

Board Network and Accounting Conditional Conservatism

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ABSTRACT

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This study investigates the structure of inter-organizational networks among firms listed on the Iranian capital market, based on shared board memberships, and analyzes how firms' positions within these networks influence accounting conservatism. Employing a quantitative approach, the research utilizes social network analysis and multivariate regression methods. Data were collected from active firms in the Iranian capital market over the period 2011–2022 and analyzed using UCINET, NetDraw, and EViews software. The network structure was examined through three centrality measures: degree, closeness, and betweenness. Findings reveal a stratified network structure, wherein central firms have superior access to information and resources compared to peripheral ones. Hypothesis testing indicates no significant relationship between degree and closeness centrality with accounting conservatism. However, betweenness centrality exhibits a significant negative relationship, suggesting that firms with higher betweenness—due to their greater control over information flows—tend to engage in more aggressive financial reporting. These results highlight the crucial role of network positioning in mitigating accounting conservatism and amplifying the risks associated with information asymmetry. The study's insights can inform policymakers and corporate managers on how to enhance financial transparency and strengthen corporate governance mechanisms.

1. Introduction

In recent years, significant developments have emerged in the fields of management and accounting research, largely driven by a deeper understanding of the complexities inherent in organizational activities and inter-organizational interactions. Unlike traditional approaches that focused on independent business entities, contemporary studies have shifted toward analyzing networks of relationships among organizations and key shareholders. These connections—formed through shared ownership, social ties, or informal structures—exert a profound influence on managerial performance and decision-making (Agustia et al., 2022), leading to notable changes in corporate governance frameworks (Taghizadeh et al., 2022). One of the most critical mechanisms within corporate governance that has garnered increasing attention is accounting conservatism. Recognized as an effective tool for mitigating information asymmetry between corporate managers and shareholders, accounting conservatism plays a pivotal role in ensuring the quality of financial reporting and enhancing transparency (Ma & Jeong, 2022). It is frequently employed by market participants to assess the reliability of reported earnings (Shen et al., 2021). By emphasizing the principle of prudence, accounting conservatism facilitates the timely recognition of losses and prevents the overstatement of profits. This approach is particularly valuable under conditions of economic uncertainty, serving as a safeguard against managerial opportunism and promoting accountability (Basu, 1997; Banimahd et al., 2021). Given the globalization of capital markets and rising expectations for financial transparency and accountability, accounting conservatism has become an indispensable element in improving the quality of financial disclosures (Diem, 2025). Its impact is especially pronounced in firms characterized by weaker governance structures and greater information asymmetry, where it contributes significantly to risk reduction and financial performance enhancement (Wu et al., 2025).

Among the core pillars of corporate governance, the board of directors plays a vital role in overseeing and controlling managerial activities. As a governing body entrusted with protecting shareholders' interests, the board guides and monitors executive management and promotes accounting conservatism by adopting more prudent approaches to the timing of profit recognition (Mehrabani et al., 2015; Ebrahimi Kordlar et al., 2013). One of the less-explored yet essential aspects of corporate governance is the analysis of the network structure among board members, which emerges through shared directorships across multiple firms. These inter-organizational connections enhance directors' social capital and facilitate the flow of information (Lam et al., 2024), thereby influencing the level of accounting conservatism. Such networks can significantly improve the quality of financial decision-making by strengthening access to relevant insights and reducing uncertainty (Hosseini-pour et al., 2021; Taghizadeh et al., 2025). Empirical studies indicate that firms whose board members maintain extensive network

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connections and occupy central positions within these networks are more capable of implementing conservative accounting policies. This contributes not only to the enhancement of financial reporting quality but also to greater transparency and a reduction in risks stemming from information asymmetry (Liang et al., 2017).

From a theoretical perspective, agency theory explains that board networks can strengthen monitoring capacity and reduce opportunism, while social capital theory highlights how interlocking directorships diffuse norms and practices across firms. These theoretical lenses provide the foundation for linking board network structures to accounting conservatism. Nevertheless, it is essential to consider the risks associated with close social ties between executives and board members. Such relationships may undermine the board's independence and create conditions conducive to opportunistic managerial behavior (Dbouk et al., 2020; Chen, 2023). In this context, accounting conservatism serves as a critical signal for shareholders, observable and analyzable through corporate financial disclosures. It enables shareholders to assess the implications of weak corporate governance structures—such as socially embedded board relationships—highlighted by Lara et al. (2016). Moreover, social ties among board members can influence board dynamics and, consequently, the behavior of the CEO (Fan et al., 2019).

The innovation of this study lies in its use of relational data in the first stage (network analysis), in contrast to most prior accounting studies that rely on attribute-based data. This relational approach highlights that a firm's position within the network not only determines access to information but also reflects broader advantages such as access to resources at lower costs, influence, and brokerage power. In other words, network position can reveal whether connections are established directly or through intermediaries, and how these differences affect governance outcomes. Unlike previous studies, this research considers the multilayered and complex structure of inter-firm relationships and the social context in which accounting practices, including financial reporting, occur—dimensions that have largely been overlooked in prior literature.

Therefore, a precise understanding and analysis of board network structures and their impact on accounting conservatism is essential for improving financial transparency and gaining deeper insights into governance mechanisms. Focusing on firms listed in the Iranian capital market, the present study identifies the inter-firm network formed through shared board memberships and examines how firms' positions within this network affect their level of accounting conservatism. Accordingly, the objective of this research is to investigate how inter-firm board networks, formed through shared directorships, influence the level of accounting conservatism among listed firms in Iran. The remainder of the article is structured as follows: Section 2 shows the theoretical background and reviews the relevant literature; Section 3 outlines the research methodology; Section 4 presents the empirical findings; and Section 5 discusses the results and concludes with implications for theory and practice.

2. Theoretical Framework, Hypotheses and Literature Review

2-1. Accounting Conservatism and Board Networks

Accounting conservatism, rooted in the principle of prudence, ensures timely recognition of losses and prevents the overstatement of profits (Basu, 1997; Yin et al., 2020). It functions as a governance mechanism that mitigates agency problems by curbing managerial opportunism and enhancing reporting credibility (Ball & Shivakumar, 2005; Aburishseh et al., 2022). Within corporate governance, the board of directors plays a central role in promoting conservatism through oversight and monitoring (Saremnia et al., 2022; Ghasemi, 2021).

Beyond individual board characteristics, the network position of directors—formed through interlocking directorships—has emerged as a critical determinant of governance outcomes (Nguyen and Ouhadouch, 2021). Drawing on agency theory, board networks can strengthen monitoring capacity and reduce opportunism. From a social capital perspective, central directors facilitate information flows and diffuse governance norms across firms. These mechanisms imply that firms with more central board positions may adopt more conservative accounting policies to enhance credibility and reduce risk, though close ties may also weaken independence (Lara et al., 2016; Yin et al., 2020).

2-1-1. Degree Centrality and Accounting Conservatism

From the perspective of agency theory, directors with a greater number of connections (high degree centrality) are better positioned to access diverse information and strengthen monitoring, thereby reducing opportunistic managerial behavior. Similarly, social capital theory emphasizes that broader networks enhance trust and facilitate information exchange, which can encourage the adoption of conservative reporting practices. Empirical studies support these theoretical arguments: Hosseinpour et al. (2021) found that firms with higher degree centrality engaged less in earnings management, indicating stronger governance; Liu et al. (2024) showed that board centrality was positively associated with conservatism following financial restatements, highlighting its role in restoring reputational capital; and Bakke et al. (2024) demonstrated that interconnected boards enhance firm value, reinforcing the governance benefits of degree centrality. When a company or board member maintains a greater number of direct connections, it benefits from broader access to information and stronger monitoring capacity, which can foster accounting conservatism by encouraging more cautious and well-informed decisions. However, excessive connections may create over-dependence on the network and pressure to conform, reducing independence in decision-making and, in some cases, weakening conservatism. Based on these theoretical and empirical insights, the following hypothesis is proposed:

H1: Accounting conservatism is significantly associated with degree centrality.

2-1-2. Closeness Centrality and Accounting Conservatism

From the perspective of agency theory, directors with shorter paths to others (high closeness centrality) can access information more quickly, which may improve monitoring and reduce information asymmetry. However, social capital theory suggests that excessive closeness may foster social embeddedness and reduce independence, potentially weakening governance. Empirical evidence reflects this duality: Hosseinpour et al. (2021) found that closeness centrality was positively associated with earnings management, indicating weaker

monitoring; Liang et al. (2017) reported that higher centrality among non-executive directors was linked to lower conservatism; and Yin et al. (2020) showed that CEO–board social ties reduced monitoring effectiveness and led to less conservative reporting. These findings highlight that closeness centrality can both enhance information access and risk undermining board independence. Closeness centrality reflects how quickly a firm or board member can reach others in the network. Greater closeness provides faster access to information and resources, which can enhance transparency and encourage managers to adopt more prudent reporting practices. However, overly close relationships may weaken board independence and create opportunities for managerial opportunism, leading to reduced conservatism as decisions become more influenced by personal ties and social pressures. Based on these insights, the following hypothesis is proposed:

H2: Accounting conservatism is significantly associated with closeness centrality.

2-1-3. Betweenness Centrality and Accounting Conservatism

According to resource dependence theory, directors who occupy brokerage positions (high betweenness centrality) provide firms with access to external resources and information, thereby strengthening governance. From a social capital perspective, such directors act as bridges within networks, diffusing norms and practices across firms, which may promote conservatism if prudence is valued within the network. Empirical studies support this view: Taghizadeh et al. (2025) showed that central firms in Iranian board networks enjoyed faster access to information and greater influence in governance structures; Kang et al. (2025) found that regulatory sanctions reduced fraud contagion in interlocking director networks, underscoring the importance of brokerage positions in controlling misconduct; and Liu et al. (2024) emphasized that conservatism helps restore reputational capital within central networks. These findings suggest that brokerage positions enhance governance effectiveness and encourage prudent reporting. In summary, Betweenness centrality reflects the role of members who act as intermediaries or bridges within the network, controlling the flow of information and resources across different parts. This position can strengthen oversight and encourage greater conservatism, as such actors help prevent concealment of information and risky behavior. However, when too much power is concentrated in the hands of intermediaries, it may lead to misuse or personal influence, causing conservatism to decline as decisions become driven by individual or group interests rather than prudence.

Accordingly, the following hypothesis is proposed:

H3: Accounting conservatism is significantly associated with betweenness centrality.

2-2. Literature Review

2-2-1. Board Networks and Financial Misconduct

Kang et al. (2025) examined how regulatory penalties mitigate the contagion of financial fraud within managerial networks. Their evidence confirmed that misconduct can spread through interlocking director ties, but regulatory sanctions reduce this contagion and improve accounting information quality. This study highlights the vulnerability of networks to negative spillovers, while also showing that external enforcement can restore governance effectiveness. Taghizadeh et al. (2025) analyzed the board interlocking network in the Iranian capital market. They found that most firms are embedded in interconnected structures, though some occupy more central positions with greater influence. These central firms benefit from faster access to information and play strategic roles in governance. The study underscores how network hierarchy creates unequal monitoring capacity, raising questions about whether centrality strengthens or distorts conservatism.

2-2-2. Board Centrality and Accounting Conservatism

Liu et al. (2024) investigated whether directors on central boards restore reputational capital after financial misstatements through conservative accounting. Their findings show a positive association between board centrality and conservatism in the post-restatement period, suggesting that conservatism functions as a reputational repair mechanism. This study links network position directly to accounting outcomes, emphasizing the reputational dimension of conservatism. Liang et al. (2017) focused on non-executive directors and found that higher centrality was associated with lower conservatism. This result contrasts with Liu et al. (2024), indicating that centrality may not uniformly strengthen prudence. Instead, the effect depends on the type of director and the governance context, pointing to theoretical tension between monitoring benefits and risks of social embeddedness.

2-2-3. Director Networks and Firm Value

Bakke et al. (2024) explored whether directors' professional networks contribute to firm value, using unexpected director deaths as exogenous shocks. They found that disruptions to networks reduce firm value, particularly in smaller or growth-oriented firms. This evidence suggests that network ties enhance firm performance, but it does not directly address conservatism. Nevertheless, it implies that network centrality can shape broader governance outcomes, of which conservatism is one dimension.

2-2-4. Executive Social Ties and Financial Reporting

Kuang et al. (2022) examined CFO–executive relationships and their impact on restatements. Professional ties reduced restatement likelihood, while personal ties were linked to performance cycles. This duality shows that not all social connections are beneficial: Professional networks improve reporting quality, but personal ties may compromise it. Yin et al. (2020) studied CEO social ties and conservatism, finding that broader connections weakened monitoring and reduced conservatism. This highlights the risk that embedded relationships erode board independence, aligning with agency theory's warning about opportunism.

2-2-5. Board Structure and Governance Mechanisms

Nakhaei and Ahmadpour (2020) analyzed board structure and governance mechanisms. They found limited effects of board structure on conservatism, but ownership concentration and institutional ownership positively influenced unconditional conservatism and financial performance. This suggests that structural features alone may be insufficient, and network or ownership mechanisms play a stronger role.

2-2-6. Network Position and Earnings Management

Hosseini et al. (2021) examined Iranian firms' network positions and accrual-based earnings management. Degree centrality reduced earnings management, while closeness centrality increased it. Their findings reveal that network metrics have divergent effects, reinforcing the need to distinguish between types of centrality when linking networks to conservatism.

2-3. Critique of Previous Research

To clarify the theoretical and empirical context of the present study, prior research conducted both inside and outside Iran has been reviewed. Regarding domestic studies, the following points can be noted: Overall, only a limited number of studies have applied network analysis in the field of accounting in Iran, among which the works of Taghizadeh et al. (2022; 2025) and Hosseini et al. (2021) are noteworthy. However, none of the previous studies have examined the structure and network relationships within the Iranian capital market and their impact on accounting conservatism. In fact, no research has specifically investigated how board networks in the capital market affect conservatism and the degree of prudence in financial reporting. Therefore, while the present study draws on the theoretical insights of earlier works, it simultaneously opens a new path for exploration.

In contrast, international studies (Kang et al., 2025; Bakke et al., 2024; Liu et al., 2024; Kuang et al., 2022; Yin et al., 2020; Liang et al., 2017) have paid greater attention to the application of network analysis in financial accounting. Accordingly, by reviewing and integrating prior research, the present study is the first of its kind to investigate the impact of board relationship patterns among firms listed in the Iranian capital market on accounting conservatism using network analysis. In this way, it goes beyond previous studies and paves the way for future research in this area.

3. Research Methodology

This study is applied in nature and follows a post-event (ex post facto) design, relying on historical data. Based on the collected information, this study is classified as quantitative research and employs social network analysis. Social network analysis focuses on the relationships among individuals, organizations, holdings, institutions, and other entities. Through this method, the structural patterns governing networks are examined and interpreted. Additionally, to test the research hypotheses, multivariate regression analysis is utilized.

This study is conducted in two stages. In the first stage, inter-firm relationships are examined based on shareholders who play a decisive role in appointing board members within each company. This phase employs social network analysis using PreMap (version 1), UCINET (version 6), and its complementary package NetDraw. The second stage investigates whether firms' positions within the relational network are significantly associated with accounting conservatism. This phase involves multivariate regression analysis, conducted using Eviews (version 13). Microsoft Excel (version 2021) is utilized throughout both stages for data organization and processing. In the first stage, beyond mapping the overall network structure, key centrality outputs—including degree, closeness, and betweenness—are extracted to determine each firm's position within the network (network analysis). In the second stage, the relationships between these centrality measures and accounting conservatism are statistically evaluated (regression analysis).

3-1. Data, Sample, and Research Period

The statistical population of this study consists of companies that were active in the Iranian capital market during the years 2011 to 2022 and for which relevant data were available. The number of firms per year was as follows: 406, 470, 514, 547, 567, 592, 592, 618, 680, 794, 806, and 837. Due to data limitations, only information related to accounting conservatism was accessible for 133 companies, which were included in the hypothesis testing. It is essential to note that firms listed on the over-the-counter (OTC) market, including those from financial, brokerage, banking, and insurance sectors, as well as companies whose fiscal year did not end in March, were excluded from the study due to a lack of available data on accounting conservatism.

3-2. Conceptual and Operational Definitions of Research Variables

Based on the studies of Muttakin et al. (2019) and Honarbaksh et al. (2020), the following models are used to test the hypotheses. It should be noted that in the second model, industry and year fixed effects are included to ensure the validity of the findings and results.

- (1) $ACCit = \alpha_0 + \alpha_1 DCFoit + \alpha_2 CFOit + \alpha_3 DCFOit \times CFOit + \alpha_4 DEGit + \alpha_5 DEGit \times DCFOit + \alpha_6 DEGit \times CFOit + \alpha_7 DEGit \times DCFOit \times CFOit + \alpha_8 CLOSit + \alpha_9 CLOSit \times DCFOit + \alpha_{10} CLOSit \times CFOit + \alpha_{11} CLOSit \times DCFOit \times CFOit + \alpha_{12} BETit + \alpha_{13} BETit \times DCFOit + \alpha_{14} BETit \times CFOit + \alpha_{15} BETit \times DCFOit \times CFOit + \alpha_{16} GROWTHit + \alpha_{17} GROWTHit \times DCFOit + \alpha_{18} GROWTHit \times CFOit + \alpha_{19} GROWTHit \times DCFOit \times CFOit + \alpha_{20} LEVit + \alpha_{21} LEVit \times DCFOit + \alpha_{22} LEVit \times CFOit + \alpha_{23} LEVit \times DCFOit \times CFOit + \alpha_{24} SIZEit + \alpha_{25} SIZEit \times DCFOit + \alpha_{26} SIZEit \times CFOit + \alpha_{27} SIZEit \times DCFOit \times CFOit + \alpha_{28} ROAit + \alpha_{29} ROAit \times DCFOit + \alpha_{30} ROAit \times CFOit + \alpha_{31} ROAit \times DCFOit \times CFOit + \alpha_{32} MTBVit + \alpha_{33} MTBVit \times DCFOit + \alpha_{34} MTBVit \times CFOit + \alpha_{35} MTBVit \times DCFOit \times CFOit + \alpha_{36} DPSit + \alpha_{37} DPSit \times DCFOit + \alpha_{38} DPSit \times CFOit + \alpha_{39} DPSit \times DCFOit \times CFOit + \epsilon it$
- (2) $ACCit = \alpha_0 + \alpha_1 DCFoit + \alpha_2 CFOit + \alpha_3 DCFOit \times CFOit + \alpha_4 DEGit + \alpha_5 DEGit \times DCFOit + \alpha_6 DEGit \times CFOit + \alpha_7 DEGit \times DCFOit \times CFOit + \alpha_8 CLOSit + \alpha_9 CLOSit \times DCFOit + \alpha_{10} CLOSit \times CFOit + \alpha_{11} CLOSit \times DCFOit \times CFOit + \alpha_{12} BETit + \alpha_{13} BETit \times DCFOit + \alpha_{14} BETit \times CFOit + \alpha_{15} BETit \times DCFOit \times CFOit + \alpha_{16} GROWTHit + \alpha_{17} GROWTHit \times DCFOit + \alpha_{18} GROWTHit \times CFOit + \alpha_{19} GROWTHit \times DCFOit \times CFOit + \alpha_{20} LEVit + \alpha_{21} LEVit \times DCFOit + \alpha_{22} LEVit \times CFOit + \alpha_{23} LEVit \times DCFOit \times CFOit + \alpha_{24} SIZEit + \alpha_{25} SIZEit \times DCFOit + \alpha_{26} SIZEit \times CFOit +$

$$\alpha_{27}SIZE_{it} \times DCFO_{it} \times CFO_{it} + \alpha_{28}ROA_{it} + \alpha_{29}ROA_{it} \times DCFO_{it} + \alpha_{30}ROA_{it} \times CFO_{it} + \alpha_{31}ROA_{it} \times DCFO_{it} \times CFO_{it} + \alpha_{32}MTBV_{it} + \alpha_{33}MTBV_{it} \times DCFO_{it} + \alpha_{34}MTBV_{it} \times CFO_{it} + \alpha_{35}MTBV_{it} \times DCFO_{it} \times CFO_{it} + \alpha_{36}DPS_{it} + \alpha_{37}DPS_{it} \times DCFO_{it} + \alpha_{38}DPS_{it} \times CFO_{it} + \alpha_{39}DPS_{it} \times DCFO_{it} \times CFO_{it} + \sum \alpha_i Industry + \sum \alpha_i Year + \epsilon_{it}$$

Each variable enters the model with four coefficients (individually, interacted with DCFO, interacted with CFO, and interacted with DCFO×CFO). The interaction of the independent and control variables with DCFO×CFO indicates how they are related to accounting conservatism.

Table 1. Variable Definitions and Measurement

Symbol	Definition	Measurement
ACC	accruals of the firm	operating income minus operating cash flows divided by beginning-of-period total assets
CFO	Cash flow from operations	Firm-level financial data
DCFO	Dummy variable for negative CFO	1 if CFO < 0, 0 otherwise
DCFO × CFO	Interaction term	captures whether operating cash flows are negative, thereby identifying the asymmetric timeliness of accruals in recognizing bad news relative to good news
Deg_Centrality	Degree centrality	The number of direct ties a firm has in the board network
Clo_Centrality	Closeness centrality	Reciprocal of the average shortest path length to other firms
Bet_Centrality	Betweenness centrality	Frequency a firm lies on the shortest paths between other firms
SIZE	Firm size	Ln (total assets)
MTBV	Market-to-book ratio	Market value of equity / book value of equity
Lev	Financial leverage	Total debt / total assets
ROA	Return on assets	Net income / total assets
Sales_Growth	Sales growth	Annual percentage change in sales
Div_Payer	Dividend payment status	Dummy variable: 1 if the firm pays dividends, 0 otherwise
Industry, Year	Fixed effects	variables controlling for industry and year

In the present study, the dependent variable is accounting conservatism, which is measured using the Ball and Shivakumar (2005) model, following the approach of Muttakin et al. (2019), Honarbakhsh et al. (2020). Ball and Shivakumar (2005) introduced a model based on the timeliness of accruals in reflecting cash flows. In this model, operating cash flows are used to distinguish between bad news and good news, and accounting conservatism exists when negative cash flows are recognized earlier than positive cash flows. The model is specified as follows:

$$(3) \quad ACC_{it} = \beta_0 + \beta_1 DCFO_{it} + \beta_2 CFO_{it} + \beta_3 DCFO_{it} \times CFO_{it} + \epsilon_{it}$$

In this model:

- ACC_{it} represents the total accruals of firm j in year t , calculated as the difference between operating income and operating cash flows, scaled by the book value of total assets at the beginning of the fiscal year (i.e., operating income minus operating cash flows divided by beginning-of-period total assets).
- CFO_{it} denotes the operating cash flows of firm j in year t , scaled by beginning-of-period total assets.
- $DCFO_{it}$ is a dummy variable equal to 1 if the operating cash flows of firm j in year t are negative, and 0 otherwise.
- The interaction term $DCFO_{it} \times CFO_{it}$ captures whether operating cash flows are negative, thereby identifying the asymmetric timeliness of accruals in recognizing bad news relative to good news.

Based on the research of Taghizadeh et al. (2025), Liang et al. (2017), Yin et al. (2020), and Falahati et al. (2023), the independent variables include degree centrality (Deg_Centrality), closeness centrality (Clo_Centrality), and betweenness centrality (Bet_Centrality). Based on the research of Liang et al. (2017), Saghafi and Motamedi Fazel (2014) and Hejazi et al. (2019), control variables consist of firm size (SIZE – natural logarithm of market value of assets), market-to-book ratio (MTB), financial leverage (Lev), return on assets (ROA), sales growth (Sales_Growth), and dividend payment status (Div_Payer). To enhance the validity of the results, industry and year effects are also controlled for in Model (2).

According to the studies by Liang et al. (2017) and Taghizadeh et al. (2022), the relational network among boards of directors in companies active in the capital market is formed through shareholders who are responsible for appointing board members. Accordingly, inter-firm connections are examined based on shareholders who play a decisive role in selecting board members within each company. In other words, when a shareholder holds a determining role in the appointment of board members in two different companies, that shareholder—or shared owner—creates a link between the two firms.

To analyze the board interlock network, the overall structure (including isolated or singleton units) is first evaluated. In the next stage, the performance of each node within the network is assessed using micro-level indicators. Among the most important of these indicators is

centrality, which determines the position of nodes within the network and reflects the influence and significance of individuals in the network structure. Node centrality can be measured and analyzed through three primary metrics: degree, closeness, and betweenness. In a network structure, the degree centrality of a node indicates the number of direct links it has with other nodes. In the context of board networks, the degree centrality of a firm reflects how many connections it has with other firms through shared shareholders—those who appoint board members across multiple companies. A firm with a high degree of centrality typically plays an active role within the network. The greater its centrality, the broader its relational ties, and the more influential its position in the network (Taghizadeh et al., 2022). The degree centrality of node k (denoted as p_k) is calculated using Formula 1 (Abbasi et al., 2012):

$$C_D(p_k) = \sum_{i=1}^n a(p_i, p_k) \tag{1}$$

In this formula, n represents the total number of nodes present in the network, and $a(p_i, p_k)$ equals 1 if there is a connection between nodes p_i and p_k , and 0 otherwise.

The betweenness centrality of a node indicates how frequently that node lies on the shortest paths between any two other nodes in the network. Nodes with high betweenness play a crucial role in connecting different parts of the network and facilitating the flow of information. They typically occupy central positions within the network structure. In essence, betweenness centrality reflects a node's (e.g., a firm's) strategic position based on its ability to link other nodes, pairs, or groups within the network. Such nodes can be considered "bridges" that help others establish connections. The greater the dependency of other nodes on a given node for communication, the more powerful and influential that node becomes within the network. The betweenness centrality of node k (denoted as p_k) is calculated using the following formula:

$$C_B(p_k) = \sum_{i < j} \frac{g_{ij}(p_k)}{g_{ij}} ; i \neq j \neq k \tag{2}$$

In this formula, g_{ij} represents the shortest path between nodes p_i and p_j , while $g_{ij}(p_k)$ denotes the number of shortest paths between p_i and p_j that pass through node p_k (Liang et al., 2017).

The closeness centrality of a node represents the average length of the shortest paths that connect that node to all other nodes in the network. Nodes with high levels of closeness centrality typically play a more central role in the network, possess greater influence, and offer higher accessibility to other nodes. In essence, closeness centrality reflects how quickly a firm can reach a larger number of other firms within the network. It also indicates the firm's ability to receive information from other network members. The closeness centrality of node k (denoted as p_k) is calculated using the following formula:

$$C_C(p_k) = \sum_{i=1}^n d(p_i, p_k)^{-1} \tag{3}$$

In this formula, $d(p_i, p_k)$ denotes the shortest path between nodes p_i and p_k (Abbasi et al., 2012).

Furthermore, the study examines how firms with more prominent positions within the relational network exhibit different levels of accounting conservatism (Stage 2 – correlation and regression analysis).

4. Research Findings

4-1. Descriptive Statistics

This section presents the findings from both the network analysis and regression analysis. Table 2 displays the descriptive statistics of the study. The first part of the table reports statistics related to inter-firm connections established through shared board members. The second part provides descriptive statistics for the research variables, including mean, standard deviation, median, first quartile, and third quartile. According to the results, the proximity of the mean and median values suggests a symmetric distribution of the data. Based on the information in this section, the mean (median) of the dependent variables is equal to the closeness centrality of 0.269 (0.26), degree centrality of 0.024 (0.011), and betweenness centrality of 0.242 (0.038), respectively. These estimated values in this study are similar to those in the previous study conducted in Iran by Taghizadeh et al. (2022). As shown in Table 2, the market value of the studied firms was approximately 3.4 times their book value. Around 55% of the firms' assets were financed through debt, and approximately 87% of the firms distributed cash dividends to shareholders. For definitions of the variables, please refer to Table 1.

Table 2. Descriptive Statistics

Variables	Number of observations	Mean	Standard deviation	First Quartile	Median	Third Quartile
ACC	1596	0.601	0.222	-0.063	0.206	0.142
CFO	1596	0.16	0.2	0.046	0.125	0.247
Closeness	1596	0.269	0.138	0.138	0.26	0.373
Degree	1596	0.024	0.029	0.004	0.011	0.039
Betweenness	1596	0.242	0.503	0	0.038	0.265
Growth	1596	0.375	0.709	0.062	0.286	0.571
Size	1596	14.966	1.738	13.782	14.636	15.945
MTBV	1596	4.268	23.686	1.771	2.865	5.065
Lev	1596	0.55	0.22	0.401	0.556	0.7
ROA	1596	14.899	14.977	4.351	12.024	23.672

DPS	1596	0.87	0.332	1	1	1
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Fig. 1. Overall Network of Inter-Firm Relationships



Fig. 2. Core Segment of the Network

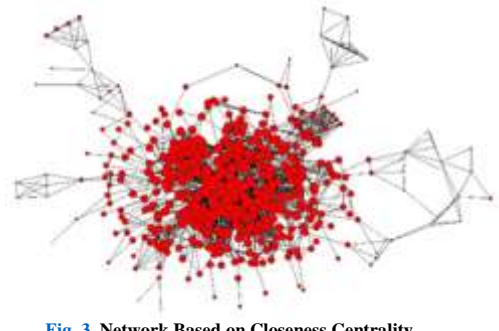


Fig. 3. Network Based on Closeness Centrality

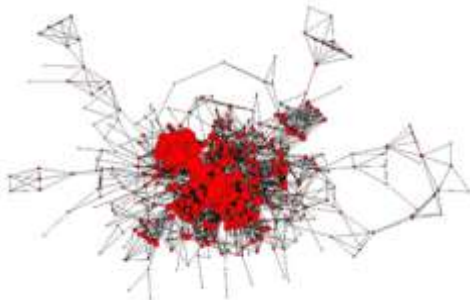


Fig. 4. Network Based on Degree Centrality



Figure 5. Network Based on Betweenness Centrality

To examine the interconnections among firms based on shareholders who play a decisive role in appointing board members, network graphs were drawn for different years using Netdraw software. The schematic figures presented above illustrate the overall structure of relationships among companies in the Iranian capital market through their shared board members. The network consists of three main segments: the core, the periphery, and isolated units. The density of nodes (firms) in the central area indicates that the number of entities located in the core is greater than in the peripheral and isolated sections. This pattern reflects the fact that most firms are interconnected, while only a few remain unlinked. Firms without ties to other entities are referred to as isolated units, positioned at the margins of the network. Considering the intensity of relationships in the central area compared to the peripheral zones, it becomes evident that firms occupy different positions within this stratified structure. It should be noted that in the figures above, the red nodes located at the center represent the core segments of the board interlock network, with the lines indicating the relationships among them. In Figure 1, in addition to these core connections, black nodes positioned on the left side of the image without links to the central nodes illustrate the isolated firms. Furthermore, the crescent-shaped and semi-circular nodes situated above the central part of the network represent the peripheral section. Firms occupying strategic and central positions within the network possess significant monopolistic power and influence. Compared to peripheral firms, they enjoy more efficient access to information flows and essential resources, thereby imposing costs on surrounding entities. This influential position within the relational structure can potentially shape the behavior of connected firms and, in particular, determine or influence their accounting conservatism decisions.

Figure 1 illustrates a schematic and overall representation of the interconnections among Iranian capital market firms through shared board members, based on data from the year 1401 (2021–2022). The network consists of three segments: the core, the peripheral, and the isolated

units. Based on the density of nodes (i.e., firms) in the central part of the network, it can be inferred that the number of entities in this segment exceeds those in the peripheral and isolated areas. This observation indicates that most firms are interconnected, while only a few operate without ties to others. Firms that lack connections with other entities are referred to as isolated units, typically located on the margins of the network graph. Considering the intensity of relationships in the central segment compared to the outer layers, it can be concluded that firms occupy stratified positions within the network structure. The core segment of the network is illustrated in Figure 2. In the central and core area of this structure, firms occupy more prominent and advantageous positions compared to other nodes, primarily due to their extensive relational ties, which grant them greater influence. Subsequently, Figures 3, 4, and 5 respectively show the main part of the network based on the three criteria of closeness centrality, degree centrality, and betweenness centrality. Based on Figure 3, most firms—particularly those located in the central areas of the network—enjoy a high level of access and proximity to other firms. The connections among these nodes are established largely through minimal intermediaries. The node with the shortest distance to other nodes holds the highest degree of closeness centrality and, as a key element of the network, possesses the ability to access information more rapidly. As shown in Figure 4, firms with a high degree of centrality play an active and influential role within the network and are referred to as key actors because they maintain connections with a larger number of other firms. Finally, as illustrated in Figure 5, and in line with the definition of betweenness centrality, nodes that act as intermediaries in connecting other nodes hold significant importance within the network structure. The removal of such nodes would disrupt communication among the remaining nodes. Those nodes on which many others depend for establishing connections exhibit high levels of betweenness and are highlighted in red within the network diagram. These nodes possess the ability to create or sever communication pathways among different parts of the network. As shown in the diagrams, the degree of betweenness varies across nodes, with some playing a more critical role in sustaining the dynamics of the network.

The figures illustrating the three centrality measures highlight notable differences in firms' positions within the network. Firms located at the core benefit from greater power, stronger influence, and faster access to information and resources, whereas peripheral firms face communication constraints and higher costs. This central positioning can play a decisive role in shaping the behavior of connected firms, as core actors are capable of influencing or even directing accounting conservatism decisions across the network.

4-2. Results of the Ball and Shivakumar Model Test

In this study, the Ball and Shivakumar model was employed to measure accounting conditional conservatism. The preliminary results of this test are presented in Table 3.

Table 3. Regression Results of the Ball and Shivakumar Model

Independent Variables	Coefficient	T-Statistic	Prob
DCFO	-0.035	-3.106	0.002
CFO	0.421	16.033	0
DCFOCFO	0.914	11.145	0
Constant	-0.109	-12.79	0
R ²	0.463		
Adjusted R ²	0.459		

The estimation of the initial Ball and Shivakumar model indicates that all variables are statistically significant at the 1% level, confirming the overall significance of the regression model with 99% confidence. According to this model, the coefficient of the variable *DCFOCFO* reflects the extent to which accruals respond more strongly to bad news than to good news—an indicator of accounting conservatism.

4-3. Hypothesis Testing Results

This section of the study presents the regression analysis results used to examine the impact of actors within the board interlock network on firms' accounting conservatism. Table 3 reports the regression model estimates related to the research hypotheses. As shown in the table below, the results of hypothesis testing (Table 4) indicate a statistically significant negative relationship between betweenness centrality and accounting conservatism. However, no significant relationship was found between closeness centrality or degree centrality and accounting conservatism. Overall, the findings suggest that a firm's position within the board interlock network structure may influence its level of accounting conservatism.

To further examine the validity of the model, year and industry fixed effects were controlled. This additional analysis (Table 5) reveals a statistically significant negative relationship between betweenness centrality and accounting conservatism, while no significant relationship was found for degree centrality or closeness centrality. Therefore, the results of this additional test are consistent with those obtained from Model 1.

Table 4. Regression Results Related to the Research Hypotheses (Model 1)

Variable	Coefficient	t-Statistic	Prob.
DCFO	0.229	2.474	**0.030
CFO	1.212	5.341	***0.000
DCFOCFO	2.513	2.768	**0.018
CLOS	0.043	1.460	0.172
CLOSDCFO	0.126	2.018	0.068
CLOSCFO	0.152	1.213	0.250
CLOSDCFOCFO	-0.834	-0.865	0.405
DEG	-0.222	-1.788	0.101

DEGDCFO	-0.421	-1.079	0.303
DEGCFO	0.258	0.339	0.740
DEGDCFOCFO	-1.340	-0.347	0.735
BET	-0.008	-1.225	0.246
BETDCFO	0.012	1.118	0.287
BETCFO	0.119	2.911	0.014
BETDCFOCFO	-0.205	-2.557	**0.026
GROTH	-0.002	-0.134	0.895
GROTHDCFO	-0.012	-0.546	0.595
GROTHCFO	-0.259	-2.791	0.017
GROTHDCFOCFO	0.169	1.502	0.161
LEV	-0.004	-0.269	0.792
LEVDCFO	-0.107	-1.085	0.301
LEVCFO	0.214	1.554	0.148
LEVDCFOCFO	-1.893	-1.952	*0.076
SIZE	0.000	0.153	0.880
SIZEDCFO	-0.012	-2.676	0.021
SIZECFO	-0.028	-2.925	0.013
SIZEDCFOCFO	-0.076	-1.019	0.329
ROA	-0.013	-18.131	0.000
ROADCFO	-0.003	-1.252	0.236
ROACFO	-0.001	-0.727	0.482
ROADCFOCFO	-0.019	-1.102	0.293
MTBV	-3.640	-1.068	0.308
MTBVDCFO	-0.000	-0.675	0.513
MTBVCFO	0.000	0.243	0.811
MTBVDCFOCFO	-0.004	-0.418	0.683
DPS	0.006	0.462	0.652
DPSCFO	0.017	0.448	0.662
DPSCFOCFO	0.127	1.368	0.198
DPSDCFOCFO	0.312	1.021	0.328
C	-0.020	-0.415	0.685
Adjusted R-squared	0.857	R-squared	0.860
F-statistic	246.973	Prob(F-statistic)	0.000
Durbin-Watson stat	2.038		

The dependent variable in the regression models presented in this table is accounting conservatism. The measurement method for this variable, along with other variables used in the analysis, is described in the "Research Variables" section. The symbols ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.1 levels, respectively.

Table 5. Regression Results Related to the Research Hypotheses (Model 2)

Variable	Coefficient	t-Statistic	Prob.
DCFO	0.255	3.194	***0.008
CFO	1.093	4.206	***0.001
DCFOCFO	3.059	2.558	**0.026
CLOS	-0.041	-0.926	0.374
CLOSDCFO	0.084	0.963	0.356
CLOSCFO	0.219	1.707	0.115
CLOSDCFOCFO	-1.017	-0.819	0.430
DEG	0.084	0.588	0.568
DEGDCFO	-0.352	-0.766	0.459
DEGCFO	-0.125	-0.162	0.873
DEGDCFOCFO	-0.475	-0.104	0.918
BET	-0.009	-2.394	0.035
BETDCFO	0.011	1.025	0.327
BETCFO	0.114	3.131	0.009
BETDCFOCFO	-0.222	-2.240	**0.046
GROTH	0.001	0.090	0.929
GROTHDCFO	-0.009	-0.496	0.629

GROTHCFO	-0.235	-2.763	0.018
GROTHDCFOCFO	0.166	1.617	0.134
LEV	-0.015	-1.140	0.278
LEVDCFO	-0.087	-0.949	0.362
LEVCFO	0.148	0.981	0.347
LEVDCFOCFO	-1.702	-1.768	0.104
SIZE	0.001	0.421	0.681
SIZEDCFO	-0.013	-3.205	0.008
SIZECFO	-0.020	-2.105	0.059
SIZEDCFOCFO	-0.115	-1.192	0.258
ROA	-0.013	-13.409	0.000
ROADCFO	-0.003	-1.129	0.282
ROACFO	-0.001	-0.786	0.448
ROADCFOCFO	-0.016	-0.963	0.356
MTBV	-6.500	-1.737	0.110
MTBVDCFO	-9.110	-0.128	0.899
MTBVCFO	0.005	1.286	0.224
MTBVDCFOCFO	-0.010	-0.807	0.436
DPS	0.004	0.389	0.704
DPSDCFO	0.007	0.207	0.839
DPSCFO	0.121	1.694	0.118
DPSCFOCFO	0.237	0.763	0.461
S1	-0.015	-1.447	0.175
S2	-0.006	-1.217	0.248
S3	0.022	2.825	0.016
S4	-0.011	-1.887	0.085
S5	-0.032	-1.554	0.148
S6	-0.000	-0.074	0.941
S7	-0.007	-1.286	0.224
S8	-0.043	-2.804	0.017
S9	-0.017	-1.706	0.115
S10	-0.018	-0.906	0.384
S11	-0.003	-0.309	0.762
Y1	0.016	0.939	0.367
Y2	0.014	0.996	0.340
Y3	0.016	1.125	0.284
Y4	0.022	1.299	0.220
Y5	0.019	1.073	0.306
Y6	0.020	1.407	0.186
Y7	0.022	1.646	0.127
Y8	0.013	1.275	0.228
Y9	-0.005	-0.454	0.658
Y10	-0.065	-41.413	0.000
Y11	-0.011	-4.817	0.000
C	-0.006	-0.110	0.913
Industry Fixed Effects	Yes		
Year Fixed Effects	Yes		
Adjusted R-squared	0.865	R-squared	0.870
F-statistic	169.123	Prob(F-statistic)	0.000
Durbin-Watson stat	2.082		

The dependent variable in the regression models presented in this table is accounting conservatism. The measurement method for this variable, along with other variables used in the analysis, is described in the "Research Variables" section. The symbols ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.1 levels, respectively.

5. Conclusion and Discussion

This study analyzes the structure of the inter-organizational network among firms listed in the Iranian capital market over the period 2011–2022 (1390–1401 in the Persian calendar). Given that financial reporting without accounting conservatism may reflect managerial opportunism and exploitative behavior (Sharma & Kaur, 2021; Haider et al., 2021), the research investigates firms' accounting conservatism in relation to their position within the social network of board interlocks in the capital market. The study aims to address two fundamental questions:

- a. What structural pattern governs the relationships among firms based on shared board members?
- b. Does a firm's position within the network relate to its level of accounting conservatism?

The findings of this study reveal the emergence of an extensive network of relationships among business entities in the Iranian capital market, shaped by prevailing inter-organizational ties. This network exhibits a stratified structure, wherein firms occupy distinct positions. In the central layers of the network, relational intensity is notably higher than in peripheral zones. Central institutions benefit from faster and more efficient access to resources and information, facing fewer intermediaries or structural bridges. This dynamic imposes greater costs on peripheral firms, as they rely on central entities to connect with the broader network. Firms with more advantageous positions in the network tend to influence the collective behavior of other entities and are thus recognized as key actors. Importantly, these key actors are not exclusively located in the core of the network, yet they possess substantial power and influence. The study's findings regarding the relational network and key actors align with the results of prior research by Hosseinipour et al. (2021), Taghizadeh et al. (2025), Muttakin et al. (2019), Yan et al. (2020), and Falahati et al. (2023).

In addition to the initial section that examined the structural patterns of the network, this part of the study explores the relationship between network outputs and accounting conservatism. The primary objective of the research is to investigate whether a firm's position within the communication network is associated with its level of accounting conservatism. Based on the results of the first hypothesis test, no statistically significant relationship was found between degree centrality and accounting conservatism. Given this finding, it appears that accounting conservatism is not influenced by a firm's degree of centrality within the social network of companies in the Iranian capital market.

According to the results of the second hypothesis test, there is no statistically significant relationship between closeness centrality and accounting conservatism. The closer a firm is to the source of information, the more effective and accessible its informational reach becomes (Newman, 2010). Given the findings, it appears that the closeness index—despite reflecting better accessibility to others and resources—does not play a role in shaping firms' accounting conservatism. Thus, this relationship does not support the research hypothesis. Nevertheless, closeness centrality contributes to a more favorable position and greater influence within the network structure.

Based on the results of the third hypothesis test, there is a statistically significant negative relationship between betweenness centrality and accounting conservatism, indicating that firms with greater intermediary power within the corporate network tend to weaken prudence in financial reporting. By controlling the flow of information and regulating the connectivity of other nodes, actors with high betweenness centrality exert stronger influence across the network, but this dominance often translates into aggressive reporting practices rather than cautious behavior. Consistent with prior studies such as Liang et al. (2017) and Yin et al. (2020), the findings suggest that brokerage positions concentrate decision-making authority and information control in the hands of a few actors, enabling them to filter, delay, or distort information, which undermines transparency and reduces the board's monitoring capacity. As a result, conservatism—intended to safeguard against opportunism—becomes less prevalent, while bargaining power allows central firms to impose their preferences on peripheral ones, encouraging earnings management and avoidance of timely loss recognition. In emerging markets, where regulatory oversight is weaker, these risks are amplified, as brokerage actors can exploit structural gaps to consolidate power, limit accountability, and prioritize short-term gains over long-term prudence. This highlights the importance of monitoring network structures to prevent concentrated power from distorting financial reporting practices, and demonstrates that relational network analysis reveals governance risks overlooked by traditional attribute-based approaches, offering valuable insights for regulators and policymakers seeking to mitigate opportunism in highly connected corporate networks (Fan et al., 2021).

While these findings are in line with prior studies, the contribution of this research lies in extending the literature in several ways. First, from a theoretical perspective, it integrates agency theory, social capital theory, and resource dependence theory to explain how different dimensions of network centrality can either strengthen or weaken conservatism. Second, from a methodological perspective, it applies social network analysis to relational data in the Iranian capital market, whereas most prior accounting studies—both domestic and international—have relied on attribute-based measures. This relational approach captures the multilayered and complex structure of board interlocks, offering a more dynamic view of governance mechanisms. Third, from an empirical perspective, the study provides novel evidence from an emerging market context, where institutional settings and governance structures differ from those in developed economies. By showing that betweenness centrality negatively affects conservatism, while degree and closeness centrality do not, the study highlights the unique role of brokerage positions in shaping financial reporting behavior.

In summary, the findings of this study suggest that improper financial reporting behaviors—including the lack of prudence and conservatism—are more prevalent among firms with greater intermediary power in the network. Beyond confirming earlier results, the study advances the literature by offering new theoretical insights, methodological innovation through relational network analysis, and empirical evidence from the Iranian capital market. These contributions not only differentiate the study from prior works but also pave the way for future research on the intersection of board networks and accounting conservatism in emerging economies.

Importantly, while earlier research in developed markets has generally highlighted positive or neutral associations between network centrality and accounting conservatism, the present study demonstrates that in the Iranian capital market, brokerage positions (high betweenness centrality) are negatively related to conservatism, reflecting the unique governance risks of an emerging economy with weaker regulatory oversight. Moreover, unlike international evidence where degree and closeness centrality often strengthen monitoring and prudence, this study finds no significant effect for these measures, underscoring contextual differences in how board interlocks shape financial reporting behavior. This divergence highlights the contribution of the research in extending the literature by providing novel empirical evidence from an emerging market and showing that concentrated intermediary power can undermine conservatism in ways not fully captured in prior international studies.

Based on the findings of this study, the following practical recommendations are proposed:

1. Considering the potential influence of the network structure and the positions of key actors within the board on accounting conservatism and the reliability of financial statements, it is recommended that all shareholders and users of financial information take into account the governance-related network structure of firms operating in the capital market when making decisions.
2. Decision-makers in business units, when selecting and appointing board members, are advised to consider not only individual and professional qualifications but also the professional reputation and the breadth of interorganizational connections of candidates. These characteristics play a crucial role in shaping the firm's network position and access to information, which in turn affects the effectiveness of monitoring.
3. Considering the role of betweenness centrality in reducing accounting conservatism, firms can review their board composition and interorganizational relationships to mitigate aggressive reporting behaviors. It is recommended that companies avoid over-concentration on highly connected board members and instead strengthen mutual monitoring mechanisms in board design.
4. Conducting training programs for board members on professional ethics, information management, and financial reporting can enhance decision-making quality and reduce opportunistic behaviors in central firms.
5. It is recommended that capital market regulatory authorities employ social network analysis (SNA) techniques and related software, such as UCINET and NetDraw, to monitor the network structures of firms. These tools can be effective in identifying firms that occupy sensitive network positions and are at a higher risk of engaging in aggressive or opportunistic behaviors.

As with any empirical study, the presence of challenges and limitations is inevitable and may pave the way for future research. This study, like other investigations in the fields of accounting and finance, was not free from constraints and encountered several obstacles. Given the vast and complex nature of inter-organizational networks, the network analysis method—despite its advantages—inevitably imposes certain limitations, such as restricting the study to commonly used network metrics. Another limitation is that the findings may not be generalizable to other markets beyond the Iranian capital market. Moreover, the network structure was examined through shared board memberships, whereas future studies may consider alternative levels of inter-organizational connectivity. The methodology employed in this research can also be applied to analyze influential actors in other critical areas of accounting. Considering the potential impact of network structure and the strategic position of key actors on accounting conservatism and the reliability of financial statements, it is recommended that decision-makers pay close attention to the distribution of power within corporate networks. Such analysis is feasible through examining the relational structure among business entities and the role of their positions in shaping accounting conservatism.

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