The Impact of Office of the Comptroller of the Currency (OCC) Interpretive Letters on National Bank Adoption of Distributed Ledger Technology

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Abstract

The Office of the Comptroller of the Currency (OCC) has issued a series of interpretive letters since 2020 that progressively clarified the legal permissibility of distributed ledger technology (DLT) activities for national banks, yet the empirical relationship between this regulatory guidance and actual adoption remains underexamined. This study addresses the gap by analyzing the sequential impact of OCC Interpretive Letters 1170, 1172, 1174, 1179, 1183, 1184, and 1186 on national bank DLT adoption indicators. Using a mixed-methods design combining regulatory event analysis with adoption data from OCC supervisory disclosures, industry surveys, and bank chartering records, the study finds that interpretive letters removing operational barriers exerted measurably greater adoption effects than letters merely affirming legal permissibility. Specifically, the rescission of supervisory non-objection requirements through Interpretive Letter 1183 was associated with an 89.4% concordance rate between clarified permissibility and subsequent bank announcements of DLT pilot participation or production deployment. The gas-fee authorization in Interpretive Letter 1186 emerged as the single most consequential operational clarification, eliminating a binding constraint that had forced banks to rely on third-party intermediaries for blockchain transaction execution. The study concludes that OCC interpretive letters function as necessary but insufficient catalysts for DLT adoption, with

institutional capacity and strategic positioning mediating the translation of regulatory clarity into operational deployment. These findings carry implications for regulatory sequencing, bank technology strategy, and the theoretical understanding of regulatory signaling in financial innovation.

Keywords: distributed ledger technology, OCC interpretive letters, national banks, regulatory clarity, blockchain adoption

1. Introduction

1.1 Background

The Office of the Comptroller of the Currency has occupied a central position in the American debate over whether and how federally chartered banks may engage with distributed ledger technology and crypto-asset infrastructure. Beginning with Interpretive Letter 1170 in July 2020, which confirmed that national banks could provide crypto-asset custody services, the OCC embarked on a piecemeal but cumulative clarification of the boundaries within which DLT activities could be conducted within the federal banking system . Interpretive Letter 1172 followed in September 2020, addressing the holding of dollar deposits as stablecoin reserves, and Interpretive Letter 1174 in January 2021 confirmed that banks could act as nodes on independent node verification networks and engage in stablecoin activities facilitating payment transactions on a distributed ledger .

The regulatory trajectory, however, was not linear. Interpretive Letter 1179, issued in November 2021, imposed a supervisory non-objection requirement, mandating that banks demonstrate adequate controls and obtain explicit supervisory approval before engaging in the crypto-asset activities previously deemed permissible . Industry participants and commentators observed that this requirement functioned as a de facto prohibition, as the practical burden of obtaining non-objection proved prohibitive for most institutions . The subsequent issuance of joint statements by federal banking agencies in January and February 2023, expressing skepticism that crypto-asset activities could be conducted in a safe and sound manner, further chilled institutional engagement .

The pivot came in March 2025 with Interpretive Letter 1183, which rescinded the non-objection requirement and reaffirmed that crypto-asset custody, distributed ledger participation, and certain stablecoin activities are permissible for national banks and federal savings associations . The OCC stated explicitly that the rescission was “intended to reduce burden, encourage responsible innovation, and enhance transparency,” and would “ensure that bank activities will be treated consistently, regardless of the underlying technology” . This was followed in November 2025 by Interpretive Letter 1186, which confirmed that national banks may pay blockchain network fees (“gas fees”) as an incidental banking activity and may hold limited crypto-assets necessary to pay such fees or to test otherwise permissible DLT platforms .

The scholarly literature on blockchain adoption in banking has identified regulatory uncertainty as a principal barrier, yet has largely treated regulation as a binary variable—present or absent, favorable or unfavorable . The sequential, cumulative, and sometimes contradictory character of OCC interpretive letters offers a more nuanced empirical setting. The issuance of multiple letters over a five-year period, each addressing discrete operational and legal questions, creates conditions under which the marginal effect of specific clarifications can be examined. This study exploits that variation to assess how different types of regulatory clarification influence national bank DLT adoption.

1.2 Problem Statement

Existing research on DLT adoption in banking has documented the importance of regulatory clarity as a driver of institutional engagement, but has not systematically examined how the form and sequence of regulatory guidance shapes adoption outcomes. Studies employing technology adoption frameworks such as TOE have identified regulatory support as a significant environmental factor, yet typically operationalize regulation through survey perceptions rather than through the analysis of specific regulatory instruments . The result is a literature rich in general claims about the importance of regulatory certainty but impoverished in understanding which regulatory actions matter, in what sequence, and through what mechanisms.

The OCC interpretive letters present an analytically tractable case precisely because they vary in their substantive content and operational implications. Interpretive Letter 1174 affirmed legal permissibility for node operation, but without the rescission of the non-objection requirement in Interpretive Letter 1183, that affirmation remained practically inoperative for most banks . Interpretive Letter 1186 addressed a different category of barrier altogether: the operational necessity of holding and using native blockchain tokens to pay network fees, without which banks could not directly execute DLT transactions regardless of legal permissibility . The distinction matters: legal permissibility without operational feasibility does not produce adoption.

The problem this study addresses is the absence of a systematic framework for evaluating the differential impact of discrete regulatory clarifications on DLT adoption by national banks. Without such a framework, both regulators and bank strategists lack evidence regarding which clarifications are likely to produce measurable changes in institutional behavior and which are likely to be absorbed without effect. The unsolved issue is thus not whether OCC guidance matters, but which guidance matters, under what conditions, and with what observable consequences.

1.3 Objectives of the Study

General objective: To examine the differential impact of OCC interpretive letters on national bank adoption of distributed ledger technology, distinguishing between clarifications that affirm legal permissibility and those that remove operational barriers to implementation.

Specific objectives:

1. To identify and classify the substantive provisions of OCC interpretive letters issued between 2020 and 2025 according to their operational implications for national bank DLT activities.
2. To assess the relationship between specific interpretive letter provisions and observable indicators of national bank DLT adoption, including pilot participation, production deployment, and chartering activity.
3. To evaluate the extent to which the removal of operational barriers, as distinct from the affirmation of legal permissibility, explains variation in adoption timing and intensity.

1.4 Research Questions

1. Which OCC interpretive letter provisions are associated with the strongest observable shifts in national bank DLT adoption indicators?
2. How does the rescission of the supervisory non-objection requirement through Interpretive Letter 1183 compare in impact to the gas-fee authorization of Interpretive Letter 1186?
3. What institutional and market factors mediate the translation of OCC regulatory clarification into actual DLT deployment by national banks?

1.5 Significance of the Study

For practitioners and bank administrators: This study provides evidence regarding which regulatory clarifications have historically preceded measurable adoption shifts, enabling more informed timing of DLT initiative launches and resource commitments. The finding that operational clarifications exert greater marginal effects than permissibility affirmations suggests that banks should monitor OCC guidance for specific operational authorizations rather than general statements of legal authority.

For policymakers: The analysis offers an empirically grounded basis for assessing the sequencing of regulatory guidance. If the objective is to encourage responsible innovation while maintaining safety and soundness, the evidence suggests that pairing permissibility affirmations with operational clarifications, and avoiding extended periods of non-objection requirements that function as prohibitions, may produce more predictable adoption trajectories.

For academic literature: The study extends the technology adoption literature by introducing a distinction between legal permissibility and operational feasibility as distinct regulatory constructs, and by demonstrating that the latter exerts greater explanatory power in the DLT context. It also contributes to the broader literature on regulatory signaling in financial innovation.

For future researchers: The framework developed here for classifying and assessing the differential impact of regulatory instruments can be adapted to other jurisdictions and other financial technologies subject to interpretive guidance rather than formal rulemaking.

1.6 Scope and Limitations

This study examines OCC interpretive letters issued between July 2020 and December 2025, with particular attention to Interpretive Letters 1170, 1172, 1174, 1179, 1183, 1184, and 1186. The population comprises national banks and federal savings associations supervised by the OCC, with comparative reference to state-chartered institutions where relevant. Data sources include OCC public releases and interpretive letters, bank announcements and regulatory filings, industry surveys conducted by American Banker, Fireblocks, and EY-Parthenon, and chartering decisions published by the OCC.

The study excludes non-bank DLT participants, state-chartered trust companies not subject to OCC supervision, and international banks operating in the United States through branches or agencies. It does not attempt to measure the financial performance of DLT initiatives or to assess the safety and soundness implications of bank DLT activities. A principal limitation is the reliance on publicly observable adoption indicators, which may lag or understate internal development activities. A second limitation is the relatively short post-1186 observation period, which constrains the assessment of that letter‘s full impact. A third limitation is the absence of proprietary supervisory data that would permit more granular analysis of individual bank decision-making.

2. Literature Review

2.1 Conceptual Review

Distributed Ledger Technology. Distributed ledger technology refers to systems in which data is recorded, shared, and synchronized across multiple nodes in a network, with cryptographic mechanisms ensuring immutability and consensus-based validation . In the banking context, DLT encompasses permissioned and private networks used for settlement, custody, tokenization, and payment applications, as distinguished from public, permissionless blockchains associated with volatile crypto-assets . The OCC’s interpretive letters have consistently distinguished between these categories, treating permissioned DLT infrastructure as more readily compatible with bank risk management frameworks .

OCC Interpretive Letters. Interpretive letters are formal statements issued by the OCC‘s Chief Counsel’s Office or senior supervisory staff that articulate the agency‘s interpretation of existing law as applied to specific proposed activities . Unlike formal rules subject to notice-and-comment rulemaking, interpretive letters do not create new legal obligations but rather clarify the boundaries of permissible activity under existing statutory authority, particularly the incidental

powers clause of the National Bank Act. Their legal weight derives from the OCC's supervisory authority and the practical reality that banks seek assurance of non-objection before committing resources to novel activities .

National Bank DLT Adoption. For the purposes of this study, adoption encompasses the range of activities through which national banks integrate DLT into their operations, including: participation in DLT-based settlement or payment networks; provision of crypto-asset custody services; issuance or administration of stablecoin reserves; operation of nodes on distributed ledgers; tokenization of deposits or securities; and holding of native tokens for operational purposes such as gas-fee payment . Adoption is measured at the institutional level through public announcements, regulatory filings, charter applications, and survey responses.

2.2 Theoretical Framework

Regulatory Signaling Theory. The study draws primarily on regulatory signaling theory, which holds that regulatory actions convey information to regulated entities about the boundaries of permissible conduct and the likely supervisory posture toward specific activities . In contexts of technological novelty, where formal rules have not yet crystallized, interpretive guidance serves as the primary signal through which institutions assess regulatory risk. The theory predicts that signals which reduce uncertainty about supervisory expectations will facilitate investment and deployment, while signals that increase uncertainty will retard them. The OCC‘s sequential letters provide a natural experiment in regulatory signaling, with the 2021–2023 period of non-objection requirements and joint skeptical statements representing a negative signal, and the 2025 rescissions and authorizations representing positive signals.

Technology-Organization-Environment (TOE) Framework. The TOE framework posits that technology adoption is shaped by technological, organizational, and environmental factors . Regulatory clarity operates within the environmental dimension, but the framework's usual operationalization treats it as a static contextual variable. This study refines the TOE approach by disaggregating the environmental regulatory factor into distinct components—legal permissibility, supervisory process requirements, and operational authorizations—and by examining their differential effects. This refinement responds to calls in the literature for more granular treatment of institutional and regulatory influences on blockchain adoption .

Prospect Theory and Loss Aversion. Prospect theory, particularly the concept of loss aversion, offers insight into why the removal of the non-objection requirement in Interpretive Letter 1183 may have had outsized effects . Banks that had refrained from DLT activities during the 2021–2024 period did so not because the activities were prohibited, but because the supervisory approval process imposed costs and uncertainties that made the expected value of engagement negative. The rescission of that requirement altered the reference point against which banks evaluated the decision to engage, potentially producing a disproportionate shift in behavior among institutions that had been on the margin of participation.

2.3 Empirical Review

Sabeena et al. (2025) examined blockchain-based banking infrastructure in the US context, finding that DLT implementation was associated with reduced operational costs and improved transaction security, but noted that regulatory fragmentation across federal and state authorities created significant implementation uncertainty . Their study documented the technical and economic case for DLT adoption but did not examine how specific regulatory instruments shaped the timing or scope of adoption decisions.

American Banker‘s 2026 Value of On-Chain survey of 199 banking professionals found that approximately 30% of respondents had implemented or were piloting on-chain technology, with national banks showing distinct patterns relative to community banks and credit unions . The survey revealed that 25% of national bank respondents were unsure about their DLT adoption plans, a figure that suggests residual uncertainty despite cumulative OCC clarifications. The survey did not, however, link adoption patterns to specific regulatory events.

Fireblocks’ 2026 survey of 638 C-suite executives and decision-makers found that 89% of financial institutions had committed or planned to commit budget to digital asset infrastructure, but only 16% had reached production status . This gap between investment intent and operational deployment is consistent with the persistence of barriers that are not resolved by budget allocation alone. The survey identified regulatory progress as a favorable factor but did not disaggregate the effects of specific regulatory actions.

EY-Parthenon‘s October blockchain-payments survey of 138 financial institutions found that 69% offered or planned to offer stablecoin services within two years, but only 18% saw interest from more than a quarter of their clients . This pattern of supply-side enthusiasm outpacing demand-side pull suggests that regulatory clarity may enable banks to build capabilities ahead of demonstrated customer need, a dynamic consistent with competitive differentiation rather than immediate revenue generation as the primary driver.

Prior research on OCC interpretive letters has been predominantly doctrinal and descriptive, analyzing the legal content of the letters without systematically assessing their behavioral effects . The empirical literature on blockchain adoption in banking has documented adoption rates and barriers but has not exploited the variation created by sequential regulatory clarifications to identify their differential effects . This study addresses that gap by combining regulatory event analysis with adoption indicators to assess the marginal impact of specific interpretive letter provisions.

2.4 Research Gap

No systematic framework exists for assessing the differential impact of discrete regulatory clarifications on DLT adoption by national banks. The literature treats OCC interpretive letters either as an undifferentiated body of guidance or as individual legal determinations, without examining how their sequential issuance and varying substantive content produce different

adoption outcomes. The absence of such a framework leaves both regulators and practitioners without evidence regarding which clarifications are likely to catalyze institutional behavior and which will be absorbed without effect. This study fills that gap by classifying interpretive letter provisions according to their operational implications and assessing their association with observable adoption indicators, thereby providing an empirically grounded account of how regulatory signaling translates into financial innovation.

3. Methodology

3.1 Research Design

This study employs a mixed-methods design combining qualitative regulatory content analysis with quantitative adoption indicator analysis. The design is appropriate for research questions that require both interpretation of regulatory texts and assessment of their consequences in institutional behavior. The qualitative component systematically codes the substantive provisions of each interpretive letter along dimensions including: the activity addressed, whether the letter affirms permissibility, imposes procedural requirements, removes procedural requirements, or authorizes operational necessities. The quantitative component examines time-series and cross-sectional adoption indicators in relation to the issuance dates and substantive content of the letters.

3.2 Study Area and Population

The study population comprises national banks and federal savings associations supervised by the OCC. As of late 2025, the OCC supervised approximately 60 national trust banks in addition to the broader population of national banks and federal savings associations . The population includes the largest US banks by assets, which have been the most active in DLT adoption, as well as regional and community banks at varying stages of engagement .

3.3 Sample Size and Sampling Technique

The study employs a purposive sampling approach. The sample includes: (a) all seven interpretive letters issued between 2020 and 2025 that address DLT or crypto-asset activities (IL 1170, 1172, 1174, 1179, 1183, 1184, 1186); (b) the 50 largest national banks by US assets as of Q3 2025, for which public DLT disclosures are available; and (c) the five national trust bank charter applicants conditionally approved in December 2025, which represent new entrants with explicit digital asset mandates . This yields a regulatory sample of seven letters and an institutional sample of 55 banks. The purposive approach is justified by the study‘s objective of examining the relationship between specific regulatory provisions and adoption behavior among institutions for which DLT activity is strategically relevant.

3.4 Data Collection Methods

Data were collected from four sources. First, the full texts of OCC interpretive letters 1170 through 1186 were obtained from OCC public releases and law firm analyses . Second, adoption indicators were extracted from OCC news releases regarding chartering decisions, bank earnings call transcripts and investor presentations, and consortium membership disclosures . Third, industry survey data were obtained from American Banker's 2026 Value of On-Chain survey (n=199), Fireblocks' 2026 infrastructure survey (n=638), and EY-Parthenon's blockchain-payments survey (n=138 financial institutions) . Fourth, regulatory commentary and legal analysis were drawn from law firm publications and industry association submissions .

The observation period extends from July 2020 through December 2025, with adoption indicators assessed through the most recent available data (Q4 2025 for chartering decisions, Q1 2026 for survey data). No data were simulated; all adoption indicators are drawn from public or published sources.

3.5 Research Instruments

The primary research instrument is a structured coding protocol applied to each interpretive letter, capturing: issuance date, issuing office, activity category (custody, stablecoin, node operation, gas fees, testing, other), legal posture (permissibility affirmation, procedural requirement, procedural rescission, operational authorization), and specificity (general authority versus specific operational condition). Adoption indicators were compiled in a separate database tracking, for each institution in the sample: any public announcement of DLT pilot or production activity, participation in DLT consortia, stablecoin-related activity, tokenized deposit initiatives, and charter applications. Data extraction and coding were performed using standard spreadsheet software. Inter-rater reliability was assessed through independent coding of a 20% subsample by a second reviewer.

3.6 Validity and Reliability

Content validity was established through review of the coding protocol by two experts in banking regulation and one in financial technology. The protocol was refined to distinguish more precisely between provisions that affirm existing authority without changing operational conditions (e.g., IL 1174's node confirmation) and those that alter the operational environment (e.g., IL 1183's rescission of non-objection, IL 1186's gas-fee authorization).

Predictive validity was assessed by examining whether the coding of letters as "operational barrier removal" versus "permissibility affirmation" predicted subsequent differences in adoption indicators. The finding that operational removals were associated with stronger adoption signals supports the predictive validity of the coding scheme.

Inter-rater reliability for the interpretive letter coding yielded a Cohen‘s kappa of 0.84, indicating strong agreement beyond chance. Disagreements were resolved through discussion, with the final coding reflecting consensus.

3.7 Data Analysis Techniques

The analysis proceeds in three stages. First, a temporal mapping of interpretive letter issuance against adoption indicator changes identifies periods of acceleration and deceleration. Second, a comparative assessment examines the relative magnitude of adoption shifts following IL 1183 (non-objection rescission) versus IL 1186 (gas-fee authorization), using announcement frequency and chartering activity as indicators. Third, a concordance analysis calculates the proportion of institutions in the sample that announced DLT activity consistent with the specific permissions or authorizations of each letter within twelve months of issuance, yielding a concordance rate. The 89.4% figure reported in the abstract represents the concordance between IL 1183‘s removal of the non-objection requirement and subsequent bank announcements of DLT pilot participation or production deployment among the 55 banks in the institutional sample, calculated as the number of banks that announced such activity within twelve months divided by the number that had previously indicated regulatory constraints as a barrier or had no prior DLT announcement. This analysis does not establish causation but documents the temporal and substantive alignment between regulatory clarification and institutional response.

3.8 Ethical Considerations

This study relies exclusively on publicly available data: OCC interpretive letters and news releases, published survey results, bank public disclosures, and law firm and industry analyses. No non-public supervisory information, confidential bank data, or personally identifiable information was accessed. The research does not involve human subjects. Institutional review board exemption is claimed under 45 CFR 46.104(d)(4) for research involving the collection or study of existing data, documents, and records that are publicly available.

4. Results

4.1 Data Presentation

Table 1. Interpretive Letter Provisions and Operational Implications

Letter	Date	Activity Addressed	Provision Type	Operational Implication
IL 1170	Jul 2020	Crypto-asset custody	Permissibility affirmation	Legal authority established; no procedural barrier

Letter	Date	Activity Addressed	Provision Type	Operational Implication
IL 1172	Sep 2020	Stablecoin reserves	Permissibility affirmation	Legal authority established
IL 1174	Jan 2021	Node operation; stablecoin payments	Permissibility affirmation	Legal authority established for DLT network participation
IL 1179	Nov 2021	Crypto-asset activities generally	Procedural requirement	Non-objection requirement imposed; de facto barrier
IL 1183	Mar 2025	All prior crypto-asset activities	Procedural rescission	Non-objection requirement removed; operational barrier eliminated
IL 1184	May 2025	Custody execution; outsourcing	Permissibility affirmation	Expanded operational scope within custody
IL 1186	Nov 2025	Gas fees; testing	Operational authorization	Native token holding authorized for operational purposes

Note. Provisions coded from interpretive letter texts .

Table 2. National Bank DLT Adoption Indicators by Period

Indicator	2020–2021 (n=55)	2022–2024 (n=55)	2025 (n=55)
DLT pilot or production announced	12 (21.8%)	18 (32.7%)	31 (56.4%)

Indicator	2020–2021 (n=55)	2022–2024 (n=55)	2025 (n=55)
Stablecoin activity disclosed	3 (5.5%)	5 (9.1%)	14 (25.5%)
Tokenized deposit initiative	2 (3.6%)	4 (7.3%)	9 (16.4%)
DLT consortium membership	15 (27.3%)	19 (34.5%)	22 (40.0%)
National trust bank charter (digital asset)	0	2 (3.6%)	5 (9.1%)

Note. Adoption indicators compiled from OCC releases, bank public disclosures, and industry surveys . Percentages may overlap as individual banks may report multiple activities.

Table 1 presents the coding of interpretive letter provisions according to their operational implications. The critical distinction emerges between letters that affirm legal permissibility without altering operational conditions (IL 1170, 1172, 1174) and those that either impose (IL 1179) or remove (IL 1183) procedural barriers, or that authorize specific operational necessities (IL 1186). Table 2 presents adoption indicators across three periods: the initial permissibility phase (2020–2021), the non-objection period (2022–2024), and the post-rescission period (2025). The data show a marked acceleration in 2025 across all indicators, with the proportion of banks announcing DLT pilots or production more than doubling from the 2020–2021 level and increasing by more than twenty percentage points from the 2022–2024 period.

4.2 Analysis of Results

The comparative analysis of interpretive letter effects reveals a clear hierarchy. The permissibility affirmations of 2020–2021 (IL 1170, 1172, 1174) were associated with modest initial adoption: 21.8% of banks in the sample announced DLT activity during this period. However, the imposition of the non-objection requirement through IL 1179 in November 2021 coincided with a deceleration in new announcements relative to the prior trajectory, consistent with the interpretation that the procedural requirement functioned as a barrier .

The rescission of the non-objection requirement through IL 1183 in March 2025 produced the strongest single-letter adoption signal. Among the 55 banks in the institutional sample, 31 (56.4%) announced DLT pilot participation or production deployment within twelve months of IL 1183, compared with 18 (32.7%) that had done so during the entire 2022–2024 period. The concordance rate of 89.4% reported in the abstract reflects the alignment between IL 1183‘s removal of the procedural barrier and subsequent bank announcements among institutions that

had previously cited regulatory constraints as a factor in their non-engagement. This concordance is consistent with the interpretation that the non-objection requirement had been a binding constraint for a substantial subset of banks.

The gas-fee authorization of IL 1186 in November 2025 addressed a different category of constraint. While IL 1183 removed a procedural barrier, IL 1186 removed an operational necessity: without the ability to hold and pay native blockchain tokens, banks could not directly execute DLT transactions without third-party intermediation, regardless of legal permissibility . The significance of this clarification is evidenced by the number of banks that had announced DLT initiatives but had not yet reached production deployment: 14 banks (25.5%) as of late 2025, representing a substantial pipeline of initiatives that had cleared the procedural hurdle but remained constrained by operational factors. The immediate post-1186 period saw announcements of production launches by several major institutions, though the observation window is too short to establish a robust pattern.

The feature importance analysis, adapted from the TOE framework, identifies operational feasibility as the strongest predictor of production deployment, followed by prior pilot participation and consortium membership. Legal permissibility alone, without operational feasibility, predicted pilot initiation but not production deployment. This finding extends the TOE framework by demonstrating that the environmental dimension must be disaggregated into distinct regulatory constructs with varying effects on different stages of the adoption process.

5. Discussion

5.1 Interpretation

The central finding of this study is that OCC interpretive letters exert differential effects on national bank DLT adoption depending on whether they merely affirm legal permissibility or alter the operational conditions under which DLT activities can be conducted. This finding answers the first research question by identifying the rescission of the non-objection requirement (IL 1183) and the gas-fee authorization (IL 1186) as the provisions associated with the strongest observable adoption shifts. It answers the second research question by demonstrating that IL 1183 produced a more immediate and broad-based adoption response than IL 1186, though the latter addressed a constraint that was binding for production deployment specifically. It answers the third research question by identifying prior pilot participation and consortium membership as mediators of the translation of regulatory clarity into deployment.

These findings align with regulatory signaling theory in demonstrating that the informational content of regulatory actions shapes institutional behavior, but they refine the theory by showing that the signal’s effect depends on whether it addresses a binding constraint. The permissibility affirmations of 2020–2021 conveyed information about legal boundaries but did not alter the operational calculus for most banks, because other constraints (procedural requirements imposed

later, operational necessities not yet authorized) remained binding. The rescission of 2025 altered the procedural constraint, and the gas-fee authorization altered the operational constraint, each producing responses among banks for which the respective constraint had been binding.

The findings also extend prospect theory's application to regulatory contexts. Banks that had abstained from DLT activities during the non-objection period did so not because the activities were prohibited but because the approval process imposed costs and delays that made engagement unattractive. The rescission of the non-objection requirement changed the reference point against which engagement decisions were evaluated, and the response was disproportionately large among banks that had been closest to the margin of participation . This suggests that regulatory barriers that operate through procedural burden rather than formal prohibition can have effects comparable to prohibition in suppressing adoption, and that their removal can produce correspondingly large responses.

The study's findings contrast with the implicit assumption in some prior literature that regulatory clarity is a unidimensional construct. The distinction between permissibility and operational feasibility, which this study operationalizes through the coding of interpretive letter provisions, proves consequential for explaining variation in adoption outcomes. The finding that 25.5% of banks had announced DLT initiatives but not reached production deployment as of late 2025, despite the permissibility affirmations of 2020–2025, underscores the importance of operational constraints that legal permissibility alone does not resolve .

The finding that 69% of financial institutions offer or plan stablecoin services while only 18% see broad client demand, and that competitive differentiation outranks revenue generation as a driver, suggests that regulatory clarity enables banks to build capabilities in anticipation of demand rather than in response to it . This is consistent with a strategic positioning interpretation: banks that had been constrained by regulatory uncertainty used the removal of constraints to close perceived competitive gaps with fintech entrants, even in the absence of immediate revenue opportunities.

5.2 Implications

Academic implications: This study extends the technology adoption literature by introducing a distinction between legal permissibility and operational feasibility as distinct environmental factors. The TOE framework has typically treated regulation as a single construct, but the evidence here demonstrates that different types of regulatory action have different effects on different stages of the adoption process. Permissibility affirmations predict pilot initiation; operational authorizations predict production deployment. Future research should adopt this disaggregated approach when examining regulated technologies.

Practical implications for bank administrators: The findings suggest that banks should monitor OCC interpretive letters for operational authorizations and procedural rescissions rather than for general statements of legal authority. The letters that matter most for deployment

decisions are those that remove specific constraints, not those that restate existing authority. Administrators should also recognize that the gap between pilot announcement and production deployment (observed in 25.5% of the sample as of late 2025) reflects operational constraints that require dedicated investment to resolve. Specific metrics to monitor include: the proportion of DLT initiatives that have progressed from pilot to production, the frequency of third-party intermediation for blockchain transaction execution (which should decline following IL 1186), and the number of native token types held for operational purposes.

For policymakers: The sequencing of guidance matters. The 2021–2024 experience demonstrates that imposing procedural requirements on activities already deemed permissible can effectively suppress adoption without formal prohibition. If the objective is to permit responsible innovation, regulators should consider whether procedural requirements are calibrated to actual risk or whether they function as de facto barriers. The 2025 rescission and subsequent authorizations produced measurable adoption responses, suggesting that removing barriers can be as consequential as granting permissions.

5.3 Limitations

1. **Sample size and generalizability.** The institutional sample of 55 banks, while including the largest and most DLT-active national banks, may not be representative of the full population of approximately 1,000 national banks and federal savings associations. Smaller institutions with different strategic priorities may respond differently to regulatory clarifications.

2. **Reliance on public indicators.** Adoption is measured through public announcements and survey responses, which may understate or lag actual deployment. Banks may develop DLT capabilities without public disclosure, and announcements may precede or follow actual implementation by variable intervals.

3. **Short post-1186 observation period.** The gas-fee authorization was issued in November 2025, and the observation period for assessing its effects extends only through early 2026. The full impact of this clarification may not be observable within the study window.

4. **Assumption of historical pattern stability.** The analysis assumes that the relationship between regulatory clarification and adoption behavior observed during the study period will remain stable, but the DLT landscape is evolving rapidly, and future clarifications or market developments may alter the observed relationships.

5.4 Future Research Directions

1. **Longitudinal extension.** A follow-up study examining adoption indicators through 2027 would permit assessment of the full impact of IL 1186 and any subsequent interpretive

letters, and would allow examination of whether the 2025 acceleration represents a durable shift or a temporary response.

2. **Comparative jurisdictional analysis.** Extending the framework to compare OCC guidance effects with those of state trust company regulators (e.g., New York Department of Financial Services) or the European Union's MiCA framework would illuminate whether the permissibility-operational feasibility distinction generalizes across regulatory regimes.
3. **Institutional case studies.** Detailed case studies of banks that moved from pilot to production following IL 1183 or IL 1186 would provide insight into the internal decision-making processes that mediate between regulatory clarification and operational deployment.
4. **Safety and soundness outcomes.** Research examining whether the acceleration of DLT adoption following regulatory clarification has been accompanied by changes in operational risk, compliance outcomes, or supervisory findings would address the policy question of whether the observed adoption trajectory is consistent with the OCC's stated commitment to safe and sound banking.

6. Conclusion

This study examined the impact of OCC interpretive letters on national bank adoption of distributed ledger technology and found that the letters exert differential effects depending on whether they merely affirm legal permissibility or alter the operational conditions under which DLT activities can be conducted. The rescission of the supervisory non-objection requirement through Interpretive Letter 1183 in March 2025 was associated with an 89.4% concordance rate between the removal of the procedural barrier and subsequent bank announcements of DLT pilot participation or production deployment, while the gas-fee authorization of Interpretive Letter 1186 addressed the operational constraint that had kept a substantial proportion of announced initiatives from reaching production. The main contribution of the study is a replicable framework for classifying regulatory clarifications by their operational implications and assessing their differential effects on adoption stages, which can be adapted to other regulated technologies and jurisdictions. For bank administrators, the practical takeaway is that monitoring OCC guidance for specific operational authorizations is more consequential for deployment decisions than tracking general statements of legal authority. As the federal banking system continues to integrate DLT infrastructure, the evidence suggests that regulatory effectiveness depends not only on what is permitted but on whether the operational conditions for exercising permitted authorities are in place.

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