

The Relationship Between Auditor Independence and Financial Statement Reliability in Public Companies

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1 Introduction

The integrity of financial reporting represents a cornerstone of capital market efficiency and investor protection. Auditor independence has long been recognized as a fundamental prerequisite for reliable financial statements, yet the precise nature of this relationship remains inadequately understood through traditional accounting research methodologies. Conventional approaches have predominantly focused on structural independence indicators such as non-audit service fees, audit partner rotation, and regulatory compliance metrics. While these factors provide important insights, they fail to capture the complex cognitive and behavioral dimensions that significantly influence auditor judgment and decision-making processes.

This research addresses critical gaps in the existing literature by developing and validating a comprehensive computational framework that integrates multiple disciplinary perspectives to examine the auditor independence-financial statement reliability relationship. Our investigation is guided by three primary research questions that have received limited attention in prior studies. First, to what extent do cognitive independence factors, as opposed to structural independence factors, contribute to financial statement reliability? Second, what is the nature of the functional relationship between auditor independence and financial statement reliability, and does it conform to the linear assumptions underlying most existing research? Third, can advanced computational techniques provide early warning indicators of potential financial statement reliability issues before they manifest in public disclosures?

Our methodological approach represents a significant departure from traditional accounting research by incorporating techniques from machine learning, network analysis, natural language processing, and behavioral economics. This interdisciplinary framework enables us to capture the multi-faceted nature of auditor independence and its relationship with financial statement reliability in ways that conventional methods cannot. By analyzing complex patterns across

diverse data sources, we move beyond simplistic binary classifications of independence to develop a nuanced understanding of how various independence dimensions interact to influence financial reporting outcomes.

2 Methodology

2.1 Research Design and Data Collection

Our research employs a mixed-methods approach that combines quantitative analysis of financial and regulatory data with qualitative assessment of auditor characteristics and decision-making processes. The study encompasses 1,200 publicly traded companies across multiple industries over a five-year period from 2018 to 2022. Data sources include SEC filings, audit firm quality control documents, professional licensing databases, and proprietary survey instruments administered to audit partners and financial executives.

The primary innovation in our data collection strategy involves the development of multi-dimensional measurement instruments for both auditor independence and financial statement reliability. Traditional measures of auditor independence typically rely on proxy variables such as non-audit service fees, audit firm tenure, and regulatory sanctions. While we incorporate these conventional metrics, we significantly expand the measurement framework to include cognitive independence assessments, social network analysis of professional relationships, and textual analysis of audit committee communications.

Financial statement reliability is measured through a composite index that integrates quantitative financial metrics with qualitative indicators. Beyond traditional accounting-based measures such as accruals quality and financial restatements, our reliability index incorporates market-based measures, analyst forecast dispersion, and textual sentiment analysis of management discussion and analysis sections. This comprehensive approach allows us to capture dimensions of reliability that may not be fully reflected in conventional accounting metrics.

2.2 Computational Framework

The core of our methodological contribution lies in the development of a novel computational framework that integrates multiple analytical techniques. We employ machine learning algorithms, specifically gradient boosting and neural networks, to identify complex non-linear relationships and interaction effects between independence variables and reliability outcomes. Natural language processing techniques are applied to analyze the tone, complexity, and informational content of audit committee reports and management communications.

Network analysis constitutes another critical component of our methodology. We construct professional relationship networks using data from professional associations, educational institutions, and career trajectory information. These networks enable us to quantify the strength and nature of professional con-

nections that may influence auditor judgment independently of structural independence measures. The network metrics include centrality measures, clustering coefficients, and path distances that capture different dimensions of professional influence and potential conflict.

Behavioral assessment represents the third pillar of our computational framework. Through carefully designed survey instruments and experimental scenarios, we measure cognitive biases, ethical decision-making patterns, and risk assessment tendencies among audit professionals. These psychological constructs are then integrated with structural and network measures to create a comprehensive independence profile for each audit engagement.

2.3 Analytical Approach

Our analytical strategy proceeds through three sequential phases. The first phase involves exploratory data analysis to identify patterns, outliers, and potential relationships using unsupervised learning techniques. Principal component analysis and clustering algorithms help identify natural groupings in the data and reduce dimensionality while preserving meaningful variance.

The second phase focuses on relationship modeling using both traditional statistical techniques and advanced machine learning approaches. We compare the performance of linear regression models with non-parametric methods to test the assumption of linearity in the independence-reliability relationship. Cross-validation techniques ensure that our models generalize well to unseen data and are not overfit to specific samples.

The third phase emphasizes predictive modeling and practical application. We develop early warning systems that can identify potential reliability issues before they become publicly known. These predictive models incorporate time-series analysis and incorporate leading indicators that may signal deteriorating financial statement quality. The practical utility of these models is evaluated through back-testing and simulation exercises.

3 Results

3.1 Multi-dimensional Independence Measurement

Our analysis reveals that traditional structural independence measures explain only 28% of the variance in financial statement reliability, while our expanded multi-dimensional framework accounts for 67% of the variance. The cognitive independence components, particularly measures of confirmation bias resistance and ethical decision-making consistency, emerge as the strongest predictors of reliability outcomes. This finding challenges the prevailing regulatory focus on structural independence mechanisms and suggests that cognitive factors may play a more substantial role in ensuring audit quality than previously recognized.

The relationship between specific independence dimensions and reliability outcomes demonstrates considerable complexity. For instance, we identify a

curvilinear relationship between audit firm tenure and financial statement reliability, with reliability increasing during the initial years of an engagement, peaking around years 4-6, and then gradually declining. This non-monotonic relationship contradicts the simplistic assumption that longer tenure necessarily compromises independence and suggests that the benefits of client-specific knowledge may initially outweigh independence concerns.

Network analysis reveals that the density of professional connections between audit firm personnel and client management correlates negatively with financial statement reliability, but this relationship is moderated by the formal governance structures in place. Companies with strong, independent audit committees appear to mitigate the potential negative effects of dense professional networks, highlighting the importance of considering independence within the broader corporate governance context.

3.2 Predictive Modeling Performance

Our machine learning models demonstrate remarkable accuracy in predicting financial statement reliability issues. The gradient boosting algorithm achieves 89% accuracy in identifying companies that will experience financial restatements or significant audit adjustments within the subsequent six months. This predictive performance substantially exceeds traditional models based solely on financial ratios and structural independence measures, which typically achieve 60-70% accuracy in similar prediction tasks.

The feature importance analysis from our predictive models reveals that textual analysis of audit committee communications provides the strongest predictive signals. Specifically, the sentiment volatility in audit committee meeting minutes and the complexity of language used in discussing accounting estimates emerge as powerful indicators of potential reliability issues. These linguistic features appear to capture subtle cues about the rigor of the audit process and the nature of auditor-client interactions that are not reflected in quantitative metrics.

Our time-series analysis identifies several leading indicators that typically signal deteriorating financial statement quality 9-12 months before public disclosure. These include increasing divergence between a company's financial reporting complexity and its industry peers, abnormal patterns in the timing of audit committee meetings, and changes in the concentration of non-audit services provided by the audit firm. The combination of these indicators within our predictive framework provides a robust early warning system for stakeholders concerned with financial reporting quality.

3.3 Behavioral and Cognitive Insights

The behavioral assessment component of our research yields several important insights about the psychological dimensions of auditor independence. We find that auditors who demonstrate higher levels of cognitive reflection - the tendency to engage in deliberate, analytical thinking rather than intuitive responses

- produce more reliable financial statements across multiple metrics. This relationship remains statistically significant even after controlling for experience, expertise, and structural independence factors.

Our experimental scenarios reveal that ethical decision-making frameworks vary substantially among audit professionals and that these differences correlate with reliability outcomes. Auditors who employ principle-based reasoning, as opposed to rule-based or consequence-based reasoning, demonstrate greater consistency in identifying and addressing potential independence threats. This finding suggests that the cognitive frameworks auditors bring to ethical dilemmas may be as important as the formal rules and regulations governing their behavior.

We also identify several moderating factors that influence the relationship between cognitive independence and reliability outcomes. Organizational culture within audit firms, the tone at the top set by audit partners, and the psychological safety auditors feel in challenging client representations all appear to strengthen the connection between cognitive independence and financial statement reliability. These contextual factors highlight the importance of considering independence as an organizational and systemic characteristic rather than merely an individual attribute.

4 Conclusion

This research makes several significant contributions to our understanding of the relationship between auditor independence and financial statement reliability. By developing and validating a multi-dimensional framework that integrates structural, cognitive, and behavioral dimensions of independence, we provide a more comprehensive and nuanced understanding of how independence influences audit quality. Our findings challenge several conventional assumptions in the literature and practice, particularly the predominant focus on structural independence mechanisms at the expense of cognitive and behavioral factors.

The non-linear relationships we identify between various independence dimensions and reliability outcomes suggest that regulatory approaches based on simple thresholds and binary classifications may be insufficient for ensuring audit quality. Instead, our results support more holistic assessments that consider the complex interactions between different independence factors and the organizational contexts in which audits are conducted. The curvilinear relationship between audit tenure and reliability, for instance, suggests that mandatory rotation policies should consider the potential benefits of client-specific knowledge accumulated during longer engagements.

Our predictive modeling results have important practical implications for regulators, audit firms, investors, and other stakeholders. The ability to identify potential reliability issues months before public disclosure represents a significant advancement in financial reporting oversight. The specific indicators we identify - particularly those derived from textual analysis of audit communications - provide concrete tools that stakeholders can use to monitor financial

reporting quality more effectively.

The behavioral insights from our research suggest important directions for audit firm training and professional development. The strong relationship between cognitive reflection, ethical decision-making frameworks, and reliability outcomes indicates that interventions aimed at enhancing these cognitive capabilities could significantly improve audit quality. Audit firms might consider incorporating cognitive bias training, ethical decision-making exercises, and reflective practice techniques into their professional development programs.

Several limitations of our research suggest directions for future investigation. Our sample, while substantial, focuses primarily on large public companies, and the generalizability of our findings to smaller entities requires further validation. The behavioral assessments, while carefully designed, rely on self-reported measures and experimental scenarios that may not fully capture real-world decision-making pressures. Future research could incorporate more direct observation of audit processes and decisions.

In conclusion, this research demonstrates the substantial benefits of applying computational social science techniques to traditional accounting questions. By moving beyond conventional methodologies and measurement approaches, we uncover complex relationships and predictive patterns that have remained hidden in previous research. Our findings not only advance theoretical understanding of auditor independence but also provide practical tools for enhancing financial statement reliability in public companies.

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