Accounting similarities, sophisticated investors, relevance and information asymmetry

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Abstract

Information asymmetry is a phenomenon in the capital market that can be caused by various factors. The purpose of this paper is to contribute to the debate on whether information asymmetry can be affected by factors such as accounting comparability, sophisticated investors, and relevance, and therefore, its value-relevance for decision-making. The paper uses three methods criteria for information asymmetry (VOLTRADE, PNSY and bid-ask spread) as well as two methods for measuring accounting comparability (text mining and De-Franco). Therefore, it is feasible to test and compare different methods of accounting comparability with different methods of information asymmetry. The results of the study indicate that the comparability of accounting practises has a notable adverse impact on information asymmetry. Additionally, it was observed that sophisticated investors have the ability to moderate this relationship. We find that relevance has significant relation with information asymmetry. Furthermore, it has been determined that comparability exerts a substantial influence on information asymmetry within an imperfectly competitive market, as opposed to a market characterised by perfect competition. Therefore, these findings underscore the significance of considering market conditions and competition levels in the issue. Ultimately, our findings indicate that the cash flow component of comparability exerts a notable impact on information asymmetry, in contrast to the accrual component. This study provides new insights regarding the nexus between accounting comparability and financial asymmetry.

1. Introduction

Information economics is one of the issues that have been developed in the field of economics. The primary discussion in Information economics is about asymmetric information. Asymmetric information means that different groups with different levels of knowledge about the subject are facing each other. For example, managers who are relatively more knowledgeable than other people such as potential shareholders who are almost completely unaware of the company's financial status (Tilles, Ferreira, Francisco, Pereira, & Sarti, 2011). Information asymmetry brings various adverse individual and collective consequences in the market. Several consequences, including a reduction in the number of individuals engaging in trading

activities, elevated transaction costs, limited liquidity of securities, and diminished trading volume. The cumulative repercussions result in a decline in the transaction's profitability.

Transparent and comparable financial information is the basic pillar of accountability and informed economic decisions, and is undoubtedly essential for economic development in the private and public sector. As a result, shareholders need a mechanism to monitor the managers' performance. In this way, it is ensured that the managers respect their interests and the mechanisms can improve the transparency of the information by maintaining a balance between social and economic goals and secondary and collective goals. The issue will eventually lead to economic growth and development.

In the context of the capital market, the comparability of financial statements and the asymmetry of information interact in two distinct ways: substitution and complementarily. The creation of a partial-full information environment occurs as a result of the substitutive role played by the exchange of firm-specific information sources (Kothari, Li, & Short, 2009). Comparable data analysis, however, can be more beneficial for businesses where there are sophisticated investors present, according to the complementary role theory.

The role of informational and monitoring is brought up in connection with the comparability of financial statements and the reduction of information asymmetry. Information risk caused by uncertainty in the information provided is an important source of risk (Easley & O'hara, 2004; Lambert, Leuz, & Verrecchia, 2007). The increase in informational uncertainty leads to a reduction in the flow of financial resources into the company. Therefore, lenders generally demand a higher rate of return. The issue leads to the creation of limitations in the financial constraint of companies and consequently the loss of investment opportunities. Comparable accounting information can reduce information asymmetry by providing the market with useful data. Furthermore, accounting data is crucial for monitoring activities among investors, particularly sophisticated ones. Managers' less accountability to shareholders and stakeholders can be caused by their pursuit of self-interests, which potentially leads to misallocation of company's resources and loss of its value. The provision of accounting information that is both comparable and of high quality serves to mitigate information asymmetry and minimise the potential for agency conflicts between managers and external stakeholders. It improves the ability of shareholders and stakeholders to monitor management decisions (Bushman & Smith, 2001; Healy & Palepu, 2001). The issue can discourage managers from engaging in profit manipulation(Kasznik, 1999; Rezaei-Petenoee & Abdullahi, 2019) and pursuing projects that undermine the interests of shareholders (Cheng & Wu, 2018).The variety of accounting methods used by different companies increases the cost of external users who need to interpret accounting information and evaluate the performance of companies (Choi, Choi, Myers, & Ziebart, 2019; Gong, Li, & Zhou, 2013). In contrast, comparable financial reporting will result in are deduction in the cognitive load, associated with computations pertaining to issues necessitating subjective evaluation. The evidence related to the mandatory adoption of financial reporting standards supports this view (Florou & Pope, 2012; Yip & Young, 2012; Yu & Wahid, 2014). Seil Kim, Kraft, and Ryan (2013) showed that accounting comparability can reduce the efforts of creditors to analyze and evaluate different companies against their peers. In addition, in contrast to other qualitative features that focus on distinct financial elements of the company and are typically calculated independently, the comparability of financial reporting enables stakeholders to discern economic similarities and disparities among companies. In particular, the usefulness of accounting information largely depends on the ability of users to relate it to some benchmarks (Financial Accounting Standards Board (FASB), 1980). De Franco, Kothari, and Verdi (2011) believe that the comparability of accounting information increases analysts' understanding of economic events that turn into accounting performance, and can help them in making accurate predictions.

The financial accounting comparability provides more quality and relevant information to the users and thus reduces the cost of receiving and processing information (De Franco et al., 2011). The issue can reduce information asymmetry and therefore reduce the monitoring costs of the stakeholders. Therefore, it can be stated that the comparability of accounting is an effective governance tool that reduces information asymmetry and improve information relevance.

The research contributes to the literature in several ways. First, to the best of our knowledge, the study is the first to provide the effect of accounting similarities, sophisticated investors, and relevance on information asymmetry. Secondly, in previous researches, De Franco model has been used to measure accounting comparability (Chen & Gong, 2019; Chen, Kurt, & Wang, 2020; Golmohammadi Shuraki, Pourheidari, & Azizkhani, 2021). This research improves the De Franco model and uses the novel approach to measure the financial statement comparability. Finally, the research findings may culminate in the establishment of a quantitative model that, through sophisticated investors, and enhancing the comparability as well as relevance of financial information, contributes to the mitigation of information asymmetry.

The rest of the research organized as follows. Section 2 provides a literature review of the study. Section 3 focuses on the development of hypotheses. Section 4 discusses the key variables examined in the research. Section 5 explores the sample, data, and control variables. Section 6 presents the results of the analysis. Section 7 conducts robustness tests to validate the findings. Section 8 includes additional analyses, distinguishing between cash flow-related and accruals-related variables. Finally, section 9 concludes the paper.

2. Literature Review

Information asymmetry refers to the uneven distribution of information among parties involved in a commercial transactions, where certain individuals possess confidential information, for some parties over others(Socoliuc, Grosu, Ciubotariu, Brînzaru, & Cosmulese, 2022). Accounting makes it possible for comparability of financial statements. Comparability is considered one of the qualitative features that improve quality (IASB, 2008). The qualitative feature of the information allows the users to identify the similarities and differences between two sets of economic phenomena. Similar difficulties of a business unit should be compared with others at various time points in order to enable information comparison. The first part can be called "harmony" and the other one can be called "consistency" which are tools to achieve comparability(Chen, Collins, Kravet, & Mergenthaler, 2013). The advantages of comparability include improving the quality of the information that is available and thereby reducing asymmetry (Bhattacharya, Desai, & Venkataraman, 2013); improving analysts' coverage and accuracy of profit forecasts; reducing the spread of profit forecast (Mahmud, Ibrahim, & Pok, 2009); increase liquidity and stock trading volume (Eisazadeh Roshan & Abdi, 2022); and more accurately reflecting the company's specific information in the current period (Barth, Landsman, Lang, & Williams, 2012) and reduction of the advantages of confidential information (Brochet, Jagolinzer, & Riedl, 2013). According to Kim and Lim (2017),the availability of comparable information likely increases the importance of publicly available information, which in turn reduces information asymmetry among skilled investors.

Stable and sustainable accounting methods allow investors to better interpret the company's operational results and information disclosure. Therefore, it reduces information asymmetry. To clarify, when the stability of the information procedure is diminished, it leads to an escalation in information asymmetry. Because investors get confused about how to distinguish between the real performance of the company and its accounting performance (Peterson, Schmardebeck, & Wilks, 2015).

Relevant information has the advantage of being useful in making a decision when it is presented in a comparable manner. The comparability of financial statements increases the level of usefulness in determining the relevance of accounting information through the role played by two important dimensions of the characteristics of users of financial statements, *i.e.*, investor sophistication and information asymmetry. Hence, it is expected that the comparability of financial statements through these two features will increase the relevance of accounting information (Robert, Kim, & Musa, 2018).

Sophisticated investors are a group of investors who have sufficient capital, skills and knowledge to participate in all types of investment opportunities (Collins, Gong, & Hribar, 2003). Comparability analysis is a specialised research technique that sophisticated investors, including institutional shareholders, have the expertise, skill and ability to perform in the company evaluation process (Kim & Verrecchia, 1994). Sophistication investors have more ability to make comparability among companies, that's why they evaluate cash flow and company performance better. Previous researches have shown that institutional traders make optimal investment decisions (Bhattacharya, 2001; Mikhail, Walther, & Willis, 2007). As a result, the comparability of financial statements increases the relevance of accounting information and the asymmetry of information decreases as the knowledge of the readers of financial statements increases.

Information asymmetry occurs when one party to a contract or transaction is aware of more information and uses the information effectively when communicating with the other party (Aboody & Lev, 2000). Private information regarding the unobservable growth potential of the company affects the selection of peer companies (Boni & Womack, 2006; De Franco, Hope, & Larocque, 2015). In the existence of private information, information asymmetry among investors creates uncertainty over the choice of peer companies (Robert et al., 2018). Therefore, when the information asymmetry is low, the relationship between comparability of financial statements and the relevance of accounting information is strong.

A perfectly competitive market refers to a situation where the demand curve for stocks is horizontal (Venkatesh & Chiang, 1986). In such markets, traders will not be able to influence the stock price, and this assumption will happen if traders are large and unlimited. Since in a perfectly competitive market, demand curves are uniform and horizontal, demand will have no effect on price. It is assumed that investors trade without affecting the prices (Imhof, Seavey, & Smith, 2017). As a result, financial statement comparability and knowledgeable investors are unaffected by information asymmetry in an environment of increased competition. Information asymmetry in imperfect competition market can be influenced by various factors. The assumption happens if the number of traders is limited. In this market, an investor faces a downward sloping demand line or an upward sloping line for the company's stock. Besides, the investor's demand drives up or down the price (depending on whether they are buying or selling). Therefore, an investor's transaction in the capital market causes the price curve to slope. The price curve falls as a result of an investor's capital market transaction. Due to the fact that others assume that this investor has more information in the market, the high slope of the price reduces the investors' desire to do the transaction (Othman, 2012).

Information asymmetry increases the slope of the price curve, which leads to adverse selection. Adverse selection is the result of differences in the information quality among investors in the market of competition, which affects the price. Therefore, in the market, price curves have a larger slope for with superior information positions than investors with lower positions, such as smart investors. This investor's demand has an adverse

effect on the price(Armstrong, Core, Taylor, & Verrecchia, 2011). Therefore, it is clear that the trading of sophisticated investors has a greater effect on the price of the company's stock.

In a perfectly competitive market, it does not matter if some investors have more information than others. Because in a perfectly competitive market, the demand curve is horizontal and the number of transactions is unlimited, as well as information asymmetry does not affect the stock price. Theoretically, it is expected that investors with less knowledge will understand the information absorbed by knowledgeable investors through the fluctuations of the company's stock price. Because they run a higher danger of being adversely selected when interacting with better aware investors, in such circumstances, information asymmetry influences the desire of less informed investors to supply liquidity by buying and selling shares. In companies that have a large information asymmetry and their securities are traded in an imperfect competition market, and an increase in the comparability of financial statements will cause a further decrease in the stock price(Lambert, Leuz, & Verrecchia, 2012).

In the market of poor competition, managers may be directed to engage in earnings management practices in order to mitigate the impact of highly volatile earnings and manipulate financial reports accordingly. This causes the financial statements to not fully reflect the economic status of the company, and as a result, it is possible that the comparability level of financial statements will decrease and information asymmetry will increase.

3. Hypotheses Development

The justification for the impact of financial statement comparability can be grounded in three theories. According to agency theory, information asymmetry exists between the principal and the agent. Comparability of accounting information helps to reduce information asymmetry by providing the principal with a better understanding of the agent's performance. Therefore, a negative relationship between financial statements comparability and information asymmetry can be expected (Jensen & Meckling, 1976). Signalling theory suggests that companies with better performance have an incentive to disclose more transparent and comparable financial statements to signal their performance to the market. As a result, comparability of financial statements can help to reduce information asymmetry and enhance market efficiency (Spence, 1973). Disclosure theory emphasizes the importance of information disclosure in reducing information asymmetry. Comparability of accounting information enables investors to compare the financial performance of different companies and make informed investment decisions. Thus, we formulated the following hypothesis:

H1: Comparability of accounting information has a negative effect on information asymmetry.

Three theories can explain the effect of relevance on information asymmetry. According to information asymmetry theory, information asymmetry exists among different stakeholders such as managers, investors, and creditors. When accounting information is not relevant or reliable, it can contribute to greater information asymmetry and hinder indecision-making processes. Therefore, it can argue that the relevance of accounting information is negatively related to information asymmetry (Myers & Majluf, 1984). According to agency theory, conflicts of interest are presented among various stakeholders, including managers and shareholders. Accounting information can serve as a mechanism to align the interests of these parties and reduce information asymmetry. When accounting information is relevant, it can help to mitigate the information asymmetry that exists in agency relationships (Jensen & Meckling, 1976). The signalling theory emphasizes the importance of information disclosure as a signal of firm performance. When accounting information is relevant, it can serve as a signal of the firm's financial position and prospects, and thereby reduce information asymmetry (Spence, 1973). Thus, we formulated the following hypothesis:

H2: Relevance has a negative effect on information asymmetry.

Signalling theory states that sophisticated investors are better able to interpret the signals provided by financial statements. When financial statements are more comparable, the signals conveyed by them are likely to be more accurate and reliable. Therefore, it can be argued that the comparability of financial statements is more important for sophisticated investors and may have a greater impact on reducing information asymmetry for this group (Spence, 1973). Agency theory suggests that sophisticated investors are more likely to engage in monitoring and controlling the behaviour of managers. More comparable financial statements may make it simpler for savvy investors to evaluate manager performance and hold them accountable. Therefore, the comparability of financial statements may be more important for sophisticated investors from an agency perspective (Jensen & Meckling, 1976). According to information processing theory, sophisticated investors have a greater ability to process complex financial information. When financial statements are more comparable, sophisticated investors may be able to extract more useful information from them and make more informed decisions. Therefore, the comparability of financial statements may be more important for sophisticated investors from an information processing perspective.

H3: Sophisticated investors affect the intensity of the relationship between comparability of accounting information and information asymmetry.

Imperfect competitive markets are characterized by fewer competitors and greater market power for individual firms, leading to greater asymmetry of information among market participants. In such markets, firms have greater discretion over their pricing strategies and financial reporting practices, which can lead to

greater variations in the comparability of financial statements. This lack of comparability can exacerbate information asymmetry, as investors struggle to discern meaningful differences between firms based on their financial statements (Kim & Shi, 2014). Therefore, we hypothesized:

H4: Imperfect competition market compared to perfect competition has an effect on the nexus between comparability of accounting information and information asymmetry.

4. Key Variables

4.1. Measuring Information Asymmetry

Following Muslim and Setiawan (2021), we measured information asymmetry using two proxies. The first proxy is VOLTRADE. Higher value of the variable means lower information asymmetry. Trading volume is defined using the square root of the traded shares divided by the shares outstanding. VOLTRADE is calculated as Equation 1:

$$VOLTRADE_{it} = \frac{\sqrt{Tradeble\ Shares}}{Listed\ shares} \qquad (1)$$

We named the second proxy as price non-synchronization (PNSY) *i.e.*, ($1-R^2$).Kelly (2014) claims that low R^2 indicates the poor quality of the information environment as well as a high degree of asymmetry. To measure PNSY, we divided the level of variations in stock returns into two components. First, variations in the market rate that measure systematic variation. Second, firm-specific information or price non-synchronization that is reflected in ($1-R^2$). R^2 is obtained through the following regression.

$$r_{it} = \propto_i + \beta_1 R_{mt} + \varepsilon_{it} \qquad (2)$$

Where, r_{it} is the return of firm *i* at time *t*, and R_{mt} refers to the market return at time *t*.

4.2. Measuring Accounting Comparability

Following Bai, Burke, Wan, and Xu (2022) the text mining process was used to measure the accounting comparability. Figure 1depicts the text mining process.
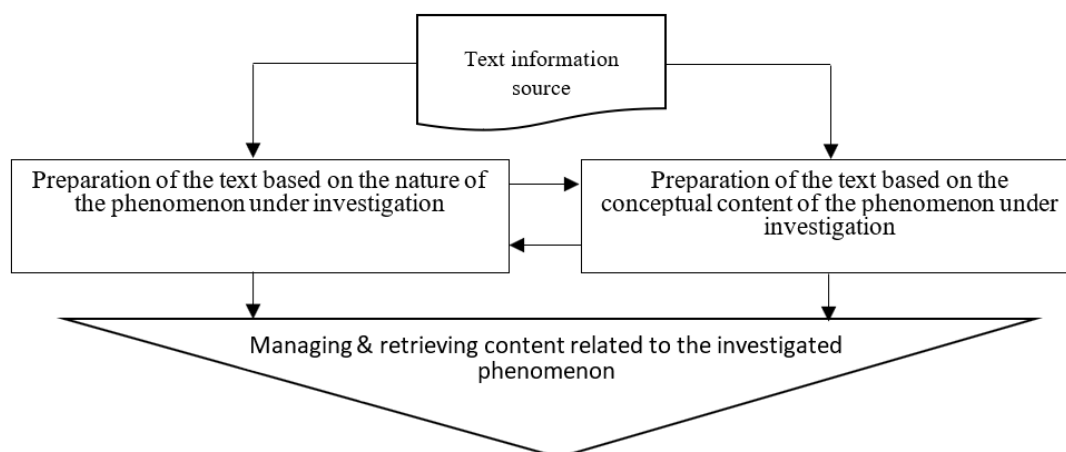

Figure 1. The process of text mining as an interactive and iterative process.

Figure 1shows the information in financial reports used as input for text preparation and text processing methods. It should be interactively demonstrated during the preparation and text processing stages in order to discover clear and practical patterns in the data that will be used in the text analysis phase. We use three levels of evaluation system for standard text mining.

First level: Text content processing.

Second level: Content refinement relational basis.

Third level: Determining the dimensions related to the similarities of financial reports.

In the first level, data mining algorithms are used, and the resulting data serves as a useful representative of the words and phrases defined in the content of the selected text. To implement the section, the Word file of The financial statements and BOD reports from each firm during the research period are entered into Net Beans 8 software as a Word file to implement the section.

The second level is related to the reduction of dimensions. The degree of text similarity in financial reports and concept of vectors are used to reduce dimensions. Dyer, Lang, and Stice-Lawrence (2017) and Bai et al. (2022) believe that Latent Dirichlet Allocation (LDA) is a suitable method. The LDA restricts the topics that can be covered in each financial report file with many paragraphs and thousands of words. LDA has an important advantage as compared to other methods such as vector space model. The advantage is the effective communication of the textual content through consecutive words and a sequence of paragraphs that maintains

the key topics. Therefore, LDA transforms the text into a vector of topics that can express the main content more accurately. The assumptions of LDA are as follows.

1. Before running LDA algorithm, stop words and words with more than 15 characters must be removed.

2. In LDA, it is assumed that the corpus of documents contain a finite number of topics. In other words, each document is composed of a combination of topics. In this study, it is assumed that there are 150 topics in financial report for every year, following Dyer et al. (2017) and Bai et al. (2022).

3. LDA is able to show bigrams, *i.e.*, pairs of two adjacent words, more meaningfully. As a result, it has high accuracy in extracting topics based on phrases. For example, two words of "FAIR VALUE" together can be more relevant and meaningful than their separate presentation, *i.e.*, "FAIR" and "VALUE".

The LDA output contains vectors consisting of 150 elements for each company. Therefore,

Topic vector for firm i's financial report text $= T_i = (T_{i.1}. T_{i.2}. \ldots . T_{i.150})$ (3)

Where, T_i signifies the topic vector for firm i's financial reports textual disclosure in a given year.

The third level uses a substitute representative index to determine dimensions relevant to the text mining objective. If several texts of financial reports have similar topics, they can be taken into account in order to examine the comparability. In this case, each text is converted into a mathematical vector as Equation 4.

$$v = (w_1. w_2. w_3. \ldots . w_n) \qquad (4)$$

Each vector has specific values or weight according to the number of words used in the text of financial reports. In the next step, the length of each vector is calculated using the Equation 5.

$$\|v_i\| = \sqrt{w_1^2 + w_2^2 + \cdots + w_n^2} \qquad (5)$$

Then, the similarity between the texts is calculated as $v_1 \times v_2$ *i.e.*, scalar multiplication.

$$v_1 \times v_2 = w_{1i}w_{1j} + w_{2i}w_{2j} + \ldots + w_{ni}w_{nj} \qquad (6)$$

Finally, the angle between two vectors is derived from a concept that expresses the basis of the comparability of financial statements as Equation 7.

$$sim_{doc v_1 v_2} = \cos(\theta) = \frac{v_1.v_2}{\|v_1\| \times \|v_2\|} \qquad (7)$$

The angle between two vectors indicates the degree of similarity (comparability) the texts of financial reports, which is in the range of zero and one. If the angle of the two vectors is equal to one, it means that the similarity between the two texts in terms of identified content is completely compatible. There is no similarity in case of zero. For example, the following texts are related to two different firms from the same industry.

Dasht-e-Morghab Co: "… *the BOD intends to keep long-term investments for a long time, taking into account capital maintenance and checking the required liquidity. …*".

Gh-Pira Co: "… *according to the need of liquidity and capital maintenance, the BOD has intended to maintain its long-term investments for a long time. …*".

w_1: the BOD.

w_2: capital maintenance and liquidity.

w_3: long-term investments.

w_4: need.

w_5: maintain.

w_6: long-time.

v_1: (1, 1, 1, 0, 0, 1).

v_2: (1, 1, 1, 1, 1, 1).

The inner product of the length of two vectors is as follows:

$v_1 \times v_2 = [(1 \times 1) + (1 \times 1) + (1 \times 1) + (0 \times 1) + (0 \times 1) + (1 \times 1)] = 4$

$\|v_1\| = \sqrt{1^2 + 1^2 + 1^2 + 0^2 + 0^2 + 1^2} = \sqrt{4} = 2$

$\|v_2\| = \sqrt{1^2 + 1^2 + 1^2 + 1^2 + 1^2 + 1^2} = \sqrt{6} = 2.449$

$\cos(\theta) = \frac{4}{\|2\| \times \|2.449\|} = 0.817$

Therefore, it was found that the similarity of two terms in the text is equal to 0.817. The higher the value approaches one, the stronger the degree of similarity observed between the two topic vectors.

According to the study conducted by Bai et al. (2022), the assessment of network centrality is determined subsequent to traversing the aforementioned stages. They believe network centrality is useful because it serves as a one-dimensional summary metric for the textual disclosure of financial reports. In the centrality of the network, attention should be paid to the node and node's centrality. In network analysis, all the nodes form a network. As a principle, the more central a node's position in the network is, the greater its connection with other nodes. In fact, the centrality of the network indicates the degree of similarity in the distribution of financial reporting topics of a company compared to other companies. Network centrality can be a criterion that is calculated for each company in a network and can be considered as a proxy for the textual disclosure of financial reports.

We conducted the research based on three different types of centralities.

(1) Centrality degree: It shows the number of nodes that are indirect proximity and within the vicinity of the group. The significance of a node increases proportionally with its degree of centrality. In relation to financial reports, it can be stated that the higher the degree of input, that is, the company's financial reports are a reference. On the contrary, the higher the degree of output, the more the text of other companies' reports has been used.

(2) Eigenvector centrality: The model can identify a set of features that are more important in the expression of random phenomenon and create a simpler and more efficient model. Therefore, it is possible to witness a reduction in dimensions. In other words, the dimensions of a complex problem are reduced, and they are placed in the final model in a more efficient way. Eigenvector centrality calculates the importance of nodes based on neighbouring nodes. If a node is connected to high importance nodes so, under their influence, its importance will also increase. If the topics included in the financial reports of a company are similar to its peers, then the focal company will have a higher distribution.

(3) Page Rank: The method is actually an algorithm for ranking the financial reports of each company and determining their value based on the connections between them. Due to the fact that there is no knowledge about the value of financial reports at first, the algorithm gives the same value to all reports as the initial value. Subsequently, the companies that exhibit a greater degree of textual overlap with the central companies, as determined by the centrality of special values, will be assigned a higher centrality Page Rank.

4.2.1. The Concept of Centrality and Comparability of Financial Statements

De Franco et al. (2011) presented a model to measure the comparability of financial statements, which is used in numerous researches (Hu, 2021; Lin, Riccardi, Wang, Hopkins, & Kabureck, 2019; Zhang, 2018). De Franco et al. (2011)believe that if two companies have a similar accounting system, they can produce comparable financial statements. The criterion of the comparability of financial statements in their research is obtained as Equation 8.

$$Financial\ statements_i = f_i(Economic\ events_i) \qquad (8)$$

Where, f_i depicts the economic phenomenon of company i. Equation 8 states when two companies with two accounting systems are comparable if they create similar financial statements. They used stock returns as an indicator to depict the result of the accounting system, *i.e.*, financial statements. Consequently, the variable that is influenced by other factors in their mathematical equation is the net profit for each year, which is dependent on the market value of equity at the start of the period. The independent variable is also the return of the stock price of the same period.

$$Earnings_{i.t} = \alpha_0 + \beta_1 Return_{it} + \varepsilon_{it} \qquad (9)$$

To bring the functions of two companies closer, they used the estimated accounting function. Also, to estimate the profit, they assumed that the two companies have same return.

$$E(earnings)_{iit} = \alpha_i + \beta_i return_{it} \qquad (10)$$
$$E(earnings)_{ijt} = \alpha_j + \beta_j return_{it} \qquad (11)$$

Where, $E(earnings)_{iit}$ is expected earnings of the company i through the effectiveness of similar economic events *i.e.*,$return_{it}$. Equation 12is used to obtain the difference between the expected returns of companies i and j, *i.e.*, the comparability of the companies.

$$FSC_{ijt} = -\frac{1}{16}\sum_{t-15}^{t}|E(Earnings)_{iit} - E(Earnings)_{ijt}| \qquad (12)$$

The result of the equation is negative. Following Bai et al. (2022), the concept of centrality replaces the earnings variable in De Franco's model.

$$Centrality_i = f_i(Returns_i) \qquad (13)$$

$f_i(Returns_i)$ represents the textual disclosure system that depicts economic events and is reflected in$(Returns_i)$ and summarized in the centrality of the semantic network. Therefore, the subsequent model is estimated for each company through the utilisation of rolling window time series regression for 16 quartiles.

$$Centrality_{i.t} = \alpha_0 + \beta_1 Return_{it} + \varepsilon_{it} \qquad (14)$$

Where, $Centrality_{i.t}$ is the centrality of the semantic network of company i, which is an annual indicator. Therefore, it will have the same values for four quarters (t) during one year. The closeness of the functions of the two companies indicates the comparability between the textual disclosure systems. Next, we employ two models to estimate whether companies i and j have encountered similar economic events, as indicated by stock returns.

$$E(centrality)_{iit} = \hat{\alpha}_i + \hat{\beta}_i return_{it} \qquad (15)$$
$$E(centrality)_{ijt} = \hat{\alpha}_j + \hat{\beta}_j return_{it} \qquad (16)$$

Where, $(centrality)_{iit}$ and $(centrality)_{ijt}$ are the centrality of the semantic network for companies i and j respectively. Finally, Equation 17is estimated to measure the comparability of financial statements.

$$FSC_{ijt} = -\frac{1}{16}\sum_{t-15}^{t}|E(centrality)_{iit} - E(centrality)_{ijt}| \qquad (17)$$

FSC_{ijt} was estimated for each firm pair listed in Tehran Stock Exchange (TSE) whose financial year ends on March 29. Then the FSC_{ijt} pairwise measure for the companies of one industry was ranked in ascending

order. A large (*i.e.*, less negative) value of FSC shows the textual comparability of company i as compared with peers in the industry.

4.3. Measuring Relevance

To measure the relevance of the company's financial reporting, we used the Earnings Response Coefficient (ERC), which is a measure of usefulness in decisions based on accounting information (relevance). The ERC expresses the relationship between stock returns and the realized profit of the current year (Collins & Kothari, 1989). Equation 18 is used to measure this variable.

$$CAR_{i.t} = \beta_0 + \beta_1 ESUR_{i.t} + \varepsilon_{i.t} \qquad (18)$$

Where, CAR is the cumulative abnormal return in the three-day earnings announcement window. We employ Equation 19 to calculate the cumulative abnormal return in a three-day period (the day before, the announcement day and the day after) around the date of the announcement of the profit.

$$CAR_{i.t} = \sum_{-1}^{1} AR_{i.t} \qquad (19)$$
$$AR_{i.t} = R_{i.t} - R_{m.t}, R_{m.t} = \frac{I_{mt} - I_{mo}}{I_{mo}}$$

Where, AR is abnormal returns, $R_{i.t}$ is daily return of firm i, $R_{m.t}$ is daily market returns, I_{mt} is market index on day t, and I_{mo} is market index on day $t-1$.

$ESUR$ = unexpected profit per share, which is calculated from the absolute difference between the announced profit and the expected profit divided by the stock price at the end of the period.

According to Pástor and Veronesi (2009), the measure of unexpected profit is the profit that the company has predicted. The reason is that receiving any information signals, including the announcement of corporate profits, can lead to a revision of the previous beliefs of investors; provide the context for learning; affect the reaction of investors as well as cause abnormal returns. In Equation 18, the β_1 coefficient is called the current ERC (relevance).

4.4. Measuring Sophisticated Investors

Following Robert et al. (2018), we defined institutional shareholders as sophisticated investors. Institutional shareholders have the necessary expertise, skills and resources to analyse company information. They are the main players in the capital market and a significant part of the company's shares belong to them, as well as they act professionally in the field of investment. Institutional shareholder refers to the percentage of shares held by institutional shareholders such as mutual, banks, insurance companies, financial institutions *etc*. The calculation median values for institutional shareholders is conducted, thereby categorizing companies that surpass the median as median as entities with a higher prevalence of sophisticated investors.

5. Sample, Data and Control Variables

To collect the sample data, we start with all the companies listed in the Tehran Stock Exchange (TSE) between 2010 and 2021[1]. We exclude companies operating in the financial sector, such as banks and insurance companies, as well as companies for which data is not available. The final research sample has 2040 firm-year observations with non-missing values for the main dependent and independent variables. Control variables were selected according to previous studies. The control variables are given in Table 1.

Table 1. Control variables definition.

Variable	Symbol	Definition
Company size	*Size*	Natural logarithm of equity market value
Financial leverage	*Lev*	Ratio of liabilities to assets
Book to market value	*BtM*	Ratio of book value to market value of stock
Loss reported	*Loss*	Dummy variable, the number is 1 if loss is reported and 0 otherwise
Return on assets	*ROA*	Ratio of net income to assets

Continuous variables winsorized at 0.5% in each tail of the sample distribution to mitigate the effect of outliers (John, Litov, & Yeung, 2008).

To control the risk of the company and the information environment (Collins & Kothari, 1989), we used the control variables of company size, financial leverage, and BtM. The rationale for controlling the loss stems from the findings of Basu (1997) and Hayn (1995) who posit that the current earning response coefficient exhibits asymmetry between financial periods characterised by profit and those characterised by loss. Referring to Dakhlaoui and Gana (2020), ROA can also capture the level of risk.

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[1] The data was collected from the website of the Securities and Exchange Organization at www.codal.ir.

Table 2. Descriptive statistics.

Variable	N	Mean	Median	Max	Min	Std. dev.	Skewness	Kurtosis
VOLTRADE	2040	0.032	0.021	0.404	0.003	0.380	2.089	4.001
PNSY	2040	0.641	0.732	1.000	0.014	0.149	-1.779	2.032
FSC	2040	-0.008	-0.001	-0.000	-0.600	0.073	2.562	2.009
CAR	2040	0.141	0.019	2.329	0.001	1.726	3.333	3.098
ESUR	2040	0.410	0.256	3.564	0.002	0.895	2.999	3.874
Sophist	2040	0.551	0.594	0.820	0.000	0.259	3.858	3.982
SIZE	2040	11.52	10.85	17.96	8.070	1.065	3.965	2.986
Lev	2040	0.607	0.565	0.838	0.118	0.186	-2.635	3.524
BtM	2040	0.611	0.488	2.625	-4.654	0.623	4.656	2.986
ROA	2040	0.102	0.046	0.802	-0.322	0.166	3.368	3.695

Note: VOLTRADE and PNSY represent information asymmetry. FSC denotes accounting comparability. CAR stands for cumulative abnormal return. ESUR represents unexpected profit per share. Sophist refers to sophisticated investors. SIZE represents firm size. Lev signifies financial leverage. BtM represents book-to-market value. ROA denotes return on assets.

6. Results

6.1. Descriptive Statistics

Table 2 presents descriptive statistics of the sample. The statistical measures provided include the mean, median, maximum value, minimum value, standard deviation, skewness, and kurtosis. The number of companies that reported losses was 306, which is about 15% of the observations. The mean (median) *FSC* score is -0.008 (-0.001). A value of zero indicates the highest comparability. The likelihood of comparison increases as the value approaches zero. Figure 2 shows the scatter plot of *FSC* variable.

The mean (median) *CAR* variable is 0.141 (0.019). This variable's median value indicates that there is no optimistic bias present in the samples. Typically, sophisticated investors, also known as institutional investors, possess approximately 55% of the company's shares.
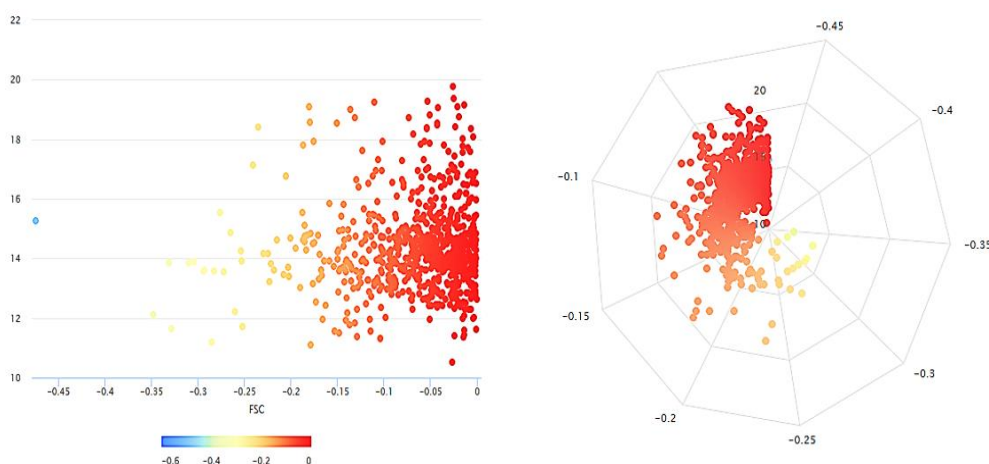

Figure 2. Scatter plot of FSC.

Table 3 shows the results of the co linearity analysis among the explanatory variables, which was conducted using the Pearson correlation method. This indicates that there is no issue of co linearity arising from weak coefficients among the variables.

Table 3. Pearson correlations with variance inflation factor (VIF).

Variable	VIF	Index	1	2	3	4	5	6	7
FSC	1.985	1	1.000						
CAR	2.006	2	-0.045**	1.000					
ESUR	1.256	3	-0.491	-0.511***	1.000				
Sophist	2.392	4	-0.325***	-0.252**	-0.362**	1.000			
SIZE	1.478	5	-0.258**	-0.099**	0.392***	0.342*	1.000		
Lev	1.639	6	0.089*	-0.048*	-0.125**	-0.421	0.189*	1.000	
BtM	2.183	7	-0.008	0.072***	-0.216*	0.098**	0.176**	-0.376	1.000
ROA	1.782	8	-0.059	0.321***	0.247***	0.165***	0.323***	-0.333***	0.436*
Loss	2.252	9	0.135***	-0.056***	-0.184**	-0.207	-0.134	-0.132	-0.255***
Variable		Index	8	9					
ROA		8	1.000						
Loss		9	-0.368***	1.000					

Note: *,**, and*** denote significance at the 10%, 5% and 1% levels, respectively.

6.2. Testing the First, Second and Third Hypotheses

In Table 4, regression results are reported. We were informed that our primary variables *i.e.*, accounting comparability and relevance, exhibit a statistically significant relationship with a significance level of 0.000, indicating significance at the 1% level. Furthermore, this relationship is found to be negative in direction. Sophisticated investors play an incremental role on the nexus between accounting information comparability and information asymmetry. Almost all the controlled variables showed significance, except for Loss and Lev.

The results of Table 4 suggest that when financial reports are more comparable, information asymmetry decreases. This finding is important for stakeholders who rely on financial reports to make informed decisions. By improving the comparability of financial reports, companies can potentially reduce information asymmetry and increase transparency, which can lead to more accurate valuations of companies and better investment decisions. The finding shows that sophisticated investors are less likely to tolerate information asymmetry and are more likely to seek out companies that have more transparent and comparable financial reports. This is an important finding because sophisticated investors often have a significant influence on the market and can affect the valuations of companies. Investors may find companies with greater transparency and comparability in their financial reporting practises more appealing, potentially resulting in increased valuations and improved access to capital.

Table 4. Panel data testing.

Variable	Hypothesis one		Hypothesis two		Hypothesis three	
	VOLTRADE	PNSY	VOLTRADE	PNSY	VOLTRADE	PNSY
FSC	−0.056***	−0.124***	−0.043***	−0.155***	−0.059***	−0.162***
	(−3.601)	(−4.003)	(−3.925)	(−4.343)	(−3.981)	(−4.511)
Sophist	−0.261***	−0.320***			−0.191**	−0.275**
	(−4.001)	(−4.992)			(−2.809)	(−2.557)
FSC*Sophist					0.101**	0.195**
					(3.001)	(3.369)
Relevance			−0.088***	−0.211***		
			(−4.444)	(−5.026)		
Size	−0.218**	−0.314**	−0.188**	−0.309***	−0.228**	−0.301***
	(−2.660)	(−3.902)	(−2.706)	(−3.922)	(−2.920)	(−3.808)
Lev	0.097	0.245	0.112	0.266	0.100	0.294
	(1.141)	(1.208)	(1.206)	(1.333)	(1.503)	(1.221)
BtM	−0.103**	−0.142*	−0.253**	−0.008***	−0.000*	−0.004*
	(−2.234)	(−1.991)	(−2.687)	(−5.002)	(−1.970)	(−1.966)
Loss	0.189	0.089	0.211	0.139	0.009	0.113
	(1.529)	(1.136)	(1.518)	(1.614)	(1.553)	(1.489)
ROA	0.034*	0.123**	0.000**	0.133*	0.099*	0.001*
	(1.961)	(2.001)	(2.240)	(1.975)	(1.989)	(1.981)
Year/Ind	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	−0.187***	−0.266***	−0.191***	−0.276***	−0.180***	−0.255***
	(−4.897)	(−5.623)	(−4.967)	(−5.701)	(−4.633)	(−5.540)
F Statistic	3.592	4.033	4.287	4.205	4.311	4.479
Adj. R square	0.128	0.131	0.141	0.137	0.142	0.153
Observations	2040	2040	2040	2040	2040	2040

Note: This table reports the OLS results of the first three hypotheses. We used the following models to test the first three hypotheses. ① $VOLTRADE (PNSY) = \alpha_0 FSC_{it} + \alpha_1 Sophist_{it} + \alpha_2 size_{it} + \alpha_3 Lev_{it} + \alpha_4 BtM_{it} + \alpha_5 Loss_{it} + \alpha_6 ROA_{it} + YEAR + Ind + \varepsilon_{it}$. ② $VOLTRADE (PNSY) = \beta_0 Relevance_{it} + \beta_1 Sophist_{it} + \beta_2 size_{it} + \beta_3 Lev_{it} + \beta_4 BtM_{it} + \beta_5 Loss_{it} + \beta_6 ROA_{it} + YEAR + Ind + \delta_{it}$. ③ $VOLTRADE (PNSY) = \gamma_0 FSC_{it} + \gamma_1 Sophist_{it} + \gamma_2 FSC*Sophist_{it} + \gamma_3 size_{it} + \gamma_4 Lev_{it} + \gamma_5 BtM_{it} + \gamma_6 Loss_{it} + \gamma_7 ROA_{it} + YEAR + Ind + \theta_{it}$. Refer to section 4 and 5 for variable definitions *,**, and*** denote P< 10%, 5% and 1%, respectively.

The results indicate that when accounting information is more relevant to stakeholders, information asymmetry decreases. This highlights the importance of providing relevant and timely accounting information to stakeholders, which can help to reduce information asymmetry and increase transparency. By improving the relevance of accounting information, companies have the potential to enhance their reputation and credibility among stakeholders, while improving their ability to make well-informed decisions.

The Table 4 suggests that sophisticated investors play an important role in shaping the relationship between financial statements comparability and information asymmetry. When comparability of financial statements is high, information asymmetry tends to decrease. However, this relationship is moderated by sophisticated investors, who have the ability to influence the market and potentially increase information asymmetry even when comparability is high. This finding underscores the importance of understanding the behaviour and inclination of sophisticated investors, and customising financial reporting methodologies to

cater their requirements. This discovery emphasises the significance of comprehending the conduct and inclinations of astute investors, and customising financial reporting methodologies to cater to their requirements.

6.3. Information Asymmetry and Competitive Market Levels

Information inequality may cause market failure. This will cause inefficiency at the micro and macro levels through the tendency of underinvestment or overinvestment. Since investors are the main providers of companies' resources, they require complete and correct information. The information asymmetry among investors creates the problem of adverse selection in determining inappropriate bid and ask prices (Sabet & Heaney, 2015).

The efficiency of capital markets is a recurring topic of significant discourse. Market efficiency is characterised by the phenomenon wherein information is promptly and accurately reflected in stock prices. Based on this, the reason for the existence of accounting can be stated as information asymmetry, in which one of the parties has more information. The emergence of this matter can be attributed to the existence of insider transactions and information(Ghaemi & Vatanparast, 2005). In the field of capital markets, the appropriate method of evaluating information asymmetry is the bid-ask spread. Equation 20shows the method of measuring information asymmetry.

$$Spread = \frac{AP_{it} - BP_{it}}{(AP_{it} + BP_{it})/2} \times 100 \qquad (20)$$

Where, AP is asking prices and BP is bid prices. We collect daily closing bid/ask prices for each year to compute the mean value of the daily percentage spread[2].

In the markets where information is distributed asymmetrically, the seller demands a higher price for the stock. The buyer, lacking sufficient information regarding the evaluation of the stock, provides an average price for its purchase. In the financial literature, the unusual gap between the bid price and the ask price shows the level of information asymmetry of the transaction parties. It is expected that by improving the accounting comparability, sophisticated investors will be able to predict their expected return more accurately and make better decisions with information asymmetry measurement criteria.

Table 5. Regression analysis

Variable	Whole sample	Imperfect competition	Perfect competition
FSC	-0.168** (-2.412)	-0.056** (-2.132)	-0.098 (-1.089)
Com			0.135 (1.425)
InCom		0.022** (3.048)	
FSC*Com			0.256 (1.558)
FSC*InCom		0.306** (3.041)	
Beta	0.003* (2.006)	0.000* (1.966)	0.028* (1.974)
Size	-0.225** (-2.061)	-0.127* (-1.968)	-0.281** (-2.664)
Lev	0.117 (1.508)	0.009 (1.289)	0.236 (1.359)
BtM	-0.143* (-2.021)	-0.068* (-1.991)	-0.222** (-2.459)
Loss	0.087 (1.123)	0.008 (1.287)	0.165 (1.446)
ROA	0.094* (1.983)	0.102 (1.592)	0.111** (2.373)
Year/Ind	Yes	Yes	Yes
Intercept	-0.098*** (-4.209)	-0.005*** (-3.005)	-0.007*** (-3.637)
F Statistic	5.363	4.119	4.896
Adj. R square	0.235	0.191	0.199

Note: We used the following models to test of fourth hypothesis. ①$Spread = \alpha_0 FSC_{it} + \alpha_1 beta_{it} + \alpha_2 size_{it} + \alpha_3 Lev_{it} + \alpha_4 BtM_{it} + \alpha_5 Loss_{it} + \alpha_6 ROA_{it} +$ YEAR + Ind + ε_{it}. ②$Spread = \beta_0 FSC_{it} + \beta_1 InCome_{it} + \beta_2 FSC * InCome_{it} + \beta_3 beta_{it} + \beta_4 size_{it} + \beta_5 Lev_{it} + \beta_6 BtM_{it} + \beta_7 Loss_{it} + \beta_8 ROA_{it} +$ YEAR + Ind + δ_{it}. ③$Spread = \gamma_0 FSC_{it} + \gamma_1 Com_{it} + \gamma_2 FSC * Com_{it} + \gamma_3 beta_{it} + \gamma_4 size_{it} + \gamma_5 Lev_{it} + \gamma_6 BtM_{it} + \gamma_7 Loss_{it} + \gamma_8 ROA_{it} +$ YEAR + Ind + θ_{it}. Refer to section 4, 5 and 6.3 for variable definitions,*,**, and*** denote P< 10%, 5% and 1%, respectively.

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[2]The daily data was collected from the www.tsetmc.com.

Competitive levels of the market are among the factors affecting information asymmetry. In situations where the market lacks competitiveness, traders who possess information tend to exhibit risk-averse behaviour. Therefore, less information is disclosed. The private information among sophisticated and informed investors has the effect of raising the expected return for uninformed investors. Additionally, it leads to a reduction in the informational content of prices when compared to a market characterised by perfect competition(Lambert et al., 2012). In a perfect competitive market, the comparability of accounting information is expected to have a greater effect on reducing information asymmetry.

Following Armstrong et al. (2011), we employed the number of shareholders to measure the spectrum of market competition. We created two levels of imperfect competition (*InCom*) and perfect competition (*Com*) with a dummy variable. If the number of shareholders during the research period is less than the first quartile, it is assumed that the competition market is imperfect and it takes the value of 1 and otherwise 0. If the number of shareholders are more than the third quartile, we call the market perfect competition and give a value of 1 and otherwise 0. The systematic risk (beta) variable is added to the model as a control variable. The mean (median) of the beta is 0.587 (0.483). Also, the min and max of the variable are -0.673 and 2.279 respectively.

This table reports OLS results of regression analysis with bid-ask spread as a dependent variable. The full sample includes observations on 2040 firm-year for the 2010-2021 periods. The control variables consist of beta, size, Lev, BtM, Loss and ROA. The P-value of the heteroscedasticity-consistent t-statistics is between parentheses below the estimated coefficients.

Table 5 shows that the interaction affects of FSC*InCom, is significant. It is clear that in a perfect competitive market, comparability has no effect on information asymmetry. This is because the number of investors is large in such market and the traders are not able to influence the stock prices. It means that the level of demand is horizontal and therefore the demand will not affect the price of the stock. Hence, in a highly competitive market, the presence of sophisticated investors and the comparability of financial statements do not have an impact on the existence of information asymmetry.

Table 6. Comparability, sophisticated investors, relevance and information asymmetry: using fixed effect model.

Panel A: Comparability, relevance, information asymmetry and moderating effect of sophisticated investors

Variable	Hypothesis one		Hypothesis two		Hypothesis three	
	VOLRADE	PNSY	VOLRADE	PNSY	VOLRADE	PNSY
FSC	-0.133*** (-2.583)	-0.342*** (-3.250)	-0.121** (-2.003)	-0.301*** (-3.513)	-0.139*** (-3.243)	-0.366** (-2.004)
Sophist	-0.321** (-2.020)	-0.402** (-1.975)			-0.385** (-2.308)	-0.420** (-2.442)
FSC *Sophist					0.170** (2.292)	0.211** (2.308)
Relevance			-0.208*** (-4.060)	-0.342** (-2.844)		
CV	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	-0.408*** (-2.425)	-0.495*** (-3.069)	-0.425*** (-3.211)	-0.399*** (-4.009)	-0.455*** (-3.529)	-0.411*** (-3.000)
Adj. R²	0.241	0.285	0.291	0.276	0.300	0.312

Panel B: competitive market levels: using bid-ask spread as dependent variable

	Whole sample	Imperfect competition	Perfect competition
FSC	-0.205*** (-3.879)	-0.0957*** (-4.653)	-0.188 (-1.083)
Com			0.246 (1.381)
InCom		0.089*** (4.989)	
FSC*Com			0.347 (1.053)
FSC*InCom		0.012*** (4.555)	
CV	Yes	Yes	Yes
Intercept	-0.167*** (-4.650)	-0.059*** (-4.391)	-0.112*** (-4.683)
Adj. R²	0.328	0.206	0.279

Note: This table reports the OLS results for test of hypotheses using FEM model. *,**, and*** denote P< 10%, 5% and 1%, respectively.

The concept of information asymmetry refers to the imbalance of information between different parties involved in a transaction. In financial markets, this can refer to situations where some investors have access to information that others do not, which can give them an advantage in trading. In the context of a market

operating under perfect competition, the presence of numerous investors and the absence of any individual trader's ability to exert influence over stock prices render the possession of superior or more comprehensive financial statements in consequential. This is because the demand for the stock is horizontal, which means that changes in demand do not affect the price of the stock. Therefore, in a perfectly competitive market, information asymmetry is not a prominent concern, given that the market is structured in such a way that makes it arduous for any individual trader to gain a competitive edge through access to superior information. Hence, within the context of a perfectly competitive market, the issue of information asymmetry is not a prominent concern, given that the market is designed in a manner that makes it arduous for any individual trader to attain a competitive edge through access to superior information.

7. Robustness Test
7.1. *Using Firm Fixed Effect Model*
In order to further explore the relationship among variables, we utilize the fixed effect model (FEM) as an additional analytical approach[3].FEM is used to control for issues that may occur due to the elimination of time-invariant firm-specific characteristics that may affect the nexus of research variables. The results are reported in panel A and B of Table 6. These results suggest that financial statements comparability diminishes financial asymmetry. Furthermore, it is observed that sophisticated investor positively moderates comparability-asymmetry relationship. This suggests that time-invariant firm-specific factors do not affect our findings. The Table 6 suggests that the results of the robustness test support the previous findings and confirm the significant negative relationship between comparability of financial statements and information asymmetry. It also highlights the role of sophisticated investors in moderating this relationship.

8. Additional Analyses
8.1. *Accounting Comparability: Cash Flow-Related Vs. Accruals-Related*
8.1.1. *Cash Flow Comparability*
To calculate the cash flow component of comparability, we took help from Equation 10, with the difference that operating cash flow are placed instead of earnings.
$$cfo_{i.t} = \propto_i^{cfo} + \beta_i^{cfo} Return_{it} + \varepsilon_{i.t}^{cfo} \qquad (21)$$
Where, cfo refers to operating cash flow at time t deflated by the market value of stockholder's equity at the beginning of the period. Park (2013) believes that the market value of equity is a criterion of all economic news, therefore, stock returns can be divided into accrual and cash news. Thus, the equations related to the calculation of cash comparability can be written as below.
$$E(cfo)_{iit} = \propto_i^{cfo} + \beta_i^{cfo} Return_{it} \qquad (22)$$
$$E(cfo)_{ijt} = \propto_j^{cfo} + \beta_j^{cfo} Return_{it} \qquad (23)$$
Where, $E(cfo)_{iit}$ represent the predicted cash flow of firm i using the function of firm i and the return of firm i at the time t. $E(cfo)_{ijt}$ denotes the predicted cash flow of firm i using the function of firm j and the return of firm i at the time t.
$$FSC_{ijt}^{cfo} = -\frac{1}{16}\sum_{t-15}^{t}\left|E(cfo)_{iit} - E(cfo)_{ijt}\right| \qquad (24)$$
FSC_{ijt}^{cfo} was estimated for each firm pair listed in Tehran Stock Exchange (TSE) whose financial year ends on March 29. Then the FSC_{ijt}^{cfo} pairwise measure for the companies of one industry was ranked in ascending order. A large (*i.e.*, less negative) value of FSC_{ijt}^{cfo} shows the cash component of comparability of company i as compared with peers in the industry.

8.1.2. *Accruals Comparability*
The same process is followed to calculate the accrual component of comparability, with the difference that instead of cash flow in the Equation 21, accruals are substituted.
$$acc_{i.t} = \propto_i^{acc} + \beta_i^{acc} Return_{it} + \varepsilon_{i.t}^{acc} \qquad (25)$$
Where, acc represent the accruals at time t deflated by the market value of stockholder's equity at the beginning of the period. Accruals are calculated from the difference between net profit and operating cash flows. The predicted accruals are measured from the following equations:
$$E(acc)_{iit} = \propto_i^{acc} + \beta_i^{acc} Return_{it} \qquad (26)$$
$$E(acc)_{ijt} = \propto_j^{acc} + \beta_j^{acc} Return_{it} \qquad (27)$$

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[3] We use Breusch-Pagan and Hausman tests to make a choice between fixed and random effect model. Frist, we did the Breusch-Pagan LM test to determine whether or not heteroscedasticity is present in regression models. The results of Breusch-Pagan LM test for three models obtained a significance of 0.000. Second, we run Hausman test to differentiate between fixed effects model and random effects model in panel analysis. The P-value of Hausman test for the models was less than 0.05, so we chose the fixed effect as the appropriate model.

Where, $E(acc)_{iit}$ is the predicted accruals of firm i using the function of firm i and the return of firm i at the time t. $E(acc)_{ijt}$ denotes the predicted accruals of firm i using the function of firm j and the return of firm i at the time t.

$$FSC_{ijt}^{acc} = -\frac{1}{16}\sum_{t-15}^{t}\left|E(acc)_{iit} - E(acc)_{ijt}\right| \qquad (28)$$

Table 7 shows the results of the test of the effect of the cash and accruals components of comparability on the asymmetry of information.

Table 7. Regression analysis.

FSC_{ijt}^{cfo}	FSC_{ijt}^{acc}	beta	size	lev	BtM	Loss	ROA	Year/Ind	Intercept	F Sta.	Adj.R²
-0.017*** (-5.007)		0.000* (1.962)	-0.194** (-2.193)	0.098 (1.208)	-0.163* (-1.972)	0.111 (1.482)	0.122* (2.001)	Yes	-0.329*** (-4.565)	6.367	0.252
	-0.004 (-1.562)	0.003* (1.970)	-0.201* (-2.300)	0.100 (1.305)	-0.159* (-1.989)	0.099 (1.551)	0.108* (1.999)	Yes	-0.336*** (-4.637)	7.205	0.271

Note: We used the following models for this section. ① $Spread = \alpha_0 FSC_{ijt}^{cfo} + \alpha_1 beta_{it} + \alpha_2 size_{it} + \alpha_3 Lev_{it} + \alpha_4 BtM_{it} + \alpha_5 Loss_{it} + \alpha_6 ROA_{it} +$ YEAR + Ind + ε_{it}. ② $Spread = \beta_0 FSC_{ijt}^{acc} + \beta_1 beta_{it} + \beta_2 size_{it} + \beta_3 lev_{it} + \beta_4 BtM_{it} + \beta_5 Loss_{it} + \beta_6 ROA_{it} +$ YEAR + Ind + δ_{it}. Refer to section 4, 5,6.3, 8.1.1 and 8.1.2 for variable definitions, *,**, and*** denote P< 10%, 5% and 1%, respectively.

This Table reports Ordinary Least Squares (OLS) results of regression analysis with bid-ask spread as a dependent variable. The sample includes observations on 2040 firm-year for the 2010-2021 periods. The control variables consist of beta, size, Lev, BtM, Loss and ROA. The P-value of the heteroscedasticity-consistent t-statistics is between parentheses below the estimated coefficients.

The findings offer evidence of the significant impact of cash flow-related factors on information asymmetry. Specifically, we find the negative nexus between accounting comparability and information asymmetry driven by cash flow rather than accrual counterpart. This indicates that information asymmetry is lessened when financial statements are comparable in terms of their cash flows. This finding can be consistent with the presence of sophisticated investors in certain industries. Sophisticated investors can minimize information processing costs by covering companies that operate in similar environments.

9. Conclusion

Information asymmetry is a phenomenon that may be affected by various factors in an imperfect market. The greater the comparability of accounting information, the better the investors can interpret the results of the company's operations and the disclosed information. Therefore, information asymmetry is reduced. On the other hand, when the information is presented similarly, it has the advantage of being useful in decision making. The comparability of financial statements increases the level of usefulness through two important dimensions of user characteristics, *i.e.*, sophisticated investors and information asymmetry. Sophisticated investors have more ability to compare companies, and hence they evaluate the cash flow and performance of the company better. Therefore, users of financial statements who fall within this category benefit from greater comparability, more relevance of accounting information, and reduced information asymmetry.

The more competitive the market is the more horizontal the demand curve will be and the demand cannot affect the stock price. In these conditions, comparability does not affect information asymmetry. On the other hand, within the context of imperfect competition markets characterised by a limited number of traders, the stock demand curve exhibits either downward or an upward slope. In contrast, within the context of imperfect competition markets characterised by a limited number of traders, the stock demand curve exhibits either a downward or upward slope. In this way, information asymmetry increases the slope of the price curve, which leads to an adverse selection. In general, the research emphasises the significance of financial statement comparability as a means to mitigate information asymmetry for investors. The findings of this study have practical implications for investors, regulators, and financial reporting standard setters. It suggests that financial statements comparability based on cash flows is a useful tool in reducing information asymmetry for investors. Regulators and standard setters may contemplate the promotion of comparability predicated on cash flows as a means to enhance transparency in financial reporting. Sophisticated investors should pay closer attention to the comparability of financial statements and its impact on information asymmetry. This can assist individuals in making more knowledgeable investment choices and mitigating their vulnerability to potential risks. Future research can focus on examining the causal effect of financial statement comparability on information asymmetry and consider other factors that may impact information asymmetry.

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