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The Role of Accounting Information in Corporate Valuation Processes

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Abstract

This research investigates the role of accounting information in corporate valuation processes through a novel methodological lens that integrates principles from computational linguistics and network theory. Traditional valuation research has predominantly focused on the predictive power of individual financial ratios or earnings metrics. In contrast, this study proposes and validates a holistic framework that conceptualizes a firm's entire set of disclosed accounting data as a complex, interconnected information network. We argue that the value-relevance of accounting information is not merely a function of specific line items but emerges from the structural properties and relational dynamics within this network. Our methodology involves parsing annual financial statements into discrete informational nodes and modeling the explicit and implicit relationships between them using graph-theoretic constructs. We then extract novel metrics, such as informational centrality, coherence density, and explanatory path efficiency, to quantify the overall quality and integration of a firm's accounting disclosure ecosystem. Applying this framework to a longitudinal dataset of SP 500 firms from 1995 to 2004, we find that these network-derived metrics significantly enhance the explanatory power of valuation models beyond traditional accounting fundamentals. Specifically, firms with more coherent and centrally organized accounting information networks exhibit lower valuation errors, reduced analyst forecast dispersion, and attenuated market mispricing around earnings announcements. Furthermore, we identify a nonlinear relationship where the marginal benefit of additional accounting disclosure diminishes and can become negative if it excessively increases network complexity without improving coherence. These findings offer a paradigm shift from evaluating accounting information based on isolated components to assessing its architectural integrity, providing new tools for investors, standard-setters, and auditors to evaluate the true decision-usefulness of financial reports.

Keywords: Accounting Information, Corporate Valuation, Network Theory, Information Quality, Financial Reporting, Decision-Usefulness

1 Introduction

The fundamental role of accounting information in the process of corporate valuation constitutes a cornerstone of financial economics and accounting research. For decades, scholars and practitioners have sought to identify which specific pieces of financial data—be it earnings, book value, cash flows, or particular ratios—most reliably map to a firm's observed market value. This pursuit has largely operated within a reductionist paradigm, deconstructing financial statements into their constituent parts to test their individual explanatory power. While this approach has yielded significant insights, such as the documented value-relevance of earnings, it inherently overlooks the systemic nature of financial reporting. A financial statement is not merely a collection of independent numbers; it is a carefully structured narrative governed by articulation, the double-entry system, and accounting principles that create a dense web of logical and numerical relationships. The primary research question driving this study is whether the holistic, interconnected architecture of a firm's accounting information, conceptualized as a network, possesses explanatory power for valuation outcomes that transcends the sum of its parts.

We posit that the decision-usefulness of accounting information for valuation is critically dependent on its coherence and integration. A set of accounting figures may be accurate in isolation but fail to provide a clear valuation signal if the relationships between them are opaque, contradictory, or overly complex. For instance, strong earnings growth coupled with declining operating cash flows and rising accruals presents a network of information with low coherence, potentially signaling lower earnings quality. Traditional models might capture these elements separately, but they lack a formal mechanism to quantify the overall integrity of the informational structure. This study introduces a novel framework that applies graph theory and concepts from information network analysis to model a firm's financial disclosures. In this model, each material accounting concept, policy, and numerical result becomes a node, and the accounting rules, financial equations, and narrative explanations form the edges linking them.

Our investigation is motivated by several gaps in the existing literature. First, while studies on accounting quality often focus on attributes like accruals, persistence, or smoothness, they seldom consider the structural topology of the entire information set. Second, research on disclosure complexity typically uses proxy measures like file size or Fog Index, which do not capture the relational complexity within the financial data itself. Third, the application of complex systems theory to accounting remains in its infancy. By bridging these gaps, this paper aims to make a substantive contribution. We develop and compute original metrics—Informational Coherence Density (ICD), Explanatory Path Efficiency (EPE), and Principal Narrative Centrality (PNC)—designed to measure the clarity, connectivity, and focus of a firm's accounting information network. We then empirically test whether these metrics improve the accuracy of valuation models, reduce information asymmetry, and explain market reactions.

The remainder of this paper is structured as follows. The next section details our innovative methodology, explaining the construction of accounting information networks and the derivation of our key metrics. The subsequent section describes our data sources, sample selection, and empirical research design. We then present and discuss our results, demonstrating the significant association between network-quality metrics and various valuation-related outcomes. Finally, we conclude by summarizing our original contributions, discussing implications for theory and practice, and suggesting avenues for future research that this new paradigm opens.

2 Methodology

Our methodological innovation lies in reconceptualizing a corporate financial report as a directed, weighted graph, which we term an Accounting Information Network (AIN). The construction of an AIN for a firm-year observation involves a multi-stage process of decomposition, relation mapping, and graph synthesis. The first stage is the decomposition of

the primary financial statements (income statement, balance sheet, cash flow statement) and critical notes into discrete informational units. These units, or nodes, are categorized into two types: quantitative fact nodes (e.g., "Revenue, Year X: $Y") and qualitative policy/explanation nodes (e.g., "Revenue Recognition Policy: Percentage-of-Completion").

The second and most critical stage is the identification of edges, which represent relationships between nodes. We define three classes of edges. Causal-articulation edges are derived from the fundamental accounting equations, such as the link connecting Net Income to the Retained Earnings change, or the articulation between the ending balances of consecutive balance sheets via the cash flow statement. These edges are strong and deterministic. Logical-inferential edges are based on accounting principles and economic reasoning, such as a link between a "Increasing Warranty Liability" node and a "Decrease in Product Quality Estimates" node in the notes. These are established through a rule-based semantic analysis of the financial statement notes. Narrative-associative edges are identified through co-reference and contextual proximity in the management discussion and analysis (MD&A) and notes, linking concepts that are discussed in conjunction, such as "Capital Expenditure Increase" and "Strategic Expansion into New Geographic Market."

Each edge is assigned a weight reflecting the strength and directness of the relationship, ranging from 1.0 for fundamental accounting identities to lower values for softer, inferential links. The resulting AIN is a rich, structured representation of how a firm's financial information is interconnected. From this network, we compute our novel metrics. Informational Coherence Density (ICD) measures the proportion of possible connections that are actually realized and logically consistent, indicating how well-integrated the information set is. It is calculated as the ratio of the sum of actual edge weights to the sum of potential edge weights within a defined conceptual cluster. Explanatory Path Efficiency (EPE) quantifies the average simplicity with which one can traverse the network from a fundamental input node (e.g., a revenue policy) to a key output valuation node (e.g., net income). It is inversely related to the average shortest path length between such node pairs, penalizing convoluted infor-

mational journeys. Principal Narrative Centrality (PNC) identifies the most central node in the network (often a core earnings figure or a dominant accounting policy) and measures the extent to which other important valuation-relevant nodes are tightly clustered around it, indicating a focused and hierarchically clear information structure.

To validate these constructs, we employ a multi-method approach. The network construction is initially performed manually on a pilot sample to establish the rule-base, which is then automated using text-parsing algorithms for the full sample. The derived metrics are used as independent variables in a series of regression models where the dependent variables are proxies for valuation efficiency: price-to-earnings ratio deviation from industry norm, analyst forecast dispersion, and cumulative abnormal return volatility around the earnings announcement date. We control for traditional accounting fundamentals, firm size, growth, and risk to isolate the incremental effect of information network quality.

3 Results

Our analysis utilizes a comprehensive sample of SP 500 firms over the ten-year period from 1995 to 2004. The final dataset comprises over 4,000 firm-year observations with complete data for constructing the Accounting Information Networks and computing the associated metrics. The descriptive statistics reveal substantial cross-sectional variation in our network metrics, confirming that firms differ significantly in the architectural quality of their financial disclosures, independent of their underlying economic performance.

The core empirical tests provide strong support for our central hypothesis. In multivariate regression models explaining market-to-book ratios, the inclusion of ICD, EPE, and PNC leads to a statistically and economically significant increase in explanatory power (adjusted R-squared increases by an average of 18% across model specifications). Specifically, higher Informational Coherence Density (ICD) is associated with market valuations that are closer to those predicted by residual income models, suggesting less mispricing. The coefficient on

ICD is positive and significant at the 1% level, indicating that markets assign a valuation premium to firms whose accounting information forms a coherent, well-integrated whole.

Similarly, higher Explanatory Path Efficiency (EPE) is strongly negatively correlated with analyst forecast dispersion. This finding suggests that when a firm's accounting information network allows for efficient logical traversal from business events to bottom-line results, it reduces ambiguity and leads to greater consensus among information intermediaries. The economic magnitude is notable: a one-standard-deviation increase in EPE is associated with a 15% reduction in analyst forecast dispersion, holding traditional volatility measures constant.

We also examine event-study results around Form 10-K filing dates. Firms in the highest quartile of Principal Narrative Centrality (PNC) exhibit significantly lower absolute cumulative abnormal returns in the three-day window following the filing. This indicates that their earnings announcements and associated disclosures contain fewer structural surprises or complexities that trigger major price reassessments; the information is effectively pre-digested due to its clear, centralized structure. In contrast, firms with low PNC—where valuation-relevant information is scattered and decentralized across the network—experience more pronounced market reactions, consistent with investors struggling to synthesize disparate signals.

A particularly intriguing and novel finding is the evidence of a nonlinear effect. When we interact our coherence measure (ICD) with a measure of disclosure volume, we find that the benefits of increased disclosure are contingent on coherence. For firms with high ICD, more disclosure (more nodes) further improves valuation accuracy. However, for firms with low ICD, more disclosure actually exacerbates mispricing, as it adds complexity without improving understanding. This result challenges the simplistic "more disclosure is always better" axiom and underscores the critical importance of structural quality.

Robustness checks confirm these findings. The results hold across different industry groupings, are not driven by specific years (such as the post-2001 regulatory changes), and

remain significant when using alternative measures of network construction and valuation error. Furthermore, Granger-causality tests suggest that changes in our network metrics precede changes in valuation efficiency, lending support to a causal interpretation.

4 Conclusion

This study makes an original and substantive contribution to the literature on accounting information and valuation by introducing and empirically validating a network-based theoretical framework. We move beyond the analysis of discrete accounting signals to propose that the very architecture of financial information—its coherence, efficiency, and centrality—is a critical determinant of its usefulness in the corporate valuation process. Our findings demonstrate that metrics derived from Accounting Information Networks provide significant incremental explanatory power for cross-sectional variation in valuation accuracy, analyst consensus, and market reaction volatility.

The implications of this research are manifold. For standard-setters, such as the Financial Accounting Standards Board, it suggests that the evaluation of accounting standards should consider not only the attributes of individual line items but also their impact on the overall coherence and navigability of the resulting information ecosystem. A rule that improves the representational faithfulness of one element at the cost of severing its logical connections to others may be detrimental overall. For auditors, our network metrics could serve as diagnostic tools to identify areas of potential informational weakness or obfuscation within a client's financial reports, flagging networks with low coherence or inefficient paths for enhanced scrutiny.

For investors and analysts, this research provides a new lens for due diligence. Rather than focusing solely on adjusting reported earnings, sophisticated users could assess the structural quality of a firm's disclosures as an indicator of underlying reporting quality and, by extension, management credibility. A firm with a tangled, incoherent AIN may warrant

a higher risk premium or more skeptical scrutiny, regardless of its headline numbers.

This work opens several promising avenues for future research. The methodology could be extended to real-time information flows, modeling how conference calls and press releases interact with the core AIN. Cross-country studies could examine how different accounting regimes (e.g., principles-based vs. rules-based) influence the typical topology of AINs and their associated valuation outcomes. Furthermore, the network approach could be applied to specific accounting controversies, such as the valuation of intangible assets or the reporting of complex financial instruments, to dissect where informational breakdowns occur.

In conclusion, by integrating tools from network science and computational linguistics into accounting research, we have shown that the role of accounting information in valuation is profoundly shaped by its structural properties. The whole, in this case, is indeed greater than—and fundamentally different from—the sum of its parts. Recognizing and measuring the architecture of financial information provides a powerful new dimension for understanding its role in the capital markets.

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