

Exploring the Relationship Between Auditor Independence and Financial Reporting Quality in Listed Companies

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Abstract

This research investigates the complex relationship between auditor independence and financial reporting quality through a novel computational framework that integrates machine learning algorithms with traditional econometric analysis. Unlike previous studies that rely primarily on regulatory proxies for independence, we develop a multidimensional independence index using natural language processing techniques applied to auditor-client communications, fee structures, and tenure patterns. Our methodology employs ensemble learning models to analyze financial statement data from 2,500 listed companies across multiple jurisdictions over a ten-year period. The findings reveal a non-linear relationship between auditor independence and reporting quality, challenging conventional linear assumptions. We identify critical threshold effects where marginal improvements in independence yield diminishing returns, and discover contextual factors that moderate this relationship, including industry volatility, corporate governance structures, and regulatory environments. The research introduces a dynamic independence assessment tool that adapts to changing market conditions and provides real-time monitoring capabilities. This study contributes to both accounting theory and computational finance by offering a more nuanced understanding of how independence mechanisms function in practice and developing predictive models that can anticipate reporting quality issues before they manifest in financial statements.

1 Introduction

The integrity of financial reporting represents a cornerstone of capital market efficiency and investor confidence. Auditor independence has long been recognized as a critical safeguard in ensuring the reliability of financial information presented by listed companies. Traditional accounting research has predominantly approached this relationship through linear regression models that treat independence as a binary or unidimensional construct. However, the increasing complexity of business transactions, globalization of capital markets, and evolving regulatory landscapes necessitate a more sophisticated understanding of how auditor independence actually influences financial reporting quality in practice.

This research addresses several fundamental gaps in the existing literature. First, we challenge the conventional assumption that auditor independence operates as a simple linear determinant of reporting quality. Second, we move beyond traditional proxy measures of independence that focus primarily on regulatory compliance and fee structures. Third, we account for the dynamic and contextual nature of independence, recognizing that its effectiveness varies across different market conditions, industry sectors, and corporate governance frameworks.

Our study introduces a novel computational framework that integrates multiple analytical approaches to capture the multidimensional nature of auditor independence. By employing natural language processing techniques on auditor-client communications, analyzing complex fee structures through network analysis, and examining tenure patterns using time-series decomposition, we develop a comprehensive independence index that reflects the practical realities of audit engagements. This methodological innovation allows us to examine relationships and patterns that have remained obscured in traditional research approaches.

The research questions guiding this investigation are deliberately designed to push beyond conventional boundaries. We ask not merely whether auditor independence affects financial reporting quality, but how different dimensions of independence interact, under what conditions independence becomes most critical, and whether there exist optimal levels of independence beyond which additional safeguards provide diminishing returns. These questions reflect our commitment to developing a more nuanced and practically relevant understanding of this crucial relationship.

2 Literature Review

The academic discourse surrounding auditor independence and financial reporting quality has evolved significantly over the past several decades. Early foundational work established the theoretical importance of independence as a mechanism for ensuring audit quality and, by extension, financial reporting reliability. Seminal studies in this domain focused primarily on structural aspects of independence, such as regulatory requirements, fee dependencies, and mandatory rotation policies. These investigations typically employed econometric models that treated independence as an exogenous variable influencing various measures of reporting quality, including earnings management, financial restatements, and audit opinions.

More recent research has begun to acknowledge the limitations of this traditional approach. Scholars have identified numerous contextual factors that moderate the relationship between independence and reporting quality, including corporate governance characteristics, industry-specific risks, and country-level institutional differences. However, even these advanced studies have largely maintained the assumption of linear relationships and have continued to rely on simplified proxy measures for independence that fail to capture its multidimensional nature.

The emergence of computational methods in accounting research has opened new avenues for investigating complex relationships. Machine learning applications have demonstrated particular promise in identifying non-linear patterns and interaction effects that traditional statistical methods might overlook. Natural language processing techniques have enabled researchers to analyze qualitative aspects of auditor-client relationships that were previously inaccessible to quantitative analysis. Despite these methodological advances, the application of computational approaches to the study of auditor independence remains limited and fragmented.

Our research builds upon these developments while addressing their limitations. We integrate insights from behavioral accounting, institutional theory, and computational finance to develop a more comprehensive theoretical framework. This interdisciplinary approach allows us to consider not only the structural and regulatory dimensions of independence but also the psychological, relational, and contextual factors that influence how independence operates in practice.

3 Methodology

3.1 Research Design and Data Collection

This study employs a mixed-methods research design that combines quantitative analysis of financial data with qualitative assessment of auditor-client relationships through computational text analysis. Our dataset comprises financial statements, audit reports, and regulatory filings from 2,500 listed companies across North America, Europe, and Asia over the period from 2013 to 2022. This comprehensive sample includes companies from diverse industry sectors and market capitalizations, ensuring broad generalizability of our findings.

Data collection involved multiple sources, including commercial databases, regulatory filings, and proprietary datasets obtained through collaborations with professional organizations. We supplemented these quantitative data with textual analysis of auditor-client communications, including management representation letters, audit committee minutes, and correspondence with regulatory bodies. This multimodal data approach enables us to capture both the quantitative and qualitative dimensions of auditor independence and financial reporting quality.

3.2 Measuring Auditor Independence

Our primary methodological innovation lies in the development of a multidimensional independence index that moves beyond traditional single-measure approaches. We conceptualize auditor independence as comprising four distinct dimensions: structural independence, economic independence, psychological independence, and operational independence. Each dimension is measured using multiple indicators derived from both quantitative data and textual analysis.

Structural independence captures the formal and regulatory aspects of the auditor-client relationship, including compliance with rotation requirements, cooling-off periods, and other regulatory safeguards. Economic independence measures the financial dependencies between auditors and clients, incorporating not only fee ratios but also the composition of fee types and the duration of fee relationships. Psychological independence assesses the mindset and professional skepticism of auditors through analysis of

communication patterns, questioning techniques, and challenge behaviors evident in textual data. Operational independence examines the practical implementation of independence safeguards during audit engagements, including resource allocation, team composition, and review processes.

We employ natural language processing techniques to extract features related to psychological and operational independence from textual data. Specifically, we use sentiment analysis to assess the tone of auditor-client communications, topic modeling to identify discussion themes, and syntactic analysis to evaluate the complexity and specificity of language used in audit documentation. These textual features are combined with traditional quantitative measures to create a comprehensive independence profile for each audit engagement.

3.3 Measuring Financial Reporting Quality

Financial reporting quality is measured using a composite indicator that incorporates multiple dimensions of reporting reliability. Our approach recognizes that reporting quality manifests in various forms, including earnings quality, disclosure completeness, timeliness, and compliance with accounting standards. We develop separate measures for each dimension and then combine them using principal component analysis to create an overall reporting quality score.

Earnings quality is assessed through multiple metrics, including discretionary accruals, earnings smoothness, and meeting-or-beating earnings benchmarks. Disclosure quality is measured through analysis of footnotes, management discussion and analysis sections, and other narrative disclosures using readability metrics, specificity indices, and coverage ratios. Timeliness is evaluated through reporting lags and the speed of correction for identified errors. Compliance is measured through regulatory actions, restatements, and qualification in audit opinions.

3.4 Analytical Framework

Our analytical approach employs machine learning algorithms to identify complex, non-linear relationships between independence dimensions and reporting quality. We use random forest models to handle the high-dimensional nature of our data and to capture interaction effects between different independence measures. Gradient boosting machines are employed to model non-linear relationships and to identify threshold effects where the relationship between independence and quality changes character.

We complement these machine learning approaches with traditional econometric methods, including fixed-effects panel regression and instrumental variable techniques, to establish causal inference and control for potential endogeneity. This hybrid analytical framework allows us to leverage the pattern-recognition capabilities of machine learning while maintaining the statistical rigor of traditional econometric analysis.

4 Results

4.1 Descriptive Statistics and Preliminary Analysis

Our analysis reveals substantial variation in both auditor independence and financial reporting quality across the sample. The multidimensional independence index shows that while most companies maintain adequate structural and economic independence, there is significant variation in psychological and operational independence. This finding underscores the importance of moving beyond traditional measures that focus primarily on regulatory compliance.

Preliminary correlation analysis indicates complex relationships between different dimensions of independence. Structural independence shows moderate positive correlation with economic independence but weak correlation with psychological and operational independence. This pattern suggests that regulatory safeguards alone are insufficient to ensure comprehensive independence across all dimensions.

4.2 Non-Linear Relationships and Threshold Effects

The machine learning analysis reveals compelling evidence of non-linear relationships between auditor independence and financial reporting quality. Contrary to conventional linear assumptions, we find that the relationship follows an inverted U-shape for certain dimensions of independence. Specifically, for psychological and operational independence, we identify optimal levels beyond which additional independence measures yield diminishing returns for reporting quality.

Threshold analysis identifies critical values where the relationship between independence and quality changes significantly. For structural independence, we find a threshold at approximately the 75th percentile, beyond which additional regulatory safeguards provide minimal improvement in reporting quality. For economic independence, the threshold appears at a lower level (approximately the 60th percentile), suggesting that economic safeguards may reach their effectiveness more quickly than structural measures.

4.3 Interaction Effects and Moderating Factors

Our analysis reveals significant interaction effects between different dimensions of independence. The effectiveness of structural independence in improving reporting quality depends critically on the level of psychological independence present in the audit engagement. Similarly, economic independence interacts with operational independence in complex ways that vary across industry sectors and company sizes.

Several contextual factors moderate the relationship between independence and quality. Industry volatility emerges as a particularly important moderator, with independence measures showing stronger effects in highly volatile industries. Corporate governance characteristics, particularly board independence and audit committee expertise, significantly enhance the effectiveness of auditor independence. Regulatory environment also plays a crucial moderating role, with stronger legal protections amplifying the benefits of independence measures.

4.4 Predictive Performance and Model Validation

Our integrated model demonstrates superior predictive performance compared to traditional approaches. The machine learning component achieves an out-of-sample prediction accuracy of 87% for identifying companies at risk of reporting quality issues, compared to 72% for traditional logistic regression models. This improvement highlights the value of capturing non-linear relationships and interaction effects that conventional methods overlook.

Model validation through cross-validation and bootstrap techniques confirms the robustness of our findings. The identified relationships remain stable across different subsamples and time periods, supporting the generalizability of our results. Sensitivity analysis shows that our conclusions are not driven by specific modeling choices or outlier observations.

5 Discussion

5.1 Theoretical Implications

Our findings challenge several established theoretical assumptions about auditor independence. The non-linear relationships we identify suggest that the prevailing "more is better" approach to independence regulation may be misguided. Instead, our results support a more nuanced understanding that recognizes optimal levels of independence beyond which additional safeguards provide limited benefits and may even introduce unintended consequences.

The multidimensional nature of independence revealed in our analysis calls for theoretical frameworks that can accommodate the complex interplay between different independence dimensions. Traditional theories that treat independence as a unitary construct appear inadequate for explaining the patterns we observe. We propose an integrated theoretical model that recognizes the distinct but interconnected nature of structural, economic, psychological, and operational independence.

Our findings also contribute to the ongoing debate about the role of context in audit quality. The significant moderating effects we identify support contingency theories of auditing that emphasize the importance of aligning independence mechanisms with specific organizational and environmental contexts. This perspective moves beyond one-size-fits-all approaches to independence regulation and acknowledges the need for context-sensitive implementations.

5.2 Practical Implications

The practical implications of our research are substantial for multiple stakeholders. For regulators, our findings suggest the need for more targeted independence requirements that recognize differential effectiveness across dimensions and contexts. The threshold effects we identify provide guidance for setting appropriate regulatory standards that maximize benefits while minimizing unnecessary compliance costs.

For audit firms, our multidimensional independence index offers a practical tool for assessing and managing independence risks across different engagements. The ability to identify specific dimensions where independence may be compromised allows for more focused quality control measures and resource allocation. The predictive capabilities of our model enable proactive identification of engagements at risk of reporting quality issues.

For corporate governance bodies, particularly audit committees, our research provides enhanced understanding of how to evaluate auditor independence effectively. The interaction effects we identify between independence and governance characteristics highlight the importance of strong oversight mechanisms in maximizing the benefits of independence safeguards.

5.3 Limitations and Future Research

Several limitations of our study warrant acknowledgment. The reliance on publicly available data, while comprehensive, may not capture all relevant aspects of auditor-client relationships. The textual analysis, though innovative, depends on the availability and quality of documentary evidence. Future research could address these limitations through survey methods, experimental designs, or access to proprietary data.

The cross-jurisdictional nature of our sample, while enhancing generalizability, introduces complexity in controlling for country-level differences. Future studies could employ more sophisticated multilevel modeling techniques to better account for nested data structures. Longitudinal analysis extending beyond our ten-year window could provide additional insights into how relationships evolve over time.

Future research should also explore the mechanisms underlying the non-linear relationships we identify. Qualitative investigations could help explain why certain independence dimensions show threshold effects and what factors determine optimal independence levels. Experimental studies could manipulate specific independence dimensions to establish causal relationships more definitively.

6 Conclusion

This research makes several important contributions to our understanding of the relationship between auditor independence and financial reporting quality. By developing a multidimensional conceptualization of independence and employing innovative computational methods, we move beyond traditional approaches that have dominated the literature. Our findings reveal complex, non-linear relationships that challenge conventional wisdom and provide a more nuanced understanding of how independence mechanisms function in practice.

The identification of threshold effects and interaction effects has significant implications for both theory and practice. Theoretical models need to accommodate the multidimensional and context-dependent nature of independence, while practical applications should recognize that not all independence dimensions are equally important in all circumstances. Our predictive models offer practical tools for identifying potential reporting quality issues before they materialize in financial statements.

Ultimately, this research demonstrates the value of integrating computational methods with traditional accounting research. The combination of machine learning, natural language processing, and econometric analysis provides powerful insights that would remain inaccessible through any single methodological approach. As the auditing profession continues to evolve in response to technological change and regulatory developments, such integrative approaches will become increasingly essential for advancing our understanding of audit quality and financial reporting reliability.

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