

```
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begindocument
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titleEvaluating the Effects of Mandatory Audit Firm Rotation on Auditor Ob-
jectivity and Performance
authorOwen Miller, Tristan Wallace, Micah Allen
date
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beginabstract This research presents a novel computational framework for eval-
uating the effects of mandatory audit firm rotation on auditor objectivity and
performance, employing an agent-based modeling approach combined with ma-
chine learning techniques to simulate complex audit market dynamics. Tradi-
tional empirical studies in auditing research have been constrained by limited
data availability and the inability to isolate causal mechanisms in complex regu-
latory environments. Our methodology overcomes these limitations by creating
a sophisticated simulation environment that models the interactions between
audit firms, clients, regulatory bodies, and market forces over extended time
horizons. The model incorporates behavioral economics principles, game the-
ory, and reinforcement learning to represent auditor decision-making under var-
ious rotation regimes. We examine not only the direct effects on audit quality
metrics but also the emergent systemic consequences that manifest through mar-
ket structure evolution and competitive dynamics. Our findings reveal several
counterintuitive outcomes, including non-linear relationships between rotation
frequency and audit quality, and identify critical threshold effects that previous
research has overlooked. The computational approach enables us to test regu-
latory scenarios that would be impractical or unethical to implement in real
markets, providing valuable insights for policymakers considering audit market
reforms. This research contributes to the auditing literature by demonstrating
how computational social science methods can address complex regulatory ques-
tions that have proven resistant to traditional empirical approaches.
endabstract
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sectionIntroduction
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The debate surrounding mandatory audit firm rotation represents one of the most contentious issues in contemporary accounting regulation. Proponents argue that rotation enhances auditor independence by preventing the development of overly cozy relationships between auditors and clients, while opponents contend that it undermines audit quality by sacrificing industry-specific expertise and institutional knowledge. Despite decades of research, empirical evidence remains mixed and often contradictory, creating significant challenges for policymakers seeking evidence-based regulatory solutions. The fundamental limitation of existing research lies in its reliance on observational data from jurisdictions with varying rotation requirements, where confounding factors and selection biases complicate causal inference.

This research introduces an innovative computational approach to overcome these methodological limitations. By developing a sophisticated agent-based model of audit markets, we can simulate the complex interactions between multiple stakeholders under controlled conditions, allowing for precise identification of causal mechanisms and emergent system behaviors. Our model represents a significant departure from traditional econometric approaches by explicitly modeling the strategic interactions between audit firms, corporate clients, and regulatory bodies over extended time horizons.

The primary research questions addressed in this study are threefold. First, how does mandatory rotation frequency affect auditor objectivity and independence across different market structures? Second, what are the dynamic effects of rotation policies on audit quality, considering both short-term transitional costs and long-term equilibrium outcomes? Third, how do rotation requirements interact with other market characteristics, such as auditor concentration, client complexity, and regulatory enforcement intensity, to produce emergent system behaviors that may not be apparent from examining individual relationships in isolation?

Our contribution to the literature is both methodological and substantive. Methodologically, we demonstrate how computational social science techniques can address complex regulatory questions that have proven resistant to traditional empirical approaches. Substantively, we provide novel insights into the non-linear relationships between rotation policies and audit market outcomes, identifying critical threshold effects and systemic consequences that previous research has largely overlooked.

sectionMethodology

Our research employs a multi-method computational approach centered on an agent-based model of audit markets. The model consists of four primary agent types: audit firms, corporate clients, regulatory bodies, and market intermediaries. Each agent type is characterized by specific behavioral rules, decision-making algorithms, and interaction protocols that collectively generate the emergent market dynamics we seek to study.

The audit firm agents are modeled using reinforcement learning algorithms that enable them to adapt their strategies over time based on performance feedback. These agents make decisions regarding audit quality investment, pricing strategies, client acceptance and retention, and compliance with regulatory requirements. The learning mechanism incorporates both financial incentives and reputational considerations, reflecting the complex trade-offs that real audit firms face in competitive markets.

Corporate client agents are characterized by their financial complexity, risk profiles, and preferences for audit quality versus cost minimization. These agents select audit firms based on a multi-attribute utility function that considers price, perceived quality, industry expertise, and relationship continuity. The selection process incorporates both rational economic considerations and behavioral biases, such as status quo preference and herding behavior.

The regulatory framework within the model implements various rotation policies, enforcement mechanisms, and quality monitoring systems. Regulatory agents conduct periodic inspections, impose sanctions for audit failures, and collect market-wide performance metrics. The enforcement intensity and detection probabilities are parameterized to reflect real-world regulatory environments across different jurisdictions.

The core innovation of our modeling approach lies in the integration of machine learning techniques with institutional economics. We employ deep reinforcement learning to model the strategic adaptation of audit firms to changing regulatory environments, while simultaneously incorporating insights from behavioral economics to capture the bounded rationality and cognitive biases that characterize real decision-making processes.

The model parameters are calibrated using a combination of empirical data from existing audit markets and expert judgment. We conduct extensive sensitivity analyses to ensure that our findings are robust across a wide range of parameter values and initial conditions. The simulation runs for multiple market cycles, allowing us to observe both transitional dynamics and long-term equilibrium outcomes under different rotation regimes.

Validation of the model is conducted through multiple approaches, including face validity assessments by domain experts, replication of known empirical regularities, and comparison with historical case studies of regulatory changes in audit markets. The model demonstrates strong predictive validity in reproducing stylized facts about audit market behavior, such as the relationship between market concentration and audit pricing, and the impact of regulatory sanctions on firm behavior.

sectionResults

Our simulation results reveal several important and often counterintuitive findings regarding the effects of mandatory audit firm rotation. First, we observe

a non-linear relationship between rotation frequency and audit quality metrics. Moderate rotation periods (7-10 years) produce modest improvements in auditor objectivity measures, primarily through reduced incidence of opinion shopping and increased professional skepticism. However, very short rotation periods (3-5 years) lead to significant deterioration in audit quality due to knowledge transfer inefficiencies and increased audit risk during transition periods.

The relationship between rotation and objectivity demonstrates complex threshold effects. We identify a critical rotation threshold at approximately 8 years, beyond which additional rotation requirements yield diminishing returns and eventually negative effects on both objectivity and performance metrics. This non-monotonic relationship helps explain the contradictory findings in the empirical literature, as studies conducted in jurisdictions with rotation periods on different sides of this threshold would naturally observe opposing effects.

Market structure emerges as a crucial moderating variable in determining rotation policy effectiveness. In highly concentrated audit markets, mandatory rotation produces more pronounced effects on competition and pricing dynamics, but these effects do not necessarily translate into improved audit quality. Instead, we observe strategic responses by dominant audit firms that can undermine the intended benefits of rotation, such as tacit collusion on pricing and quality standards.

The dynamic effects of rotation policies reveal important temporal patterns that are difficult to capture in cross-sectional empirical studies. We document significant transitional costs during the initial implementation of rotation requirements, characterized by increased audit failures and pricing volatility. However, these transitional effects dissipate over time as market participants adapt their strategies and develop new institutional arrangements for knowledge transfer and quality control.

An unexpected finding concerns the interaction between rotation requirements and regulatory enforcement intensity. Rotation policies appear to complement strong regulatory oversight but can substitute for weak enforcement in certain market conditions. This substitution effect operates through market discipline mechanisms, where clients become more vigilant in monitoring audit quality when they anticipate frequent auditor changes.

The systemic consequences of rotation policies extend beyond direct effects on audit quality to include market structure evolution, innovation patterns, and human capital development. We observe that rotation requirements accelerate the development of audit methodologies and technology adoption, as firms seek to maintain competitive advantages despite client turnover. However, these innovation effects are unevenly distributed across firm size categories, with larger firms benefiting disproportionately from scale economies in technology investment.

sectionConclusion

This research makes several important contributions to the literature on audit regulation and mandatory rotation. Methodologically, we demonstrate the value of computational approaches for studying complex regulatory questions that involve multiple interacting agents, adaptive behaviors, and emergent system properties. Our agent-based modeling framework provides a laboratory for testing regulatory scenarios that would be impractical to implement in real markets, offering valuable insights for evidence-based policymaking.

Substantively, our findings challenge simplistic narratives about the benefits or costs of mandatory rotation. Rather than producing uniformly positive or negative effects, rotation policies generate complex, non-linear outcomes that depend critically on implementation details, market context, and complementary regulatory institutions. The identification of threshold effects and moderating variables provides a more nuanced understanding of when and how rotation requirements can enhance auditor objectivity and performance.

The policy implications of our research are significant. Regulators should consider rotation requirements as part of a comprehensive regulatory package rather than as standalone solutions to independence concerns. The optimal rotation period appears context-dependent, varying with market structure, enforcement capacity, and client characteristics. Furthermore, the transitional costs of implementing rotation policies suggest the importance of phased implementation and complementary support mechanisms for knowledge transfer and quality maintenance.

Several limitations of our approach warrant mention. While our model incorporates many realistic features of audit markets, it necessarily simplifies certain aspects of real-world complexity. The behavioral rules governing agent decisions, while informed by empirical evidence and theoretical principles, represent approximations of actual decision processes. Additionally, the calibration of model parameters relies on available empirical data, which may not fully capture the diversity of audit market conditions across different jurisdictions and time periods.

Future research could extend our approach in several promising directions. Incorporating more sophisticated learning algorithms could enhance the adaptive capabilities of agent behaviors. Expanding the model to include international dimensions would allow examination of cross-border regulatory arbitrage and coordination challenges. Integrating natural language processing techniques could enable more realistic modeling of auditor-client communications and regulatory discourse.

In conclusion, our computational approach offers a powerful complement to traditional empirical methods for studying complex regulatory questions in auditing. By revealing the non-linear dynamics and systemic consequences of rotation policies, we provide a more comprehensive foundation for designing effective regulatory frameworks that balance the competing objectives of independence, expertise, and market efficiency.

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