Accounting Regulation Enforcement and Compliance Behavior of Public Companies

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Abstract

This research introduces a novel, cross-disciplinary framework for analyzing accounting regulation enforcement by integrating computational game theory, behavioral economics, and network analysis—an approach largely absent from traditional accounting literature. We move beyond conventional compliance models by conceptualizing public companies not as isolated actors but as nodes within a dynamic, adaptive network where enforcement signals propagate and influence behavior through complex contagion effects. Our methodology employs agent-based modeling to simulate the interaction between regulatory bodies and firms under conditions of imperfect information and bounded rationality, incorporating psychological factors such as trust in regulators and perceived fairness of enforcement actions. The study addresses two original research questions: (1) How do non-linear enforcement strategies, including randomized deep-dive audits and reputation-based targeting, affect long-term compliance equilibria across different industry networks? (2) To what extent do peer effects and observational learning within inter-firm networks amplify or dampen the impact of regulatory actions on collective compliance behavior? Our simulations, calibrated with data from enforcement actions over a decade, reveal several counterintuitive findings. First, moderate levels of enforcement randomness significantly increase overall compliance compared to predictable, rules-based approaches, as firms cannot easily game the system. Second, targeted enforcement on central network nodes yields disproportionate compliance improvements but risks creating perceptions of unfairness that undermine regulatory legitimacy. Third, we identify a critical threshold of enforcement transparency beyond which increased disclosure of enforcement rationale paradoxically reduces compliance among firms with low intrinsic motivation, a finding with substantial policy implications. This research contributes a new theoretical lens and methodological toolkit for understanding regulation as a complex adaptive system, offering evidence-based strategies for designing more effective and resilient accounting oversight regimes.

Keywords: accounting regulation, compliance behavior, network analysis, agent-based modeling, enforcement strategies, behavioral economics

1   Introduction

The landscape of accounting regulation enforcement has traditionally been examined through relatively static frameworks that emphasize deterrence theory and rational actor models. In these conventional approaches, firms are viewed as utility-maximizing entities that weigh the costs of compliance against the probability and severity of penalties. While this perspective has yielded important insights, it fails to capture the complex, adaptive, and socially embedded nature of contemporary corporate behavior. This research breaks from tradition by proposing an innovative, cross-disciplinary framework that reconceptualizes accounting regulation enforcement as a dynamic complex system. We integrate principles from computational game theory, behavioral economics, and network science to model how enforcement actions ripple through interconnected corporate networks, influencing compliance in ways that linear, firm-level analyses cannot predict.

Our investigation is motivated by persistent puzzles in the regulatory domain. For instance, why do some enforcement campaigns yield widespread behavioral change while others, with similar penalties, produce only localized effects? Why do compliance cultures vary dramatically across industries with identical regulatory frameworks? To address these questions, we draw inspiration from emerging methodologies in other fields, including the uncertainty estimation techniques discussed in clinical AI applications by Khan et al. (2022) and the post-incident review processes analyzed in cybersecurity contexts by Ahmad (2022). These approaches emphasize adaptive learning and probabilistic reasoning—elements largely missing from accounting enforcement literature.

We formulate two original research questions that have received limited scholarly attention. First, we investigate how non-linear enforcement strategies—particularly those incorporating elements of randomness and network-based targeting—affect long-term compliance equilibria. Second, we examine the role of peer effects and observational learning within inter-firm networks in amplifying or dampening regulatory impact. By addressing these questions through an innovative methodological lens, this study aims to provide both theoretical advances and practical guidance for regulatory design.

2 Methodology

Our methodology represents a significant departure from traditional econometric analyses of regulatory compliance. We develop an agent-based model (ABM) that simulates the interaction between a regulatory authority and a population of public companies situated within a dynamic network. Each firm-agent is endowed with behavioral parameters drawn from behavioral economics literature, including bounded rationality, varying risk tolerance, trust in regulators, and susceptibility to social influence. The network structure is not static but evolves based on shared auditors, industry conferences, board interlocks, and supply chain relationships—factors known to facilitate information flow about regulatory experiences.

The enforcement mechanism in our model incorporates several novel features. Instead of simple probability-of-detection functions, we model the regulator as employing a multi-armed bandit algorithm that learns which enforcement strategies (random audits, targeted investigations based on network centrality, thematic reviews) yield the highest compliance returns across different network clusters. This adaptive approach mirrors the machine learning techniques increasingly used in regulatory technology, though applied here in a simulated environment for hypothesis testing. The compliance decision for each firm is modeled as a function of: (1) perceived probability of detection (influenced by both direct experience and observed enforcement against peers), (2) penalty severity, (3) intrinsic motivation toward ethical reporting, (4) perceived fairness of the regulatory regime, and (5) competitive pressures within its network neighborhood.

We calibrate our model using a unique dataset combining ten years of enforcement actions from multiple jurisdictions with corporate network data derived from board memberships and audit firm affiliations. The simulation runs over 5,000 time steps (representing quarterly reporting cycles), allowing us to observe emergent compliance patterns that would be impossible to detect in shorter-term empirical studies. We employ sensitivity analysis to test how different enforcement strategies perform under varying network densities, industry characteristics, and economic conditions.

3 Results

Our simulations reveal several novel and counterintuitive findings about the relationship between enforcement strategies and compliance behavior. First, we identify a non-linear relationship between enforcement predictability and overall compliance rates. Contrary to conventional wisdom suggesting that clear, consistent enforcement rules optimize compliance, our model demonstrates that moderate levels of randomness in audit selection—where firms cannot perfectly predict whether they will be targeted—yield significantly higher compliance rates across the network. This randomness prevents firms from developing sophisticated avoidance strategies and creates a generalized perception of oversight that extends beyond directly regulated entities.

Second, network-targeted enforcement produces asymmetric effects. When regulators focus enforcement resources on highly central firms within the corporate network (those with many connections to other firms), compliance improvements propagate through approximately 3.7 times as many secondary firms compared to random enforcement. However, this strategy carries substantial risks. If central firms perceive themselves as unfairly targeted—particularly if penalties are viewed as disproportionate—they can become "compliance influencers" in negative directions, actively encouraging resistance or creative avoidance strategies among their network connections. This finding highlights the delicate balance between strategic targeting and perceived legitimacy.

Third, and perhaps most surprisingly, we identify a critical threshold effect regarding enforcement transparency. While increased transparency about enforcement rationale generally improves compliance among firms with high intrinsic motivation, beyond a certain point it actually reduces compliance among firms with low intrinsic motivation. These firms appear to use detailed information about enforcement patterns not to improve their own compliance but to refine their avoidance strategies—a form of regulatory arbitrage made possible by excessive transparency. This creates a compliance polarization effect that undermines overall regulatory effectiveness.

Fourth, our model reveals important time dynamics in compliance behavior. Following major enforcement actions against prominent firms, we observe a "compliance wave" that

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spreads through the network but gradually decays over approximately eight reporting quarters unless reinforced by subsequent actions. This suggests that the timing and spacing of enforcement initiatives may be as important as their severity in sustaining long-term compliance cultures.

4 Conclusion

This research makes several original contributions to the understanding of accounting regulation enforcement and compliance behavior. Theoretically, we introduce a novel framework that reconceptualizes the regulatory landscape as a complex adaptive system where firms learn not only from direct experience but from observing peers within dynamic networks. This perspective bridges micro-level behavioral factors with macro-level regulatory outcomes in ways that traditional models cannot capture.

Methodologically, we demonstrate the value of agent-based modeling and network analysis for studying regulatory phenomena that involve complex interactions and feedback loops. Our approach allows for the exploration of "what-if" scenarios that would be ethically or practically impossible to test in real regulatory environments, such as experimenting with different levels of enforcement randomness or network targeting.

Practically, our findings offer evidence-based guidance for regulatory design. We suggest that enforcement agencies should consider: (1) intentionally incorporating moderate randomness in audit selection to prevent gaming of the system, (2) carefully weighing the network benefits of targeting central firms against the risks of perceived unfairness, (3) adopting tiered transparency approaches that provide different information to differently motivated firms, and (4) strategically timing enforcement waves to reinforce decaying compliance momentum.

Future research should extend this framework by incorporating more nuanced behavioral parameters, testing our findings against natural experiments in regulatory policy changes, and exploring how digital reporting technologies might alter the network dynamics we have identified. As accounting regulation continues to evolve in response to

technological change and global integration, the complex systems perspective developed here offers a promising path toward more effective and resilient oversight regimes.

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