009), industry specialization is measured at the firm level. DeAngelo (1981) argued 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 from serving a broader client base. Following the studies by Krishnan (2003) and Wei (2014), this paper uses an audit firm's market share within a given industry as a proxy for industry specialization. The data are obtained from the China Research Data Services Platform (CNRDS), and the calculation formula is

as follows:

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

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* exceeds the 90th percentile, indicating that the audit firm has industry specialization, and 0 otherwise. Based on this classification, the firm sample is divided into two subsamples: firms audited by industry specialists and those audited by non-specialists. The main regression model is then re-estimated for each group.

[Table 11]

Table 11 reports the results of the heterogeneity analysis, testing whether the impact of blockchain platform adoption on audit quality varies with audit firm industry specialization. The regressions include firm, audit firm, and year fixed effects. Columns (1)-(3) report the results using *Accrual*, *DAccrual*, *Correction* as dependent variables, respectively. Sub-panel A1 reports the results for firms audited by industry specialists, while Sub-panel A2 reports results for those audited by non-specialists. The coefficients for *PostTreated* are generally more significant in the non-specialist sample, suggesting that the blockchain platform is more strongly associated with improvements in audit quality when audit firms lack industry specialization. These findings are consistent with prior literature indicating that digital audit tools can enhance professional skills and decision-making (Lamboglia et al., 2020).

We further explore additional cross-sectional implications in the Online Appendix (Tables OA.4 through OA.8). These analyses examine whether the effects of blockchain adoption vary across several institutional and governance characteristics, including auditor size (Big Four vs. non-Big Four), auditor rotation, ownership structure (state-owned vs. non-state-owned firms), and board governance features such as audit committee size and the proportion of independent directors. Across these specifications, the estimated blockchain effects are generally stronger in settings with weaker traditional monitoring or fewer informational resources. For example, the improvements in audit quality are more pronounced among non-Big Four auditors and firms without recent auditor rotation, consistent with the technology substituting for experience-based verification mechanisms. Similarly, the effects are stronger for firms with weaker internal governance structures, such as smaller audit committees or lower board independence. Overall, these results reinforce the interpretation that blockchain-based confirmation systems primarily improve audit outcomes in environments where conventional monitoring mechanisms are relatively limited.

6.3 Testing hypothesis III: Operational efficiency

Finally, we examine whether blockchain adoption is associated with improvements in audit efficiency, as measured by audit fees and audit report delay.

6.3.1 Audit fee

A potential benefit of the blockchain platform is the reduction in costs and enhancement of efficiency by minimizing the time and effort required from CPAs. Audit fees serve as a proxy for CPA workload, reflecting both demand-side and supply-side factors in 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 CPAs' workload changes after adopting blockchain. Prior literature suggests that efficiency improvements may affect audit fees, although such changes do not necessarily reflect enhancements in audit quality (Rajgopal et al., 2021). Studies on audit digitization have found that the adoption of digital technologies is frequently associated with reductions in audit fees (Pincus et al., 2017; Fedyk, Hodson, Khimich, and Fedyk, 2022b).

[Table 12]

Table 12—Panel A uses audit fees, scaled by the total fees paid to the audit firm (*AuditFee*), as the dependent variable. Columns (1)-(3) present the regression results with bank fixed effects, audit firm fixed effects, and both included, respectively. The coefficients on *PostTreated* are negative and significant at the 5% level across all model specifications, with estimated coefficients ranging from –0.074 to –0.082. These results suggest a notable reduction in audit fees and, by implication, a decrease in audit workload following the adoption of the blockchain platform.

6.3.2 Audit delay

Audit report delay is commonly used to measure the timeliness of financial reporting (Ashton, Willingham, and Elliott, 1987; Abbott, Parker, and Peters, 2004). Prior studies have identified two primary categories of determinants: firm-specific factors and audit-related factors (Ika and Ghazali, 2012). Firm-specific factors include company size (Dyer and McHugh, 1975), financial performance and condition (Haw, Hu, Hwang, and Wu, 2003), and operational complexity (Ashton, Graul, and Newton, 1989). Audit-related factors include the availability of auditor resources and characteristics of the audit process itself (Behn, Choi, and Kang, 2006). These elements directly or indirectly reflect the efficiency of audit execution. Accordingly,

this section uses audit delay as a proxy for audit input quality, aiming to assess whether blockchain platform adoption alleviates auditors' workload and facilitates the more timely issuance of audit reports. Following prior studies (Abernathy, Barnes, Stefaniak, and Weisbarth, 2017; Zhang, 2016), audit delay is measured as the number of days between the fiscal year-end and the annual report disclosure date.

Table 12—Panel B reports the regression results using audit delay (*AuditDelay*) as the dependent variable. *AuditDelay* is calculated as the number of calendar days between the fiscal year-end and the release date of the company's annual reports, scaled by 365. Columns (1)-(3) present the regression results when the dependent variable is audit delay in year *t* ($AuditDelay_{i,t}$), including bank fixed effects, audit firm fixed effects, and both of them, respectively. Columns (4)-(6) present the regression results when the dependent variable is audit delay in year *t+1* ($AuditDelay_{i,t+1}$), including bank fixed effects, audit firm fixed effects, and both of them, respectively. The coefficients for *PostTreated* are not significant when the dependent variable is $AuditDelay_{i,t}$, but are negative and significant at the 5% level or better when the dependent variable is $AuditDelay_{i,t+1}$. These results suggest that audit delays decrease following the adoption of the blockchain platform, but with a lag. In other words, blockchain adoption is associated with improved timeliness of financial disclosures, consistent with the platform enhancing audit efficiency over time.

7 Conclusion

This study examined whether integrating blockchain technology into the bank confirmation process improves audit outcomes. Using the staggered implementation of a blockchain-based confirmation platform in China and a mixed-methods design that combines structured interviews with large-sample archival analysis, we provide evidence that exposure to the platform is associated with improvements in financial reporting quality, including fewer financial restatements, reduced accrual-based earnings management, and fewer regulatory enforcement actions related to financial reporting. These findings are consistent with blockchain-based confirmations mitigating the core vulnerabilities of traditional confirmation procedures—document tampering, interception, and unverifiable transmission—that regulators have identified as persistent sources of audit failure. The improvements are more pronounced in environments with relatively limited monitoring resources: firms audited by non-specialist auditors and firms with smaller banking relationships exhibit greater improvements, consistent with the platform substituting for the relational familiarity and institutional knowledge that specialist auditors historically provided. This leveling effect is directly corroborated by our interview evidence, which indicates that adoption was accompanied by a unanimous increase in reported trust in confirmations from small and regional banks. Operationally, the 7% to 8% reduction in audit fees

and the significant reduction in audit report delay are consistent with the platform reducing the labor costs of one of the most resource-intensive standard audit procedures.

The findings carry implications for audit standard-setters. The deficiencies in bank confirmation procedures that motivate this study are not unique to China: PCAOB inspection reports have repeatedly identified confirmation-related weaknesses in U.S. audits, and the AICPA has revised its confirmation standards multiple times in response to documented failures (Caster et al., 2008; Janvrin et al., 2010). Our evidence suggests that blockchain-based platforms can address a specific, well-documented failure mode in a core evidentiary procedure codified in both PCAOB AS 2310 and ISA 505. For regulatory bodies considering technology adoption, the Chinese experience—a government-coordinated rollout that addressed first-mover disadvantages and network externalities while preserving voluntary participation—provides an informative case. Several limitations merit acknowledgment. The blockchain platform bundles multiple process changes that our research design cannot fully disentangle; although our early-versus-late adopter analysis exploits heterogeneity in pre-adoption digital infrastructure to narrow the inference toward blockchain-specific features, we cannot rule out that some portion of the estimated effects reflects co-occurring process improvements rather than blockchain properties per se. Additionally, the institutional features of the Chinese A-share market may not generalize directly to other jurisdictions, though the underlying economic mechanisms—tamper resistance, traceability, and automation—are not jurisdiction-specific. Our restatement-based measures also rely on a two-year detection window that may constrain inference in later post-adoption periods.

As blockchain-based confirmation platforms expand to additional jurisdictions, researchers will be able to assess whether the audit-quality improvements documented here replicate in settings with different regulatory structures. The substitution between technology-based verification and auditor specialization warrants further investigation: if blockchain platforms reduce the returns to relational capital, this could reshape auditor-client matching and the competitive structure of audit markets. The platform's implications for continuous auditing also remain unexplored as confirmation turnaround times compress from weeks to days. Overall, our evidence suggests that integrating blockchain into a core audit procedure can strengthen verification mechanisms and improve the reliability and efficiency of the audit process, with the benefits distributed broadly rather than concentrated among already-sophisticated participants.

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Figures

Figure 2. Traditional Bank Confirmation Workflow.
The figure depicts the workflow of the traditional (pre-blockchain) bank confirmation process, which involves three primary parties: the audited entity, the audit firm, and the bank. Confirmations are initiated by the audit firm upon authorization from the audited entity and returned by the bank, with all steps conducted by postal mail or in person.

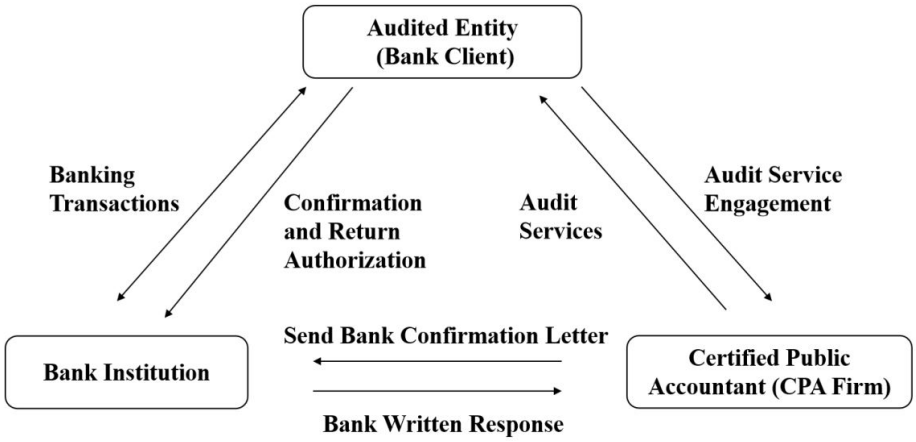


Figure 3. Business Interactions.
This figure depicts business interactions within the blockchain platform.

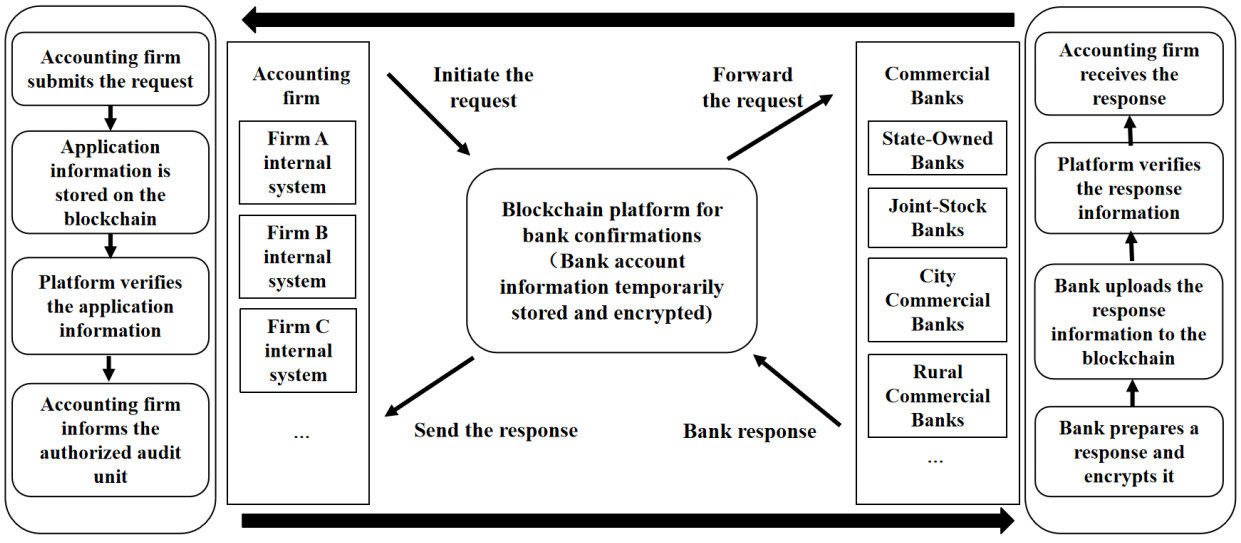


Figure 4. Bank Size and Digitization Intensity.
This figure illustrates banks' average total assets and average digitization intensity by blockchain adoption year (2021-2024). Average assets are reported in USD billions, converted from banks' 2021 total assets. For reference, 1 trillion CNY is approximately equal to USD 155 billion. Digitization intensity is measured by the frequency of digitization-related terms in banks' 2021 annual disclosures.

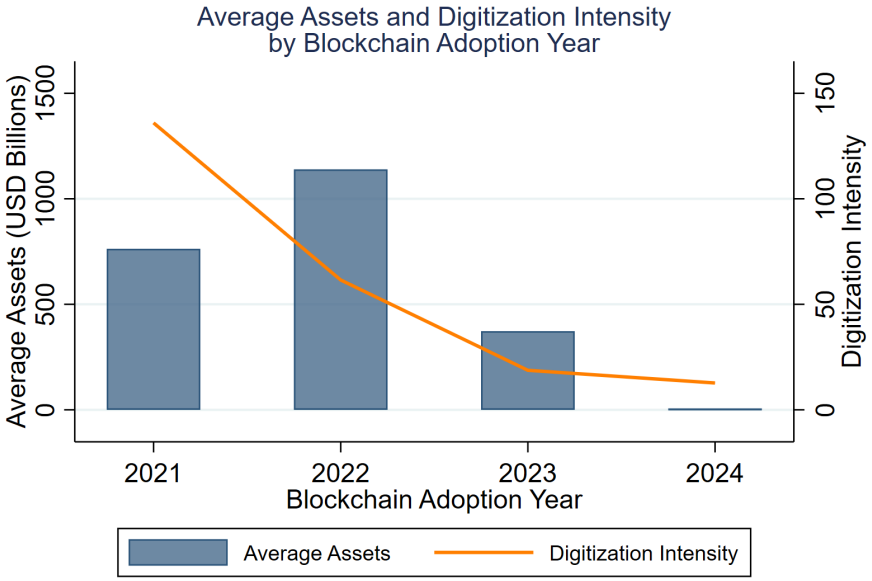
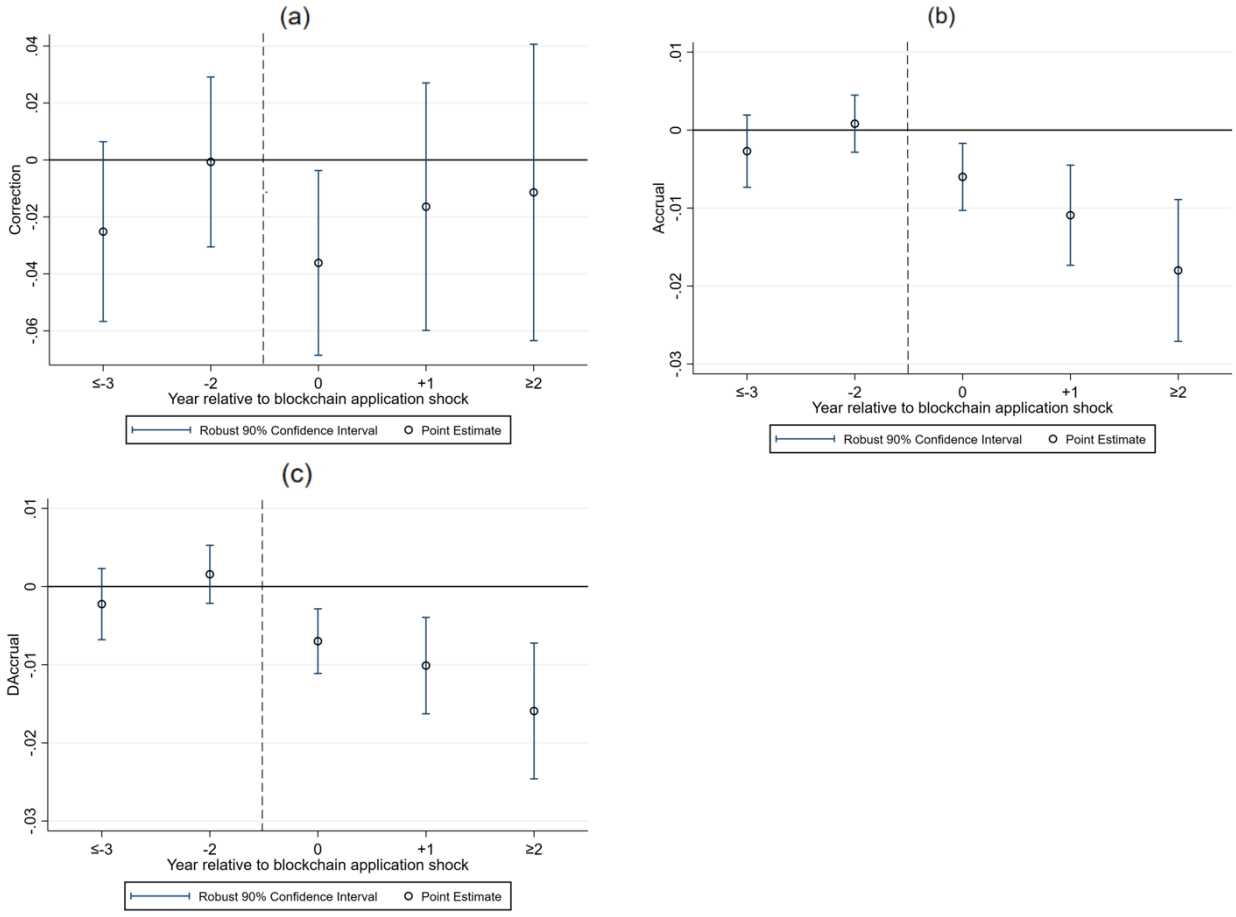


Figure 5. Parallel Trends.
This figure shows a visual DiD examination of the effect of using the blockchain platform for bank confirmations on firms' correction of accounting errors (i.e., financial restatements) and discretionary accounts for the treatment sample, relative to the control sample, from three years before adoption to three years after. Panel (a) depicts the dynamic effects of adoption on the correction of financial errors in financial statements. Panel (b) depicts the dynamic effects of adoption on total accruals. Panel (c) depicts the dynamic effects of adoption on discretionary accruals. The year before adoption is the reference benchmark.



Tables

Table 1. Sample distribution. This table reports the distribution of audit firms and banks on different blockchain platforms in China (platforms established by the China Banking Association (CBA), China Internet Finance Association (CIFA), and China Financial Certification Authority (CFCA), respectively). Panel A reports the number and percentage of audit firms and banks that adopted the platform each year. Panel B reports the distribution of banking institutions across different categories. The data covers January 2021 to September 2024.

Panel A

	Audit firms						**Banks**					
	CBA		**CIFA**		**CFCA**		**CBA**		**CIFA**		**CFCA**	
Year	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
2021	12	2.12	0	0	0	0	1	0.90	0	0	0	0
2022	143	25.22	10	3.4	6	4.76	21	18.92	1305	70.05	186	41.80
2023	118	20.81	108	36.73	58	46.03	55	49.55	463	24.85	21	4.72
2024	294	51.85	176	59.86	62	49.21	34	30.63	95	5.10	238	53.48
Total	567	100	294	100	126	100	111	100	1863	100	445	100

Panel B

	CBA		**CIFA**		**CFCA**	
Banks	**N**	**%**	**N**	**%**	**N**	**%**
Commercial Banks	89	80.18	38	2.04	43	9.66
Village Banks	15	13.51	327	17.55	109	24.49
Rural Commercial Banks	1	0.90	1156	62.05	218	48.99
Rural Cooperative Banks	0	0.00	22	1.18	3	0.67
Rural Credit Cooperatives	1	0.90	320	17.18	70	15.73
Finance Companies	5	4.50	0	0.00	2	0.45
Total	111	100	1863	100	445	100

Table 2. Blockchain vs. Conventional Electronic Bank Confirmation System. This table compares the features of conventional electronic bank confirmation platforms (pre-blockchain) with the CBA blockchain-based confirmation platform. The comparison draws on publicly available platform documentation and interviews with platform participants conducted in March 2025. Immutability and traceability are blockchain-specific properties not present in conventional electronic platforms.

Feature	**Conventional Electronic System**	**Blockchain-Based Platform (CBA)**
Document integrity	No cryptographic verification; documents can be altered after transmission without detection	Hash-based verification at every step; any alteration is immediately and irrefutably detectable
Trust model	Participants must trust the platform operator; no independent verification available	Each participant independently verifies document integrity via on-chain hash comparison; no reliance on a third party
Post-event accountability	Limited audit trail; alteration or fabrication is difficult to attribute	Full on-chain audit trail; any tampering is attributable to the party responsible
Audited firm access	Audited firm may control or intercept document flow in some configurations	Audited firm authorizes the request but cannot intercept, modify, or replace the bank's response
Response authenticity	Depends on the platform operator and bank's internal controls; not independently verifiable	Cryptographically verifiable: hash-match proves the response is the unaltered output of the bank's query
Forgery deterrence	Limited; sophisticated fabrication may go undetected	Strong; any forged document produces a hash mismatch, providing definitive forensic evidence
Data confidentiality	Variable; some platforms lack robust confidentiality protections	End-to-end encryption with bank-held private keys; confirmation data not accessible in plain text to the platform operator
Network scalability	Limited by confidentiality concerns	Scalable; cryptographic privacy enables broad multi-institution participation

Table 3. Structured Interview Evidence: Adoption Motivations. This table presents adoption motivations reported by interviewed audit firms (Panel A, $N = 10$) and banks (Panel B, $N = 6$) in response to the following interview question: "What were the primary factors that motivated your institution to connect to the CBA blockchain platform?" Respondents could select multiple factors."# ranked as the most important factor" indicates the number of times respondents selected each factor as the most important factor. "% ranked as the most important factor" values are relative to the total respondents in each panel. "# marked by respondents" indicates the number of respondents citing each factor. All ten interviewed audit firms previously conducted bank confirmations via postal mail.

Panel A. Audit Firms ($N = 10$)

Adoption Factor	# ranked as the most important factor	% ranked as the most important factor	# marked by respondents
Regulatory and policy guidance	8	80%	10
Internal digital transformation strategy	1	10%	10
Industry association guidance (CICPA)	1	10%	10
Competitive pressure from peer audit firms	0	0%	7
Client influence and demand from companies	0	0%	8
Other factors (risk management and fraud prevention)	0	0%	1
Other factors (cost reduction and efficiency improvement)	0	0%	1

Panel B. Banks ($N = 6$)

Adoption Factor	# ranked as the most important factor	% ranked as the most important factor	# marked by respondents
Regulatory and policy guidance	3	50%	4
Client influence and demand from audit firms	2	33%	6
Industry association guidance (CBA)	1	17%	5
Internal digital transformation strategy	0	0%	5
Competitive pressure from peer banks	0	0%	3

Table 4. Structured Interview Evidence: Pre-Adoption Digitization Status by Bank Adoption Cohort. This table presents the pre-adoption digitization status of the six surveyed banks, stratified by their blockchain platform adoption year. "Prior Electronic System" indicates whether the bank had an existing electronic (non-blockchain) system prior to joining the blockchain platform. "Pre-adoption Digitization Level" reflects the bank's self-reported overall level of digital infrastructure prior to blockchain platform adoption (High / Moderate / Basic / Low / None). "None" indicates that the bank had no prior electronic confirmation system before adopting the blockchain platform. In these cases, the pre-adoption digitization level was not rated. Bank identifiers (K–P) correspond to anonymized interview respondents. Banks K and P represent banks for which blockchain adoption was an incremental change from a prior electronic system (early adopters); Banks L–O had no prior electronic system and represent a combined digitization-plus-blockchain transition (later adopters). This stratification directly validates the early vs. late adopter partition used in Section 6.

Bank	Adoption Year	Bank Type	Prior Electronic System	Pre-adoption Digitization Level
K	2021	Large state-owned commercial	Yes	High
P	2022	Joint-stock commercial	Yes	High
L	2022	City commercial	No	None
M	2022	Joint-stock commercial	No	None
N	2022	Joint-stock commercial	No	None
O	2023	Large state-owned commercial	No	None

Note: Banks K and P (early adopters, already digitized) provide a near-pure test of blockchain's incremental value. Banks L–O (later adopters, no prior electronic system) capture the combined benefit of digitization and blockchain. Both groups show significant effects in the archival analysis, with late adopters exhibiting larger effect magnitudes, consistent with blockchain providing incremental value beyond digitization alone.

Table 5. Structured Interview Evidence: Operational Changes Following Blockchain Platform Adoption. This table presents audit firm respondents' (N = 10) assessments of operational changes following adoption of the CBA blockchain platform. Respondents rated each dimension on a five-point scale: Significantly Decreased / Slightly Decreased / No Change / Slightly Increased / Significantly Increased. For risk and efficiency-related dimensions (the first 11 dimensions), decreases represent improvement. For cross-institution coordination (the last dimension), increases represent improvement.

	Significantly Decreased		**Slightly Decreased**		**No Change**	
Dimension	**N**	**%**	**N**	**%**	**N**	**%**
Forgery or tampering of confirmations	9	90%	0	0%	1	10%
Loss of confirmation documents	8	80%	2	20%	0	0%
Delays in bank confirmation replies	6	60%	4	40%	0	0%
Time required to complete confirmations	6	60%	3	30%	0	0%
Inability to have parties responsible for confirmation errors	5	50%	2	20%	3	30%
Internal information leakage	5	50%	0	0%	5	50%
Collusion	5	50%	2	20%	3	30%
Data omissions or errors	4	40%	0	0%	6	60%
Cost required to complete confirmations	4	40%	5	50%	0	0%
Error rates in confirmation content	3	30%	2	20%	5	50%
Manual follow-up and communication costs	2	20%	6	60%	1	10%
	Significantly Decreased		**Slightly Decreased**		**No Change**	
Convenience of cross-institution coordination	0	0%	0	0%	4	40%

Note: Bank respondents additionally reported that confirmation processing times fell from *several weeks* (under the postal mail system) to *one to three business days* following blockchain adoption.

Table 6. Structured Interview Evidence: Perceived Effects on Audit Quality and Professional Judgment. Panel A presents audit firm respondents' (N = 10) assessments of changes in audit quality dimensions following blockchain adoption.The trust-related dimension (Row 1) is rated on a five-point scale (Significantly Decreased to Significantly Increased). The professional judgment dimensions (Rows 2-5) are drawn from responses to the following interview question: "In which ways have blockchain confirmation platforms significantly influenced auditors' professional judgment on bank confirmations?" Respondents were allowed to select multiple dimensions. "# marked by respondents" indicates the number of respondents citing each dimension. "% marked by respondents" values are relative to the total respondents. Panel B presents the most important platform features as ranked by respondents. Immutability and traceability are blockchain-specific properties not present in conventional electronic platforms. Panel C presents respondents' views on which type of audit firm benefits most from blockchain adoption (audit firms: N = 10; banks: N = 6).

Panel A: Perceived Changes in Audit Quality Dimensions (N = 10)

Dimension	**Significantly Increased**		**Moderately Increased**		**Slightly Increased**	
	N	**%**	**N**	**%**	**N**	**%**
Trust in confirmations from small/regional banks	7	70%	2	20%	0	0%
	# marked by respondents		**% marked by respondents**			
Increased confidence in authenticity of confirmation data	10		100%			
Reduction in tampering concerns	9		90%			
Enhanced ability to identify or deter collusion	6		60%			
Improved efficiency or reduced costs	9		90%			

Panel B: Most Important Blockchain Platform Features (N = 10)

Feature	**# marked by respondents**	**% marked by respondents**
Immutability (tamper resistance)	9	90%
Traceability (post-event accountability)	9	90%
Faster and automated processing	9	90%
Lower administrative or coordination costs	6	60%
Shared information accessible to multiple parties	1	10%
Reduced reliance on a single intermediary	1	10%

Note: Immutability and traceability are inherent blockchain properties absent from conventional electronic platforms, directly supporting the premise that the observed improvements reflect blockchain's incremental value beyond digitization alone.

Panel C: Perceived Beneficiaries of Blockchain Adoption

Which type of audit firm benefits most?	**Audit Firms (N = 10)**		**Banks (N = 6)**	
	N	**%**	**N**	**%**
All types benefit equally	7	70%	2	33%
Large audit firms benefit most	3	30%	3	50%
Small audit firms benefit most	0	0%	1	17%
Medium audit firms benefit most	0	0%	0	0%

Note: Respondents were asked which type of audit firm benefits most from blockchain platform adoption. Percentages may not sum to 100% due to rounding. The divergence between audit firm and bank perceptions, with audit firms predominantly viewing benefits as universal (70%)and banks leaning toward large-firm primacy (50%), is discussed in Section 3.5.

Table 7. Summary statistics for empirical analysis. This table reports summary statistics of the main variables included in the analysis. The sample consists of observations from 1,844 publicly traded companies in the Chinese A-share market from 2017 to 2024. *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, Leone, and Wasley (2005); DeFond and Zhang (2014)). *Correction* is the total number of restated accounting items over two years after 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 otherwise. *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 one if the firm had 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 one if the firm has valid internal controls based on its internal control evaluation reports, and 0 otherwise. *Foreign* is the portion of overseas revenue divided by total revenues. All continuous variables are winsorized at the 1% and 99% levels. Appendix C provides further details on all variables used in this study.

Variable	N	Mean	SD	Min	p25	Median	p75	Max
Accrual	9046	—0.015	0.073	—0.225	—0.053	—0.015	0.021	0.222
DAccrual	9046	—0.003	0.065	—0.205	—0.036	—0.001	0.032	0.186
Correction	6355	0.057	0.292	0.000	0.000	0.000	0.000	2.200
PostTreated	9046	0.415	0.493	0.000	0.000	0.000	1.000	1.000
Size	9046	22.669	1.205	20.257	21.814	22.542	23.417	26.176
Leverage	9046	0.482	0.190	0.102	0.344	0.479	0.613	0.937
Issuance	9046	0.002	0.011	0.000	0.000	0.000	0.000	0.086
Top10	9046	0.502	0.500	0.000	0.000	1.000	1.000	1.000
MTB	9046	0.003	0.003	0.000	0.001	0.002	0.003	0.021
CFO	9046	0.048	0.063	—0.145	0.013	0.046	0.084	0.233
ChangeSales	9046	0.055	0.182	—0.451	—0.030	0.034	0.116	0.866
Loss	9046	0.143	0.350	0.000	0.000	0.000	0.000	1.000
ROA	6355	0.025	0.074	—0.351	0.008	0.030	0.060	0.197
AuditFee	6355	0.859	0.127	0.590	0.751	0.841	1.000	1.000
InternalControl	6355	0.986	0.118	0.000	1.000	1.000	1.000	1.000
Foreign	6355	0.161	0.225	0.000	0.000	0.048	0.246	0.919

Table 8. 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*, *Accrual*, and *DAccrual*. *Correction* is the total number of restated accounting items during the two years following 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*, an indicator variable that equals one for firm-years in which both the audit firm and the bank adopt the blockchain platform and years afterwards, and 0 otherwise. We include bank, audit firm, firm and year fixed effects. The Appendix provides definitions for all other variables. 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	**Correction**	**Correction**
Variable of interest:	**(1)**	**(2)**	**(3)**
PostTreated	—0.041**	—0.034*	—0.035*
	(—2.17)	(—1.67)	(—1.86)
Controls:			
Size	0.009	0.011	0.013
	(0.38)	(0.43)	(0.52)
Leverage	0.054	0.044	0.046
	(0.66)	(0.54)	(0.56)
Issuance	0.685*	0.701*	0.667*
	(1.90)	(1.90)	(1.79)
Top10	0.026	—0.002	0.024
	(1.44)	(—0.13)	(1.36)
MTB	3.285	2.612	1.516
	(0.76)	(0.58)	(0.37)
ROA	—0.285**	—0.306**	—0.289**
	(—2.41)	(—2.57)	(—2.40)
AuditFee	—0.061	—0.066	—0.053
	(—0.70)	(—0.72)	(—0.59)
InternalControl	—0.186**	—0.158*	—0.177**
	(—2.20)	(—1.84)	(—2.05)
Foreign	—0.030	—0.046	—0.029
	(—0.49)	(—0.71)	(—0.46)
Bank FE	No	Yes	Yes
Audit Firm FE	Yes	No	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	6355	6355	6355
Adj. R^2	0.104	0.102	0.112

Table 8—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	—0.005**	—0.005**	—0.007***	—0.006***	—0.005**	—0.007***
	(—2.157)	(—2.105)	(—2.630)	(—2.619)	(—2.355)	(—2.866)
Controls:						
Size	0.039***	0.040***	0.040***	0.034***	0.035***	0.035***
	(10.289)	(10.093)	(10.386)	(9.751)	(9.775)	(10.234)
Leverage	—0.295***	—0.297***	—0.298***	—0.238***	—0.242***	—0.244***
	(—25.479)	(—24.209)	(—24.894)	(—20.917)	(—21.019)	(—21.724)
Issuance	0.247***	0.249***	0.246***	0.252***	0.257***	0.249***
	(4.098)	(3.955)	(3.993)	(4.263)	(4.161)	(4.143)
Top10	0.005**	0.004**	0.005**	0.004*	0.002	0.004*
	(2.318)	(2.142)	(2.363)	(1.796)	(1.337)	(1.825)
MTB	3.833***	3.903***	3.972***	3.038***	3.111***	3.223***
	(7.566)	(7.553)	(7.590)	(6.546)	(6.772)	(6.950)
CFO	—0.854***	—0.853***	—0.857***	—0.767***	—0.770***	—0.773***
	(—47.236)	(—46.900)	(—47.337)	(—45.618)	(—45.458)	(—46.295)
ChangeSales	0.067***	0.066***	0.067***	0.020***	0.020***	0.020***
	(11.959)	(11.727)	(11.862)	(4.218)	(4.213)	(4.207)
Loss	0.004*	0.003	0.004*	0.004*	0.003	0.004*
	(1.879)	(1.376)	(1.811)	(1.926)	(1.521)	(1.910)
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.	9046	9046	9046	9046	9046	9046
Adj. R^2	0.599	0.600	0.602	0.522	0.524	0.527

Table 9. Incremental Value of Blockchain Technology. This table presents the DiD regression results conditioned on bank digitization. Early (late) blockchain platform adopters tend to be larger (smaller) banks that already have (or lack) robust IT capabilities. To capture this heterogeneity, we classify banks into high and low-digitization groups based on when they adopted the blockchain platform for bank confirmations. In Panel A, since the restatement data are collected through June 2025, the sample includes annual reports from 2017 to 2023, providing approximately a two-year window for error detection and correction. Thus, early adopters are defined as banks that implemented the blockchain platform in 2021 or 2022, while late adopters adopted it in 2023. In Panel B, we account for the lag between financial statement disclosure and subsequent restatements. Thus, early adopters are banks that adopted the platform between 2021 and 2023, whereas late adopters are those that adopted it in 2024. The Appendix provides definitions for all other variables. 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

	Early Adoption	**Late Adoption**
	Correction	**Correction**
	(1)	**(2)**
PostTreated	-0.052^{**}	-0.109^{**}
	(-2.06)	(-2.12)
Controls	Yes	Yes
Bank FE	No	No
Audit Firm FE	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Obs.	5036	1021
Adj. R^2	0.095	0.225

Panel B: Discretionary Accounts

	Early Adoption		**Late Adoption**	
	Accrual	**DAccrual**	**Accrual**	**DAccrual**
	(1)	**(2)**	**(3)**	**(4)**
PostTreated	-0.005^{**}	-0.006^{**}	-0.031^{**}	-0.027^{*}
	(-2.021)	(-2.288)	(-2.517)	(-1.701)
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.	8652	8652	309	309
Adj. R^2	0.599	0.525	0.720	0.609

Table 10. 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 were 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 were penalized by regulators, and 0 otherwise. *RestatementUp* is an indicator variable that equals one if a company adjusted earnings upward for the restated financial statements, and 0 otherwise. *RestatementDown* is an indicator variable that equals one if a company adjusted earnings downward for the restated financial statements, and 0 otherwise. The main independent variable is *PostTreated*, an indicator variable that equals one for firm-years in which both the audit firm and the bank adopted the blockchain platform and years afterwards, and 0 otherwise. We include audit firm, firm, and year fixed effects. The Appendix provides definitions for all other variables. 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	—0.128**	—0.117***	0.037	—0.216***
	(—2.39)	(—2.85)	(0.79)	(—2.75)
Controls:				
Size	—0.091	—0.071	—0.081	—0.044
	(—1.49)	(—1.35)	(—1.34)	(—0.47)
Leverage	0.193	0.139	0.118	0.087
	(0.67)	(0.55)	(0.48)	(0.24)
Issuance	0.520	0.528*	—0.270	3.902*
	(1.50)	(1.94)	(—0.25)	(1.87)
Top10	0.018	0.013	0.035	0.193***
	(0.37)	(0.27)	(1.40)	(2.64)
MTB	—9.089*	—7.860*	7.571	—12.736
	(—1.68)	(—1.65)	(0.71)	(—0.87)
ROA	0.066	—0.184	—0.279	—0.836
	(0.16)	(—0.54)	(—0.86)	(—1.49)
AuditFee	—0.490*	—0.298	0.313*	—0.573
	(—1.72)	(—1.17)	(1.69)	(—1.30)
InternalControl	—0.037	—0.072	—0.154	—0.420
	(—0.18)	(—0.40)	(—0.90)	(—1.23)
Foreign	0.600**	0.647**	0.199**	0.905**
	(2.15)	(2.19)	(2.12)	(2.08)
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.	6384	6384	6384	6384
Adj. R^2	0.293	0.301	0.100	0.215

Table 11. Cross-Sectional Tests. Panel A: Audit Firm Industry Specialization. This table presents the DiD regression results when conditioning on audit firms' industry specialization. Audit firms with industry specialization and those without specialization are divided by their industry market share (MarketShare). MarketShare above the 90th percentile is considered to indicate an auditor with industry specialization. The Appendix provides definitions of all other variables. All continuous variables are winsorized at the 1% and 99% levels. T-statistics are in parentheses, with standard errors clustered at the firm level. See other cross-sectional tests in the Appendix. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Audit firm industry specializations

	Accrual (1)	**DAccrual (2)**	**Correction (3)**
Sub-panel A1 (with industry specialization)			
PostTreated	0.011	0.009	0.055
	(0.999)	(0.849)	(1.37)
Controls	Yes	Yes	Yes
Bank FE	No	No	No
Audit Firm FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	606	606	557
Adj. R^2	0.586	0.452	0.382
Sub-panel A2 (w/o industry specialization)			
PostTreated	—0.006**	—0.007***	—0.050**
	(—2.109)	(—2.669)	(—2.53)
Controls	Yes	Yes	Yes
Bank FE	No	No	No
Audit Firm FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	6969	6969	5616
Adj. R^2	0.618	0.551	0.099

Table 12. Blockchain Adoption and Audit Efficiency. Panel A: Audit Fees. This 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*, defined as audit fees scaled by total fees paid to the audit firm. The main independent variable is *PostTreated*, an indicator variable that equals one for firm-years in which both the audit firm and the bank adopted the blockchain platform and in the subsequent year, and 0 otherwise. We include bank, audit firm, firm, and year fixed effects. The Appendix provides definitions of all other variables. 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	—0.074**	—0.082**	—0.076**
	(—1.987)	(—2.175)	(—2.039)
Controls:			
Size	0.123**	0.099*	0.113**
	(2.244)	(1.793)	(2.050)
Leverage	—0.185	—0.115	—0.131
	(—0.933)	(—0.578)	(—0.659)
Top10	0.061**	0.050	0.056*
	(1.964)	(1.577)	(1.788)
ROA	—0.300	—0.301	—0.304
	(—1.448)	(—1.451)	(—1.487)
ChangeSales	0.095*	0.087*	0.096*
	(1.791)	(1.665)	(1.789)
Loss	0.006	—0.000	0.008
	(0.203)	(—0.002)	(0.275)
Foreign	—0.154	—0.120	—0.125
	(—0.981)	(—0.727)	(—0.787)
Current	—0.318*	—0.294	—0.303
	(—1.680)	(—1.505)	(—1.609)
Quick	0.040*	0.043**	0.038*
	(1.908)	(2.003)	(1.783)
UAO	0.005	0.011	0.012
	(0.071)	(0.162)	(0.173)
Bank FE	No	Yes	Yes
Audit Firm FE	Yes	No	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	7072	7072	7072
Adj.R^2	0.787	0.784	0.787

Table 12—Continuation. Panel B: Audit Delay. This 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 variables are $AuditDelay_{i,t}$ (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*, an indicator variable that equals one for firm-years in which both the audit firm and the bank adopted the blockchain platform and years afterwards, and 0 otherwise. We include bank, audit firm, firm, and year fixed effects. The Appendix provides definitions for all other variables. 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.

	AuditDelay$_{i,t}$			**AuditDelay$_{i,t+1}$**		
Variable of interest:	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
PostTreated	0.014	0.009	0.015	—0.033***	—0.030**	—0.032***
	(1.130)	(0.581)	(0.936)	(—3.976)	(—2.181)	(—3.509)
Controls:						
Size	0.124***	0.111***	0.114***	0.135***	0.124***	0.134***
	(9.052)	(5.774)	(6.316)	(9.183)	(8.120)	(8.599)
Leverage	0.139	0.200**	0.199**	—0.066	—0.012	—0.065
	(1.613)	(2.274)	(2.483)	(—0.797)	(—0.144)	(—0.719)
Top10	0.016	0.021	0.017	0.026*	0.030**	0.026*
	(0.652)	(1.281)	(0.609)	(1.793)	(2.260)	(1.848)
ROA	—0.870***	—0.816***	—0.837***	—0.114	—0.086	—0.118
	(—6.939)	(—7.554)	(—7.269)	(—1.088)	(—0.860)	(—1.100)
ChangeSales	—0.056**	—0.055*	—0.055*	—0.015	—0.009	—0.013
	(—2.161)	(—1.951)	(—1.952)	(—1.261)	(—0.621)	(—0.999)
Loss	—0.001	—0.004	—0.004	—0.026***	—0.030***	—0.026***
	(—0.147)	(—0.326)	(—0.356)	(—3.251)	(—4.352)	(—3.699)
Foreign	0.088**	0.056**	0.074**	—0.044	—0.045	—0.043
	(2.658)	(2.145)	(2.327)	(—0.647)	(—0.746)	(—0.661)
Current	—0.227***	—0.250***	—0.231***	—0.306***	—0.318***	—0.304***
	(—2.979)	(—3.084)	(—3.039)	(—4.592)	(—4.865)	(—4.170)
Quick	0.027*	0.026	0.028*	0.011	0.013	0.011
	(1.799)	(1.645)	(1.926)	(1.003)	(0.963)	(0.866)
UAO	—0.092***	—0.099***	—0.088***	—0.023	—0.024	—0.020
	(—4.515)	(—4.491)	(—3.973)	(—1.531)	(—1.156)	(—0.909)
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.	5133	5133	5133	5133	5133	5133
Adj. R^2	0.514	0.516	0.516	0.537	0.538	0.537

Appendix A: Example of Penalty Cases

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

Penalized Entity	Cases
Audit 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 audit 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 justification.[16]
Audited Firm	In 2019, the 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. The Zhongxingcai Guanghua audit firm confirmed only 34 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 audit 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	The total number of restated accounting items over two years after the release of financial reports in year t.
Exposed	An indicator variable that equals one if the restatements of year t's financial reports were 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 were penalized by regulators, and 0 otherwise.
RestatementUp	An indicator variable that equals one if a company adjusted earnings upward for the restated financial statements, and 0 otherwise.
RestatementDown	An indicator variable that equals one if a company adjusted 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 received 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 was restated during the 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 was restated during the 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 adopted the blockchain platform and years afterwards, and 0 otherwise.
MarketShare	The market share of the audit firm, calculated as total assets of the listed companies audited by audit firm i in industry K/total assets of all listed companies in industry K.
SOE	equals one if the firm is a state-owned enterprise (SOE), and 0 otherwise.
AuditCom	The natural logarithm of the number of members in the company's audit committee.
AuditDir	The ratio of independent directors to the total number of members in the company's audit committee.
Top10	An indicator variable that equals one for the 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, calculated following 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 one 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 one if the firm had 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 is calculated as: (total current assets - inventory)/total current liabilities, as of the end of fiscal year t.
Foreign	The portion of overseas revenue divided by total revenues.

Appendix C: Classification of Financial Restatements

Classification of Financial Restatements and Corresponding Bank Confirmation Contents. This table reports the correspondence between bank confirmation content and the classification of financial restatement items.

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
2	Cost/Expense Valuation	Bank Loans, Account Cancellations	Item2
3	Asset/Inventory Valuation	Bank Deposits, Custodied Securities, or Other Proprietary Documents	Item3
4	Cash Flow	Bank Deposits, Bank Loans, Account Cancellations	Item4
5	Restructuring (Mergers/Divisions)	N/A	Item5
6	Tax Rate Adjustment/Tax Reimbursement	Bank Deposits, Bank Loans	Item6
7	Change in Qualification or Certification	Custodied Securities or Other Proprietary Documents	Item7
8	Application of Incorrect Accounting Policies	N/A	Item8
9	Accounting Policy Change	N/A	Item9
10	Accounting Estimate Change	N/A	Item10
11	Litigation Cases	N/A	Item11
12	Internal Controls	N/A	Item12
13	Related Parties/Related Transactions (e.g., Shareholder Loans, Accounts Receivable)	Bank Deposits, Bank Loans, Accepted but Unpaid Bank Acceptance Bills	Item13
14	Reclassification	N/A	Item14
15	Equity/Shareholders	Bank Deposits	Item15
16	Profit Distribution/Dividend Distribution	Bank Deposits	Item16
17	Entrusted Wealth Management	Bank Deposits, Unmatured Bank Wealth Management Products	Item17
18	Significant Guarantees	Guarantees	Item18
19	Equity Confirmation	Custodied Securities or Other Proprietary Documents	Item19
20	Liability Confirmation	Bank Loans, Accepted but Unpaid Bank Acceptance Bills	Item20
21	Other	N/A	Item21

Appendix D: Additional Notes on Novelty and Contribution

A recent study by R. Guo, Jia, and Shentu (2024) investigates the effect of a blockchain-enabled bank confirmation platform on audit quality. While our research shares a similar topical focus, the following section elaborates on the key differences between their work and ours, as well as the novel contributions our study makes.

1. **Time frame and sample coverage:** Guo et al. (2024) use data from 2019 to 2022, but the blockchain platform only launched in 2021, and at that point only one bank had joined. In contrast, our dataset spans 2017 to 2024, providing a longer time window and a larger sample, especially as more banks joined the system and post-adoption activity increased.

2. **Audit quality measurement:** Guo et al. (2024) primarily use abnormal operating cash flows to proxy for audit quality and only include discretionary accruals in the spillover analysis. In contrast, we use financial restatements, discretionary accruals, and audit opinion types to provide a more direct and multidimensional assessment of audit quality.

   Our argument is that blockchain-based confirmations primarily enhance auditors' trust in and the verifiability of third-party bank responses, affecting multiple aspects of the audit process,Äî- not just cash flow-related ones. OCFM, on the other hand, reflects managerial incentives and behavior, and may not directly capture the auditor's ability to detect fraud or restatements.

3. **Exposure identification strategy:** Guo et al. (2024) do not observe the actual banks associated with the audited entities. Instead, the study assumes that bank branches located within 15 kilometers of a firm's headquarters are potential cooperating banks and uses this geographic proximity to infer whether the firm is exposed to the blockchain platform. In the robustness checks, the sample is restricted to A+H-share companies or IPO companies whose banks of account or designated receiving banks are disclosed.

   While this approach improves identification precision, it may also introduce selection bias, limited generalizability, and incomplete coverage of bank-firm interactions. By contrast, we identify relevant banks based on actual borrowing relationships, enabling more accurate and meaningful exposure classification.

4. **Heterogeneity by auditor characteristics:** Guo et al. (2024) find that the impact of digital confirmations on improving cash flow audit quality is more pronounced among auditors with strong industry expertise, suggesting that digital tools amplify existing capabilities. In contrast, we find that the positive effects of blockchain-based confirmations are more pronounced among non-specialist accounting firms, indicating that blockchain helps level the playing field in audit quality by providing greater benefits to auditors with relatively limited expertise or resources.

5. **Audit fees and operational efficiency:** Guo et al. (2024) do not examine the efficiency channel of blockchain adoption. We directly test whether blockchain reduces audit fees and shortens audit report lag (H3). Our structured interview evidence quantifies the operational gain: all six interviewed banks report that confirmation turnaround times fell from *several weeks* under the postal mail system to *one to three business days* following adoption (Table 5). Our archival analysis indicates that this reduction in evidence-gathering costs is associated with measurable decreases in audit fees and audit delays—consistent with the Simunic (1980) prediction that efficiency improvements in audit procedures are reflected in both audit prices and completion times.

6. **Distinguishing digitization from blockchain—early vs. late adopter analysis:** Guo et al. (2024) do not test whether the observed effects reflect blockchain's specific properties or merely the generic transition from manual to digital processes. We address this directly through an early vs. late adopter analysis (Section 6). We partition the sample into *early-adopting banks* (Banks K and P), which had high pre-existing digitization before joining the blockchain platform, and *late-adopting banks* (Banks L, M, N, and O), which had no prior electronic confirmation systems. For early adopters, the blockchain platform represents a marginal change from an already electronic system; any observed effect in this group is more plausibly attributed to blockchain-specific mechanisms (tamper resistance, traceability, and forensic accountability). We document significant associations with improved audit quality outcomes in *both* groups, with late adopters exhibiting larger magnitudes—a pattern consistent with blockchain providing incremental value beyond digitization, directly validated by our structured interview evidence on pre-adoption digitization status (Table 4).

7. **Structured interview evidence and mixed-methods design:** Guo et al. (2024) rely exclusively on archival data and do not collect primary evidence from platform participants. We conduct structured interviews with ten audit firms and six banks that are active participants in the CBA blockchain platform (Appendices 7 and 7). The interviews serve three purposes that archival data alone cannot fulfill. *First*, they document the adoption decision function, showing that adoption timing reflects pre-existing variation in institutional capacity rather than anticipated quality outcomes (Tables 3 and 4). *Second*, they establish the pre-adoption baseline: prior to blockchain, 50% of interviewed audit firms rated confirmations from small and regional banks as "somewhat doubtful" and the remaining 50% as only "fairly reliable"—not a single respondent considered them highly reliable. This documents the specific trust deficit that blockchain's tamper-resistance architecture addresses. *Third*, they confirm the operative mechanisms: immutability and traceability are cited by 9 of 10 audit firms (90%) as the most important platform features (Table 6, Panel B)—both are properties unique to blockchain architecture and absent from conventional electronic systems. The interviews additionally reveal that the dominant barrier to adoption is *client coordination* (7 of 10, 70%), consistent with network externality dynamics that explain the gradual staggered adoption trajectory we observe in the data.

8. **Voluntary adoption with a documented decision function:** Unlike Guo et al. (2024), who infer treatment exposure through geographic proximity without directly observing the adoption decision, we explicitly characterize and document the voluntary adoption decision function. Rather than treating adoption as exogenous, we show that adoption timing reflects observable variation in pre-existing institutional capacity—bank size and prior digitization level—accumulated before the platform was launched. This characterization is supported by both archival evidence (Figure 4, which shows that earlier adopters had larger assets and higher digitization intensity) and direct interview evidence (Table 4, which confirms each bank's pre-adoption digitization status). The result is an identification strategy that is transparent about its assumptions, directly tests the parallel trends assumption, and uses the selection mechanism itself as an additional source of variation in the blockchain vs. digitization analysis.

9. **Democratization of audit quality:** Guo et al. (2024) find that the effects of digital confirmations are more pronounced among auditors with strong industry expertise, suggesting that digital tools amplify the capabilities of already-sophisticated practitioners. Our findings point in the opposite direction: the positive effects of blockchain adoption are more pronounced among *non-specialist* accounting firms (Section 6), indicating that blockchain levels the playing field rather than amplifying existing advantages. This democratization finding is further supported by our structured interview evidence: Panel C of Table 6 shows that 70% of interviewed audit firms believe *all types of audit firm benefit*

equally from the platform—only 30% perceive large-firm primacy. The mechanism is direct: the blockchain platform provides a uniform cryptographic integrity guarantee for confirmation responses regardless of bank size, equalizing the quality of confirmation evidence available to auditors of all sizes and reducing the informational advantage that large, specialized firms previously held through established banking relationships and relational trust mechanisms.

Appendix E: Conversation with Mr. Wu, Vice Chairman of Deloitte China

Wu explained that firms banking with smaller or regional institutions had historically posed challenges for auditors. Confirmations from these banks were often treated with suspicion due to their lack of robust IT systems and weaker internal controls. In his view, one way to assess the success of the blockchain platform is to examine whether audit quality improved for these firms once confirmations were routed through the system.

He recalled one striking case investigated by KPMG, in which a company claimed to have RMB 1 billion in deposits. The bank issued a confirmation to that effect, but upon further scrutiny, it was discovered that the company itself controlled the bank branch in question and that the funds did not exist. Wu emphasized that such cases of collusion and fabricated confirmations had been a recurring risk in the past. He noted that the blockchain platform made such fraud far less likely, since confirmations were logged in an immutable ledger shared across participants, which no single party could manipulate.

On the design and rollout of the system, Wu stressed the importance of collaboration. Both the banks and the accounting associations were brought into the process early, with several rounds of meetings and feedback sessions. He saw this co-development as key to the eventual acceptance and use of the platform, as it reflected the concerns of those who would rely on it most.

Wu also noted that training programs were provided to banks, but their ability to adopt the platform varied significantly. Larger banks with more advanced digital systems and stronger technical expertise integrated the system much faster, while smaller banks took longer. This uneven adoption pattern, he suggested, could be an interesting dimension for empirical study.

Perhaps most importantly, Wu observed a drastic decline in the incidence of misinformation and errors in confirmations after the platform went live. For him, this was the clearest evidence of its effectiveness: auditors could rely on the system, clients had less room to manipulate, and the efficiency of the confirmation process improved across the board.

Mr. Wu is a Vice Chairman of Deloitte China. He has more than 35 years of experience in auditing and advisory services in Hong Kong, New York, Sydney, London, Shanghai, and Beijing. Notably, he was the first Chinese national to be named a senior partner in a Big Four audit firm. His personal history highlights broader institutional changes underway in the profession and the significance of initiatives such as the blockchain platform in modernizing both banking and auditing practices in China.

Appendix F: Structured Interview Protocol for Audit Firms

Note: The questionnaire was originally administered in Chinese. The original Chinese instrument is provided as Supplementary Material (file: `Survey Questionnaire - Audit Firm [Chinese].docx`*). The English translation reproduced below is the version used for data recording and analysis.*

Structured Interview on the Use of the Blockchain Bank Confirmation Platform

(Audit Firm Version —19 Questions)

Q1. Please indicate whether your institution has connected to and used the following blockchain platforms *(single choice per row)*:

	Not connected	Completed connection, not yet used	Pilot use in limited cases	Regular use in daily operations
CBA Blockchain Platform	□	□	□	□
NIFA Blockchain Platform	□	□	□	□
CFCA Blockchain Platform	□	□	□	□

CBA = China Banking Association; NIFA = National Internet Finance Association of China; CFCA = China Financial Certification Authority. All three platforms are described in Section 2.

Q2. Please fill in the year when your institution first completed connecting to each platform and the year of its first actual use *(leave blank for unconnected platforms)*:

	Year of First Connection	Year of First Use
CBA Blockchain Platform	_____	_____
NIFA Blockchain Platform	_____	_____
CFCA Blockchain Platform	_____	_____

Q3. Please fill in the approximate number of bank confirmations your institution has completed through each platform each year *(cumulative totals welcome)*:

	2021	2022	2023	2024	2025	Cumulative Total
CBA	_____	_____	_____	_____	_____	_____
NIFA	_____	_____	_____	_____	_____	_____
CFCA	_____	_____	_____	_____	_____	_____

Q4. Please fill in the approximate total number of bank confirmations your institution processed each year and the percentage processed via blockchain platforms:

	2021	2022	2023	2024	2025
Total confirmations processed	_____	_____	_____	_____	_____
Percentage via blockchain platform	_____	_____	_____	_____	_____

Q5. Which of the following factors influenced your institution's decision to adopt blockchain platforms? *(Multiple choices; rank selected items 1 = most important through 5 = least important.)*

□ ___ Guidance or initiatives from industry associations
□ ___ Policy or regulatory guidance
□ ___ Your institution's internal strategy of digital development
□ ___ Client influence or expectations
□ ___ Competitive pressure from peer institutions
□ ___ Other, please specify: _____

Q6. Which of the following factors have limited your institution's use of blockchain platforms? *(Multiple choices; rank 1 = most limiting through 5 = least limiting.)*

□ ___ Counter-parties have not connected to the platform
□ ___ Technical infrastructure not yet mature, or platform procedures are complex
□ ___ Costs are too high
□ ___ Insufficient training; staff unfamiliar with operating procedures
□ ___ Coordination with existing clients is not smooth
□ ___ Preference for traditional paper-based or manual confirmation methods
□ ___ Other, please specify: _____

Q7. How have the following areas changed since your institution adopted blockchain platforms? *(Single choice per row.)*

	Significantly Decreased	Somewhat Decreased	No Change	Somewhat Increased	Significantly Increased
Risk					
Error rate in confirmation content	□	□	□	□	□
Delays in bank confirmation replies	□	□	□	□	□
Data omissions or errors	□	□	□	□	□
Loss of confirmation documents	□	□	□	□	□
Forgery or tampering during confirmations	□	□	□	□	□
Inability to assign responsibility for errors	□	□	□	□	□
Internal information leakage	□	□	□	□	□
Collusion	□	□	□	□	□
Manual follow-up and communication costs	□	□	□	□	□
Efficiency					
Time required to complete confirmations	□	□	□	□	□
Cost required to complete confirmations	□	□	□	□	□
Convenience of cross-institution coordination	□	□	□	□	□

Q8. Before the launch of blockchain platforms, confirmations from small or regional banks were generally considered to be *(single choice)*:

□ Very reliable □ Fairly reliable □ Somewhat doubtful □ Frequently doubtful

Q9. After adopting blockchain platforms, have auditors increased their trust in confirmations from small or regional banks? *(single choice)*:

□ Yes, significantly increased □ Yes, moderately increased □ Yes, slightly increased □ No change

Q10. Before adopting blockchain platforms, had your institution already digitized its operations (not limited to bank confirmation systems)? *(single choice; if "No," proceed to Q14)*:

□ Yes □ No

Q11. How would you assess the overall level of digitization at your institution *before* blockchain adoption? *(single choice)*:

□ Low: primarily manual operations with virtually no digital support
□ Basic: predominantly manual, with only limited digital support
□ Moderate: some processes digitized, but manual intervention remains common
□ High: highly automated and standardized digital processes for major business functions

Q12. How did your institution use digital platforms or systems *before* blockchain adoption? *(multiple choices)*:

□ Limited scale within headquarters only (pilot or localized)
□ Widely used within headquarters, covering multiple departments or business lines
□ Widely used across headquarters and regional branches, multiple departments
□ Used jointly with a small number of external partners
□ Used with multiple external partners, without a unified coordinating platform
□ Served as a dominant platform, encouraging external partners to participate

Q13. To what extent did your institution use digital processes in *confirmation-related* activities before blockchain adoption? *(single choice)*:

□ None □ Very limited □ Somewhat limited □ Moderate □ Relatively high

Q14. Through which method(s) did your institution conduct bank confirmations *before* blockchain adoption? *(multiple choices)*:

□ Postal mail (paper-based) □ Email □ In-person delivery
□ Delivery by employees of the audited company
□ Delivery by employees of the audit firm
□ Fax □ Other electronic systems (specify): _____

Q15. Compared with a conventional digital confirmation system, what are the most important distinctive features of blockchain platforms? *(multiple choices)*:

□ Immutability: confirmation records cannot be altered once submitted
□ Full traceability of all confirmation operations and a complete audit trail
□ Shared information accessible to multiple parties simultaneously
□ Reduced reliance on a single intermediary (specify if applicable): _____
□ Faster processing time and higher level of automation
□ Lower administrative or coordination costs
□ No substantive difference compared with conventional digital platforms

Q16. In which ways have blockchain platforms significantly influenced auditors' professional judgment on bank confirmations? *(multiple choices)*:

□ Increased confidence in the authenticity of confirmation replies
□ Reduced concerns about post-submission tampering of completed confirmations
□ Enhanced ability to identify or deter collusion
□ Improved efficiency or reduced costs
□ No substantive impact on auditor judgment

Q17. What type of audit firm do you think benefits most from using blockchain platforms? *(single choice)*:

□ Large firms with extensive experience and deep industry knowledge in the sectors they audit

□ Medium-sized firms with a moderate level of experience or resources
□ Small firms with relatively limited experience or resources
□ All types of audit firms benefit to a similar degree

Q18. If your institution has branches in smaller cities or regional areas, how does their use of the blockchain platform compare with your headquarters or major branches? *(single choice)*:

□ Significantly lower □ Slightly lower □ Roughly the same □ Higher □ Not applicable / unsure

Q19. From your experience, in which aspects have blockchain platforms most significantly changed bank confirmation practices or related audit risks? *(open-ended)*:

Appendix G: Structured Interview Protocol for Banks

Note: The questionnaire was originally administered in Chinese. The original Chinese instrument is provided as Supplementary Material (file: `Survey Questionnaire - Bank [Chinese].docx`*). The English translation reproduced below is the version used for data recording and analysis. The bank questionnaire contains 18 questions (Q1–Q18); questions Q1–Q15 are identical in structure to the audit firm questionnaire (Appendix F, Q1–Q15), adapted where necessary for the bank respondent.*

Structured Interview on the Use of the Blockchain Bank Confirmation Platform

(Bank Version —18 Questions)

Q1–Q15. *Identical in structure to the Audit Firm Questionnaire (Appendix F, Q1–Q15), with the following adaptation in Q14: response options for "Delivery by employees of the audit firm" and "Delivery by employees of the audited company" are included, reflecting the bank's perspective on the confirmation delivery process. See Appendix F for the full text of each question.*

Q16. What type of audit firm do you think benefits most from using blockchain platforms? *(single choice)*:

□ Large firms with extensive experience and deep industry knowledge in the sectors they audit
□ Medium-sized firms with a moderate level of experience or resources
□ Small firms with relatively limited experience or resources
□ All types of audit firms benefit to a similar degree

Q17. If your institution has branches in smaller cities or regional areas, how does their use of the blockchain platform compare with your headquarters or major branches? *(single choice)*:

□ Significantly lower □ Slightly lower □ Roughly the same □ Higher □ Not applicable / unsure

Q18. From your experience, in which aspects have blockchain platforms most significantly changed bank confirmation practices or related risks? *(open-ended)*:

_____

_____

_____

Online Appendix

"Blockchain Adoption and Audit Quality"

Table OA.1. Placebo tests. This table tests potential placebo effects of the adoption of a blockchain platform on accrual-based earnings management and financial error correction. In Panel A, the treatment years are replaced by the pre-treatment 1 year. In Panel B, the treatment sample is replaced by companies whose related banks established the Centralized Bank Confirmation Processing Center instead of using the blockchain platform for bank confirmations. We include audit firm, firm, and year fixed effects. The Appendix provides definitions for all other variables. 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 1 year)

	Accrual	**DAccrual**	**Correction**
	(1)	**(2)**	**(3)**
PostTreated	0.002	0.000	—0.029
	(0.771)	(0.118)	(—1.58)
Controls	Yes	Yes	Yes
Bank FE	No	No	No
Audit Firm FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	9046	9046	6355
Adj. R^2	0.598	0.522	0.103

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

Pseudo_Treat_Platform	0.001	0.002	0.012
	(0.546)	(0.641)	(0.645)
Controls	Yes	Yes	Yes
Bank FE	No	No	No
Audit Firm FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	9046	9046	6355
Adj. R^2	0.598	0.522	0.103

Table OA.2. Blockchain Adoption and Financial Restatements. This table reports estimates for the following DiD regression:

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

The outcome variables are the number of times that each item was restated during the two years after the release of financial reports in year t (*Item1-Item5*; *Item19-Item20*). Definitions of each financial item (Item_1-Item_21) are listed in Appendix C. The main independent variable is *PostTreated*, an indicator variable that equals one for firm-years in which both the audit firm and the bank adopted the blockchain platform and years afterwards, and 0 otherwise. We include audit firm, firm, and year fixed effects. The Appendix provides definitions for all other variables. 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.

	Item1	**Item2**	**Item3**	**Item4**	**Item5**	**Item19**	**Item20**
Variable of interest:	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
PostTreated	—0.024**	—0.016*	—0.029***	—0.005	—0.003	—0.026**	—0.027***
	(—2.05)	(—1.71)	(—2.61)	(—0.61)	(—0.75)	(—2.54)	(—2.78)
Controls:							
Size	—0.025*	—0.023*	—0.005	0.005	0.007	—0.023**	—0.011
	(—1.76)	(—1.71)	(—0.43)	(0.50)	(0.94)	(—2.03)	(—1.16)
Leverage	0.009	—0.007	0.041	—0.018	—0.003	0.043	0.017
	(0.18)	(—0.17)	(0.85)	(—0.66)	(—0.09)	(1.04)	(0.46)
Issuance	0.240	0.040	0.440*	0.180	0.136	0.199	0.121
	(1.02)	(0.21)	(1.76)	(0.89)	(0.90)	(1.19)	(0.94)
Top10	0.020**	0.015**	0.012	0.002	0.004	0.014*	0.007
	(2.05)	(1.98)	(1.24)	(0.28)	(0.69)	(1.81)	(0.91)
MTB	0.042	—0.555	0.032	—1.435	—1.172	—0.770	0.729
	(0.02)	(—0.37)	(0.02)	(—1.22)	(—1.26)	(—0.57)	(0.61)
ROA	—0.114	—0.012	—0.099	—0.015	—0.017	—0.117*	—0.039
	(—1.60)	(—0.22)	(—1.40)	(—0.39)	(—0.36)	(—1.94)	(—0.75)
AuditFee	—0.029	—0.039	—0.055	0.001	0.024	—0.052	—0.040
	(—0.54)	(—0.79)	(—1.09)	(0.05)	(1.36)	(—1.02)	(—0.90)
InternalControl	—0.039	—0.068*	—0.083*	—0.017	0.014	—0.082**	—0.053
	(—0.97)	(—1.82)	(—1.95)	(—0.58)	(0.60)	(—2.15)	(—1.59)
Foreign	0.073	0.070	0.094**	0.015	0.000	0.108**	0.098**
	(1.47)	(1.45)	(2.00)	(0.44)	(0.00)	(2.27)	(2.06)
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.	6384	6384	6384	6384	6384	6384	6384
Adj.R^2	0.193	0.193	0.166	0.111	0.087	0.235	0.197

Table OA.3. Blockchain Adoption and Unmodified Audit Opinion. This 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*), an indicator variable that equals one when a client received an unqualified opinion without explanatory notes or disclaimers for year t's financial statements, and 0 otherwise. The main independent variable is *PostTreated*, an indicator variable that equals one for firm-years in which both the audit firm and the bank adopted the blockchain platform and years afterwards, and 0 otherwise. We include audit firm, firm, and year fixed effects. The Appendix provides definitions for all other variables. 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	0.026***	0.029***	0.031**
	(3.332)	(3.384)	(2.454)
Controls:			
Size	0.046***	0.052***	0.049***
	(4.692)	(5.731)	(4.792)
Leverage	—0.368***	—0.392***	—0.353***
	(—3.992)	(—4.196)	(—3.933)
Issuance	0.192	0.221	0.141
	(0.883)	(1.225)	(0.598)
Top10	0.002	0.002	—0.002
	(0.295)	(0.374)	(—0.357)
ROA	0.769***	0.787***	0.781***
	(6.203)	(7.636)	(6.489)
AuditFee	—0.015	—0.008	—0.009
	(—0.294)	(—0.138)	(—0.156)
InternalControl	0.620***	0.624***	0.610***
	(19.339)	(18.317)	(20.179)
OScore	0.018	0.020*	0.016
	(1.745)	(2.043)	(1.671)
ChangeLev	0.060	0.057	0.062
	(1.599)	(1.612)	(1.716)
CFO	0.040	0.047	0.036
	(0.574)	(0.773)	(0.555)
ChangeSales	0.007	0.007	0.001
	(0.391)	(0.499)	(0.040)
Loss	—0.019	—0.021	—0.021
Bank FE	No	Yes	Yes
Audit Firm FE	Yes	No	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	5572	5572	5572
Adj.R^2	0.471	0.450	0.460

Table OA.4. Cross-Sectional Tests: Audit Firm Size. This table presents the DiD regression results when conditioning on whether audit firms are among the international Big Four. The Appendix provides definitions of all other variables. 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	**DAccrual**	**Correction**
	(1)	**(2)**	**(3)**
Sub-panel B1: Big Four			
PostTreated	0.002	—0.011*	0.001
	(0.273)	(—1.676)	(0.06)
Controls	Yes	Yes	Yes
Bank FE	No	No	No
Audit Firm FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	501	501	372
Adj. R^2	0.661	0.560	0.310
Sub-panel B2: Not Big Four			
PostTreated	—0.005**	—0.006**	—0.042**
	(—2.090)	(—2.453)	(—2.11)
Controls	Yes	Yes	Yes
Bank FE	No	No	No
Audit Firm FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	8503	8503	5957
Adj. R^2	0.598	0.523	0.121

Table OA.5. Cross-Sectional Tests: Audit Firm Rotation. This table presents the DiD regression results when conditioning on audit firm rotation. The Appendix provides definitions of all other variables. 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	**DAccrual**	**Correction**
	(1)	**(2)**	**(3)**
Sub-panel C1: Audit Firm (Rotated)			
PostTreated	0.015	0.019	—0.371
	(0.553)	(0.725)	(—1.54)
Controls	Yes	Yes	Yes
Bank FE	No	No	No
Audit Firm FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	293	293	264
Adj. R^2	0.552	0.500	0.116
Sub-panel C2: Audit Firm (Not Rotated)			
PostTreated	—0.005**	—0.006**	—0.031*
	(—2.097)	(—2.569)	(—1.73)
Controls	Yes	Yes	Yes
Bank FE	No	No	No
Audit Firm FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	6919	6919	5630
Adj. R^2	0.631	0.555	0.127

Table OA.6. Cross-Sectional Tests: Ownership Structure. This table presents the DiD regression results when conditioning on firms' ownership structure (SOE vs. non-SOE). The Appendix provides definitions of all other variables. 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	**DAccrual**	**Correction**
	(1)	**(2)**	**(3)**
Sub-panel D1: Enterprises (State-Owned)			
PostTreated	—0.007**	—0.005	—0.053
	(—2.084)	(—1.509)	(—1.44)
Controls	Yes	Yes	Yes
Bank FE	No	No	No
Audit Firm FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	3211	3211	1954
Adj. R^2	0.670	0.599	0.086
Sub-panel D2: Enterprises (Not State-Owned)			
PostTreated	—0.004	—0.007**	—0.028
	(—1.282)	(—2.103)	(—1.28)
Controls	Yes	Yes	Yes
Bank FE	No	No	No
Audit Firm FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	5776	5776	4349
Adj. R^2	0.583	0.506	0.121

Table OA.7. Cross-Sectional Tests: Audit Committee Size. This table presents the DiD regression results when conditioning on firms' audit committee size. Large and small audit committee sizes are defined based on the median. The Appendix provides definitions of all other variables. 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	**DAccrual**	**Correction**
	(1)	**(2)**	**(3)**
Sub-panel E1: Audit Committee (Large)			
PostTreated	—0.001	—0.004	—0.046
	(—0.162)	(—0.560)	(—0.71)
Controls	Yes	Yes	Yes
Bank FE	No	No	No
Audit Firm FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	885	885	705
Adj. R^2	0.695	0.631	0.154
Sub-panel E2: Audit Committee (Small)			
PostTreated	—0.006**	—0.006**	—0.043**
	(—2.129)	(—2.437)	(—2.30)
Controls	Yes	Yes	Yes
Bank FE	No	No	No
Audit Firm FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	7952	7952	5540
Adj. R^2	0.589	0.510	0.118

Table OA.8. Cross-Sectional Tests: Proportion of Independent Directors on the Audit Committee. This table presents the DiD regression results when conditioning on the proportion of independent directors on the audit committee. The high- and low-proportion groups are divided at the median. The Appendix provides definitions of all other variables. 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**
	(1)	**(2)**	**(3)**
Sub-panel F1: Independent Directors (High Proportion)			
PostTreated	0.002	—0.006	—0.047
	(0.215)	(—0.790)	(—0.41)
Controls	Yes	Yes	Yes
Bank FE	No	No	No
Audit Firm FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	2422	2422	2050
Adj. R^2	0.599	0.517	0.146
Sub-panel F2: Independent Directors (Low Proportion)			
PostTreated	—0.005*	—0.006**	—0.038**
	(—1.856)	(—2.179)	(—2.15)
Controls	Yes	Yes	Yes
Bank FE	No	No	No
Audit Firm FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	6174	6174	3983
Adj. R^2	0.641	0.568	0.167