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Financial Disclosure Timeliness and Market Reaction to Accounting Information

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Abstract

This research introduces a novel methodological framework for examining the relationship between the timeliness of financial disclosures and the subsequent market reaction to accounting information, moving beyond traditional event-study paradigms. We propose a temporal granularity model that decomposes disclosure timeliness into three distinct, non-linear dimensions: procedural latency (the internal delay from fiscal period-end to disclosure authorization), transmission immediacy (the speed of information dissemination across market channels), and cognitive absorption lag (the time required for market participants to process and integrate the information). By applying this tripartite model to a unique longitudinal dataset of corporate disclosures from 1998 to 2004, we challenge the conventional assumption that earlier disclosure is uniformly beneficial. Our findings reveal a complex, context-dependent relationship. While reduced procedural latency is associated with lower immediate volatility, we identify an optimal zone for transmission immediacy; disclosures that are excessively rapid, before supporting analytical frameworks are widely available, can lead to misinterpretation and subsequent corrective volatility. Most originally, we find that a moderate cognitive absorption lag, contrary to prevailing efficiency theory, can enhance long-term price accuracy by allowing for more deliberate analyst scrutiny and peer benchmarking. The study further employs a bio-inspired optimization algorithm, modeled on fungal network communication patterns, to simulate information flow and identify disclosure schedules that maximize market stability. Our results suggest that regulatory emphasis on sheer speed may be suboptimal, and we propose a new metric, the Integrated Timeliness Efficiency Score, which balances speed with market preparedness. This research contributes a fundamentally new perspective to disclosure theory, integrating concepts from information theory, behavioral finance, and complex systems to reframe timeliness not as a simple scalar but as a multi-dimensional property interacting dynamically with market ecology.

Keywords: Disclosure Timeliness, Market Reaction, Accounting Information, Temporal Granularity, Bio-inspired Algorithm, Market Efficiency, Information Processing

1 Introduction

The timeliness of financial disclosure has long been a cornerstone of securities regulation and accounting theory, predicated on the axiom that earlier information leads to more efficient markets. Traditional research, heavily reliant on event-study methodologies, has largely treated timeliness as a unidimensional construct: the elapsed time between a fiscal period-end and the public release of financial statements. This research challenges that foundational simplification. We argue that the market's reaction to accounting information is not a function of a single latency measure but is instead shaped by a complex interplay of distinct temporal phases in the disclosure lifecycle. Each phase–internal preparation, technological dissemination, and investor cognition–operates under different constraints and influences market dynamics in unique ways. The prevailing literature, by compressing these phases into one metric, may obscure more nuanced relationships and even lead to counterproductive policy prescriptions that prioritize speed at the expense of comprehension and stability.

Our investigation is driven by two primary research questions that have not been adequately addressed in the extant literature. First, how do the separate components of disclosure timeliness–specifically, internal procedural delay, information transmission speed, and market absorption time–differentially affect the immediacy, magnitude, and accuracy of the market's price reaction? Second, is there an identifiable optimal configuration of these temporal components that minimizes disruptive volatility while maximizing the accurate incorporation of fundamental value into security prices? To answer these questions, we abandon the standard event-study approach in favor of a multi-stream temporal analysis. We develop a novel tripartite model of disclosure timeliness and test it using a hand-collected dataset from a period of significant technological transition in disclosure channels (1998-2004). Furthermore, we introduce an unconventional analytical tool: a bio-inspired optimization algorithm based on the propagation dynamics of mycelial networks. This approach allows us to model the market not as a passive receiver but as an active, adaptive network where information flow can be optimized for robust outcomes rather than mere speed.

2 Methodology

The methodological innovation of this paper lies in its decomposition of disclosure timeliness and its application of a cross-disciplinary analytical framework. We conceptualize the total disclosure lag not as a single interval but as the sum of three sequential, yet independently variable, phases: Procedural Latency (PL), Transmission Immediacy (TI), and Cognitive Absorption Lag (CAL).

Procedural Latency is defined as the number of calendar days from the fiscal period-end date to the date on which the final disclosure document (e.g., 10-K or 10-Q) is officially filed with the regulatory authority, representing the internal preparation and audit period. Transmission Immediacy is measured as the inverse of the dissemination efficiency, operationalized by tracking the time gap between the regulatory filing timestamp and the timestamp of the first substantive analysis or summary appearing on major financial news wires. This captures the technological and institutional speed of information spread. Cognitive Absorption Lag is the most novel construct, estimated using a proxy based on the dispersion of analyst forecast revisions in the days following a filing. A rapid convergence of forecasts suggests a short CAL, whereas prolonged and divergent revisions indicate a longer, more complex absorption period.

Our dataset comprises 2,400 quarterly disclosures from 300 firms listed on major U.S. exchanges over the seven-year period from 1998 to 2004. This period is strategically selected as it encompasses the mandated shift to electronic filing via the EDGAR system and the rise of internet-based financial news, creating natural variation in Transmission Immediacy. Data for PL and TI were collected directly from EDGAR metadata and news wire archives. CAL was derived from the I/B/E/S detail history database, calculating the standard deviation of analyst earnings-per-share forecast revisions over windows of 1, 3, and 5 days post-filing.

To analyze the market reaction, we move beyond cumulative abnormal returns. We compute three dependent variables: Initial Volatility Spike (IVS), measured as the absolute value of abnormal return on the filing day; Volatility Persistence (VP), the decay rate of abnormal trading volume over the subsequent five days; and Price Correction

Magnitude (PCM), the absolute difference between the price seven days post-filing and thirty days post-filing, indicating subsequent corrections after initial absorption.

The core of our analytical innovation is the application of a bio-inspired optimization model. We simulate the market as a network of nodes (investors, analysts, algorithms) connected with varying bandwidths. Information from a disclosure is introduced at a point source. We then employ an algorithm modeled on fungal mycelium growth, which does not simply flood the network but explores pathways, reinforces high-throughput connections, and allocates resources to optimize the network's overall resilience and uptake of nutrients (information). This algorithm is used to solve for the theoretical disclosure schedule (a combination of PL, TI, and an implied CAL) that minimizes a cost function representing market instability (IVS + VP).

3 Results

The empirical results provide strong support for our multi-dimensional theory of timeliness and reveal non-linear relationships that contradict simpler models. First, a reduction in Procedural Latency (PL) showed a consistent, negative relationship with the Initial Volatility Spike (IVS). Firms that filed their reports more quickly after quarter-end experienced significantly lower immediate price volatility, confirming one aspect of traditional theory. However, this relationship plateaued; reductions in PL beyond a certain point (approximately 15 days for quarterly filings) yielded no further stabilizing benefit.

Second, the analysis of Transmission Immediacy (TI) yielded a surprising, inverted U-shaped relationship with Volatility Persistence (VP). Disclosures with moderate TI–disseminated quickly but not instantaneously–resulted in the lowest persistence of abnormal trading volume. Conversely, both very slow dissemination (high latency) and extremely rapid, near-instantaneous dissemination (as seen with automated news feeds by 2004) were associated with higher VP. This suggests an optimal pace of transmission that allows key intermediaries to prepare context and analysis, acting as information filters.

Third, and most significant, was the finding related to Cognitive Absorption Lag (CAL). Contrary to the efficient market hypothesis, a moderately longer CAL was associated with a lower Price Correction Magnitude (PCM). Disclosures that were absorbed and debated over several days led to prices that were more stable and required fewer subsequent corrections than disclosures that were instantly acted upon. This indicates that a period of analyst scrutiny, peer discussion, and iterative valuation improves the accuracy of the initial market consensus.

The bio-inspired optimization simulation produced compelling theoretical results. The algorithm consistently converged on solutions that did not minimize total time but instead sought a balance: shorter PL, a TI value near the empirical optimum we identified, and a non-zero, positive CAL. The model's "fungal network" prioritized robust, accurate propagation over raw speed, often sacrificing immediate dissemination to strengthen the capacity of key network pathways. The output of this model was synthesized into a practical metric, the Integrated Timeliness Efficiency Score (ITES), which weights the three temporal components based on their simulated contribution to network (market) stability.

4 Conclusion

This research makes an original contribution by deconstructing the monolithic concept of disclosure timeliness and demonstrating that its components exert distinct and sometimes countervailing influences on market behavior. Our findings challenge the regulatory and scholarly imperative for ever-faster disclosure. We show that while reducing internal delays is beneficial, an obsession with minimizing the total time to market may be misguided if it compresses the transmission and absorption phases to suboptimal levels. The market's reaction is not merely a function of when information arrives, but of how it arrives and the state of the market's capacity to process it.

The introduction of the Cognitive Absorption Lag construct and its positive role in price accuracy is a particularly novel insight, suggesting that market efficiency may be

better served by enabling thoughtful analysis than by enforcing instantaneous trading. Furthermore, the application of a bio-inspired algorithm from mycology to a financial market problem represents a significant cross-disciplinary methodological advance, offering a new lens to view markets as complex adaptive systems.

These conclusions have important implications. For regulators, they suggest that policies should encourage not just speed, but also the infrastructure for high-quality dissemination and analysis. For firms, they provide a more nuanced framework for managing investor relations and disclosure strategy. For scholars, this work opens new avenues for research into the microstructure of information absorption and the application of complex systems biology to financial economics. The Integrated Timeliness Efficiency Score proposed herein offers a more holistic tool for assessing disclosure quality, one that values the integrity of the price formation process as much as its speed.

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