Ferdowsi University of Mashhad Press (FUMP)

Volume 8, Issue 3, Summer 2024

IJAAF

IRANIAN JOURNAL OF
ACCOUNTING, AUDITING and FINANNCE

Volume 8, Issue 3, Summer 2024

Serial Number: 28

Print - ISSN: 2717-4131
Online - ISSN: 2588-6142

https://ijaaf.um.ac.ir

IRANIAN JOURNAL OF ACCOUNTING, AUDITING and FINANNCE

In the Name of God, the Compassionate, the Merciful

Ferdowsi University of Mashhad

Iranian Journal of Accounting, Auditing & Finance (IJAAF)

Volume 8, Number 3, Summer 2024, Serial 28

ISSN (Print): 2717-4131, ISSN (Online): 2588-6142

Editorial Office: Faculty of Economics and Administrative sciences, Ferdowsi University of Mashhad, Azadi Sq., Mashhad; IRAN; P.O. Box: 1793; Postal Code: 9177948974; Tel: +98 51 38803742; Fax: +98 51 38763852
http://ijaaf.um.ac.ir E-mail: ijaaf@um.ac.ir

Table of Contents

Editorial Board

Received articles will be published after professional referee, and being approved by the editorial board. Submission to this Journal is required to send at least two files include: an "Article cover" and an "Anonymous file of the main article", through systems, http://ijaaf.um.ac.ir/ .Submission of a manuscript implies that the paper has not been published before and it is not under consideration for publication elsewhere. Please pay attention to the following:

1-Article Cover

The file should be typed in Word software (office), and A4 sized page which include:

- Full title of the paper centered in Times New Roman 16.
- Author's name centered in Times New Roman 12 (Bold),
- Author's characteristics centered in Times New Roman 11 (italics), including the authors' name (the name of correspondence author should be marked with an asterisk), academic rank and the name of the institution or university (do not use pseudonym and nickname), complete address, telephone number and fax of correspondence author and e-mail address of all authors.

2- Anonymous file of the main article

The main article should be typed in Word software (office), A4 sized page and utmost in 7500 words (including references), and numbered pages while page margins are as follows: margin from the above 4 cm, from the below 5/6 cm, from the left 5/4 and from the right 5 cm. The line spacing should be set at 1 cm and the beginning of each paragraph indented about 0.3 cm, the entire text should be Justified and include the following:

The first page:

- Full title of the paper, centered in Times New Roman 16.
- Abstract in Times New Roman 11 and utmost 165 words, including four issues: (1) Subject and purpose of the paper, (2) methodology, (3) findings, and (4) conclusions, and Contribution (maximum).
- Utmost 5 keywords in Times New Roman
- Subject classification code in Times New Roman This coding is designed for subject classification in economic literature and how to use it in detail is available on the following website:www.aeaweb.org/journal/jel_class_system.html
- The main titles in manuscript (including abstract, introduction, literature review, methodology, findings and Conclusion) left aligned in Times New Roman 12(Bold) and sub-titles (such as Keywords, subject classification code and other necessary(important) titles) left aligned in Times New Roman 11(bold) and in the left alignment, content of main manuscript in Times New Roman
- As far as possible, do not use any image in the text and if used, it should be high- quality black and white photos.

Structure of second page until the end of manuscript is as follow:

- *Introduction* Some paragraphs contain explaining the problem, literature review, object (purpose), importance and necessity of it.
- *Literature review* a review of the literature investigates only related researches chronologically and the results exploit at the end of the section theory matrix or conceptual model that document research variables and Formulate research hypotheses.
- *Methodology* including Methods, data collection tools, population, sample size and sampling methods, analysis and model testing hypothesis, definition of study variables and operational definition of them can be in presented the same section that model testing is represented and there is no need to repeat.
- *Results* including the findings compare it with the findings of previous and interpretation of compliance or inconsistency of findings with research findings and theories.*Conclusion* includes a summary of the problem, provide a summary of the results and overall conclusion and

recommendations based on the results (policy recommendations is necessary only in applied research and, if necessary, recommendations for future research accordant with the research limitations or how development of current research;
- *References* are as Section 3-2 and
- *Endnotes* terminology and some necessary explanations provide in the endnote (no footer) and as a two-column table (contains the endnote number and content of endnote with invisible lines (No Border). Numbering the endnotes are as text and doing without the use of EndNote technique.

3- Other important points in the original file

3-1- References inside the text

- In order to reference within the text (APA) method should be used; so the author's last name with the year of publication it is presented in the text respectively. If there are two authors, last names' will be separated by "and" and if more than three people, "et al." will be used
- After the last name of the first author. If the number of resources is more than one, a semicolon (;) will be used to separate them.
- Any reference which is mentioned in the article, must be included in references part.
- If it is required to explain more about terms or words within the text, endnote can be used.

3-2- References

To set the reference list, use the (APA) method, as follows:
Books: Author, A.A. (Year of Publication). *Title of work*. Publisher City, State: Publisher.
When citing a book in APA, keep in mind:

- Capitalize the first letter of the first word of the title and any subtitles, as well as the first letter of any proper nouns.
- The full title of the book, including any subtitles, should be stated and *italicized*.
- Magazines: Author, A.A. (Year of Publication). Title of the Article. *Journal Title*, *Volume* (Issue), pp.-pp.
- When citing a magazine in APA, keep in mind:
- You can find the volume number with the other publication information of the magazine.
- You can typically find page numbers at the bottom corners of a magazine article.
- If you cannot locate an issue number, simply don't include it in the citation.
- Online magazine article: Author, A.A. (Year). Title of the Article. *Magazine Title*, *Volume* (Issue), Retrieved from http://xxxx
- When creating an online magazine citation, keep in mind:
- The volume and issue number aren't always on the same page as the article. Check out the other parts of the website before leaving it out of the citation.
- List of references should not be numbered. If there are 2 or more authors alike, in addition to alphabetical order, the publisher year also should be ordered. In order to avoid the pitfalls of the various sources listed, the beginning of each reference is 0/5 cm protrusion.
- If there are two authors, last names' will be separated by "and" and if more than three people, last names' will be separated by a comma (,) and the last one with "and".

3-3- Charts, Tables and Formulas

Charts' title should be writhen below and tables' title on the top centered in Times New Roman 11 and Bold. Charts and tables render within the text and immediately place after the explaining paragraph. The content of charts and tables in Times New Roman 10

- Tables and images number from No. (1) To refer to the content of the images and diagrams in the text, use the number and appropriate referral.
- Inserting decimal numbers, instead of using slash (/), and show negative numbers by using the minus sign.
- Tables include variables, should contain a column for the symbols used for variables.

- Formulas represent centered in Times New Roman11and render in a two column table with no border and number with figure in parentheses.

3-4- Other notes

- There is no need to spaces before dot, comma, semicolon, colon, question mark, exclamation mark and, but after these signs shall be placed a spaces.
- Use spaces before opening and after the closing parenthesis.
- Articles should not be sent to Persian/English journal or another language at home and/or abroad simultaneously.
- If the format and structure of submitted articles are not same as what mentioned in this guide, it won't be accepted.
- Journal can edit and delete some sections, without any change in its content and received journals will not bring.
- Responsibility for the accuracy of the article is the author.
- The file should be named in English. This name should include the first author's last name and sending date. Articles will be received only by Journal Website.
- In order to expedite the referee process and publishing an article, we will ask respected professors and researchers to ensure technical and literary editing and enforce this guide.

The journal is devoted to research papers. Research paper is extracted from the research project, master's dissertation or thesis.

Receiving the papers is only possible electronically.

Editor's Note

I am pleased to announce that the Ferdowsi University of Mashhad is publishing Iranian Journal of Accounting, Auditing & Finance (IJAAF). On behalf of the board of the IJAAF and my co-editors, I am glad to present the Volume 1, Issue 1 of the journal in December 2017; the journal will publish four issues in a year. The board includes experts in the fields of accounting, finance and auditing, all of whom have proven track records of achievement in their respective disciplines. Covering various fields of accounting, *IJAAF* publishes research papers, review papers and practitioner oriented articles that address significant issues as well as those that focus on Asia in particular. Coverage includes but is not limited to:

- Financial accounting
- Managerial accounting
- Auditing
- Taxation
- Accounting information systems
- Accounting education

Perspectives or viewpoints arising from regional, national or international focus, a private or public sector information need, or a market-perspective are greatly welcomed. Manuscripts that present viewpoints should address issues of wide interest among accounting scholars internationally and those in Asia in particular.

Yours faithfully,
Mahdi Moradi
Editor in Chief

IJAAF; Vol. 8, No. 3, Summer 2024, Serial 28

Iranian Journal of
Accounting, Auditing & Finance

Ferdowsi University of Mashhad

Quarterly

RESEARCH ARTICLE

Corporate Inertia and Information Asymmetry: Evidence from Iran

Esmaeil Abdi

Department of Accounting, Nour Branch, Islamic Azad University, Nour, Iran

Mehdi Safari Gerayli *

Department of Accounting, Bandargaz Branch, Islamic Azad University, Bandargaz, Iran

Yasser Rezaei Pitenoei

Department of Accounting, University of Guilan, Rasht, Iran

How to cite this article:
Abdi, E., Safari Gerayli, M., & Rezaei Pitenoei, Y. (2024). Corporate Inertia and Information Asymmetry: Evidence from Iran. Iranian Journal of Accounting, Auditing and Finance, 8(3), 1-25. doi: 10.22067/ijaaf.2024.430771130
https://ijaaf.um.ac.ir/article_43077.html

ARTICLE INFO

Article History
Received: 2023-09-30
Accepted: 2023-11-10
Published online: 2024-07-06

Abstract

Corporate inertia, stemming from a reluctance to adapt and innovate over time, poses significant challenges in the modern business landscape, particularly in capital markets. This study examines the impact of corporate inertia on information assymetry within the Iranian capital market. Employing a comprehensive research approach involving meta-synthesis, Delphi analysis, and questionnaire design, we assess corporate inertia. Questionnaires were distributed to managers of sampled companies, with 138 responses included in the statistical analysis. Information asymmetry is measured using three proxies: bid-ask spread, turnover, and the liquidity of the company's stock. The findings indicate a positive and significant relationship between corporate inertia and information assymetry. Our results suggest that corporate inertia fosters a managerial mindset characterized by insularity and resistance to change. This mindset prioritizes individual insights over stakeholder interests, resulting in a monopolistic control of information disclosure that exacerbates information assymetry in the market.

Keywords:
Corporate Inertia,
Information Asymmetry,
Iranian Capital Market,
Managerial Resistance

https://doi.org/10.22067/ijaaf.2024.43077.1130

NUMBER OF REFERENCES
73

NUMBER OF FIGURES
8

NUMBER OF TABLES
14

Homepage: https://ijaaf.um.ac.ir
E-Issn: 2717-4131
P-Issn: 2588-6142

*Corresponding Author: Mehdi Safari Gerayli
Email: mehdi.safari83@yahoo.com
Tel: 09395898912
ORCID:

1. Introduction

Despite decades of scholarly focus and theorizing on managing change and success, failure and dealing with failure remains a captivating, persistent corporation feature (Bruton et al., 2003; Ucbasaran et al., 2013). This constancy acknowledges the ongoing practical placement of failure incorporates, such as strategies for learning from failure (Shepherd et al. 2011), using failure to innovate (McKinley et al., 2014), or incorporating failure for improvement, as well as the ubiquity of corporate mortality (US Department of Labor, https://www.bls.gov/bdm/entrepreneurship/bdm_chart5.htm). Such endurance, however, also brings attention to the positioning of failure in the debate on corporates and their features: Historically well-theorized as a seminal characteristic of all corporates, yet currently presented as either serving change themes or deeply contextualized to change processes (Lewis, 2015; Schwarz, 2012; Suddaby and Foster, 2017). With this positioning and background, we seek to refresh the discussion on corporate inertia, one of the basic tenets of organizational ecology that centers on information asymmetry (Hannan and Freeman, 1989; Mellahi and Wilkinson, 2010). Due to corporate inertia, information asymmetry can appear as one of the most important competitive functions in companies in the market. As Illeditsch et al. (2021) referred to Fama theory, information asymmetry is a kind of information inertia. Fama's efficient markets hypothesis ignited a lot of empirical and theoretical research on the informational role of asset prices. Recent empirical evidence points to the importance of this role since most of the expected excess return is earned around when vital information is released, such as macro and earnings announcement premiums. During such times, prices underreact to news and thus fail to incorporate this information efficiently (Savor, 2012), leading to news momentum, one of the most robust manifestations of which is post-earnings announcement drift. The mechanism that leads to information asymmetry relies on the tradeoff between over and underestimating the informativeness of news that is difficult to link to future asset payoffs.

On the one hand, ambiguity-averse investors who learn such news do not want to respond to it for fear of overestimating its informativeness and, as a result, underestimating the residual risk. On the other hand, investors do not want to ignore news that predicts a drop in the future asset value for fear of underestimating its informativeness. Corporate Inertia Theory points out that a corporation has internal inertia, which prevents it from promptly responding to external environmental changes and engaging in reform. When it tries to change, due to past successful experiences and operation procedures, a corporate will have inertial behaviors in organizational structure, strategy, and policy. Many studies asserted that corporate inertia is not conducive for an organization to information asymmetry, especially in the financial industry (Francis and Smith, 1995; Amabile et al., 1996; Nijssen et al., 2006; Matthyssens et al., 2006).

Large organizations tend to have more organizational inertia, which is more likely to hinder organizational growth and innovation (Godkin and Allcorn, 2008). This can lead to information asymmetry in the long run due to the incapability of the corporation to respond to external changes. Many scholars assumed that corporate inertia causes information asymmetry because it lacks flexible structures for reflecting its information to shareholders in the form of representation theory at the level of companies such as the capital market (Palomino-Tamayo and Timaná, 2022; Schwarz et al., 2020). It is noteworthy that managers and their approaches as decision makers at the company's helm are considered as a stimulus to strengthen the company's inertia, which can lead to information asymmetry. In other words, because some CEOs show a lack of interest in change and a kind of lethargy is seen in their financial operations and decisions (Sadeghi Alavije et al., 2020), corporate inertia is strengthened and under this negative behavioral function and consequently, managerial performance, the layers of power acquired in the managerial position increase the level of opportunism of information concealment in the structures under its leadership. In this situation, the

management seeks to satisfy the needs of external and even internal stakeholders by monopolizing news and information simply by reflecting positive news and hiding negative information, and this leads to information asymmetry (Matoufi and Tabarsa, 2019).

This gap in ongoing inertia development is understandable given that the abovementioned well-accepted ecology perspective assumes the value of structural stability and its information asymmetry. This gap in ongoing inertia development is understandable given that the abovementioned well-accepted ecology perspective assumes the value of structural stability and its information asymmetry. Therefore, the importance of this research should be explained from two dimensions.

First, this is the first study that simultaneously presents a model of corporate inertia through qualitative analysis and by measuring the variable of asymmetry of information from the financial statements of capital market companies, based on cross-sectional regression to examine the effect of corporate inertia shows information asymmetry. Although previous research, such as Olaniyi (2019) examined the "Asymmetric information phenomenon in the link between CEO pay and firm performance", Wu et al. (2019) who examined "Board independence and information asymmetry: family firms vs non-family firms" and Majid et al. (2011) who examined "Organizational inertia and change portfolio". However, no research has examined the effect of corporate inertia on information asymmetry. While innovating the research from a methodological point of view, it can be acknowledged that this research can be used to develop a theoretical literature to fill the gap of agency costs to improve the level of oversight, contribute to stakeholder expectations and broaden the level of theoretical knowledge about the subject of research based on the structural characteristics of companies in different societies and capital markets.

Secondly, in accordance with the recommendations of the Iran Stock Exchange Organization under Articles (2) and (3) of the Corporate Governance Instruction under the banner of paragraphs 8, 11 and 18 of Article 7 of the Securities Market Law of the Islamic Republic of Iran (approved by the Islamic Consultative Assembly in December 2005), regarding the strengthening of governance mechanisms in the field of monitoring decisions of managers (Pourzamani et al., 2014), however, there is a lack of structured rules such as certain standards regarding the tenure of managers or the evaluation of their periods in line with the firm's strategies and the interests of stakeholders. The existence of such gaps in corporate governance mechanisms, while gradually affecting managerial values in the shadow of inertia in the performance of corporate executives, can also, as a tangible external consequence, eventually lead to information asymmetry or at least be an important factor in terms of influencing it. Therefore, conducting this study helps regulators such as policymakers and financial reporting standards setters to improve the financial reporting quality by raising the level of knowledge of stakeholders' information needs to control unpredictable probabilities in their estimates to strengthen the level of investment attractiveness in the capital market by controlling the inertia of the company, and through more oversight in the development of equilibrium values and equality of news coverage and information, strengthen companies' commitment to respecting stakeholder rights and prevent the emergence of capital market abnormalities due to the behavioral opportunities of companies and managers to circumvent the rules and gain more benefits, which is likely to have negative consequences due to the occurrence of mass behavior. Accordingly, this research first provides a corporate inertia framework in the qualitative section and then examines its effect on information asymmetry.

2. Literature Review and Hypothesis Development

In this section, the theoretical literature with a focus on theoretical reinforcement of research to test the hypothesis is presented.

2.1 Information asymmetry

According to contract theory and economics, information asymmetry is an important and thought-provoking concept in agency theory that examines transactions between investors and the firm. Accordingly, it has an advantage when one party to the transaction has more or better information than the other party. This creates a power imbalance in transactions that can sometimes lead to market failure or, at worst, market failure due to poor selection and the risk of mistrust. Prior research as Jayasimha (2022), Rehman et al. (2022) and Iqbal and Santhakumar (2018) in the context of the business-to-business exchange considers "information" as a treasured possession and suggests that the seller mostly has greater information about the task compared to the buyer, hence, a buyer desirous of controlling sellers opportunistic behavior and reduce information asymmetry can invest in information systems.

The theory of information asymmetry was first proposed by Akerlof (2002) and according to this theory, in the presence of inequality in access to information, the market equilibrium in the acquisition of profits is disturbed and the returns and risks of the decision unequally lead the market flow to inefficiency. In other words, the asymmetric distribution of information leads to abnormal returns for traders with confidential information. Also, it causes ambiguity and uncertainty for some investors in the capital market due to incorrect transaction choices. On the other hand, public trust in the capital market will decrease and cause capital to leave (Hu & Fu, 2022). Information asymmetry tends to be greater for credence goods such as professional services (e.g. advertising and media planning); credence goods are difficult to understand and evaluate both before and after consumption (Xia et al., 2022).

Khatali (2020), in terms of the importance of information asymmetry in the capital market, presented its implications in a study conducted in the form of content analysis in the following order.

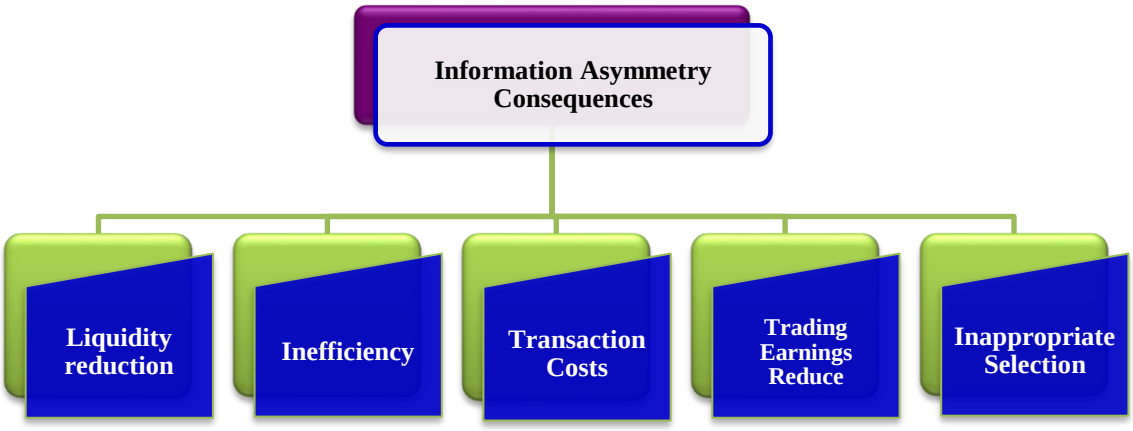

Figure 1. Consequences of information asymmetry

According to this framework, incorrect selection is one of the consequences of information asymmetry, which refers to a situation in which sellers have information that buyers are unaware of. In this case, the increase in the level of information asymmetry is shown by expanding the difference in the proposed range of stock buying and selling prices. Marketers use the increase in this difference to compensate for the risk of incorrect selection (Hajiha et al. 2018).

On the other hand, under high information asymmetry, the willingness to trade decreases, increasing stock selling transactions. Therefore, under a lack of equal knowledge of the information provided, trading profits decrease and transaction costs increase (Imany and Dastgir, 2018). On the

other hand, as information asymmetry increases, market efficiency decreases, and many future plans and projects that could lead to higher returns stop as the stock exchange ratio decreases. In other words, information asymmetry prevents the exchange of assets at an efficient price and reduces costs, ultimately leading to problems in raising the capital and liquidity required for issuing firms (Li, 2020).

Finally, information asymmetry between market traders leads to the selection and maintenance of different portfolios by them. Therefore, traders with little information will try to maintain assets that can compensate for the weakness caused by unequal information. This will lead to lower prices for securities with high information asymmetries, which will reduce the liquidity of stocks in the capital market (Vayanos and Wang, 2012).

2.2 Corporate inertia

Inertia and flexibility are two opposing terms in the behavioral literature. Inertia manifests in various ways in analyzing organizational behavior, such as suppressing valuable information and the unwillingness to give feedback, dry and inflexible rules, prejudice, etc. (Ebrahimi, 2016). Lack of flexibility due to an inertial attitude causes the company to be unable to adapt to environmental changes, resulting in stagnation of decision-making functions and, consequently the emergence of inertia in the company as a whole. A review of the existing theoretical and experimental literature on the formation of organizational inertia helps identify this phenomenon's various dimensions and components and helps researchers and managers better understand this phenomenon and take appropriate measures to eliminate this situation (Allcorn and Godkin, 2011). The concept of inertia is also used for human behavior, showing that people often use old methods to deal with problems and show a negative reaction or resistance to change. Problem-solving approaches and similar reasoning are commonly used to save time and avoid risk. In strategic change, inertia tends to remain in the current situation and resist redesigning the company's strategy outside its current form (Ghaffari and Rostamonia, 2017). For many executive teams, the battle with the demon of organizational inertia is one of the most significant challenges; sadly, the devil usually wins. In the same way, in modern organizational theory, inertia is considered the highest contaminating factor that adversely affects firm change results (Palomino-Tamayo and Timaná, 2022). Corporate inertia is the stability of products, processes and policies that sustain an organization’s deficient adaptation to the changing environment (Shaik et al., 2022). Godkin and Allcorn (2008) considered organizational inertia to include three dimensions, which are:

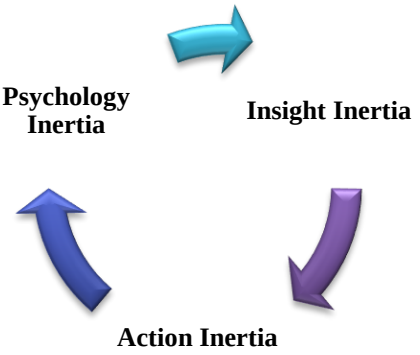

Figure 2. Dimensions of organizational inertia

Insight inertia is related to mental models and theories of action. In contrast, action inertia is examined from the two dimensions of management assumptions and default control and

psychological inertia is examined in terms of stress and anxiety and defense mechanisms of response to change (Sillic, 2019). In contrast, Polites and Karhama (2012) have introduced five types of inertia: 1. Cognitive inertia: This type of inertia states that key managers, while aware that there may be better, more effective, and more efficient alternatives, consciously insist on using existing systems and procedures; 2. Behavioral inertia: This type of inertia indicates that company managers continue to use existing methods because they are accustomed to these methods and have become accustomed to them in the past; 3. Social cognitive inertia: Company managers continue to use existing processes and methods because changing existing methods and procedures is faced with employee resistance and changing the values and norms of the organization is not easily possible. 4. Economic inertia: Changing the company's existing processes is difficult due to its high costs. Therefore, acting according to existing processes is easier for managers. 5. Political inertia: Managers of companies insist on using existing traditional processes because the change in existing practices is opposed or hindered by partners and strategic stakeholders (Malakar et al., 2018).

2.3 Corporate inertia and information asymmetry

Organizational structures, which by nature have a board of directors and a CEO, are always confronted with the theoretical presuppositions of opportunistic behavior in theories such as agency theory. Because the CEO is in a situation where the supervisory structures do not have the necessary power, managers may coordinate with the board to pursue certain interests. On the other hand, management may prioritize its own interests by distorting the facts (Setayesh and Ghayouri, 2018). According to the theory of corporate inertia, several aspects of organizational structure arise from strong internal forces that constrain structural changes. For this reason, operationalizing this definition of corporate inertia as a composite using an index of three factors available in the dataset and the content analysis from the annual reports, such as introducing new products, business-to-business firms and CEO tenure (Chen et al., 2022).

Organizational structures lose regulatory incentives due to the reduction of the necessary effectiveness of management, and by creating corporate inertia, power is placed in the manager's possession. For structures with a representative nature, these conditions can confirm the opportunism of managers in organizational decisions, especially the disclosure of financial information (Xu and Cheng, 2020). In such a situation, in practice, the company's intelligence functions transmit the news to the market based on the level of monopoly created based on the protection of individual or group interests of the company's managers and refrain from fully disclosing news and information that may lead to mass behavior by shareholders (Rezaei Pitenoei et al., 2017). Information monopoly, due to the inertia of managers, puts them in a position to provide information selectively and in accordance with their utilitarian vision to consolidate their managerial position and meet the minimum expectations of external stakeholders (Ye et al., 2021).

In other words, they decide to disclose information based on cost and benefit. In this regard, Huang and Gao (2022) stated that the information asymmetry channel is the main channel through which strategic inertia promotes capital structure persistence. Consistent with imprinting theory, Rajan (2012) explores the relationship between organizational transformation and financing and indicates that one of the reasons why the firm needs a second transformation is to finance. Focusing on non-financial strategy, it can be assumed that the positive effect of firm inertia on information asymmetry may come from the difficulty of adjusting organizational strategy and the impact of stock price crash risk (Casamatta and Guembel, 2010). From the perspective of information asymmetry, strategic inertia can help listed companies maintain capital structure persistence by reducing the information asymmetry between the company and investors.

Based on the definition of strategic inertia, the firms with higher strategic inertia have released

more relevant information since they first put forward the strategy, so these firms have a low level of information asymmetry (Huang and Gao, 2022). Prior research indicates that asymmetric information comes from assets-in-place and future growth opportunities (Wu and Wang, 2005). Some scholars propose that asymmetric information about assets in place leads to the adverse selection of new equity issues (Myers and Majluf, 1984), while other scholars indicate more asymmetric information that arises from growth opportunities rather than assets-in-place can facilitate new equity issues (Wu and Wang, 2005). Gerwanski et al. (2019) Found that the number of board members can have either a positive (due to greater expertise and better supervision of management) or negative (due to increased organizational inertia) impact on Materiality Disclosure Quality (MDQ) (Amran et al. 2014; Fasan and Mio, 2017).

In fact, by reviewing these studies empirically along with the theoretical literature, justifying the role of corporate inertia in the actions of managers can be due to the ownership of managers in hiding bad news due to the structural power created in the management layers of companies. Organizational inertia strengthens the power of managers and thus motivates them to use the firm's resources for their personal benefit. Engaging the company in monopolizing selective news releases will positively impact information asymmetry.

Therefore, as can be seen, most of the research has examined the working mechanisms of managers as examples in financial and accounting topics and less research has been done to examine the consequences such as information asymmetry, to create a model of the foundations of the formation of opportunistic behaviors of managers. Therefore, relying on the theoretical and empirical support expressed, the following hypothesis is examined for testing in the Iranian capital market:

Research hypothesis: Corporate inertia positively and significantly affects information asymmetry.

3. Research Methodology

The present study is applied in terms of research purpose and descriptive-correlational research in terms of data collection. Also, in terms of the reasoning method, it is deductive-inductive and due to the study of data related to a specific period, the data analysis method is cross-sectional and based on the path analysis method. The statistical population studied in this study includes all companies listed on the Tehran Stock Exchange in 2021. Our final example is companies that meet the following conditions:

1. Companies that are members of the stock exchange from the beginning to the end of 2021.
2. In order to increase comparability, their fiscal year should end in March.
3. They have not changed their activity or financial year during the mentioned year.
4. Not to be part of investment and financial intermediation companies (investment companies were not included in the statistical community due to the differences in their activities with other companies).

After applying the above restrictions, 162 companies listed on the Tehran Stock Exchange were selected as a research sample. The mentioned questionnaire was sent to the managers of these companies. Finally, after many follow-ups, 138 questionnaires were completed, returned, and used as a final sample for analysis. The final analysis of the collected data was performed using the structural equation modeling method and the partial least squares analysis method using PLS software.

3.1 Research variables

3.1.1 Dependent variable

The independent variable of this research is information asymmetry. To measure this variable, following the research of Fakhari and Rezaei Pitenoei (2017), the following observable variables have been used to measure it:

The bid-ask spread is used in the following order, following the research of Lotito et al. (2020):

$$\text{BID} - \text{ASK SPREAD}_{it} = \frac{1}{D_{it}} \sum_{1}^{D_{it}} \frac{(\text{Ask Price}_i - \text{Bid Price}_i)}{(\text{Ask Price}_i + \text{Bid Price}_i)/2} \quad \textbf{Equation (1)}$$

$\text{BID} - \text{ASK SPREAD}_{it}$ The bid-ask spread of the company's shares in year t; Ask Price_i The highest selling price of the company i; Bid Price_i The lowest bid price of the company i; D_{it} is the number of days in year t in which the last bid price and the last daily bid price are available for i stock.

Frequencies of turnover Companies with high information asymmetry will have lower turnover. Because ignorant traders know that they will suffer losses when dealing with knowledgeable people, they are less likely to trade in the shares of these companies. Therefore, the number of stock rotations is used as an inverse measure of information asymmetry (Mohd, 2005):

$$\text{TURNOVER}_{it} = \frac{1}{D_{it}} \sum_{1}^{D_{it}} \frac{\text{shares traded}_i}{\text{Shares Outstanding}_i} \quad \textbf{Equation (2)}$$

In this regard:

TURNOVER_{it} : Total number of times i company turnover in year t; shares traded_i : the number of daily traded shares of the company i; : $\text{Shares Outstanding}_i$ Total number of shares issued by the company i; Dit: is the number of days in year t in which the stock of company i was traded.

Amihud (2002): The clearer the information environment, the lower the level of market information asymmetry and the higher the liquidity of the company's stock. Therefore, AmiHood's lack of liquidity ratio directly measures the company's information asymmetry.

$$\text{ILIQ}_{it} = \frac{1}{D_{i,t}} \sum_{1}^{D_{it}} \frac{|R_i|}{\text{VOL}_i} \quad \textbf{Equation (3)}$$

In the above relation:

ILIQ_{it} Company i's liquidity criterion in year t; $|R_i|$ The absolute value of the daily stock return of the company i; : VOL_i Rial volume of daily transactions of company i

3.1.2 Dependent variable

In this study, meta-synthesis analysis is used for measurement since there is no instrumental basis for measuring this research's exogenous (independent) variable, i.e., corporate inertia at the capital market level. This analysis provides the basis for formulating effective components consistent with the firm's inertia in the capital market. For this purpose, relying on the meta-synthesis and Delphi analysis process, this study seeks to develop a tool to measure this variable at the capital market level.

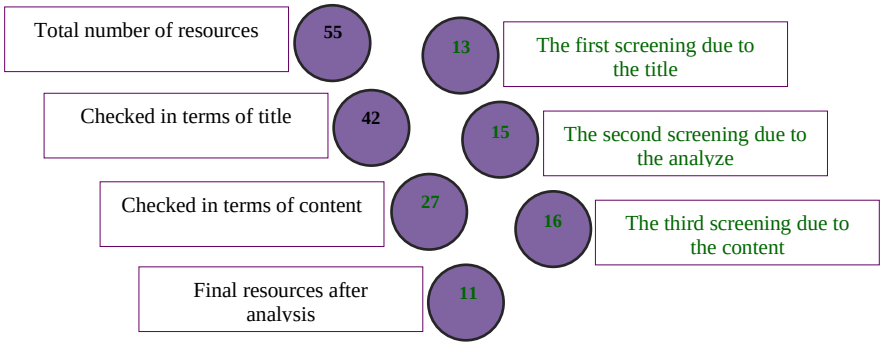

Figure 3. Screening analysis process of research appropriate to the purpose of the research to identify topics

It should be noted that the 11 initial types of research should be analyzed in the third step in terms of critical evaluation with the participation of research experts. This process includes the following 10 criteria, which are examined based on a minimum score of (1) and a maximum of (5). The total score based on 10 criteria can be 50, and if a research score is 30 or more, it enters the fourth step.

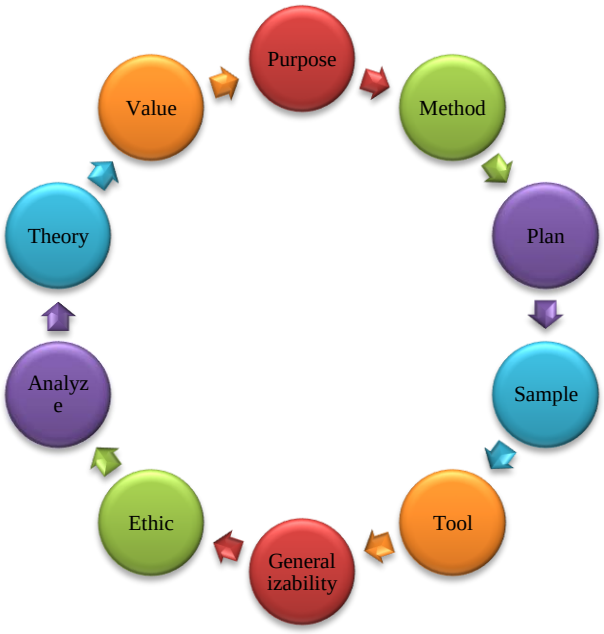

Figure 4. Criteria for the critical appraisal process

Based on a better understanding of the analysis process in this step, with the participation of research experts, 11 approved initial researches will be analyzed for points based on critical appraisal analysis. Based on a better understanding of the analysis process in this step, with the participation of research experts, 11 approved initial researches will be analyzed for points based on critical evaluation analysis.

Table 1. Critical appraisal analysis

Appraisal Criteria	1 Mikalef et al. (2021)	2 Lovallo et al. (2020)	3 Crepin and Neavdal (2020)	4 Ispano (2018)	5 Lin et all (2018)	6 Dayanandan et al. (2017)	7 Kumar et al. (2017)	8 Marjanian et al. (2020).	9 Pourheidari and Forughi. (2019).	10 Taheri et al. (2018)	11 Seyednejad Fahim et al.(2018)
Purpose	3	4	3	2	3	3	4	3	3	3	4
Method	4	3	3	3	3	3	3	4	5	4	3
Plan	4	4	4	3	4	3	4	3	4	4	4
Sampling	4	4	3	3	3	4	4	3	3	4	4
Collecting	4	3	4	3	4	3	4	2	4	4	3
Generalization	3	4	3	2	5	4	4	3	3	3	4
Ethical	4	4	3	3	4	4	4	2	3	4	4
Analyze	5	3	3	3	۵	3	4	3	3	5	3
Theoretical	4	4	3	3	4	4	3	2	4	4	4
Value	4	4	4	3	4	4	4	3	4	4	4
Total	39	37	33	28	39	34	37	28	36	39	37

Based on the results of this analysis, it was found that 2 studies that did not obtain the required score (more than 30 points) were excluded from the study. In order to determine the themes of evaluating the organizational inertia of managers, the following scoring method is used. Based on this method, all sub-criteria extracted from the text of approved articles are written in the table column. Then, the approved researchers' names are given in each table's row. Based on each researcher's use of the sub-criteria written in the table column, the symbol "☑" is inserted, then the scores of each ☑ are added together in the sub-criteria column, and scores above the Mean of the researchers are selected as research components.

Table 2. Analysis of research components

Research Status	Researchers	Social Inertia	Insight Inertia	Cultural Inertia	Structural Inertia	Perceptual Inertia
International	Mikalef et al. (2021)	-	☑	-	☑	-
	Lovallo et al. (2020)	-	☑	-	-	☑
	Crepin and Neavdal (2020)	-	☑	☑	-	☑
	Lin et al. (2018)	☑	☑	-	-	-
	Dayanandan et al. (2017)	-	-	-	☑	☑
	Kumar et al. (2017)	-	☑	☑	-	☑
Internal	Pourheidari and Forughi (2019).	-	-	-	☑	-
	Taheri et al. (2018)	☑	-	-	☑	-
	Seyednejad Fahim et al. (2018)	-	-	-	☑	☑
Total		2	5	2	5	5

According to the approval of 9 kinds of research in the critical evaluation process, the main components that have obtained more than half of the approved research are approved as the main components in determining the research themes. In this section, after analyzing the theoretical foundations of approved research and confirming the three main components, the contents of the research have been determined according to Table (3).

Table 3. Themes of managers' organizational inertia

Main Components	Research Propositions	7	6	5	4	3	2	1
Insight Inertia	Lack of knowledge about the information content required by shareholders							
	The feeling of lack of support for corporate governance							
	Lack of job identity of managers							
	Lack of job commitment of managers							
	Lack of insight and belief in the need for change and dynamism							
	Lack of managers 'insight in protecting shareholders' rights							
	The inability of managers to recognize the information needs of stakeholders							
	Negative perception of fear of losing managerial position							
	Perceived negative benefits							
Structural Inertia	Ineffectiveness of independent auditing							
	Lack of mandatory policies on managers' decisions							
	Lack of regulatory requirements							
	The existence of poor accounting standards							
	Lack of proper internal control structures							
	The structural complexity of companies							
	Lack of dynamics of board features							
	The role of managers' duality							
	Inadequacy of stakeholder information needs with the culture of desirability							
Perceptual Inertia	Perceptual errors of managers							
	Lack of job motivation of managers							
	Source of external control of managers							
	Existence of conflicts in managers' job perception							
	Perception of psychological contract violation							
	Existence of the power-seeking nature of managers							
	Low degree of tolerance for managers' ambiguity							
	Stress tolerance and control threshold							
	Lack of self-confidence of managers							

Then, in order to ensure the identified components and propositions, Delphi analysis was used to reach the theoretical saturation point. For this purpose, these statements were provided to experts for a survey in the form of a checklist of 7 options, which Table (4) shows the results of Delphi analysis.

Table 4. The process of the first and second steps of the Delphi analysis

Main Components	Propositions	The first round of Delphi			The second round of Delphi		Result
		Mean	Coefficient of agreement	Merge	Mean	Coefficient of agreement	
Insight Inertia	Lack of knowledge about the information content required by shareholders	3	0.200	-		*Delete*	
	The feeling of lack of support for corporate governance	5	0.500		5.100	0.550	Confirm
	Lack of job identity of managers	4.98	0.510	Merge	5.500	0.750	Confirm
	Lack of job identity of managers	5	0.520				
	Lack of insight and belief in the need for change and dynamism in the face of social and environmental expectations	6	0.800	-	6.200	0.850	Confirm
	Lack of managers 'insight in protecting shareholders' rights	5.300	0.650	-	5.500	0.750	Confirm
	Negative perception of fear of losing managerial position	6	0.800	-	6.200	0.850	Confirm
	Negative perception of fear of losing managerial position	5.300	0650	-	5.500	0.750	Confirm
	Perceived negative benefits	5.500	0.750	-	6.100	0.820	Confirm
Structural Inertia	Ineffectiveness of independent auditing	4	0.350	-		*Delete*	
	Lack of mandatory policies on managers' decisions	4.900	0.490	Merge	5.200	0.650	Confirm
	Lack of regulatory requirements	5	0.520				
	The existence of poor accounting standards	5.300	0.650	-	5.500	0.750	Confirm
	Lack of proper internal control structures	5	0.500		5.100	0.550	Confirm
	The structural complexity of companies	3.500	0.300	-		*Delete*	
	Lack of dynamics of CEO features	4	0.350	-		*Delete*	
	The role of managers' duality	5	0.500	-	5.100	0.550	Confirm
	Inadequacy of stakeholder information needs with the culture of desirability	5.200	0.650	-	5.500	0.750	Confirm
Perceptual Inertia	Perceptual errors of managers	5.500	0.750	-	6.100	0.820	Confirm
	Lack of job motivation of managers	5.300	0.650	-	5.500	0.750	Confirm
	Source of external control of managers	5	0.500	-	5.100	0.550	Confirm
	Existence of conflicts in managers' job perception	4	0.350	-		*Delete*	
	Perception of psychological contract violation	5.200	0.650	-	5.500	0.750	Confirm
	Existence of the power-seeking nature of managers	5.500	0.750	-	6.100	0.820	Confirm
	Low degree of tolerance for managers' ambiguity	5.300	0.650	-	5.500	0.750	Confirm
	Stress tolerance and control threshold	5	0.500		5.100	0.550	Confirm
	Lack of self-confidence of managers	5.400	0.700	-	6.300	0.880	Confirm

Delphi analysis found that in two rounds, 5 items were removed from the corporate inertia evaluation themes, and 4 themes were merged because, according to the Likert scale, 7 options scored below 5 and their agreement coefficient was below 0.5. Has been removed on that basis. Therefore, the corporate inertia model can be presented in the following order:

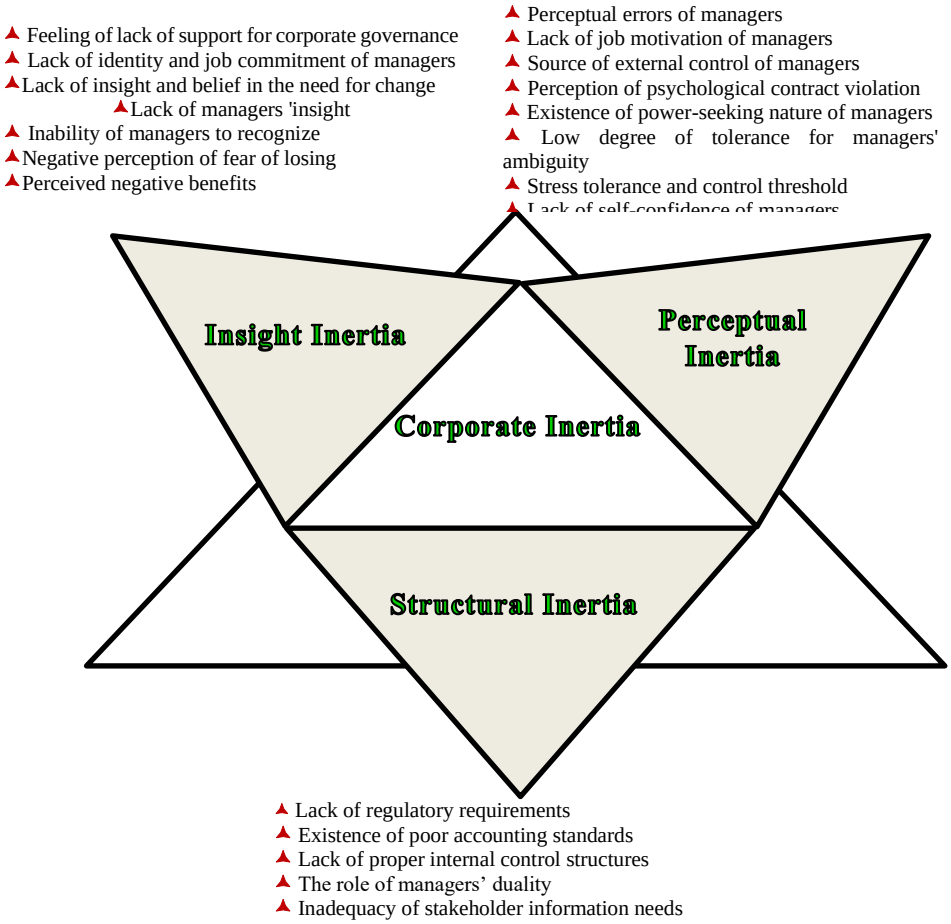

Figure 5. Corporate inertia pattern

Then, the questionnaire questions should be determined based on the organizational inertia model. Based on this, a total of 20 theoretical screening topics were approved by the relevant researchers. A questionnaire will be developed based on the specified propositions to measure this variable.

Table 5. Questionnaire of corporate inertia assessment themes

Components	Propositions	Likert Scale 7	6	5	4	3	2	1
Insight Inertia	Is the feeling of lack of support for corporate governance an important factor in organizational inertia?							
	Will managers' lack of identity and job commitment lead to organizational inertia?							
	Is the lack of insight and belief in the need for change and dynamism in the face of social and environmental expectations a factor in creating organizational inertia?							
	Is the lack of insight of managers in protecting the rights of shareholders considered a factor in decision-making regarding information disclosure?							
	To what extent is managers' inability to recognize stakeholders' information needs an important factor in organizational inertia?							
	To what extent is the negative perception of fear of losing a managerial position an important factor in organizational inertia?							
	To what extent is perceived negative benefit an important factor in organizational inertia?							
Structural Inertia	Is the existence of poor accounting standards considered a factor for corporate inertia?							
	To what extent does the lack of mandatory requirements and policies affect the formation of inertia of the organization's managers?							
	To what extent is the lack of optimal internal control structures a factor for corporate inertia?							
	Is the dual role of managers on the board and the position of CEO considered a basis for corporate inertia?							
	To what extent does the incompatibility of stakeholder information needs with the culture of information desirability in the company structure cause the organizational inertia of managers?							
Perceptual Inertia	Is the source of external control of managers considered a basis for corporate inertia?							
	To what extent is managers' lack of job motivation considered a basis for corporate inertia?							
	To what extent do managers' perceptual errors cause the formation of their in-person inertia?							
	To what extent does the perception of a violation of the psychological contract cause the formation of in-person inertia in managers?							
	Is the existence of a power-seeking trait of managers considered a basis for corporate inertia?							
	Does the low degree of tolerance of managers' ambiguity cause the formation of their in-person inertia?							
	Does the lack of self-confidence of managers cause the formation of their inner inertia?							
	Is a low stress tolerance threshold a basis for corporate inertia?							

As can be seen, the above questionnaire in the form of 20 questions and 3 sub-components of individual insight into organizational inertia, Structural causes of organizational inertia and psychological causes of organizational inertia, have been developed. The questionnaire is graded on a five-point Likert scale (I strongly agree = 5, I agree = 4, I have no opinion = 3, I disagree = 2 and strongly disagree = 1). Therefore, according to the dimensions of research variables, the theoretical framework for testing the research hypothesis is presented in the following order:

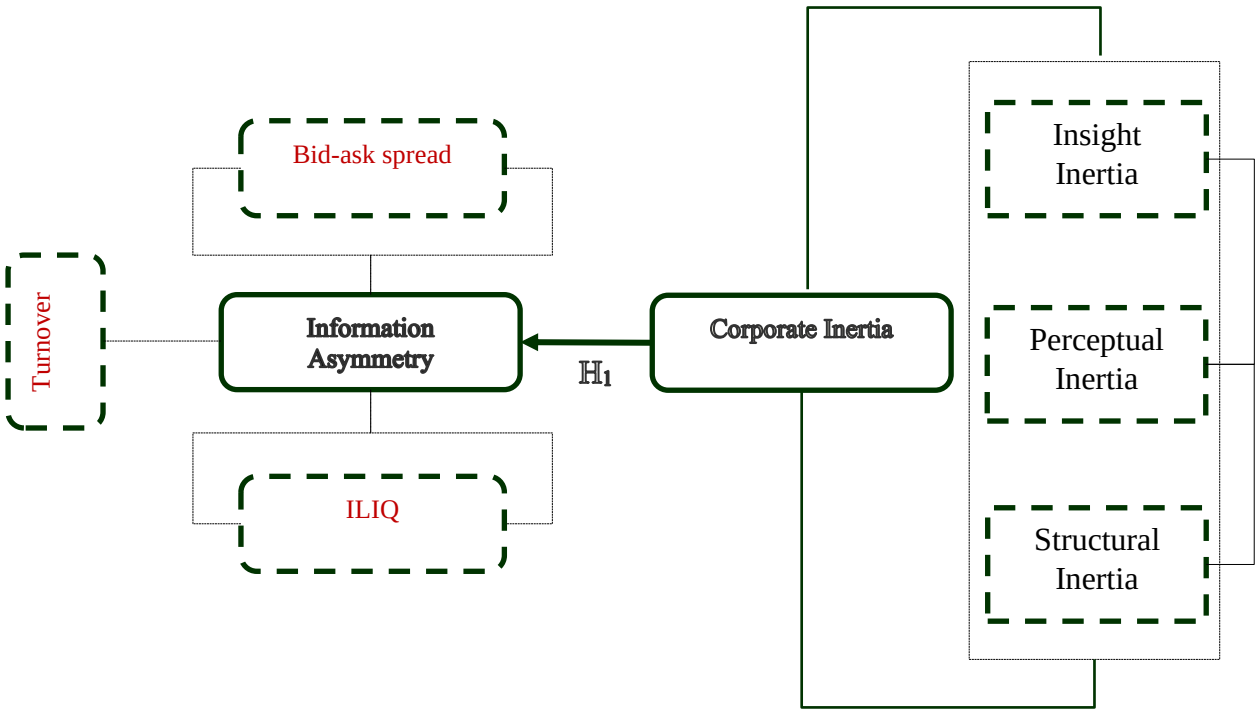

Figure 6. Research hypothesis test framework

4. Research findings

Descriptive statistics is a basis for identifying the tested variables in research, measured by indices such as central and dispersion indexes. According to the results:

Table 6. Descriptive statistics pf the research variables

Variable	Mean	Mean	Minimum	Maximum	Standard deviation
Insight Inertia	3.760	3.430	1.000	5.000	0.710
Perceptual Inertia	3.840	3.600	1.000	5.000	0.690
Structural Inertia	3.510	3.000	1.000	5.000	0.840
BID – ASK SPREAD	0.131	0.128	0.003	0.678	0.152
TURNOVER	-0.002	-0.001	-0.005	-0.000	0.091
ILIQ	0.003	0.003	0.000	0.057	0.102

4.1 Fitness of measurement models

Three reliability criteria, convergent validity and divergent validity, were used to determine the fitness of the measurement models. To investigate the reliability of the measurement model, the coefficients of factor loads, Cronbach alpha coefficient, and compound reliability were used.

Table 7. Factor loading

Factor	Index	Questions	Factor loading	Factor	Index	Questions	Factor loading
Insight Inertia	Ins ine	Ins ine 1	0.799	Perceptual Inertia	Per ine	Per ine 13	0.728
		Ins ine 2	0.826			Per ine 14	0.714
		Ins ine 3	0.605			Per ine 15	0.505
		Ins ine 4	0.786			Per ine 16	0.752
		Ins ine 5	0.639			Per ine 17	0.731
		Ins ine 6	0.736			Per ine 18	0.653
		Ins ine 7	0.542			Per ine 19	0.686
		Str ine8	0.862			Per ine 20	0.725
		Str ine9	0.682			BID – ASK SPREAD	0.584
Structural Inertia	Str ine	Str ine10	0.695	Information Asymmetry		TURNOVER	0.956
		Str ine11	0.559			ILIQ	0.963
		Str ine12	0.608				

The benchmark value for the appropriateness of the coefficients of factor loads is 0.4. According to Table (7), all values of the coefficients of factor loads of the questions are bigger than 0.4, indicating the appropriateness of this criterion. Considering the data analysis algorithm in PLS, the measurement of the factor loads of the questions is followed by calculating and reporting the Cronbach alpha coefficients and compound reliability, the results of which are presented in Table (8).

Table 8. Results of Cronbach alpha and compound reliability of the latent variables

Symbol	Cronbach alpha (α>0.7)	Compound reliability (CR>0.7)
Corporate Inertia	0.783	0.708
Information Asymmetry	0.706	0.818
Insight Inertia	0.834	0.876
Perceptual Inertia	0.840	0.878
Structural Inertia	0.714	0.816

Because the appropriate value for Cronbach alpha and compound reliability coefficients is 0.7 and, according to the findings in the above table, these criteria have obtained appropriate values for latent variables, the measurement models of the present research can be confirmed to be appropriate. The second criterion for examining the fitness of the measurement models is convergent validity, which addresses the correlation of each structure with the questions (indices).

Table 9. Results of convergent validity of latent variables

Symbol	Mean Variance Extracted (AVE>0.5)
Corporate Inertia	0.548
Information Asymmetry	0.640
Insight Inertia	0.507
Perceptual Inertia	0.577
Structural Inertia	0.575

Because the appropriate value for AVE is 0.7 and, according to the findings in Table (9), this criterion has obtained appropriate values for latent values, the convergent validity of the present work is approved. Divergent validity is the third criterion for examining the fitness of the measurement models. The acceptable divergent validity of a model indicates that a structure in the model has more interactions with its indices than other structures. Divergent validity is acceptable when the AVE for each structure is higher than the common variance between that structure and other structures in the model. According to Table (10), the mean square root value of the common values of the latent variables in the present study, which are placed in the main diameter of the matrix, is higher than their

correlation values, which are placed in the entries at the bottom right side of the main diameter, indicating that each structure in the research model has more interactions with its indices than other structures. This indicates the appropriate divergent validity and fitness of the measurement models of the research.

Table 10. Fornell & Larcker matrix for examining the divergent validity

	Corporate Inertia	Information Asymmetry	Insight Inertia	Perceptual Inertia	Structural Inertia
Corporate Inertia	0.669				
Information Asymmetry	0.059	0.800			
Insight Inertia	0.730	0.139	0.712		
Perceptual Inertia	0.656	-0.037	0.213	0.691	
Structural Inertia	0.638	0.010	0.216	0.131	0.689

Regarding reliability, convergent validity, and divergent validity, it is observed that the measurement models of the structural equation modeling (SEM) can favorably measure the latent variables of the research. Thus, the fitting of the research structural model is evaluated in the following.

4.2 Fitness of structural model

After assessing the validity and reliability of the measurement model, the structural model was evaluated through the relations between the latent variables. In this study, two criteria of coefficient of determination (R^2) and predictive power (Q^2) are used.

Coefficient of Determination (R^2) and Predictive Power (Q^2)

R^2 is a measure that indicates the influence of an exogenous variable on an endogenous variable. According to Figure (2), the value of R^2 is calculated for the endogenous constructs of the research so that the suitability of the structural model fit can be confirmed. Moreover, to evaluate the predictive power of the model, a measure called Q^2 was employed. Considering the results of this measure in Table (11), it can be concluded that the model has a "strong" predictive power.

Table 11. The values of the coefficient of determination (R^2) and predictive power (Q^2)

Variable	Q^2	R^2
Information Asymmetry	0.013	0.304
Insight Inertia	0.246	0.534
Perceptual Inertia	0.193	0.430
Structural Inertia	0.176	0.407

After fitting the measurement part and structural part of the model of this study, in order to control the overall fit of the model, a measure called goodness of fit (GOF) was used; three values of 0.01, 0.25, and 0.36 were introduced as weak, medium and strong values. This criterion is calculated through the equation (4):

$$GOF = \sqrt{\overline{Communalities} \times \overline{R^2}} \qquad \textit{Equation (4)}$$

$\overline{Communalities}$ Is the Mean of the common values for the latent variables of the research and $\overline{R^2}$ is the Mean value of the coefficient of determination for the model's endogenous variables.

Table 12. The value of Communalities and R^2

Symbol	Communality	R^2
Corporate Inertia	0.659	-
Information Asymmetry	0.637	0.304
Insight Inertia	0.647	0.534
Perceptual Inertia	0.732	0.430
Structural Inertia	0.628	0.407

Table 13. The results of the overall model fitting

Communality	R2	GOF
0.66	0.410	0.520

According to the value gained for GOF at a rate of 0.52, the overall model is verified to be a very good fit.

After assessing the fit of the measurement models and the structural model and enjoying the favorable fit of the overall model, according to figures (7) and (8), we check the results of testing the research hypotheses, which have been provided in Table (12). The variables obtained by direct observation of the event act as a measurement indicator of a hidden variable and are specified in the path diagram with a rectangle. Variables that are not directly visible. Hidden variables are examined by linking to measurable (explicit) variables and identified in a circle or ellipse path diagram. The latent variables in the structural equation model are divided into two categories: external [1] and internal[2].

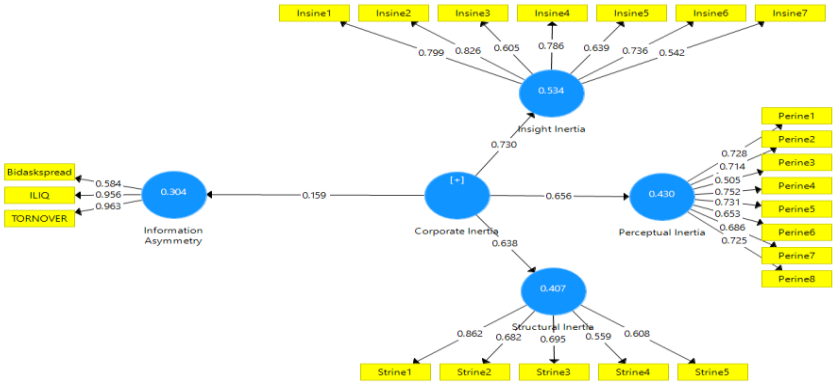

Figure 7. The structural model of the research hypothesis with factor loading coefficients

1 External hidden variables: are variables that are not considered in the model due to their changes and are not affected by other variables in the model.

2 Hidden internal variables: Variables that are affected by one or more other variables.

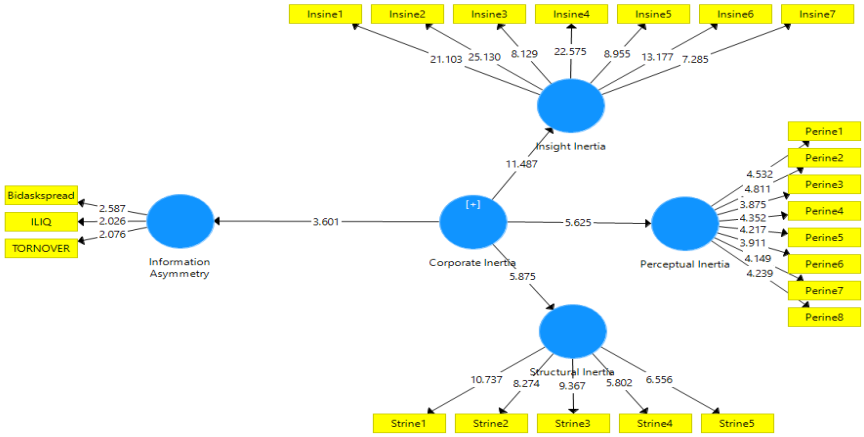

Figure 8. The structural model of the research hypothesis with significant coefficients

Taking into account the structural model and factor loadings, as depicted in Table (17), the result of the research hypothesis test can be observed.

Table 14. The result related to the research hypothesis test

The causal relationships between research variables	Path coefficient (β)	Significance (T-Value)	Test result
Corporate inertia has a significant effect on information asymmetry.	0.150	3.600	Confirmation of hypothesis

With respect to Figures (7) and (8), the standardized coefficient (path coefficient), the Corporate inertia has a significant and positive effect on information asymmetry. Since the path coefficient is positive and equals 0.15, the t statistic also equals 3.60. Considering that the t statistic is greater than 1.96 while confirming the result of the hypothesis, it illustrates that Corporate inertia has a significant and positive effect on information asymmetry.

5. Discussion and conclusion

Testing the research hypothesis showed that corporate inertia positively and significantly affects information asymmetry. This result reflects that the dominance of inertia in the company's actions strengthens the negative functions of managers in not disclosing the facts outside the company. Perhaps this issue can be examined from two dimensions. First, the lack of external stimuli such as structural oversight, and second, perceptual disorders and personal insight can be one of the reasons that the company's inertia occurs and causes the company to resist the reflection of news and information and only selectively disclose news that creates a positive feeling in shareholders and refrain from disclosing bad news and create a kind of information monopoly. In this situation, information asymmetry is strengthened and hiding negative news can have consequences such as the risk of falling. Corporate inertia gives managers a kind of utilitarian identity and individual insight characteristics. Perceptual and structural, they form a kind of possessive approach according to which the interests of stakeholders or external stakeholders are not prioritized. These people try to strengthen their position by transmitting the company's positive news while portraying it in the shareholders' minds, unaware that failure to disclose news and information on time can lead the company to a crisis of distrust in the market. In this situation, the flow of information due to the imbalance based on supply and demand in the market by these companies is in its most exclusive state, exposing the company to a serious risk of falling stock prices. Non-disclosure of bad news for a long period is

always created in the structural system of companies. Even regulatory bodies, which is often due to the inertia of the company, a lack of mobility in effective monitoring of managers' performance, affecting the difference between intrinsic value The stock market creates a price gap or bubble; this bubble is, in fact, a mass of negative news that, according to the principle of utility in the economy, is transmitted to the market at a saturation point at once, causing the price bubble to burst, resulting in a fall in stock prices. The result of this hypothesis is based on Olaniyi's (2019) research, which corresponds to Agarwal and Chakraverty (2023) and Elbadry et al. (2015).

Based on the obtained result, it is suggested that, based on an effective regulatory development strategy, the upstream institutions of companies such as the Stock Exchange Organization and other institutions related to the development of executive and practical regulations and their application and obligation to the board of directors to communicate and periodically evaluate more enhanced regulatory processes based on corporate governance mechanisms. In this situation, by stimulating external stimuli of monitoring on the one hand and developing the expected values of stakeholders in terms of information transparency on the other hand, the level of sensitivity to managers' decisions regarding timely disclosure of news and information to increase managers to understand that Their position can be assessed by in and out of company institutions and there will be a serious obstacle in their way in terms of utilitarian motives. Under these circumstances, the disclosure of company information is reflected in the market under any circumstances to improve the level of stakeholder decisions and is likely to increase the confidence of shareholders and investors in the capital market. However, due to the relevance of bad news disclosure to managers' characteristics and the incoherence of regulatory standards such as financial and institutional on the other hand, there may be no 100% guarantee for full disclosure of information by managers, so focus on development. Cultural values and the development of social norms in the disclosure of news and information by companies can lead to a kind of self-control in the behavior of managers and increase the level of information symmetry while reducing the company's inertia.

References

1. Agarwal, N., and Chakraverty, A. (2023). Growth opportunities, information asymmetry, and dividend payout: Evidence from mandatory IFRS adoption. *European Accounting Review*, 32(1), pp. 113-139. https://doi.org/10.1080/09638180.2021.1938622
2. Akerlof, G. A. (2002). Behavioral macroeconomics and macroeconomic behavior. *American Economic Review*, 92(3), pp. 411-433. DOI: 10.1257/00028280260136192
3. Allcorn, S., and Godkin, L. (2011). Workplace psychodynamics and the management of organizational inertia. Competitiveness Review: *An International Business Journal*, 21(1), pp. 89-104. https://doi.org/10.1108/10595421111106247
4. Amabile, T. M., Conti, R., Coon, H., Lazenby, J., and Herron, M. (1996). Assessing the work environment for creativity. *Academy of management journal*, 39(5), pp. 1154-1184 https://doi.org/10.5465/256995
5. Amihud, Y. (2002). Illiquidity and stock return cross sectional and time-series effect, *Journal of Financial market*, 5(2), pp. 31-56. https://doi.org/10.1016/S1386-4181 (01)00024-6
6. Amran, A., Lee, S. P., and Devi, S. S. (2014). The influence of governance structure and strategic corporate social responsibility toward sustainability reporting quality. *Business Strategy and the environment*, 23(4), pp. 217-235..https://doi.org/10.1002/bse.1767
7. Bruton, G. D., Ahlstrom, D., and Wan, J. C. (2003). Turnaround in East Asian firms: Evidence from ethnic overseas Chinese communities. *Strategic Management Journal*, 24(6), pp. 519–540. https://doi.org/10.1002/smj.312
8. Casamatta, C., Guembel, A. (2010). Managerial Legacies, Entrenchment, and Strategic Inertia,

The Journal of Finance, 65(6), pp. 2403-2436, https://doi.org/10.1111/j.1540-6261.2010.01619.x

9. Chen, W., Jin, R., and Xie, Y. (2022). Strategic flexibility or persistence? Examining the survival path of export enterprises under COVID-19. *Chinese Management Studies*, 17(2), pp. 320-342. https://doi.org/10.1108/CMS-07-2021-0313
10. Crépin, A. S., and Nævdal, E. (2020). Inertia Risk: Improving Economic Models of Catastrophes, *the Scandinavian Journal of Economics*, 122(4), pp. 1259-1285. https://doi.org/10.1111/sjoe.12381
11. Dayanandan, A., Donker, H., and Karahan, G. (2017). Do voluntary disclosures of bad news improve liquidity? *The North American Journal of Economics and Finance*, 40(1), pp. 16-29 https://doi.org/10.1016/j.najef.2017.01.002
12. Ebrahimi, S. (2016). An introduction to organizational inertia and effective factors on it in organizations of public sector of Iran. *Quarterly Journal of Public Organzations Management*, 4(1), pp. 91-108. 20.1001.1.2322522.1394.4.0.6.7
13. Elbadry, A., Gounopoulos, D., and Skinner, F. (2015). Governance quality and information asymmetry. *Financial Markets*, 24(2/3), pp. 127-157. https://doi.org/10.1111/fmii.12026
14. Fakhari H, and Rezaei P. Y. (2017). Explaining a Model for Measuring Corporate Information Environment. *Quarterly Financial Accounting Journal*, 9(33), pp. 121-147 .https://sid.ir/paper/168161/en
15. Fasan, M., and Mio, C. (2017). Fostering stakeholder engagement: The role of materiality disclosure in integrated reporting. *Business Strategy and the Environment*, 26(3), pp. 288-305.. https://doi.org/10.1002/bse.1917
16. Francis, J., and Smith, A. (1995). Agency costs and innovation-some empirical evidence. *Journal of Accounting and Economics* 19(2/3), pp. 383-409. https://doi.org/10.1016/0165-4101(94)00389-M
17. Gerwanski, J., Kordsachia, O., and Velte, P. (2019). Determinants of materiality disclosure quality in integrated reporting: Empirical evidence from an international setting, *Business Strategy and the Environment*, 28(5), pp. 750-770. https://doi.org/10.1002/bse.2278
18. Ghaffari, R., and Rostamniya, Y. (2017). Organizational Social Inertia and laziness; Dysfunctions of the bureaucratic Organizational culture. *Journal of Public Administration*, 9(2), pp. 307-332. https://doi.org/10.22059/jipa.2017.234155.2019
19. Godkin, A., and S. Allcorn. (2008). overcoming organizational inertia: A tripartite model for achieving strategic organizational change. *The Journal of Applied Business and Economics*, 8(1), pp. 82-95. https://www.researchgate.net/publication/267362860
20. Hajiha, Z., Jafari, S., and Ranjbar navi, R. (2018). Effect of price gap and inappropriate selection as information asymmetric measures on the level of cash holdings. *Journal of Investment Knowledge*, 7(27), pp. 207-224. http://www.jik-ifea.ir/article_12962.html?lang=en
21. Hannan, M. T., and Freeman, J. (1989). Organizational ecology. Cambridge: Harvard University Press.
22. Hu, W., and Fu, X. (2022). Does individual investors' online search activities reduce information asymmetry? Evidence from stock exchanges' comment letters in China. *Asia-Pacific Journal of Accounting & Economics*, 29(3), pp. 582-602. https://doi.org/10.1080/16081625.2020.1754248
23. Huang, Z., and Gao, W. (2022). Has the past really passed? Strategic inertia and capital structure persistence. *Managerial and Decision Economics*, 43(4), pp. 883-893. https://doi.org/10.1002/mde.3424
24. Illeditsch, P. K., Ganguli, J. V., and Condie, S. (2021). Information inertia. The Journal of

Finance, 76(1), pp. 443-479.. https://doi.org/10.1111/jofi.12979
25. Imany, H., and Dastgir, M. (2018). Investigating the Integration between Asymmetric Decrease in Liquidity Trading before Earnings Announcements, The Announcement Return Premium and Profitability News Announcements Using a Simultaneous Equations System. *Journal of Asset Management and Financing*, 6(4), pp. 43-56. https://doi.org/10.22108/amf.2017.21351
26. Iqbal, M. and Santhakumar, S. (2018). Information asymmetry and insider trade profitability in India, *Journal of Indian Business Research*, 10(1), pp. 53-69. https://doi.org/10.1108/JIBR-05-2017-0059
27. Ispano, A. (2018). Information acquisition and the value of bad news, *Games and Economic Behavior*, 110(2), pp. 165-173. https://doi.org/10.1016/j.geb.2018.03.013
28. Jayasimha, K.R. (2022). Client opportunism in agency-client relationship: the role of information asymmetry, *agency response and calculative commitment, Journal of Business & Industrial Marketing*, 37(2), pp. 326-340. https://doi.org/10.1108/JBIM-07-2020-0354
29. Khatali, A. (2020). Identifying effects of information asymmetry on firm performance. *International Journal of Economics, Finance and Management Sciences*, 8(2), pp. 75-91. https://doi.org/10.11648/J.IJEFM.20200802.12
30. Kumar, P., Langberg, N., Oded, J., and Sivaramakrishnan, K. (2017). Voluntary disclosure and strategic stock repurchases, *Journal of Accounting and Economics*, 63(2/3), pp. 207-230. https://doi.org/10.1016/j.jacceco.2017.02.001
31. Lambert, R. A., Leuz, C., and Verrecchia, R. E. (2021). Information asymmetry, information precision, and the cost of capital. *Review of Finance*, 16(1), pp. 1-29. https://doi.org/10.1093/rof/rfr014
32. Lewis, S. (2015). The rise*: Creativity, the gift of failure, and the search for mastery*. New York: Simon and Schuster.
33. Li, K. (2020). Does Information Asymmetry Impede Market Efficiency? Evidence from Analyst Coverage, *Journal of Banking & Finance*, 118(1), pp. 74-98. https://doi.org/10.1016/j.jbankfin.2020.105856
34. Lin, Z. Y., Chang, C. C., and Wang, Y. H. (2018). The impacts of asymmetric information and short sales on the illiquidity risk premium in the stock option market. *Journal of Banking & Finance*, 94(17), pp. 152-165. https://doi.org/10.1016/j.jbankfin.2018.07.005
35. Lotito, G., Migheli, M., and Ortona, G. (2020). Transparency, asymmetric information and cooperation, *European Journal of Law and Economics*, 50(1), pp. 267–294 https://doi.org/10.1007/s10657-020-09669-z
36. Lovallo, D., Brown, A, L., Teece, D, J., and Bardolet, D. (2020). Resource re-allocation capabilities in internal capital markets: The value of overcoming inertia, *Strategic Management Journal*, 41(8), pp. 1365-1380. https://doi.org/10.1002/smj.3157
37. Majid, A., Yasir, M. T. A. M., and Tabassum, N. (2011). Organizational inertia and change portfolio: An analysis of the organizational environment in developing countries, *African Journal of Business Management*, 5(2), pp. 383-388. http://doi.org/10.5897/AJBM10.368
38. Malakar, Y., Greog, Ch., and Van de Fliert, E. (2018). Structure, agency and capabilities: Conceptualizing inertia in solid fuel-based cooking practices, *Energy Research & Social Science*, 40(3), pp. 45-53. https://doi.org/10.1016/j.erss.2017.12.002
39. Marjanian, Y., Shahveisi, F., Eivani, F., and Khanzadi, A. (2020). Study Effect of Earnings Management Forecast News on Earnings Predictability and Disclosure Noises. *Empirical Studies in Financial Accounting*, 17(66), pp. 87-122. https://doi.org/10.22054/qjma.2020.46188.2047
40. Ma'toufi, A., and Tabarsa, M. (2019). The Effect of CEO Power on Future Stock Price Crash

Risk: Opportunistic Approach to Power. *Journal of Securities Exchange*, 11(44), pp. 5-22. https://doi.org/10.22034/jse.2019.11139

41. Matthyssens, P., K. Vandenbempt, and L. Berghman. (2006). Value innovation in business markets: Breaking the industry recipe. *Industrial Marketing Management* 35(6), pp. 751-761. https://doi.org/10.1016/j.indmarman.2005.05.013
42. McKinley, W., Latham, S., and Braun, M. (2014). Organizational decline and innovation: Turnarounds and downward spirals. *Academy of Management Review*, 39(1), pp. 88–110. https://doi.org/10.5465/amr.2011.0356
43. Mellahi, K., and Wilkinson, A. (2010). Managing and coping with organizational failure: Introduction to the Special Issue. *Group & Organization Management*, 35(5), pp. 531–541. https://doi.org/10.1177/1059601110383404
44. Mikalef, P., Wetering, R, V, D., and Krogstie, J. (2021). Mikalef, P., van de Wetering, R., Krogstie, J. (2021). Building dynamic capabilities by leveraging big data analytics: The role of organizational inertia. *Information & Management*, 58(6), A. 103412., https://doi.org/10.1016/j.im.2020.103412
45. Mohd, E. (2005). Accounting for Software development costs and information asymmetry, *The Accounting Review*, 80(4), pp. 1211-1231. DOI:10.2308/accr.2005.80.4.1211
46. Myers, S. C., and Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of financial economics*, 13(2), pp. 187-221.. https://doi.org/10.1016/0304-405X(84)90023-0
47. Nijssen, E. J., Hillebrand, B., Vermeulen, P. A., and Kemp, R. G. (2006). Exploring product and service innovation similarities and differences. *International Journal of Research in Marketing* 23(3), pp. 241-251. https://doi.org/10.1016/j.ijresmar.2006.02.001
48. Olaniyi, C. (2019). Asymmetric information phenomenon in the link between CEO pay and firm performance: An innovative approach, *Journal of Economic Studies*, 46(2), pp. 306-323. https://doi.org/10.1108/JES-11-2017-0319
49. Palomino-Tamayo, W. and Timaná, J. S. (2022). Creating firm value, overcoming organizational inertia through the marketing value chain, *Academia Revista Latinoamericana de Administración*, 35(1), pp. 20-36. https://doi.org/10.1108/ARLA-06-2021-0119
50. Polites, G. L. and Karahanna, E. (2012). Shackled to the Status Quo: The Inhibiting Effects of Incumbent System Habit, Switching Costs, and Inertia on New System Acceptance. *MIS Quarterly*, 36(1), pp. 21-42. https://doi.org/10.2307/41410404
51. Pourheidari, O., and Forughi, A. (2019). Effect of management influence on disclosure quality of accounting information. *Empirical Studies in Financial Accounting*, 16(61), pp. 27-53. https://doi.org/10.22054/qjma.2019.38013.1928
52. Pourzamani, Z., Avali, M, R., and Abdolahiyan, J. (2014). The effect of corporate governance bylaw of Tehran Stock Exchange on earnings management. *Management Accounting*, 7(1), pp. 1-10. https://sid.ir/paper/198699/en
53. Rajan, R. G. (2012). Presidential address: The Corporation in finance. *The Journal of* Finance, 67, pp. 1173–1217. https://doi.org/10.1111/j.1540-6261.2012.01745.x
54. Rehman, I.U., Naqvi, S.K., Shahzad, F. and Jamil, A. (2022). Corporate social responsibility performance and information asymmetry: the moderating role of ownership concentration, *Social Responsibility Journal*, 18(2), pp. 424-440. https://doi.org/10.1108/SRJ-06-2020-0244
55. Rezaei Pitenoei, Y., Safari Gerayli, M., and Norouzi, M. (2017). Social Trust, External Monitoring and Stock Price Crash Risk: Testing Complementary and Substitution Theory. *Accounting and Auditing Review*, 24(3), pp. 349-370. https://doi.org/10.22059/acctgrev.2017.235880.1007639

56. Sadeghi Alavije, F., Shaemi Barzoki, A., and Teimouri, H. (2020). Determining the Impact of Organizational Trust on Organizational Learning with the Mediating Role of Organizational Inertia The Case of Department of Natural Resources and Watershed Management of Isfahan Province. *Strategic Research on Social Problems in Iran*, 9(2), pp. 1-30. https://doi.org/10.22108/srspi.2020.122741.1547
57. Savor, P. (2012). Stock returns after major price shocks: The impact of information, *Journal of Financial Economics* 106(2), pp. 635–659. https://doi.org/10.1016/j.jfineco.2012.06.011
58. Schwarz, G, M., Yang, K, P., Chou, Ch., and Chiu, Y, J. (2020). A classification of structural inertia: Variations in structural response, *Asia Pacific Journal of Management*, 37(2), pp. 33-63. https://doi.org/10.1007/s10490-018-9588-6
59. Schwarz, G. M. (2012). The logic of deliberate structural inertia. *Journal of Management*, 38(2), pp. 547–572. https://doi.org/10.1177/0149206309361206
60. Setayesh, M, H., and Ghayouri, M. A. (2018). Designing a Model of Agency Costs of Principal-agent Relation Using Systemic Thinking, *Quarterly Financial Accounting Journal*, 10(38), pp. 46-89. https://sid.ir/paper/168171/en
61. Seyed Nezhad Fahim, S., Meshki, M., Chirani, E., and Mahfoozi, G. (2018). Investigating the Effect of Withholding Strategy of Bad News on Shareholders' Satisfaction. *Accounting and Auditing Review*, 25(4), pp. 519-536. https://doi.org/10.22059/acctgrev.2019.260229.1007918
62. Shaik, R., Nambudiri, R. and Yadav, M.K. (2022). Mindfully performed organizational routines: reconciling the stability and change duality view, *International Journal of Organizational Analysis*, 30(4), pp. 1019-1038. https://doi.org/10.1108/IJOA-12-2020-2535
63. Shepherd, D. A., Patzelt, H., and Wolfe, M. (2011). Moving forward from project failure: Negative emotions, affective commitment, and learning from the experience. *Academy of Management Journal*, 54(6), pp. 1229–1259. https://doi.org/10.5465/amj.2010.0102
64. Sillic, M. (2019). Individual inertia in explaining non-compliant security behavior in the Shadow IT context, *Computers & Security*, 80(5), pp. 108-119. https://doi.org/10.1016/j.cose.2018.09.012
65. Suddaby, R., and Foster, W. M. (2017). History and organizational change, *Journal of Management*, 43(1), pp. 19-38. https://doi.org/10.1177/0149206316675031
66. Taheri Abed, R., Alinezhad Sarokolaei, M., and Faghani Makerani, K. (2019). Impact of Reputation and Chief Executive Officer's Job Security on Financial Reporting Transparency. *Journal of Accounting Knowledge*, 9(4), pp. 185-215. https://doi.org/10.22103/jak.2018.11902.2661
67. Ucbasaran, D., Shepherd, D. A., Lockett, A., and Lyon, S. J. (2013). Life after business failure: The process and consequences of business failure for entrepreneurs. *Journal of Management*, 39(1), pp. 163–202. https://doi.org/10.1177/0149206312457823
68. Vayanos, D., and Wang, J. (2012). Liquidity and Asset Returns Under Asymmetric Information and Imperfect Competition, *The Review of Financial Studies*, 25(5), pp. 1339-1365. https://doi.org/10.1093/rfs/hhr128
69. Wu, K., Sorensen, S. and Sun, L. (2019). Board independence and information asymmetry: family firm's vs non-family firms, *Asian Review of Accounting*, 27(3), pp. 329-349. https://doi.org/10.1108/ARA-05-2018-0110
70. Wu, X., and Wang, Z. (2005). Equity financing in a Myers-Majluf framework with private benefits of control. *Journal of Corporate Finance*, 11, pp. 915–945. https://doi.org/10.1016/j.jcorpfin.2004.04.001
71. Xia, Y., Xie, J., Zhang, G., and Zhu, W. (2022). Service outsourcing contract design under

asymmetric information. *Industrial Management & Data Systems*, 122(1), pp. 194-214.https://doi.org/10.1108/IMDS-06-2021-0409

72. Xu, M., and Cheng, Y. (2020). Equity Incentives, Inefficient Investment and Stock Price Crash Risk—Taking GEM as an Example, *Open Journal of Social Sciences*, 8(3), pp. 353-373. DOI: 10.4236/jss.2020.88030
73. Ye, K., Guan, J, X., and Zhang, B. (2021). Strategic Deviation and Stock Return Synchronicity, *Journal of Accounting, Auditing & Finance*, 36(1), pp. 172-194. https://doi.org/10.1177/0148558X18802551

IJAAF; Vol. 8, No. 3, Summer 2024, Serial 28

Ferdowsi University of Mashhad

Iranian Journal of
Accounting, Auditing & Finance

Quarterly

RESEARCH ARTICLE

Enhancing Going Concern Prediction Models: Integrating Text Mining with Data Mining Approaches

Hamid Abbaskhani, Asgar Pakmaram, Nader Rezaei*

Department of Accounting, Bonab Branch, Islamic Azad University, Bonab, Iran

Jamal Bahri Sales

Department of Accounting, Urmia Branch, Islamic Azad University, Urmia, Iran

How to cite this article:
Abbaskhani, H., Pakmaram, A., Rezaei, N., & Bahri Sales, J. (2024). Enhancing Going Concern Prediction Models: Integrating Text Mining with Data Mining Approaches. Iranian Journal of Accounting, Auditing and Finance, 8(3), 27-42. doi: 10.22067/ijaaf.2024.43123.1217
https://ijaaf.um.ac.ir/article_43123.html

ARTICLE INFO

Article History
Received: 2023-09-25
Accepted: 2023-12-10
Published online: 2024-07-06

Keywords:
Auditor Report, Data Mining, Going Concern, Sentiment Analysis, Text Mining

Abstract

The linguistic features embedded within business unit information play a crucial role in effectively conveying economic realities, a consideration increasingly recognized in accounting and behavioral finance research. This study endeavors to assess the predictive capacity of companies' going concern status by integrating structured and unstructured data, while also evaluating the impact of incorporating unstructured variables into traditional data mining models. Spanning from 2012 to 2021, the study encompasses a sample of 540 company years listed on the Tehran Stock Exchange. Tone analysis of auditor reports was conducted using models by Mayew et al. (2015) and Visvanathan (2021), while MAXQDA 20 text analysis software and the Loughran and McDonald (2015) dictionary facilitated data processing. Data analysis and hypothesis testing were performed using the logit regression model and the Vuong test. The findings support the first hypothesis, indicating that the text-based model yields a higher coefficient of determination compared to the data-based approach. Moreover, the second hypothesis reveals a significant discrepancy in the explanatory power between the data-based and integrated text-based models within companies.

https://doi.org/10.22067/ijaaf.2024.43123.1217

NUMBER OF REFERENCES
56

NUMBER OF FIGURES
1

NUMBER OF TABLES
5

Homepage: https://ijaaf.um.ac.ir
E-Issn: 2717-4131
P-Issn: 2588-6142

*Corresponding Author: Nader Rezaei
Email: nader.rezaei@bonabiau.ac.ir
Tel: 09144815093
ORCID: 0000-0001-9907-4648

1. Introduction

Predicting bankruptcies has been an ongoing research topic in the accounting and financial fields since the late 1960s. Many researchers developed a more robust bankruptcy forecasting model for classification accuracy. While early studies adopted statistical techniques such as multiple resolution analysis (Altman, 1968) and logit analysis (Hamer, 1983; Ohlson, 1980), later studies adopted artificial intelligence approaches such as artificial neural networks (Leshno and Spector, 1996; Odom and Sharda, 1990), decision trees (Shaw and Gentry, 1990), and support vector machines (Shin et al., 2005) as alternative methods for business prediction problems.

A company's bankruptcy is related to the financial situation of the company and the external economic situation. Despite ongoing research on the construction of bankruptcy prediction models in terms of modeling techniques, such as statistical methods and artificial intelligence techniques, studies on using qualitative information for a bankruptcy prediction model have not yet been conducted. Although the use of financial ratios to model bankruptcy prediction is insufficient, research on the development of bankruptcy prediction models mainly uses superior financial ratios as input variables.

Bankruptcy forecasting models based only on financial ratios have several limitations. Accounting information, such as financial ratios, is based on historical data and is usually determined one year before bankruptcy. The bankruptcy prediction model based on financial ratios is a static model (Altman et al., 2010). There is a time interval between the endpoint of the financial statements and the credit rating point. In addition, fiscal ratios do not take into account environmental factors such as external economic situations. Using financial ratios alone may not be sufficient to construct a bankruptcy forecasting model, as they do not reflect the latest information and essentially reflect the company's past internal accounting information. Qualitative data needs to be added to the standard bankruptcy forecasting model to complement the accounting information.

Some past studies have attempted to use nonfinancial information other than internal accounting information, such as the type of business, firm age, and the number of employees (Altman et al., 2010; Grunert et al., 2005; Pervan and Kuvek, 2013), but these efforts continue to merely reflect the nonfinancial internal information of a company due to a lack of technology to obtain and analyze qualitative information produced from an external source. Today, vast amounts of data, including news, blogs, and social networking services, are available online. With the increasing volume of unstructured textual data, big data analysis techniques, particularly text mining, have received considerable attention in academia and industry. However, research on the impact of qualitative information on the forecasting model is still in its infancy and is limited to specific applications such as stock forecasting. Therefore, big data analysis techniques, such as text mining, need to be used for various business forecasting issues, including credit risk assessment.

Bankrupt companies in different stages of bankruptcy have poor financial performance (Campbell et al., 2008). Therefore, the importance of bankruptcy and identifying important and effective factors for it is obvious; even though so far, many researchers have examined the quantitative dimensions of financial reports and information to predict the bankruptcy of companies, this research tried to investigate the effect of the qualitative dimensions of financial reports in predicting bankruptcy. The meaning of tone in financial reports is its positive or negative degree (Mirali et al., 2018). Therefore, using certain methods and tools of text mining, the text's tone is converted into a quantitative state, and then with the selected model, its impact on the desired factors is evaluated (Siano and Wysocki, 2021).

2. Theoretical foundations and research background

2.1 Theoretical

The country faces increasing downward pressure on its economy and an expanding business risk on listed companies. Listed companies, as the solid foundation of the national economy, will experience hazards from multiple perspectives once they face a financial crisis. Therefore, constructing an effective financial crisis early warning model can help beneficiaries predict risks (Zhang et al., 2022). beneficiaries often look for ways to predict corporate bankruptcy. Therefore, the need for information, especially qualitative information, along with the quantitative information published by the company, has received the attention of beneficiaries more than in the past. Writings in financial reports can focus on persuasiveness. One of the important methods of persuasion is reflecting and repeating certain words of information in the text, which emphasizes the tone of information disclosure (Henry, 2008).

Ideas and thoughts are reflected in the tone of the messages in annual reports (Huang et al., 2014; Yekini et al., 2016). In qualitative texts, positive words are used against negative words to evaluate the text's tone (Kou, 2022). The pessimistic tone of financial statements will cause investors to respond negatively (Feldman et al., 2010; Loughran and McDonald, 2011). Previous research has linked the tone of financial reporting to the company's economic performance and business risk.

Loughran and McDonald (2011) found that words that have a negative tone are more effective and reliable than positive words. This view aligns with Law and Mills' (2015) psychological research results because humans tend to process more negative than positive information. Another study found that a pessimistic tone influences readers' decisions in a statistically meaningful way (Garcia, 2013).

Researchers used various methods to measure the tone of writing in managers' reports. There are two common approaches to content analysis: the first is based on counting the frequency of specific words (dictionary), and the other is a machine learning classification algorithm method based on assigning an experimental data set to specific categories using a manual coding mechanism (Kashanipoor et al., 2020). In financial research, the methodology based on counting the frequency of specific words is more common and assigns words to different classifications based on predefined rules (Loughran & McDonald, 2011).

In this research, a method based on counting the frequency of specific words was used. There is no consensus in the research literature on text tone word lists, but two lists of words provide the most appropriate classification for use in text analysis (Davis et al., 2015). The first list includes the Loughran and McDonald (2011) dictionary, which is specifically designed to analyze the text of financial and accounting reports, while the second list, the Mohammad and Turney (2013) dictionary, contains the general word list (Bozorg Asl et al., 2021).

This study broadly refers to the information literature of the Annual Reports (Brown and Taker, 2011; Cole and Jones, 2005; Feldman et al., 2010), the bankruptcy prediction literature (Altman, 1968; Beaver et al., 2005; Ohlson, 1980; Shumway, 2001; Zmijewski, 1984), and the literature that studies the auditor's boundaries for its going concern (Carson et al. 2013). This study also contributes to the growing literature on the importance of qualitative disclosure using automated language techniques (Tetlock, 2007; Tetlock et al., 2008; Li, 2010) and, in particular, fills the gap identified by Li (2011) that linguistic analysis may be useful for predicting bankruptcy (Mayew et al., 2015).

Two important research issues raise researchers' interest in giving investors early warning signals through auditor disclosure. Firstly, does the tone of the auditor's report and the business unit's going concern disclosures help predict whether a business will continue to operate? Secondly, to what extent are the outcomes of the first question different from the purely structured data? Discussing the advantages of extending the textual disclosure of financial statements can be aided by the answers to

these questions.

2.2 Research background

Mayew et al. (2015) examined the role of textual disclosure in a firm's financial statements to predict a firm's ability to continue as a going concern. Using a sample of 262 firms that filed for bankruptcy over the period 1995-2011 and a matched set of control firms, they find that both the management's opinion and the textual features of management discussion and analysis disclosure together provide significant explanatory power in predicting whether a firm will cease to exist as a going concern. In addition, the ability to predict MD&A disclosure is incremental to financial ratios, market-based variables, and the auditor's opinion. The study's most important finding is that information in MD&A disclosure is more useful in predicting bankruptcy three years before it occurs. This indicates that MD&A disclosures are more timely than financial ratios, making them a leading indicator of ongoing concern problems.

Jo and Shin (2016) suggest qualitative information should be added to the conventional bankruptcy prediction model to complement accounting information. This study proposes a bankruptcy prediction model for small and medium-sized Korean construction companies using quantitative data such as financial ratios and qualitative data from economic news articles. The performance of the proposed method depends on how well the types of information are converted from qualitative to quantitative information suitable for incorporation into the bankruptcy prediction model. In addition, big data analysis techniques, especially text mining, have been used to process qualitative information. The proposed method involves analyzing keyword-based sentiment analysis using a domain-specific sentiment lexicon to extract sentiment from economic news articles. Experimental results showed that combining qualitative data based on extensive data analysis in the traditional model of bankruptcy forecasting based on accounting information increases forecasting performance. The experimental results showed that incorporating qualitative information based on big data analytics into the traditional bankruptcy prediction model based on accounting information enhances predictive performance. The sentiment variable extracted from economic news articles impacted corporate bankruptcy. In particular, a negative sentiment variable improved the accuracy of predicting corporate bankruptcy because the corporate bankruptcy of construction companies is sensitive to poor economic conditions.

Lopatta et al. (2017) examine whether the language used in 10-K filings reflects a firm's risk of bankruptcy. They use propensity score matching to find healthy matches. Based on a logit model of failing and vital firms, their findings indicate that firms at risk of bankruptcy use significantly more negative words in their 10-K filings than comparable vital companies. They confirm the findings of previous accounting and finance research with their investigation. Beyond the reported financials, 10-K filings contain valuable information. Additionally, they show that 10-Ks filed during a firm's collapse contain a higher proportion of litigious words than healthy businesses. This indicates that the management of failing firms is already dealing with legal issues when reporting financials before bankruptcy. Their results suggest that analysts should include the presentation of financials in their assessment of bankruptcy risk as it contains explanatory and predictive power beyond the financial ratios.

Dey et al. (2017) report that due to the vast amount of textual information generated across various sources on the web, they have begun to combine relevant structured and unstructured data to improve predictions. This study provides a generic deep-learning framework for predictive analysis using structured and unstructured data. They also offer a case study to validate the performance and application of the proposed framework in which LSTM is used to predict the movement direction of

structured data utilizing events extracted from news articles. Experimental results show that the proposed model outperforms the existing baseline.

Li and Wang (2017) conducted a study in which they compared statistical and machine learning (ML) methods for predicting bankruptcy using Chinese listed companies. They began by selecting the most appropriate indicators using statistical methods. Different indicators may have different characteristics, and not all indicators can be analyzed. The indicators will be more convincing after filtering the data. Unlike previous research methods, researchers used the same sample set to conduct their experiments. The result proves the effectiveness of the machine learning method. Furthermore, with 95.9 percent accuracy, the test outperforms previous studies.

Elsayed and Elshandidy (2020) explored the incremental explanatory power of narrative-related disclosures in predicting corporate failure by creating a comprehensive corporate failure-related lexicon. They found that corporate failure-related narrative disclosures significantly predict firms' failure up to two years ahead of actual failure. Additionally, they found that a financially distressed firm would become more vulnerable when financial constraints befall, precipitating corporate failure. Various robustness tests assured the credibility of the explanatory ability of corporate failure-related narrative disclosures to predict corporate failure. Collectively, their results showed the feasibility of these narrative-related disclosures in improving the explanatory power of models that predict corporate failure.

According to Gutierrez et al. (2020), investors, regulators, and academics question the usefulness of going concern opinions (GCOs). They assessed whether GCOs provide incremental information relative to other predictors of corporate default. Their measure of incremental information was the additional predictive power that GCOs give to a default model. Utilizing data from 1996 to 2015 found no difference in predictive power between GCOs alone and a default model that includes financial ratios. However, there was an imperfect overlap between GCOs and other predictors. They showed that GCOs increase the predictive power of several models, including ratios, market variables, probability of default estimates, and credit ratings. Using a model that includes ratios and market variables, GCOs increased the number of predicted defaults by 4.4% without increasing Type II errors. Their findings suggested that GCOs summarize a complex set of conditions not captured by other predictors of default.

Lohmann and Ohliger (2020) say the structural and linguistic characteristics of companies' annual reports (e.g., their length, complexity, and linguistic tone) and the qualitative information they contain (e.g., on the risks a company potentially faces) provide useful insights that can help increase the accuracy of predicting bankruptcy. They use a sample of German companies compiled through propensity score matching to examine what type of textual information allows them to discriminate accurately between companies that are likely to go bankrupt and companies that, although financially distressed, are likely to remain solvent. Their findings provide empirical evidence that both the structural and linguistic characteristics of annual reports and the qualitative information they contain help discriminate between effectively bankrupt companies and companies that are solvent but financially distressed. Furthermore, the study provides empirical evidence that the "management obfuscation hypothesis" is valid because the tone of annual reports produced by bankrupt companies is quantifiably less negative than that of reports produced by companies that, although financially distressed, are likely to remain solvent.

Visvanathan's (2021) study aligns with the development of Mayew et al.'s (2015) analysis by including deferred tax valuation allowances in their framework. To the extent valuation allowances incorporate managers' private information about future profitability, valuation allowances are useful in identifying the transitory nature of losses and thus, the going concern status of the firm. Using a sample of firms that filed for bankruptcy over the period 2002–2018, the study shows that increases

to valuation allowances are incrementally informative in predicting a firm's ability to continue as a going concern after considering management's textual disclosures, linguistic tone of the MD&A, auditor's going concern opinions, financial statement ratios, and market-based variables.

Nießner et al. (2022) conducted a study using qualitative and quantitative criteria to predict bankruptcy. They concluded that qualitative information from companies' financial statements provides useful information that can increase the accuracy of bankruptcy prediction models.

Zhao et al. (2022) conducted a study in which, in addition to financial features, they proposed a novel framework that combines sentiment tone features extracted from management discussion and analysis and financial statement notes to predict financial distress. They found that financially distressed companies were more likely to have weak sentiment. They recommend incorporating sentiment tone features with financial features, as they contribute to predictive performance improvements of all models using only financial features. Economic benefits analysis shows that the proposed framework can correctly identify financially distressed companies.

In the domestic and foreign backgrounds of the research, the bankruptcy and the going concern, as well as the tone of the auditors' report, have been investigated. Still, those investigations have not been carried out simultaneously or in Iran's economic environment with internal data. In this research, the researchers have conducted research by considering the cases of the going concern, the tone of the auditors' report, and the positive and negative words of the reports for the domestic companies. As a result of this research, the impact of qualitative and textual data along with the quantitative data of the company, is determined for the interested parties.

The following summarizes the contribution of this paper to the development of the research literature.

1- The use of qualitative data in addition to quantitative data, improves estimates and forecasts about the company.

2- It fosters the attitude that qualitative data can be used to predict a company's going concern, and it draws more attention to qualitative data in the field of going concern predictions.

3- The present research arouses the interest of researchers to study more in this field and use other qualitative data.

2.3 Research hypotheses

The two hypotheses of the present study are:

1. Using the text mining approach, the ability to predict the going concern of companies with/without growth opportunities is greater than the data mining approach.
2. The ability to predict companies with/without growth opportunities using the text mining approach significantly differs from expecting the going concern using the data mining approach.

3. Research Methodology

The research is applied in terms of purpose because its results can be used by potential and actual investors and other groups, and it is correlational because it examines the relationships between variables using regression analysis. The necessary information on the research literature and theoretical foundations was obtained from library sources, scientific databases, and national and foreign articles. Tehran Stock Exchange Organization and Rahavard Novin software database were utilized to collect research data, reports, and announcements published in the CODAL network. The MAXQDA software version (2020) and the Loughran and McDonald (2015) dictionary were then used to process the text analysis section. After extracting the research's numerical and textual data, EViews software version 10 was used to test the hypotheses.

3.1 Statistical population and statistical sample

The research statistical population consists of companies listed on the Tehran Stock Exchange, and the study period is from 2012 to 2021. In this study, a statistical sample was performed using the systematic elimination method, Article 141 of the Commercial Code, to select 27 bankrupt companies, and the Q-Tobin ratio to select 27 successful going concern companies. The number of samples used in this research is 540 company years.

3.2 Text mining process

The text mining process involves steps according to Figure 1 to extract data from the document (Kumar and Bhatia, 2013).

Figure 1. Text mining process

The present study uses the latest updated version of the Loughran and McDonald dictionary (2015), available through the relevant site and contains 354 positive and 2355 negative words. The translation of this dictionary was used to analyze the contents of the auditor's annual report on the activities and general status of the company. For example, with the assistance of content analysis software, the number of positive words (desirable, excellent, and profit) and negative words (unfavorable, weakness, and loss) can be counted in accounting narrations.

The frequency of positive and negative words reflects the tone of the language. We measure the auditor's going concern statement using an index variable (GC_AUD) and if the auditor is unsure of the company's going concern, its value becomes zero; otherwise, it becomes one (Mayew et al., 2015).

The audit reports of the sample companies were extracted from the CODAL site by the researchers for this section. They then entered the Maxqda software to determine the word count within each report. Afterwards, they counted the number of positive and negative words in auditor reports using the Loughran and McDonald dictionaries. For the index variable (GC_AUD), Standard No. 570 of Auditing Standards entitled going concern has been used. A company experiencing going concern difficulties has two instances (although only one is stated in the standard) of signs referred to in this standard that suggest a serious doubt as to whether going concern exists.

3.3 Logit model

The dependent variable in this model is a two-state variable equal to the logarithm of the probability that a particular event (bankruptcy) will happen. The linear probability model as equation 1 can be written in the form of a logistic regression function as equation 2.

Equation 1) $$Y = b_1 + b_2 X_i$$

Equation 2) $$Ln\left(\frac{p}{1-p}\right) = b_1 + b_2 X_i + m$$

Therefore, the probability of an event occurring is described in Equation 3.

Equation 3) $$p = \frac{1}{1 + e^{-(b_1 + b_2 X_i)}}$$

The maximum probability method is used to estimate Equation 5. We take zero to represent bankruptcy. Suppose the result is greater than 0.5 decimal places (used for the company's equal index of bankruptcy or non-bankruptcy). In that case, the company is less likely to continue as a going concern. Researchers who have used this method include Mayew et al. (2015) and Li and Wang (2017).

3.4 Vuong Z Test

For comparison of the power of two models in a common statistical sample. Considering the coefficient of determination obtained from estimating the two models is necessary. Because the amount of the coefficient of determination determines the model's power, a model with a higher determination coefficient has more power in explaining and forecasting the dependent variable.

However, a test must be carried out to determine whether the difference in the coefficients of determination of the two models is statistically significant. The desired test for comparing the difference between the coefficients of determination of both models was introduced by Vuong and is known as the Vuong Z test (Banimahd et al., 2016).

3.5 Research variables and models

3.5.1 Dependent variable

Bankruptcy: In Iran, Article 141 of a 1968-approved amending bill to a section of the Commercial Law serves as the foundation for bankruptcy. According to this article, the board of directors is required to summon an extraordinary general meeting of shareholders as soon as at least half of the company's capital is lost due to losses so that the issue of the company's survival or liquidation can be discussed and voted on.

3.5.2 Independent variables

Research variables are categorized into both quantitative and qualitative. The quantitative variables are retrieved from the financial statements. The qualitative variables were collected by counting the positive and negative words and dubious phrases from the going concern in the auditor's report.

In this study, 11 independent variables were used, presented in Table (1) and used in past studies by national and international researchers.

Table 1. Research variables

Independent variables	Researchers	Symbols
retained earnings to total assets ratio	*Mayow et al. (2015), Li and Wang (2017), Rowland et al. (2021)*	*Reta*
net profit to total assets ratio	*Elsayed and Elshandidy (2020), Rowland et al. (2021)*	*Neta*
operating profit to total assets ratio	*Mayow et al. (2015), Li and Wang (2017), Rowland et al. (2021)*	*Ebitta*
current assets to current liabilities ratio	*Li and Wang (2017), Elsayed and Elshandidy (2020), Rowland et al. (2021)*	*Cacl*
working capital to total assets ratio	*Mayow et al. (2015), Rowland et al. (2021)*	*Wcta*
Total liabilities to total assets ratio	*Li and Wang (2017), Rowland et al. (2021)*	*Tlta*
sale revenue to total assets ratio	*Mayow et al. (2015), Saroei et al. (2020), Rowland et al. (2021)*	*Saleta*
growth opportunity	*Namazi et al. (2018)*	*growth*
Positive words	*Wang et al. (2013), Mayow et al. (2015), Jo and Shin (2016), Visvanathan (2021)*	*Posmda*
Negative words	*Wang et al. (2013), Mayow et al. (2015), Jo and Shin (2016), Visvanathan (2021)*	*Negmda*
Expressing the substantial doubt of the auditor	*Mayow et al. (2015), Visvanathan (2021)*	*Gc_aud*

3.6 Research model

According to the studies of Mayow et al. (2015) and Visvanathan (2021), the research model is based on research hypotheses and a data mining approach as equation 4.

Equation 4)

$$Pr\,(BRUPT_{t+1}) = \beta_0 + \beta_1 RETA_t + \beta_2 NETA_t + \beta_3 EBITTA_t + \beta_4 CACL + \beta_5 WCTA_t + \beta_6 TLTA_t + \beta_7 SALETA_t + \beta_8 Growth_t + \vartheta_t$$

The research model is based on research hypotheses and a text analysis approach, as shown in Equation 5.

Equation 5)

$$\begin{aligned} Pr(BRUPT_{t+1}) &= \beta_0 + \beta_1 RETA_t + \beta_2 NETA_t + \beta_3 EBITTA_t \\ &+ \beta_4 CACL_t + \beta_5 WCTA_t + \beta_6 TLTA_t \\ &+ \beta_7 SALETA_t + \beta_8 Growth_t + \beta_9 POSMDA_t \\ &+ \beta_{10} NEGMDA_t + \beta_{11} GC\_AUD_t + \vartheta_t \end{aligned}$$

4. Analysis of research data and findings

4.1 Unit Root Test

Dummy regression occurs when nonstationary variables are present in the model. The test

presented by Levin et al. (2002) was used to evaluate the significance of the variables. When the time dimensions are large enough, this test is more efficient and powerful than other static tests (Najafzadeh et al., 2024). Table (2) shows the results of a test of the reliability of independent research variables.

Table 2. Test of reliability of independent research variables

Variables	Levin, Lin & Chu test statistics	Significance level(prob.)
Reta	-4.346	0.000
Neta	-7.215	0.000
Ebitta	-6.817	0.000
Cacl	-8.162	0.000
Wcta	-7.803	0.000
Tlta	-6.893	0.000
Saleta	-10.888	0.000
growth	-7.313	0.000
Posmda	-7.845	0.000
Negmda	-9.043	0.000
Gc_aud	-7.447	0.000

If the variables are nonstationary, the co-integration method is used to allow the original values of the variables to be used while ensuring that the regression results are not a dummy. If one of their linear combinations is stationary, a set of values is said to be co-integrated. Therefore, if the explanatory and dependent variable processes co-integrate in a regression model, the possibility of dummy regression is eliminated (Banimahd et al., 2016). The unit root test results in Table (3) show that the distribution of error values in both models in Table (4) is significant. As a result, the linear relationships of the explanatory and dependent variables are co-integrated.

Table 3. Unit root test results of error values of regression models

Variables	Levin, lin & chu test statistics	Significance level(prob.)
Error-values of data mining regression model	-21.784	0.000
Error-values of text mining regression model	-24.212	0.000

4.2 Results of fitting the regression models of the research

Table (4) compares the results of Logit regression equation estimation to make it easier to compare the explanatory ability of data mining and text mining models for bankruptcy prediction. In the data mining technique, the logit regression model has a coefficient of determination of 62 percent, while the text mining approach has a coefficient of determination of 64 percent.

Table 4. Comparision analysis

Variables	Data mining model	Text mining model
C	*-0.260*	*-0.990*
Reta	5.310***	5.270***
Neta	-4.680	-6.380
Ebitta	0.660	2.240
Cacl	-3.160***	-3.290***
Wcta	2.340***	2.480***
Tlta	-0.760**	-0.740**
Saleta	-0.490***	-0.530***
Growth	0.630*	0.580*
Posmda		-0.250
Negmda		0.450*
Gc_aud		1.130***
R-squared	0.620	0.640

*Symbols ***, ** and * indicate significance levels of 99%, 95% and 90%, respectively.*

These coefficients indicate that 3 qualitative variables, positive words, negative words, and the auditor's expression of doubt, along with quantitative model variables, improve the model's explanatory power. Although the variable of positive words is not significant, the variables of negative words and the auditor's expression of doubt with a significance level of 0.1 and 0.01 play an essential role in predicting bankruptcy in the text mining model.

4.3 Results of Vuong Test of research models

The Vuong Z statistic was used to ensure that the incremental explanatory power of the text-mining model compared to the data-mining model in companies with/without growth opportunities was different in Table (5). Consequently, the incremental explanatory power of a model with a bigger R^2 is greater. The text mining model has more explaining power than the data mining model in enterprises with and without growth opportunities. Overall, these results show that the increasing explanatory power of the text mining model in companies with and without growth opportunities differs significantly from the data mining model.

Table 5. Vuong test

Vuong Statistic Value	Z Statistics	Significance Level(prob.)	Test Result
-2.547	0.010	0.050	*The hypothesis is confirmed*

5. Conclusions and suggestions

Text mining is obtaining high-quality information from unstructured or semi-structured texts or data (Hearst, 2003). Accordingly, in modern accounting and behavioral finance, particular attention has been paid to the relationship between the linguistic characteristics of enterprises' annual reports and their behavior and economic results (Davis et al., 2015; Huang et al., 2014). In recent years, the study of linguistic features of financial reporting in experimental accounting research has been prompted by the variety of disclosable issues, the diversity of different industries of international companies, and the existence of various institutions that formulate accounting standards at the global level. Although numerous studies have been conducted on bankruptcy and the influence of different

factors in its determination, the tone of the financial reports as a linguistic characteristic of the company's financial reports was not considered. It was found that adding textual variables to data mining models with the presence of company size improves the coefficient of determination of logit regression models, according to the results obtained from testing the first hypothesis of the research in Table (4). Moreover, the predictive power of text mining is greater, as shown in Table (5), and the difference is significant.

Finally, the search hypotheses are confirmed based on the results obtained and the corresponding coefficients. Furthermore, the findings of this study are consistent with those of Mayow et al. (2015), Elsayed et al. (2020), Lohmann and Ohliger (2020), Viswanathan (2021), and Nießner et al. (2022). It is suggested that the Auditing Organization, Tehran Stock Exchange and Securities Organization design a specific framework that includes compiling explanatory reports with a specific lexicon for both formulating new laws and amending previous cases with the knowledge of how auditors manage perception. In addition, auditing firms are urged to take into account the tone of financial statements when assessing the level of risk to the client company, the planning of operations, and the volume of audit tests, among other factors.

Ultimately, it is suggested that the following be investigated in future research:

1. Comparing the predictive power and ongoing concern of companies using text mining and data mining approaches with qualitative variables of the activity report of the board of directors
2. The effect of financial reporting tone on the comparability of financial statements.
3. Further, variables in the current study were examined over 10 years and in a sample of 54 companies, which suggests a longer period with a much larger sample can be useful.

In the research process, a set of conditions and cases are out of control but can potentially affect the results. It is necessary to examine the results of the research, taking into account the existing limitations. The limitations of this study were as follows:

1. Lack of Persian dictionaries that can be used as a standard tool to measure writing tone in financial research. Thus, due to the use of English dictionaries in translation and the linguistic differences, the reliability of research tools would increase if there were a standard dictionary in Persian.

2. As the word file of the auditor's reports was unavailable, calculating the financial reporting tone index was very challenging.

3. According to all the text descriptions in the report, the research results are obtained in the tone inferred. Nonetheless, the tone inferred by the investor from a fraction of the text differs from the tone inferred from the entire text because there is no guarantee of an equal distribution of positive, negative, or neutral words in all paragraphs.

References:

1. Altman, E.I. (1968). Financial ratios, discriminant analysis, and the prediction of corporate bankruptcy. *Journal of Finance*, 23(4), pp. 589-609. https://doi.org/10.2307/2978933
2. Altman, E.I., Sabato, G., and Wilson, N. (2010). The value of nonfinancial information in small and medium-sized enterprise risk management. *Journal of Credit Risk*, 2(1), pp. 95-127. https://api.semanticscholar.org/CorpusID:168632861
3. Banimahd, B., Arabi, M. and Hasanpor, Sh. (2016). Experimental research and methodology in accounting, Tehran, *Termeh Publications*. https://www.termehbook.com/product/9789649785547/

4. Beaver, W. H., McNichols, M. F., and Rhie, J. W. (2005). Have financial statements become less informative? Evidence from the ability of financial ratios to predict bankruptcy. *Review of Accounting Studies*, 10(1), pp. 93-122. https://doi.org/10.2139/ssrn.634921
5. Bozorg Asl, M., marfo, M., and mahannejad, M. (2021). The Effect of Financial Reporting Tone on Audit Fees of Listed Companies in Tehran Stock Exchange. *Empirical Studies in Financial Accounting*, 18(72), pp. 79-107. https://doi.org/10.22054/qjma.2021.57363.2211
6. Brown, S. V. and J. W. Tucker. (2011). Large-Sample Evidence on Firms' Year-over-Year MD&A Modifications. *Journal of Accounting Research*. 49(2). pp. 309-346. https://doi.org/10.1111/j.1475-679X.2010.00396.x
7. Campbell, J. Y., Hilscher, J., and Szilagyi, J. (2008). In search of distress risk. *The Journal of Finance*, *63* (6), pp. 2899-2939. https://doi.org/10.1111/j.1540-6261.2008.01416.x
8. Carson, E., Fargher, N.L., Geiger, M.A., Lennox, C., Raghunandan, K., and Willekens, M. (2013). Audit Reporting for Going-Concern Uncertainty: A Research Synthesis. *Auditing-a Journal of Practice & Theory*, 32(1), pp. 353-384. https://doi.org/10.2308/AJPT-50324
9. Cole, C. J., and Jones, C. L. (2005). Management discussion and analysis: A review and implications for future research. *Journal of Accounting Literature*, 24(1), pp. 135-174. https://www.proquest.com/openview/ce689fdf754d0f04d7b8e555e6e5cbe0/1?pq-origsite=gscholar&cbl=31366
10. Davis, A. K., Ge, W., Matsumoto, D., and Zhang, J. L. (2015). The effect of manager-specific optimism on the tone of earnings conference calls. *Review of Accounting Studies*, 20(2), pp. 639–673. https://doi.org/10.1007/s11142-014-9309-4
11. Dey, L., Meisheri, H., and Verma, I. (2017). Predictive Analytics with Structured and Unstructured data - a Deep Learning based Approach. *IEEE. Informatics Bull.*, 18(1), pp. 27-34. https://api.semanticscholar.org/CorpusID:52012652
12. Elsayed, M., and Elshandidy, T (2020). Do narrative-related disclosures predict corporate failure? Evidence from UK nonfinancial publicly quoted firms. *International Review of Financial Analysis*, 71(1), A. 101555. https://doi.org/10.1016/j.irfa.2020.101555
13. Feldman, R., Govindaraj, S., Livnat, J., and Segal, B. (2010). Management's tone change, post earnings announcement drift and accruals. *Review of Accounting Studies*, 15(4), pp. 915–953. https://doi.org/10.1007/s11142-009-9111-x
14. Garcia, D. (2013). Sentiment during recessions. *The Journal of Finance*, 68(3), pp. 1267–1300. https://doi.org/10.1111/jofi.12027
15. Grunert, J.P., Norden, L. and Weber, M. (2005). The role of nonfinancial factors in internal credit ratings. *Journal of Banking and Finance*, 29(2), pp. 509-531. https://doi.org/10.1016/j.jbankfin.2004.05.017
16. Gutierrez, E., Krupa, J., Minutti-Meza, M., and Vulcheva, M. (2020). Do going concern opinions provide incremental information to predict corporate defaults?. *Review of Accounting Studies*, *25*(4), pp. 1344-1381. https://doi.org/10.1007/s11142-020-09544-x
17. Hamer, M.M. (1983). Failure prediction: sensitivity of classification accuracy to alternative statistical methods and variable sets. *Journal of Accounting and Public Policy*, 2(4), pp. 289-307. https://doi.org/10.1016/0278-4254(83)90032-7
18. Hearst, M. (2003). What is text mining. SIMS, UC Berkeley, 5. https://www.jaist.ac.jp/~bao/MOT-Ishikawa/FurtherReadingNo1.pdf
19. Henry, E. (2008). Are investors influenced by how earnings press releases are written?. *The Journal of Business Communication*, 45(4), pp. 363-407. https://doi.org/10.1177/0021943608319388
20. Huang, X., Teoh, S. H., and Zhang, Y. (2014). Tone management. *The Accounting Review*,

89(3), pp. 1083–1113. https://doi.org/10.2308/accr-50684
21. Jo, N., and Shin, K. (2016). Bankruptcy prediction modeling using qualitative information based on big data analytics. *Journal of Intelligence and Information Systems*, 22(2), pp. 33-56. https://doi.org/10.13088/jiis.2016.22.2.033
22. Kashanipoor, M., Aghaee, M.A., and Mohseni Namaghi, D. (2020). Information Disclosure Tone and Future Performance. *Accounting and Auditing Review*, 26(4), pp. 570-594. (In Persian). https://doi.org/10.22059/acctgrev.2020.278084.1008146
23. Kou, J. (2022). Analysing Housing Price in Australia with Data Science Methods *(Doctoral dissertation, Victoria University)*. https://vuir.vu.edu.au/id/eprint/43940
24. Kumar, L., and Bhatia, P. (2013). Text mining: concepts, process, and applications. *Journal of Global Research in Computer Sciences*, 4(3), pp. 36-39. https://api.semanticscholar.org/CorpusID:58813172
25. Law, K. K., and Mills, L. F. (2015). Taxes and financial constraints: Evidence from linguistic cues. *Journal of Accounting Research*, 53(4), pp. 777–819. https://doi.org/10.1111/1475-679X.12081
26. Li, F. (2010). The information content of forward-looking statements in corporate filings—A naïve Bayesian machine learning approach. *Journal of accounting research*, 48(5), pp. 1049-1102. https://doi.org/10.1111/j.1475-679X.2010.00382.x
27. Li, F. (2011). Textual Analysis of Corporate Disclosures: A Survey of the Literature. *Journal of Accounting Literature*, 29(1), pp. 143-165. http://www.cuhk.edu.hk/acy2/workshop/20110215FengLI/Paper1.pdf
28. Li, Y., and Wang, Y. (2017). Machine learning methods of bankruptcy prediction using accounting ratios. *Open Journal of Business and Management*, 6(1), pp. 1-20. https://doi.org/10.4236/ojbm.2018.61001
29. Leshno, M., and Spector, Y. (1996). Neural network prediction analysis: the bankruptcy case. *Neurocomputing*, 10(2), pp. 125-147. https://doi.org/10.1016/0925-2312(94)00060-3
30. Levin, A., Lin, C.F., and Chu, C-S.J. (2002). Unit root tests in panel data. *Journal of Econometrics*, 108(1), pp. 1-24. https://doi.org/10.1016/S0304-4076(01)00098-7
31. Lohmann, C., and Ohliger, T. (2020). Bankruptcy prediction and the discriminatory power of annual reports: empirical evidence from financially distressed German companies. *Journal of Business Economics*, 90(1), pp. 137-172. https://doi.org/10.1007/s11573-019-00938-1
32. Lopatta, K., Gloger, M. A., and Jaeschke, R. (2017). Can language predict bankruptcy? The explanatory power of tone in 10-K filings. *Accounting Perspectives*, 16(4), pp. 315-343. https://doi.org/10.1111/1911-3838.12150
33. Loughran, T., and McDonald, B. (2011). When is a liability not a liability? Textual analysis, dictionaries, and 10-Ks. *The Journal of Finance*, 66(1), pp. 35–65. https://doi.org/10.1111/j.1540-6261.2010.01625.x
34. Loughran, T., and McDonald, B. (2015). The Use of Word Lists in Textual Analysis. Journal of Behavioral Finance, 16(1), pp. 1–11. https://doi.org/10.1080/15427560.2015.1000335
35. Mayew, W.J., Sethuraman, M., and Venkatachalam, M. (2015). MD&A Disclosure and the Firm's Ability to Continue as a Going Concern. *The Accounting Review*, 90(4), pp. 1621-1651. https://doi.org/10.2308/accr-50983
36. Mirali, M., Gholami Moghaddam, F., and Hesarzadeh, R. (2018). Investigation of the Relationship between Financial Reporting Tone with Future Corporate Performance and Market Return. *Financial Accounting Knowledge*, 5(3), pp. 81-98. (In Persian). https://doi.org/10.30479/jfak.2018.1513
37. Mohammad, S. M., and Turney, P. D. (2013). Crowdsourcing a word–emotion association

lexicon. *Computational intelligence*, 29(3), pp. 436-465. https://doi.org/10.1111/j.1467-8640.2012.00460.x
38. Namazi, M., Hajiha, Z., & Chenaribokat, H. (2018). Modeling and Identifying Hierarchy of the Effective Measures of the Earning Management on the Prediction of the Bankruptcy. *Financial Management Strategy*, 6(4), pp. 1-27. https://doi.org/10.22051/jfm.2018.13604.1257
39. Najafzadeh, A., Farzinvash, A. A., Yousefi sheikh robaat, M., and Elahi, N. (2024). The Mechanism of Fiscal Policy Transfer in the Economy: Evidence of the Asymmetric Behavior of the Fiscal Expenditure Multiplier During Business Cycles. *The Journal of Economic Studies and Policies*, 10(2), pp.157-187. https://doi.org/10.22096/esp.2024.535691.1555
40. Nießner, T., Gross, D. H., and Schumann, M. (2022). Evidential Strategies in Financial Statement Analysis: A Corpus Linguistic Text Mining Approach to Bankruptcy Prediction. *Journal of Risk and Financial Management*, *15*(10), 459. https://doi.org/10.3390/jrfm15100459
41. Odom, M.D., and Sharda, R. (1990). A neural network model for bankruptcy prediction. *Joint international conference on neural networks*, 2(1), pp. 163-168. https://doi.org/10.1109/IJCNN.1990.137710
42. Ohlson, J.A. (1980). Financial ratios and the probabilistic prediction of bankruptcy. *Journal of accounting research*, 18(1), pp. 109-131. https://doi.org/10.2307/2490395
43. Pervan, I., and Kuvek, T. (2013). The relative importance of financial ratios and nonfinancial variables in predicting insolvency. *Croatian Operational Research Review*, 4(1), pp. 187-197. https://hrcak.srce.hr/file/143355
44. Rowland, Z., Kasych, A., and Suler, P. (2021). Prediction of financial distress: case of mining enterprises in Czech Republic. *Ekonomicko-manazerske spektrum*, *15*(1), pp. 1-14. https://doi.org/10.26552/ems.2021.1.1-14
45. Shaw, M.J., and Gentry, J.A. (1990). Inductive learning for risk classification. IEEE Expert, 5(1), pp. 47-53. https://doi.ieeecomputersociety.org/10.1109/64.50856
46. Shin, K., Lee, T.S., and Kim, H. (2005). An application of support vector machines in the bankruptcy prediction model. *Expert syst. Appl.*, 28(1), pp. 127-135. https://doi.org/10.1016/j.eswa.2004.08.009
47. Shumway, T. (2001). Forecasting bankruptcy more accurately: A simple hazard model. *The Journal of Business*, 74(1), pp.101-124. https://doi.org/10.2139/ssrn.171436
48. Siano, F., and Wysocki, P. (2021). Transfer learning and textual analysis of accounting disclosures: Applying big data methods to small (er) datasets. *Accounting Horizons*, 35(3), pp. 217-244. https://doi.org/10.2308/HORIZONS-19-161
49. Tetlock, P. C. (2007). Giving content to investor sentiment: The role of media in the stock market. *The Journal of Finance*, 62(3), pp. 1139-1168. https://doi.org/10.1111/j.1540-6261.2007.01232.x
50. Tetlock, P. C., Saar-Tsechansky, M., and Macskassy, S. (2008). More than words: Quantifying language to measure firms' fundamentals. *The Journal of Finance*, 63(3), pp.1437-1467. https://doi.org/10.1111/j.1540-6261.2008.01362.x
51. Visvanathan, G. (2021). Is information in deferred tax valuation allowance useful in predicting the firm's ability to continue as a going concern incremental to MD&A disclosures and auditor's going concern opinions?. *International Journal of Disclosure and Governance*, 18(3), pp. 223-239. https://doi.org/10.1057/s41310-021-00107-3
52. Wang, C. J., Tsai, M. F., Liu, T., and Chang, C. T. (2013, October). Financial sentiment analysis for risk prediction. *In Proceedings of the Sixth International Joint Conference on Natural Language Processing*. pp. 802-808. http://aclweb.org/anthology/I/I13/I13-1097.pdf

53. Yekini, L. S., Wisniewski, T. P., and Millo, Y. (2016). Market reaction to the positiveness of annual report narratives. *The British Accounting Review*, 48(4), pp. 415–430. https://doi.org/10.1016/j.bar.2015.12.001
54. Zhang, Z., Luo, M., Hu, Z., and Niu, H. (2022). Textual Emotional Tone and Financial Crisis Identification in Chinese Companies: A Multi-Source Data Analysis Based on Machine Learning. *Applied Sciences*, 12(13), 6662. https://doi.org/10.3390/app12136662
55. Zhao, Y., Wei, S., Guo, Y., Yang, Q., and Kou, G. (2022). FisrEbp: Enterprise Bankruptcy Prediction via Fusing its Intra-risk and Spillover-Risk. arXiv preprint arXiv, 2202. https://api.semanticscholar.org/CorpusID:246652179
56. Zmijewski, M. E. (1984). Methodological issues related to the estimation of financial distress prediction models. *Journal of Accounting Research*, 22(1), pp. 59-82. https://doi.org/10.2307/2490859

IJAAF; Vol. 8, No. 3, Summer 2024, Serial 28

Iranian Journal of
Accounting, Auditing & Finance

Ferdowsi University of Mashhad

Quarterly

RESEARCH ARTICLE

A Comprehensive Analysis of Startup Valuation Models: Insights from Meta-Synthesis

Zohreh Arefmanesh

Department of Accounting, Faculty of Economic, Management & Accounting, Yazd University, Yazd, Iran

Akram Taftiyan*, Sara Darvishi Javanmardi

Department of Accounting, Yazd Branch, Islamic Azad University, Yazd, Iran

How to cite this article:
Arefmanesh, Z., Taftiyan, A., & Darvishi Javanmardi, S. (2024). A Comprehensive Analysis of Startup Valuation Models: Insights from Meta-Synthesis. Iranian Journal of Accounting, Auditing and Finance, 8(3), 43-62. doi: 10.22067/ijaaf.2024.43024.1220
https://ijaaf.um.ac.ir/article_43024.html

ARTICLE INFO

Article History
Received: 2023-02-16
Accepted: 2023-04-10
Published online: 2024-07-06

Keywords:
Meta-Synthesis Qualitative Approach, Startup Companies, Technological Dimension, Valuation

Abstract

In today's rapidly evolving technological landscape, the valuation of startup companies holds significant importance, given the increasing interest in startups among companies. Valuation models for startups typically fall into two categories: quantitative and qualitative methods. This study employs a qualitative research approach, utilizing meta-synthesis methodology, to identify and categorize these valuation models. Through a systematic evaluation of 162 previous research findings using Wilson's seven-step meta-synthesis process, nine main categories and 63 sub-categories were extracted from the literature. These categories were then analyzed and weighted using Shannon Entropy analysis. The findings reveal two overarching categories: quantitative valuation, encompassing cost-oriented, market-oriented, revenue-oriented, and actual methods, and qualitative valuation, comprising human capital, organizational capital, market-based assets, industrial structure, and quality techniques. This study's outcomes offer valuable insights for venture capitalists and financial managers, facilitating a deeper understanding of startup valuation and the classification of valuation models.

https://doi.org/10.22067/ijaaf.2024.43024.1220

NUMBER OF REFERENCES
56

NUMBER OF FIGURES
1

NUMBER OF TABLES
11

Homepage: https://ijaaf.um.ac.ir
E-Issn: 2717-4131
P-Issn: 2588-6142

*Corresponding Author: Akram Taftiyan
Email: taftiyan@iauyazd.ac.ir
Tel: 09133544852
ORCID:

1. Introduction

In today's world, startups play an important role in creating employment, wealth, and sustainable development in both developed and developing countries, and a large part of the economy and production of these countries is based on these companies. The ability to raise capital is pivotal for technology and innovation startups aiming for fast growth and large scale (Wise et al., 2022). The startups used various sources of funding to establish and develop themselves. Most of the startups used public funding programs, both locally and internationally. They also used private finances to kick off their operations. The startups used their early sales as a good financing source. They also borrowed from public and private organizations and used equity to finance (Gbadegeshin et al., 2022). Therefore, an accurate valuation of these companies is crucial to resolving the conflict between entrepreneurs and investors. This matter has led analysts to pay more attention to the startup valuation model in the last decade.

Common valuation techniques for business projects face many problems in the early stages of startup development. Valuation methods are generally divided into three main groups: valuation methods that rely on cash flows, comparable transactions, and asset analysis. The main difficulty in using these methods in evaluating startups is that these companies can provide little information about their history. This issue may be due to either a lack of accounting data (short history, i.e., the company has neither profit nor income) or a lack of market data (there is no comparable company or no direct competitor) or most of the company's assets are intangible (Rahardjo and Sugiarto, 2019).

Many investors are frustrated with investing in startups due to changes in their valuations. Despite the different valuation methods available, the general problem is that the valuation of startups is complex, leading to significant reductions in purchase or sale value of between 20 and 40 percent compared to public companies (Aydın, 2015). Thus, to reduce the challenges entrepreneurs and investors face in startup companies, providing a valuation model for such companies seems necessary. This research seeks an efficient model to address the challenges facing investors and entrepreneurs among the existing corporate valuation models. This research aims to identify and classify the valuation models of startup companies. To do this, the evaluation models of researchers and the findings of previous researchers should be considered. The meta-synthesis tool has systematically analyzed the factors affecting the content items.

The innovation of this study is focused on the classification of valuation models of startups using the meta-synthesis method. Existing corporate valuation research seeks to compensate for the lack of information needed to standardize startups with additional information about the entrepreneur and the business project. However, none of the available research has provided a comprehensive classification of startup valuation models for investors. This article presents the proposed classification by applying the meta-synthesis method, considering the quantitative and qualitative methods of investment models, and the classification of the existing evaluation model of startup companies.

In the following, after a brief definition of valuation, some company evaluation methods and models are first mentioned, and research related to research literature is reviewed. While stating the methodology and explaining the steps of meta-synthesis, the findings of each stage are also presented. Finally, the findings are discussed, and practical suggestions and research limitations are stated.

2. Theoretical foundations and literature review

2.1 Evaluation

Firm evaluation is one of the most important and key issues in the investment process. Stock valuation in the field of investment analysis in general and in particular, is a stage of fundamental analysis. Regardless of the angles in question in investing, techniques and methods are needed to

determine the firm's expected value. The challenge of valuing startups is further enhanced by the many existing and well-known valuation methods that characterize innovative investment. Despite the different valuation methods, the overall problem is valuing startups; the challenges of using the valuation method increase when making an investment decision.

The valuation of startups is useful to entrepreneurs as they can determine their exit value and control rights (as specified by the number of shares in the valuation) after every investment round. The ultimate return for venture capitalists (investors) is positively associated with the difference between exit proceeds at a liquidity event (in the event of an initial public offering or mergers and acquisitions) and the price they paid to invest in venture firms (Hidayat et al., 2022).

Rahardjo and Sugiarto (2019) believe that no standard valuation method would always work for startups. Because they have different characteristics at each stage, certain valuation methods would be more appropriate for specific startup life cycles depending on the availability of information (revenues/EBITDA, operating history, comparable firms and source of values). For early-stage startups without sufficient financial data to rely on, founders and investors have to use creative ways to substitute these inputs. At the early stage, the company's value is more related to the growth potential than the present value.

Some methods and models of corporate evaluation

2.2.1 Capital Asset Pricing Model (CAPM)

The CAPM—initially proposed by Sharpe (1964) with further contributions by Lintner (1965), Mossin (1966), and Black (1972)—states that the expected return of a given asset (r_i) is defined by the sum of a risk-free rate (r_f) and a premium ($r_m - r_f$) that is proportional to the risk (β) of this asset (Kayo et al., 2020).

This model is instrumental in determining the required rate of return on an asset and provides a theoretical basis for estimating the price of an asset using the company's expected cash flow. Therefore, the capital asset pricing model is not an independent valuation method; however, this model is used to determine the cost of capital required when deciding to invest, after which the value of a company can be assessed using the method of discounted cash flows (Elbannan, 2015). The capital asset pricing model assumes that they offset the time value of capital and any potential risks while investing in each other (Dawson, 2015).

Over the last four decades, the capital asset pricing model has been one of the most common asset valuation techniques. This model is the Foundation of many asset pricing models and has been used by most researchers to estimate return and cost of capital.

2.2.2 Discounted cash flow method

The discounted Cash Flow (DCF) Method is commonly used for startup valuation and is based on Simple discounted cash flow (DCF) formulas. DCF method can be used especially in the growth stage of startups once the revenue is generated; hence, future cash flow can be forecasted using an estimated discount rate (Rahardjo and Sugiarto, 2019). The DCF method discounts all free cash flow to all available investors at a weighted cost of capital. The value of a firm is obtained by discounting cash flows to the firm (i.e. the residual cash flows after meeting all operating expenses, reinvestment needs, and taxes, but prior to payment to either debt or equity holders) at a weighted cost of capital (WACC) (Olsen, 2019).

In practice, many researchers consider this method the most common and conceptually correct method. The discounted cash flow model is very popular in corporate financing because it involves various risks in estimating the cost of a firm's capital; this model operates independently of market shocks and considers the firm's future investment plans.

However, in the startup context, this method has flaws. First, future cash-flow estimation is complex and inaccurate, especially given the difficulty of determining the appropriate discount rate. Second, the lack of earnings (actual and reported) for most startups makes it impossible to estimate the earnings multiple. (Hidayat et al, 2022). Olsen (2019) argues that the discounted cash flow model's weakness is its inability to predict the cash flow, growth rate, and capital cost of startups. Also, this model is not able to adapt to real-world changes such as corporate liquidation or business change.

2.2.3 Asset-based valuation model

This model was first introduced by Lee (1996) and later developed by Reilly and Schweihs (1999). Asset-based valuation refers to one of the approaches used to calculate the value of a business. It values a business based on the assets it possesses. The method evaluates assets and liabilities, obtains their fair market value, and deducts the liabilities from assets. However, this method ignores growth opportunities and focuses on tangible assets, which, as mentioned above, do not represent a majority of the startups (Hidayat et al., 2022).

2.2.4 Relative valuation method

The basic idea behind using multiples is that similar assets and companies should sell for similar prices. Relative valuation uses ratios to determine the value of a company. A relative valuation is achieved by multiplying the average of a given industry ratio with a specific firm accounting number. The most commonly used relative valuation metrics are price to earnings, enterprise value (EV) to revenue and enterprise value to EBIT. Common practice is to identify a peer group of 8 to 15 peers and take the average of the multiples of the peers. Identifying a legitimate peer group requires carefully considering the similarities between the corporation you are trying to value and those in the peer group. Relative valuation in general, faces difficulties in valuing startups. First, the measures used in relative valuation can lead to negative valuations. Startups that are early in the corporate life cycle often have negative EBIT and net income, and it, therefore, does not make sense to multiply these measures with the average of a peer group. Also, startups very early in the life cycle often don’t have any revenue, which rules out the use of the enterprise value to revenue multiples. In addition to the problems with what metric to use, relative valuation also faces implications in identifying comparable companies. A logical comparison would be to form a peer group of 8 to 15 similar publicly listed startups. However, startups are usually not publicly listed, meaning such a comparison will have to be with companies within the same industry later in the corporate life cycle. These firms usually have different risk, cash flows, and growth characteristics than the young firm being valued, and therefore, such a valuation does not make sense in practice (Olsen, 2019).

In general, due to the ambiguities associated with high-tech startups, the lack of historical records, the lack of publicly available data, and fluctuations in their financing costs, such ratios and multiples are not suitable for valuing startups (Festel et al., 2013). Van de Schootbrugge and Wong (2013) argue that Using multiples to value startups usually results in a false valuation of the firm's value, which results in the founder's benefit and the investor's loss.

2.2.5 Real Options Valuation Model (ROVM)

the most common limitations of the DCF method are the difficulty in estimating future cash flow and finding an appropriate rate of return. For early-stage startups requiring initial investment, such as for R&D, DCF value would most likely be negative, discouraging the investors. The real options approach was first proposed by Stewart (1984) and based on the financial valuation framework. So, the main advantage of this model is its ability to consider the level of risk and uncertainty associated with new investments, which discounted cash flow models and asset-based methods lack. The options

will give the taker rights (not obligation) to buy (call option) or to sell (put option) the underlying assets before or at the expiration date (Rahardjo and Sugiarto, 2019).

Real options analysis allows for capturing flexibility in outcomes, which is one of the weaknesses of DFC valuation and relative valuation. This makes this valuation technique a powerful tool in cases where it is difficult to capture the expected expansion opportunities in the DFC method and where the startup has significant competitive advantages. Despite real options' ability to capture flexibility, this valuation technique has various implications. First, real options analysis is a technical task that requires careful estimation of given inputs and practitioners to make many simplifying assumptions. This suggests that practitioners employing this method need strong technical competencies. As with the other methods, real option analysis does not take into account the impact of term sheet agreements. Furthermore, the volatility estimation presents a challenge in the context of a startup. As mentioned earlier option pricing theory is built on the assumption that it is possible to create a replicating portfolio using the underlying asset and riskless lending or borrowing. This assumption may hold up in practice for frequently traded stocks, but it will most likely be violated for startups experiencing infrequent trading. Additionally, option pricing models assume the underlying inputs are known and constant. However, factors such as interest rates and volatility are not always constant. The Black and Scholes model specifically assumes that the price of an asset follows a continuous process, which is not the case for startups due to infrequent funding rounds (Olsen, 2019).

2.2.6 Venture capital model

The venture capital model is one of the investors' most widely used models to value young companies. Sahlman and Tayib (2012), a professor at Harvard University, first used this model. The venture capital model is a method risky investors use to decide to invest by evaluating startups with high growth potential. This model combines the features of a discounted cash flow model and multiplicative methods to determine the value of a startup (Aydın, 2015).

The venture capital (VC) method is comprised of six steps:

- Estimate the Investment Needed
- Forecast Startup Financials
- Determine the Timing of Exit (IPO, M&A, etc.)
- Calculate Multiple at Exit (based on comps)
- Discount to PV at the Desired Rate of Return
- Determine Valuation and Desired Ownership Stake (Shao et al., 2021).

Experts in the field usually calculate venture capital financing and value a business based on the projected returns on investment and how and when to exit (Aydın, 2015; Chavda, 2014; Festel et al., 2013). Risky investors use multi-stage financing approaches and specialized valuation tools to exploit various investment opportunities (Becsky-Nagy and Fazekas, 2015).

Researchers have worked on the phenomenon of venture capitalization valuation. Cumming and Dai (2011) studied the size of venture capital, credit, and the conditions that limit the effect of bargaining power and valuation of the investee. Their results indicate a positive correlation between the size of venture capital and the price paid per unit invested. Peter and Anyieni (2015) examined the impact of venture capital financing on the growth of SMEs[1]and how governments can use this model to accelerate the achievement of the Millennium Development Goals.

[1]. Small and medium-sized enterprises

2.3 Research questions

1) What are the determinants of identifying and classifying the valuation models of startup companies?

2) How do we prioritize the identified indicators and categories?

3. Research methodology

Meta-synthesis is a qualitative study that examines the information and findings of other qualitative studies related to the subject. As a result, the sample for meta-synthesis is selected from qualitative studies based on their relationship with the research question. Meta-synthesis is not an integrated review of the qualitative literature nor an analysis of secondary and primary data from selected studies; rather, it is an analysis of the findings of these studies. It explores new and fundamental topics and concepts by providing a systematic approach to researchers and combining different qualitative research, promoting current knowledge and creating a comprehensive view of the issues. Meta-synthesis requires the researcher to review and combine related qualitative research findings carefully. According to Sandelowski and Barroso's model (2001), the meta-synthesis method was used to achieve this research goal. This model consists of seven steps, described in the next part and the different dimensions of this research method will be explained in the form of these steps. This approach has been used in various kinds of research, including Hatami et al. (2019), Eghtesadifard et al. (2020), Karimi et al. (2021), Nazarian et al. (2021), Khavari et al. (2022) and Gupta and Chauhan (2023).

3.1 Step 1: Setting up the research questions

Various dimensions formulate the research question, such as the study community, what, when, and how the method is performed. An appropriate question in meta-synthesis can examine a particular phenomenon, its dimensions, consequences, and determinants. If the research question is too limited and rigorous, it will lead to few studies being identified and reducing the generalizability of the findings. Table 1 shows the general research questions to start the meta-synthesis method.

Table 1. General questions to start the meta-synthesis method

Parameter	Research question
Research purpose (what)	*Indicators that are effective in identifying and categorizing the valuation models of startups.*
Community (who)	*Various works, including articles, book chapters, and dissertations, have identified and categorized the valuation models of startup companies.*
Time range (when)	*All works available between 2000 and 2020*
How to do it?	*Thematic review of works, identification of key points, analysis and classification of identified concepts and categories about valuation models of startup companies*

3.2 Step 2: A systematic review of the literature

Secondary data, called past documents, was used to collect research data. These documents have included all the research in identifying and classifying the valuation models of startups. Articles and research from 2000 to 2020 have been studied for this study. In order to collect and categorize the content of the articles produced in the field of research, the Google search engine and scientific article databases were used. In order to search for research articles on keywords as described in Table 2, individually or in combination, through the National Library site and other libraries, research institutes and sites such as Science Direct, Google Scholar, Springer, Emerald, Researchgate, Mag Iran, Normags, etc. were examined, and a total of 162 studies were found.

Table 2. Searched words

Keywords English
Valuing startups
Evaluation of startup companies
Technology value pricing

Using the criteria mentioned above, a search of the introduced databases was performed, and all available studies were collected in a large file based on the relevance of their title to the keywords. The frequency of studies related to each database is specified in Table 3.

Table 3. The frequency of studies found in each database

Database	***Number of articles***
Scopus	*25*
Science Direct	*71*
ProQuest	*49*
Magiran	*17*
Total	*162*

3.3 Step 3: Search and select the right texts

At this stage, the appropriateness of the received article with the question and purpose of the research is checked. For this purpose, the articles are reviewed several times, and the researcher removes several articles from each review. These articles have not been reviewed in the meta-synthesis process. The review and selection process in this study is summarized in Figure 1.

After removing inappropriate studies for the research objectives and questions, the researcher should evaluate the quality of the research method. This step eliminates research where the researcher does not trust the findings. The most commonly used tool for assessing the quality of initial qualitative research studies is the Critical Appraisal Skills Program, which helps determine qualitative research studies' accuracy, validity, and importance by asking ten questions. These questions focus on the following: 1. Research Objectives 2. The logic of research method 3. Research Design 4. Sampling Method 5. Data Collection 6. Reflexivity (which refers to the relationship between the researcher and the participants) 7. Ethical considerations 8. Accuracy of analysis Data 9. Clear expression of findings 10. Value of research.

To use this tool, articles have been studied; each article is assigned a score between 1 and 5 in terms of having the above characteristics. Based on the 50-point scale of the Critical Appraisal Skills Program, the researcher proposes the following scoring system and categorizes the studies based on their methodological quality (Table 4). Very good (41-50), Good (31-40), Medium (21-30), Poor (11-20), Very poor (0-11). Any article with a good score (below 31) is then eliminated. In this study, the remaining 55 studies of the title, abstract, content, and research methods in the previous section were evaluated using the Critical Appraisal Skills Program. After assigning points to the characteristics of each study and deleting studies with a score less than 31, 42 studies were accepted in the evaluation process, of which 11 studies received very good points and 31 studies received good points.

After conducting four stages of review, out of 162 studies, 120 were excluded, and 42 studies were selected for data analysis. The review and selection process in this study is summarized in Fig. 1

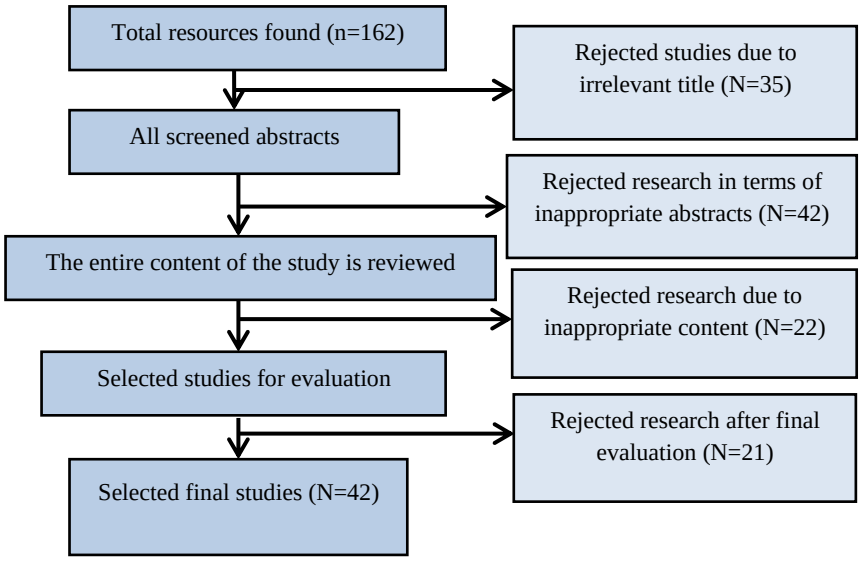

Figure 1. Review and selection process

Table 4. The outcome of the Critical Appraisal Skills Program

Total scores	*Research Methods*	*Clear expression of findings*	*Accuracy of data analysis*	*Ethical considerations*	*Reflexivity*	*Data collection*	*Sampling method*	*Research plan*	*Methodological logic*	*Research purposes*	*Criteria* / *Article*
38	*4*	*3*	*3*	*5*	*4*	*4*	*4*	*3*	*4*	*4*	*1*
39	*4*	*4*	*4*	*5*	*3*	*4*	*4*	*4*	*4*	*4*	*2*
37	*4*	*5*	*4*	*5*	*3*	*4*	*2*	*4*	*3*	*3*	*3*
40	*4*	*4*	*4*	*5*	*4*	*3*	*4*	*5*	*4*	*3*	*4*
39	*3*	*4*	*3*	*5*	*4*	*4*	*3*	*4*	*4*	*5*	*5*
44	*4*	*4*	*4*	*5*	*5*	*4*	*4*	*5*	*4*	*5*	*6*
30	*3*	*3*	*3*	*5*	*3*	*3*	*3*	*2*	*3*	*2*	*7*
32	*3*	*2*	*3*	*5*	*3*	*3*	*3*	*4*	*3*	*3*	*8*
32	*2*	*3*	*4*	*5*	*3*	*2*	*3*	*3*	*4*	*3*	*9*
37	*4*	*3*	*4*	*5*	*3*	*3*	*4*	*3*	*4*	*4*	*10*
39	*4*	*4*	*4*	*5*	*3*	*4*	*4*	*3*	*4*	*4*	*11*
33	*3*	*4*	*3*	*5*	*4*	*3*	*4*	*2*	*3*	*2*	*12*
32	*2*	*3*	*4*	*5*	*2*	*3*	*4*	*4*	*3*	*2*	*13*
39	*4*	*4*	*4*	*5*	*3*	*4*	*4*	*3*	*4*	*4*	*14*
38	*3*	*4*	*4*	*5*	*4*	*4*	*3*	*4*	*4*	*3*	*15*
39	*4*	*4*	*3*	*5*	*4*	*4*	*4*	*4*	*4*	*3*	*16*
37	*4*	*4*	*4*	*5*	*4*	*3*	*3*	*3*	*3*	*4*	*17*
41	*4*	*4*	*4*	*5*	*4*	*4*	*4*	*4*	*4*	*4*	*18*

40	4	4	4	5	4	3	4	4	4	4	19
29	2	3	2	5	3	4	3	2	3	2	20
37	3	4	4	5	3	4	4	3	4	3	21
39	4	4	4	5	3	4	4	3	4	4	22
45	4	4	**5**	5	4	4	5	4	5	5	23
39	4	4	4	5	3	4	4	3	4	4	24
39	4	3	4	5	4	4	3	4	4	4	25
34	3	3	4	5	3	4	4	3	3	2	26
39	4	4	4	5	3	4	4	3	4	4	27
41	4	4	4	5	4	4	4	3	4	**5**	28
42	4	4	4	5	4	4	4	4	4	**5**	29
39	4	4	4	5	3	4	4	3	4	4	30
43	4	4	4	5	4	4	4	4	5	5	31
42	4	4	4	5	4	4	**5**	4	4	4	32
39	4	4	4	5	3	4	4	3	4	4	33
36	3	3	4	5	3	4	3	4	4	3	34
38	3	3	4	5	4	3	4	4	4	4	35
35	3	3	3	5	4	4	4	3	3	3	36
37	4	3	4	5	4	3	3	3	4	4	37
40	3	4	4	5	4	**3**	4	4	4	5	38
42	4	4	4	5	4	4	5	4	4	4	39
40	4	4	4	5	4	3	4	5	4	3	40
39	3	4	3	5	4	4	3	4	4	5	41
44	4	4	4	5	5	4	4	5	4	5	42

3.4 Step 4: Extract article information

After identifying and selecting appropriate sources, the articles were carefully reviewed individually, information related to the research topic was extracted from them, and the articles were classified based on the identified components and codes. Table 5 shows the extraction of codes from selected articles.

Table 5. Extraction of initial codes

References	Indicators
Dusatkova & Zinecker (2016), Miloud et al (2012), Hsieh(2013)	*Replacement cost*
Rahardjo and Sugiarto (2019), Charumathi & Sudhakar (2014)- Savaneviciene et al. (2015)	*Re-ownership method*
Ahangari (2017); Rahardjo and Sugiarto (2019)	*Historical cost*
Miloud et al.(2012)- Bock et al. (2020)	*Base price*
Dusatkova & Zinecker (2016),- Doffou(2015)- Hsieh (2013)- Bock et al. (2020)	*factor analysis*
Sudarsanam et al (2003)-; Gharibi & Tabatabaiyan (2008)	*Based Stock Valuation Model with Learning*
Hsieh et al (2013)- Sudarsanam et al (2003)- Damodaran (2007)- Asta Savaneviciene et al (2015)- Gharibi & Tabatabaiyan (2008), Bock et al. (2020),	*Offer and acceptance*
Dusatkova (2016); Gharibi & Tabatabaiyan (2008); Taghavi Fard , 2019; Mousaei, et al (2010)	*Technical knowledge*

Rahgozar(2008); Hsieh (2013); Gharibi & Tabatabaiyan (2008)	*intrinsic value*
Dusatkova et al (2016) - Miloud et al (2012) - Charumathi & Sudhakar (2014)- Bock et al(2020)-	*Industry standards*
Dusatkova et al(2016)- Miloud et al (2012)- Rahardjo and Sugiarto (2019) ; Hsieh (2013); Eisenmann (2020); Gharibi & Tabatabaiyan (2008)	*Market pricing*
Bock et al. (2020)-	*Expert opinion*
Bock et al (2020)- Guo et al (2016)	*Technical evaluation*
Bock et al (2020)	*Strategic importance*
Dubiansky (2005); Ashrafitabar & Hanafizadeh (2019)	*Market position*
Damodaran (2007); Gharibi & Tabatabaiyan (2008)	*Cash flow*
Bock et al(2020)	*Cost cutting*
Olsen (2019)- Savaneviciene et al (2015); Mousaei (2010)	*Cash flow discounted*
Dusatkova et al (2016)- Bock et al (2020)-	*Venture capital*
Dusatkova et al (2016)- Miloud et al (2012)- Rahardjo and Sugiarto (2019)- Hsieh (2013)- Sudarsanam et al (2003)- - Bock et al. (2020)-Dehghani Eshrat Abad(2020)	*Future profitability*
Bock et al. (2020)- Ashrafitabar & Hanafizadeh (2019)	*First Chicago Method*
Bock et al. (2020)- - Dehghani Eshrat Abad, (2019-2020)	*Gross earnings*
Dubiansky (2005)-	*Tax components*
Ahangari (2017); Taghavifard (2019), Bock et al (2020),	*Gordon model*
Dusatkova et al (2016)- Miloud et al (2012)- Rahardjo and Sugiarto (2019)- Hsieh (2013)- Sudarsanam et al (2003)- - Bock et al (2020)- Paulsen (2016) - Dehghani Eshrat Abad, (2019-2020)	*a financial and economic evaluation*
Ahangari, (2017); Gharibi & Tabatabaiyan (2008), Bock et al (2020);	*Black Scholes*
Olsen (2019); Savaneviciene et al (2015);	*The success rate in laboratory steps*
Dusatkova et al (2016) - Miloud et al (2012) - Doffou(2015) - Hsieh (2013) - Bock et al (2020)	*decision tree algorithm*
Dusatkova et al (2016)- Rahardjo and Sugiarto (2019)- Charumathi et ai (2014); Bock et ai (2020);	*Risk assessment*
Dubiansky (2005)- Charumathi & Sudhakar (2014) - Bock et ai (2020)	*Stochastic Differential Equation*
Olsen (2019)- Dubiansky(2005); Gharibi & Tabatabaiyan (2008), Bock et al (2020)-	*Monte-Carlo*
Olsen (2019) - Dubiansky(2005) Gharibi & Tabatabaiyan (2008- Bock et al. (2020) -	*Intangible Business*
Olsen (2019)- Dubiansky(2005) Gharibi & Tabatabaiyan (2008) - Bock et al. (2020)	*Valuation based on the concept of real option*
Olsen (2019)- Dubiansky(2005) Gharibi & Tabatabaiyan (2008), Bock et al (2020)-	*Valuation based on the concept of financial option*
Bock et al. (2020); Taghavi Fard et al.(2009);	*Staff training hours*
Bock et al. (2020)-	*Costs of entrepreneurs*
Bock et al. (2020)-	*Number of entrepreneurs*
Damodaran (2007) - Eisenmann (2020). - de Oliveira et al (2018) – Savaneviciene et al (2015) - Bock et al (2020) -	*The average level of education of entrepreneurs*
Olsen (2019)- Dubiansky(2005), Gharibi & Tabatabaiyan (2008); Bock et al (2020)-	*The average number of years of entrepreneurial experience*
Bock et al. (2020)-	*Total working hours of entrepreneurs*
Gharibi & Tabatabaiyan (2008), Olsen (2019)	*Investment in research and development(R&D)*
Dusatkova et al (2016) Bock et al (2020) Gharibi & Tabatabaiyan (2008)	*The ratio of R&D expenditures to total costs*
Bock et al. (2020)-	*The ratio of R&D expenditures to total sales*
Bock et al. (2020)-	*Total salaries and bonuses of managers and administrative and sales expenses*

Bock et al. (2020)	*Advertising expenses*
Srinivasan et al (2009) - Bock et al. (2020)	*Distribution and sales expenses*
Dusatkova et al (2016)- Miloud et al (2012)- Doffou(2015)- Hsieh(2013)- Sudarsanam et al (2003)- Damodaran (2009)- Eisenmann(2020)- Dubiansky(2005), Savaneviciene et al (2015)- Bock et al(2020)-	*Relative market share*
Dubiansky(2005)- Gharibi & Tabatabaiyan (2008); Bock et al (2020)-	*Brand reputation*
Bock et al (2020)	*brand Cash flow or profit*
Damodaran (2007)- de Oliveira et al (2018) Gharibi & Tabatabaiyan (2008);	*Brand royalty rates*
Dehghani Eshratabad, et al (2020) Bock et al. (2020)	*Total brand value*
Dusatkova et al (2016)- Guo et al (2016)	*Strong evidence from customers to buy the product*
Miloud et al. (2012) Bock et al. (2020)-	*Customer experience*
Puska et al (2018); Miloud et al (2012) Taghavifard (2019)	*Market/industry characteristics*
Chan et al. (2012)	*Distinctive product or service*
Chan et al (2012)- Hsieh(2013) Gharibi & Tabatabaiyan (2008)	*Industry growth rate*
Miloud et al (2012); Chan et al (2012))	*Structural diversity of industry*
Miloud et al (2012); Chan et al (2012)	*industry Competitive advantage*
Janabi & Dehmarde Qala No (2019); Dusatkova et al (2016) ;Doffou(2015)	*Delphi*
Doffou(2015); Rahgozar (2008)- Savaneviciene et al (2015) – ; Miloud et al (2012), Gharibi & Tabatabaiyan (2008)	*Brainstorm*
Miloud et al. (2012)	*Econometrics*
Miloud et al. (2012)	*Use the opinions of experts.*
Zheng et al (2010); Srinivasan et al (2009); Miloud et al (2012)	*royalty free*

3.5 Step 5: Analysis of qualitative findings

During the analysis, the researcher looks for topics that have emerged among the studies in meta-synthesis. This is known as a case study. Once the subjects have been identified, the examiner forms a classification and places similar and related classifications on the subject that best describes it. Topics provide the basis for creating explanations, patterns, and theories or hypotheses.

All factors extracted from articles were considered Indicators in this study. Then, considering the meaning of each of them, the Indicators were defined in a similar concept, and similar concepts were categorized in the codes to identify the dimensions explaining the classification of valuation models of startups in the main components of the research. In table 6, the indicators, dimensions and related codes of qualitative analysis are presented:

Table 6. Extraction of indicators, dimensions and related codes

Indicators	***Code***	***Dimensions***
Replacement cost	*Cost-based*	*Valuation of intangible assets (qualitative)*
Re-ownership method		
Office expenses		
base price		
Multi-criteria comparison	*Market-based*	
Based Stock Valuation Modelwith Learning		
offer and acceptance		
Technical knowledge		

intrinsic value		
Industry standards		
Market pricing		
Expert opinion		
Technical evaluation		
Strategic importance		
Market position		
Cash flow	*Income-based*	
cost cutting		
Cash flow discount		
Venture capital		
Future profitability		
First Chicago Method		
Gross earnings		
Tax components		
Gordon model		
A financial and economic evaluation		
Black Scholes	*The real option method*	
The success rate in laboratory steps		
decision tree algorithm		
Risk assessment		
Stochastic Differential Equation		
Monte-Carlo		
Intangible Business		
Valuation based on the concept of real authority		
Valuation based on the concept of financial authority		
Staff training hours	*Human capital*	*Valuation of intangible assets (qualitative)*
Costs of entrepreneurs		
Number of entrepreneurs		
The average level of education of entrepreneurs		
The average number of years of entrepreneurial experience		
Total working hours of entrepreneurs		
Investment in research and development	*Organizational capital*	
The ratio of R&D expenditures to total costs		
The ratio of R&D expenditures to total sales		
Total salaries and bonuses of managers, administrative expenses, and sales		
Advertising expenses	*Market-based assets*	
Distribution and sales costs		
Relative market share		
Brand reputation		
Cash flow or brand profit		
Brand royalty rates		
Total brand value		
Strong evidence from customers to buy the product		
Customer experience		
Market/industry characteristics	*Industrial structure*	
Distinctive product or service		
Industry growth rate		
Structural diversity of industry		
Competitive advantage in the industry		
Delphi	*Qualitative techniques*	
Brainstorm		
Econometrics		
Use the opinions of experts		
royalty free		

3.6 Step 6: Quality control and content analysis

The reliability and validity of the measurement tool need to be tested for quality control. The method of agreement between the evaluators is used to evaluate the reliability of the selected articles. In this way, another researcher examines these articles. If these two evaluators' opinions are close to each other, it indicates reliability.

In this study, this evaluation was performed on extractive codes. The coding status of the first and second researchers is shown in Table 7, and the analysis results obtained from SPSS statistical software are shown in Table 8. As can be seen, the obtained significant number for the kappa index is less than 0.05, so the assumption of the independence of the extracted codes is rejected, and the dependence of the extracted codes on each other is confirmed, so it can be claimed that the tools used to extract the codes were sufficiently reliable.

Table 7. The interaction of the first and second evaluators

The sum of the first evaluator	*The second evaluator comment*			
	Yes	*No*		
39	*38*	*1*	*yes*	*The first evaluator*
3	*3*	*0*	*No*	*Comment*
42	*41*	*1*		*42*

Table 8. Quality control

	Amount	**Meaningful number**
Kappa amount of agreement	*0.740*	*0.001*
Number of cases	*42.000*	

In addition to Kappa Cohen, three quantitative criteria of the Holst coefficient, P-Scott coefficient, Kappa Cohen index, and Kerpindroff alpha have been used to evaluate the validity, verifiability, and reliability. Table 9 shows the results of these indicators:

Table 9. Results of quality control indicators

Quality control indicators	**Holstein coefficient**	**P-Scott coefficient**	**Kappa Cohen Index**	**Kerpindoroff Alpha**
Value	0.766	0.810	0.770	0.840
Number			42	

As shown in Table 9, the value of these coefficients is more than 0.7 and indicates the reliability of the extracted code.

In this study, Lavashe's content validity ratio (CVR) index was used to evaluate the validity and reliability of the extracted codes. Lavache designed this index. So, 63 factors identified in the previous steps were given to 16 experts as a checklist, whose characteristics are described in Table 10.

Table10. Characteristics of experts

Characteristics of experts	**Number**
University professors	8
Certified Public Accountant (CPA)	3
Financial managers and managers of audit institutions	5
Total	16

The opinions of experts in the field of test content are used to calculate this index. By explaining the test objectives to them and providing operational definitions of the content of the questions, they are asked to rate each question based on the Likert scale: "Item is necessary," "Item is useful but not necessary" and "item is not necessary." Then, according to the following formula, the content validity ratio is calculated:

$$CVR = \frac{Number\ of\ specialists\ who\ have\ selected\ the\ necessary\ option - \frac{Total\ number\ of\ specialists}{2}}{\frac{Total\ number\ of\ specialists}{2}}$$

Based on the number of experts who evaluated the questions, the minimum CVR is acceptable, 0.62 for ten experts. In this study, the CVR based on ten experts (university professors) was 0.84, more than 0.62; therefore, the content validity is confirmed.

4. Report and study findings

At this stage of the meta-synthesis method, the findings of the previous steps are presented. At this stage, using the Shannon entropy method, the level of support of previous research from the findings of this research is shown statistically. According to Shannon's entropy method, data processing is presented based on content analysis with a new perspective, both quantitatively and qualitatively. Entropy in information theory is an indicator for measuring uncertainty expressed by a probability distribution. Based on this method, the content of the design will be analyzed. After identifying the research indicators based on content analysis and determining the units of analysis (words and themes), the Shannon entropy method will be used to analyze the data as follows:

The frequency of each identified code should be determined based on content analysis. In the next step, the desired frequency matrix must be normalized. For this purpose, the linear normalization method is used:

$$n_{ij} = \frac{x_{ij}}{\sum x_{ij}}$$

The entropy E_j is then calculated as follows:

$$E_j = -k \sum \left[n_{ij} LN(n_{ij}) \right]$$

K is calculated as a fixed value as follows, which holds the value of E_j between zero and one:

The following equation is used for this purpose:

$$k = \frac{1}{Ln(a)};\ \mathrm{a} = \mathrm{Number\ of\ options}$$

The significance coefficient of each category must be calculated. Each category has a higher information load, increasing Wj's importance. The following equation is used for this purpose:

$$W_j = \frac{E_j}{\sum E_j}$$

Therefore, in the first step, the decision matrix is formed. The scores obtained from the decision matrix around the issue are presented in Table 9:

Table 11. Determining the importance and emphasis of past research on identifying and classifying startup valuation models

Indicators	Frequency	Unreliability E_j	Significance factor W_j	Rank
Replacement cost	9	0.020	0.021	5
Re-ownership method	10	0.021	0.022	4
Historical cost	6	0.014	0.015	8
Base price	3	0.008	0.009	11
factor analysis	6	0.014	0.015	8

Based on the Stock Valuation Model with Learning	4	0.010	0.011	10
offer and acceptance	5	0.012	0.013	
Technical knowledge	10	0.021	0.022	4
intrinsic value	14	0.027	0.028	1
Industry standards	11	0.023	0.024	3
Market pricing	11	0.023	0.024	3
Expert opinion	9	0.020	0.021	5
Technical evaluation	12	0.024	0.025	2
Strategic importance	5	0.012	0.013	9
Market position	8	0.018	0.019	6
Cash flow	6	0.014	0.015	8
Cost cutting	8	0.018	0.019	6
Cash flow discounted	2	0.006	0.006	12
Venture capital	6	0.014	0.015	8
Future profitability	2	0.006	0.006	12
First Chicago Method	2	0.006	0.006	12
Gross earnings	6	0.014	0.015	8
Tax components	3	0.008	0.009	11
Gordon model	5	0.012	0.013	9
a financial and economic evaluation	2	0.006	0.006	12
Black Scholes	1	0.003	0.003	13
The success rate in laboratory steps	2	0.006	0.006	12
decision tree algorithm	2	0.006	0.006	12
Risk assessment	6	0.014	0.015	8
Stochastic Differential Equation	6	0.014	0.015	8
Monte-Carlo	7	0.016	0.017	7
Intangible Business	3	0.008	0.009	11
Valuation based on the concept of real option	1	0.003	0.003	13
Valuation based on the concept of financial option	4	0.001	0.011	11
Staff training hours	7	0.016	0.017	7
Costs of entrepreneurs	3	0.008	0.009	11
Number of entrepreneurs	8	0.018	0.019	6
The average level of education of entrepreneurs	5	0.012	0.013	9
The average number of years of entrepreneurial experience	3	0.008	0.009	11
Total working hours of entrepreneurs	3	0.008	0.009	11
Investment in research and development(R&D)	2	0.006	0.006	12
The ratio of R&D expenditures to total costs	3	0.008	0.009	11
The ratio of R&D expenditures to total sales	2	0.006	0.006	12
Total salaries and bonuses of managers and administrative and sales expenses	2	0.006	0.006	12
Advertising expenses	1	0.003	0.003	13
Distribution and sales expenses	5	0.012	0.013	9
Relative market share	8	0.018	0.019	6
Brand reputation	7	0.016	0.017	7
brand Cash flow or profit	5	0.012	0.013	9
Brand royalty rates	5	0.012	0.013	9
Total brand value	5	0.012	0.013	9
Strong evidence from customers to buy the product	6	0.014	0.015	8
Customer experience	1	0.003	0.003	13
Market/industry characteristics	6	0.014	0.015	8

Distinctive product or service	5	0.012	0.013	9
Industry growth rate	8	0.018	0.019	6
Structural diversity of industry	4	0.010	0.011	10
industry Competitive advantage	1	0.003	0.003	13
Delphi	3	0.008	0.009	11
Brainstorm	1	0.003	0.003	13
Econometrics	4	0.010	0.011	10
Use the opinions of experts	2	0.006	0.006	12
royalty free	1	0.003	0.003	13

5. Discussion and conclusion

Determining the value of startups is controversial due to the lack of historical data and many uncertain factors about the company's future (Festel et al., 2013). Therefore, identifying appropriate valuation methods for valuing startups is crucial to address the investment challenges in startups.

This study aims to apply the meta-synthesis approach to review, identify, and categorize the valuation models of startups. So, based on the research findings, nine codes and 63 indicators were extracted from the texts of previous articles using the meta Synthesis qualitative analysis method. In order to analyze the content quantitatively and qualitatively, after identifying the research indicators based on the content analysis and determining the units of analysis (words and themes), Shannon entropy analysis was examined and weighted for data analysis.

In this way, The basis for classifying the valuation models of startup companies (startups) was extracted as main categories (codes). The main categories (codes) extracted are quantitative valuation, including cost-oriented, market-oriented, revenue-oriented, and real options methods; qualitative valuations include human capital, organizational capital, market-based assets, industrial structure, and quality techniques.

The contribution of this study is the focus on categorizing the valuation models of startups using the meta-synthesis method. Studying, reviewing, and classifying the valuation models of startup companies is a new step for the growth and development of these companies.

Identifying and classifying valuation models of startup companies and adding knowledge in this field helps entrepreneurs better understand their business valuation models and facilitate the ability to create, develop, transform, and measure business. In other words, startup partners can increase the value of their company and achieve more success and profitability by recognizing and emphasizing the value-enhancing factors.

Given the importance of startup valuation, this study provides new information about the classification of valuation methods used in the valuation of startup companies. In addition, banking, investment, and small private companies are advised to provide a valuation model in accordance with the existing conditions to reduce risky investments and achieve a specific standard in these companies because the valuation model is rarely used in these companies, and achieving a corporate valuation model minimizes the investment challenges in this category of companies.

With all its advantages, qualitative research has weaknesses, such as generalizability and credibility. Therefore, the generalization of results should be done with caution. Also, a small number of articles and studies in the relevant field is one of the limitations of the present study. The existence of large volumes of unstructured data that require much time to analyze is another limitation of the present study.

Resources

1. Ahangari, S. S. (2017). Valuation of newly established technology-based companies in Iran. *Science and Technology Policy*, 7(2), pp. 5-16. https://doi.org/20.1001.1.24767220.1396.07.2.1.3

2. Ashrafitabar, N., and Hanafizadeh, P. (2019). Valuation of Candidate Projects Financed by Crowdfunding. *Financial Management Strategy*, 7(2), pp. 33-59. https://doi.org/10.22051/jfm.2019.22379.1800. (in Persian).
3. Aydın. (2015). A Review of models for valuing young and innovative firms. *International Journal of Liberal Arts and Social Science*, 3(9), pp. 1-8. DOI:10.13140/RG.2.2.30295.57762
4. Black, F. (1972). Capital market equilibrium with restricted borrowing. *The Journal of Business*, 45(3), pp. 444-455. https://doi.org/10.1086/295472
5. Becsky-Nagy and Fazekas. (2015). Emerging markets queries in finance and business, private equity market in recovery. *Procedia Economics and Finance*, 32(30), pp. 225 – 231. https://doi.org/10.1016/S2212-5671(15)01386-6
6. Bock, C., and Hackober, C. (2020). Unicorns—what drives multibillion-dollar valuations?. *Business Research*, 13(3), pp. 949-984. https://doi.org/10.1007/s40685-020-00120-2
7. Chan, C , Cheng, C , Gunasekaran, A and Wong, K-F. (2012). A framework for applying real options analysis to information technology investments. *International Journal of Industrial and Systems Engineering*, 10(2), pp. 217-237. https://doi.org/10.1504/IJISE.2012.045181.
8. Charumathi, B. and Sudhakar, Suraj. (2014). Comparing Stock Valuation Models for Indian Bank Stocks. *International Journal of Accounting and Taxation*, 2(2). pp. 111-127.
9. Chavda. (2014). An overview on "venture capital financing" in India.*International Multidisciplinary Research Journal*, 1(2), pp. 1-4.
10. Cumming and Dai. (2011). Fund size, limited attention, and valuation of venture capital backed firms. *Journal of Empirical Finance*, 18(1), pp. 2–15. https://doi.org/10.1016/j.jempfin.2010.09.002
11. Damodaran, A. (2007). Valuation approaches and metrics: a survey of the theory and evidence. *Foundations and Trends® in Finance*, 1(8), pp. 693-784. https://doi.org/10.1561/0500000013
12. Dawson, P. C. (2015). The capital asset pricing model in economic perspective. *Journal of Applied Economics*, 47(6), pp. 569-598. https://doi.org/10.1080/00036846.2014.975333
13. de Oliveira, F. B., and Zotes, L. P. (2018). Valuation methodologies for business startups: A bibliographical study and survey. *Brazilian Journal of Operations & Production Management*, 15(1), pp. 96-111. https://doi.org/10.14488/BJOPM.2018.v15.n1.a9
14. Dehghani Eshrat Abad, M., Albadvi, A., Sepehri, M., and Hossein Zadekashan, A. (2020). Startup valuation in the first round of venture financing by considering real options before and after commercialization. *Innovation Management Journal*, 9(2), pp. 151-175.
15. Doffou, A. (2015). An improved valuation model for technology companies. *International Journal of Financial Studies*, 3(2), pp. 162-176. https://doi.org/10.3390/ijfs3020162
16. Dubiansky, J. (2005). An Analysis for the Valuation of Venture Capital-Funded Startup Firm Patents. *bepress Legal Series. bepress Legal Series*. Working Paper 880. https://law.bepress.com/expresso/eps/880
17. Dušátková, M and Zinecker, M. (2016). Valuing startups – Selected approaches and their modification based on external factors. Business: *Theory and Practice*. 17(4), pp. 335-344. https://doi.org/10.3846/btp.17.11129
18. Elbannan, M. A. (2015). The capital asset pricing model: An overview of the theory. *International Journal of Economics and Finance*, 7(1), pp. 216-228. https://doi.org/216-228, 2015. 155, 2015.
19. Eisenmann, T. R., (2020). Determinants of Early-Stage Startup Performance: Survey Results, *Harvard Business School Entrepreneurial Management*, 21(57),

http://dx.doi.org/10.2139/ssrn.3725023
20. Eghtesadifard, M., Ronaghi, M., and Rasekh, M. (2020). Identification and classification of the business model elements influencing on trading strategy in startup business with a meta-synthesis approach. *Commercial Strategies*, 16(14), pp. 113-130. https://doi.org/10.22070/cs.2020.2466
21. Festel, G., Wuermseher, M., and Cattaneo, G. (2013). Valuation of early stage high-tech startup companies. *International Journal of Business*, 18(3), pp. 217-231.
22. Gharibi,j and tataeian,h. (2008). A review of concepts and quantitative methods in technology valuation. *Roshd -e- Fanavari*,13(4), pp. 1-10. (in Persian)
23. Gbadegeshin, S. A., Al Natsheh, A., Ghafel, K., Mohammed, O., Koskela, A., Rimpiläinen, A., ... and Kuoppala, A. (2022). Overcoming the Valley of Death: A New Model for High Technology Startups. *Sustainable Futures*, 4(8), pp. 1-15. https://doi.org/10.1016/j.sftr.2022.100077.
24. Guo, H, Tang, J, Zhongfeng Su and Jerome A. K. (2016). Opportunity recognition and SME performance: the mediating effect of business model innovation. *R&D management*, 47(3), pp. 431-442. https://doi.org/10.1111/radm.12219
25. Gupta, P. and Chauhan, S. (2023). Dynamics of corporate governance mechanisms - family firms' performance relationship- a meta-analytic review. *Journal of Business Research*, 154(18), pp. 1-39 https://doi.org/10.1016/j.jbusres.2022.113299.
26. Hatami, S, Mirali, S, Alvani, S and Hoseinpour, D. (2019). Human Resource Management Social Responsibilities: A Meta Synthesis Approach. *Journal of Public Administration Perspective*, 10(3), pp. 45-65. https://doi.org/10.48308/jpap.2021.102300. (in Persian)
27. Hidayat, S.E, Bamahriz,O, Hidayati,N, Sari,C,A and Dewandaru, G. (2022). Value drivers of startup valuation from venture capital equity-based investing: A global analysis with a focus on technological factors. *Borsa Istanbul Review*, 22(4), pp. 653-667. https://doi.org/10.1016/j.bir.2021.10.001.
28. Hsieh, C-H. (2013). Patent value assessment and commercialization strategy, *Technological Forecasting and Social Change*, 80(2), pp. 307-319, https://doi.org/10.1016/j.techfore.2012.09.014
29. Janabi, O, and Dehmarde Qala No, N. (2019). Pricing of subordinated bonds using Heston's deficit-jump model. *Financial Research*, 21(3), 392-416. https://doi.org/10.22059/frj.2019.277291.1006834
30. Karimi, A., Rezaei, H., Akbari, M. and Foroudi, P. (2021). The concept of innovation network: an application of the meta-synthesis approach. *Journal of Global Entrepreneurship Research*, 11(1), pp. 399-419 https://doi.org/10.1007/s40497-021-00300-2
31. Kayo, E. K., Martelanc, R., Brunaldi, E. O., and da Silva, W. E. (2020). Capital asset pricing model, beta stability, and the pricing puzzle of electricity transmission in Brazil. *Energy Policy*, 142(31), A. 111485.https://doi.org/10.1016/j.enpol.2020.111485
32. Khavari, H, Farzinfar, A and Jabbari, H. (2022). The Pattern of Causal Factors, Strategies and Consequences of Auditors' Stress Management With A Meta-Synthesis Approach. *Iranian Journal of Value and Behavioral Accounting*, 7 (13), pp. 224-255. https://doi.org/ 10.52547/aapc.7.13.224. (In Persian)
33. Lee, T. (1996). Income and value measurement. London: International Thomson Business Press.
34. Lintner. (1965). The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *Review of Economics and Statistics Journal*, 47, pp. 13–17.

35. Miloud, T., Aspelund, A. and Cabrol, M. (2012). Startup valuation by venture capitalists: An empirical study. *Venture Capital*, 14(2-3), pp.151-174. https://doi.org/10.1080/13691066.2012.667907
36. Mousaeia, A., Mansoory, F., and Ghozatloo, A. (2010). Introduce a Model to Establish Industrial Clusters in Petrochemicals, *Monetary & Financial Economics*, 16(28), pp. 1-21. https://doi.org/10.22067/pm.v16i28.2503 (In Persian)
37. Mossin. (1966). Equilibrium in a capital asset market. *Econometrica*, 34, pp. 768-783. https://doi.org/10.2307/1910098
38. Stewart C. M. (1984) Finance Theory and Financial Strategy. *Interfaces*, 14(1), pp. 126-137. https://doi.org/10.1287/inte.14.1.126
39. Nazarian R, taftiyan A and heyrani F. (2021). Examination of environmental reporting motives: meta-synthesis application. *Journal of Value & Behavioral Accounting* 6(11), pp. 341-382. URL: http://aapc.khu.ac.ir/article-1-1015-en.html
40. Olsen, M. R. (2019). An empirical study of startup valuation. Copenhagen Business School, available at https://research. cbs. dk/en/studentProjects/an-empirical-study-of-startup-valuation.
41. Peter, B. A., and Anyieni, A. G. (2015). Influence of venture capital financing on the growth of micro, small and medium enterprises in Kenya: The case study of Nairobi County. *European Journal of Business and Management*, 7(29), pp. 85-89.
42. Puška, A., Beganović, A. I., and Šadić, S. (2018). Model for investment decision making by applying the multi-criteria analysis method. *Serbian Journal of Management*, 13(1), pp. 7-28. https://doi.org/10.5937/sjm13-12436
43. Rahardjo, D., and Sugiarto, M. (2019). Valuation model using a mixed real options method: a review on Singapore and Indonesia digital startup, *Advances in Social Science. Education and Humanities Research*, 308, pp. 9-12. https://doi.org/10.2991/insyma-19.2019.3
44. Rahgozar, R. (2008). Valuation models and their efficacy in predicting stock prices. *American Journal of Finance and Accounting*. 1(2), pp.139-151. https://doi.org/10.1504/AJFA.2008.019949.
45. Reilly and Schweihs. (1999). Valuing intangible assets. New York, NY: McGraw-Hill.
46. Salman, R. T., and Tayib, M. (2012). Intellectual capital measurement tools. *International Journal on Social Science Economics & Arts*, 2(2), pp. 19-26.
47. Sandelowski, M., and Barroso, J. (2006). Handbook for synthesizing qualitative research. Springer Publishing Company.
48. Savaneviciene, A , Venckuviene, V and Girdauskienė, L. (2015). Venture Capital a Catalyst for Startups to Overcome the "Valley of Death": Lithuanian Case. *Procedia Economics and Finance*, 26, pp. 1052-1059. https://doi.org/10.1016/S2212-5671(15)00929-6.
49. Shao, B, Ni, C , Wang, J and Wang Y. (2021). Research on venture capital based on information entropy, BP Neural network and CVaR model of digital currency in Yangtze River Delta, *Procedia Computer Science*, 187, pp. 278-283. https://doi.org/10.1016/j.procs.2021.04.063.
50. Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *Journal of Finance*, 19(3), pp. 425-442. https://doi.org/10.1111/j.1540-6261.1964.tb02865.x
51. Srinivasan, S., and Hanssens, D. M. (2009). Marketing and firm value: Metrics, methods, findings, and future directions. *Journal of Marketing research*, 46(3), pp. 293-312. https://doi.org/10.2139/ssrn.1136332

52. Sudarsanam, S, Sorwar, G and Marr B. (2003). Valuation of intellectual capital and real option models, *PMA Intellectual Capital Symposium*, 01-02
53. Taghavifard, M., Radmard, M., Jafarnezhad, S. and Harati Nik, M. (2019). Challenges of valuation and evaluation of information technology startup companies. *IT Management Studies*, 7(27), pp. 29-58. https://doi.org/10.22054/ims.2019.9983
54. Van de Schootbrugge, E., and Wong, K. M. (2013). Multi-Stage valuation for startup high tech projects and companies. *Journal of Accounting and Finance*, 13(2), pp. 45-56.
55. Wise, S., Yeganegi, S., and Laplume, A. O. (2022). Startup team ethnic diversity and investment capital raised. *Journal of Business Venturing Insights*, 17(1), pp.1-8. https://doi.org/10.1016/j.jbvi.2022.e00314
56. Zheng, W., Yang, B., and McLean, G. N. (2010). Linking organizational culture, structure, strategy, and organizational effectiveness: Mediating role of knowledge management. *Journal of Business Research*, 63(7), pp. 763-771. https://doi.org/10.1016/j.jbusres.2009.06.005.

IJAAF; Vol. 8, No. 3, Summer 2024, Serial 28

Ferdowsi University of Mashhad

Iranian Journal of
Accounting, Auditing & Finance

Quarterly

RESEARCH ARTICLE

Risk and Return Analysis of Government Bonds in Indonesia: A Multifactor Model Approach

Amaliah Siti*, Andriana Isni, Muizzudin Muizzudin

Departement of Management, Faculty of Economics, Universitas Sriwijaya, Indonesia

How to cite this article:
Amaliah, S., Andriana, I., & Muizzudin, M. (2024). Risk and Return Analysis of Government Bonds in Indonesia: A Multifactor Model Approach. Iranian Journal of Accounting, Auditing and Finance, 8(3), 63-74. doi: 10.22067/ijaaf.2024.44421.1400
https://ijaaf.um.ac.ir/article_44421.html

ARTICLE INFO

Article History
Received: 2023-08-28
Accepted: 2023-10-05
Published online: 2024-07-06

Abstract

Understanding the relationship between risk and government bond returns is crucial for assessing the influence of risk factors on bond returns. This study investigates the dynamics of risk-taking behavior and its impact on the performance of government bonds in Indonesia. Using monthly data spanning from January 2017 to December 2021, we employ a multifactor model with GARCH analysis technique to analyze the data. The findings reveal that risk exposure exerts a negative and significant effect on government bond returns in Indonesia, while market factors also negatively and significantly influence bond returns. Conversely, the joint stock performance exhibits a positive relationship and significantly impacts returns in Indonesia.

Keywords:
GARCH Analysis, Government Bonds, Indonesia, Market Factors, Multifactor Model, Stock Performance

https://doi.org/10.22067/ijaaf.2024.44421.1400

NUMBER OF REFERENCES
20

NUMBER OF FIGURES
-

NUMBER OF TABLES
7

Homepage: https://ijaaf.um.ac.ir
E-Issn: 2717-4131
P-Issn: 2588-6142

*Corresponding Author: Amaliah Siti
Email: lhiyaamalia.fkmunsri@gmail.com
Tel:
ORCID:

1. Introduction

Investment is an important part of developing a country's economy because investment can increase the available capital stock. This increase in capital stock will increase community production and encourage the pace of national economic growth. In this case, the capital market as a forum for trading financial instruments plays a role in national economic development. Investment product choices that can be made in the capital market are stocks, bonds, and mutual funds. Government bonds are an important component of many investors' portfolios, even more than other equities. However, the academic literature often neglects risk and return on bonds.

Government bonds are simple financial products issued by the government, so the government has an obligation to pay a fixed coupon early and pay the principal when the bond matures. These bonds are issued to finance the state budget deficit, cover short-term cash shortfalls, and manage the state debt portfolio. Bond prices are based on calculating the current value of future cash flow. In the simplest approach, if the future cash flows are fixed and guaranteed, the value of the bond is the present value of those cash flows that have been discounted at a certain rate. The interest rate in financial terms is called the yield. Government bond yields have become a major concern either by the government as issuer or by bond investors.

Several studies link bond returns with risk and macroeconomic variables. There is a close relationship, especially between inflation volatility and interest rate volatility; it is also seen that macro volatility cannot be ignored to capture the risk-return trade-off in the US Treasury market accurately. The same was followed by Fan et al. (2021) and Bauer et al. (2018), who revealed that risk based on macroeconomic variables influences bond risk premiums. However, the study is more focused on corporate bonds than government bonds.

Febi et al. (2018) discuss the impact of liquidity risk on *green bonds* using a regression model. The findings show that LOT liquidity and /or bid-ask/ size positively relate to returns. However, only LOT size is relevant for the fixed effects model returns. His research also finds that the LOT effect dissipates over time, indicating that for rates of return, the impact of liquidity risk on returns has been negligible in recent years. Other research conducted by Nitschka (2018) shows that global exchange rate risk influences the returns on government bonds in developed countries. These results support research conducted, which found that the level of risk based on exchange rates, inflation, and interest rates affects returns from *US Treasury Bonds*. In addition, bond ratings fully mediate the effect of corporate governance and liquidity on bond yields, while for maturity, bond ratings partially mediate the effect of maturity on bond yields.

Some studies use the *Markowitz* portfolio selection approach to government bond portfolios. Such as research (Martin and Swanson, 2021) ; (Pasricha et al., 2020) ; (Korn and Koziol, 2006) recently estimated the expected yield, return variance, and covariance of government bonds. An empirical study was conducted on the German bond market. The results suggest that a few government bonds are risky enough to achieve a predictably very promising risk-return profile. In their research, Creal and Wu (2020) also show that the risk price channel largely drives the time variation in the bond term premium and affects the rate of return *on US Treasury Bonds*.

Another study by Kim et al. (2021) showed that most government bonds outperformed their benchmarks*;* this indicated that government bonds exhibited a risk character that differed from the benchmarks. Taking risks with greater risk exposure than the benchmark drives the difference between the index-adjusted and risk-adjusted performance.

Ouyang and Lu (2021) researched the risk evaluation of Chinese government bonds that focused on interest rate and stability risks using the EWMAVaR and SVM models. His research results show that interest rate risk increased rapidly in 2018–2020 while stability risk decreased slightly, and changes in this risk influence the rate of return on government bonds in China.

According to research, the returns on government bonds in 25 developed and developing countries from 1992 to 2016 were discussed using the *Fama-MacBeth cross-sectional model*. The results show that the four-factor model effectively explains various patterns of returns in the international government bond market. Volatility risk, credit risk, value effects and momentum are the main drivers of government bond returns. However, Haddad and Sraer (2020) showed different results in their research; they revealed that liquidity risk does not affect the rate of return on bonds. Pratama et al. (2021) show that the expected return on stocks exceeds the expected market return value. The yield generated from the bond portfolio is also more optimal when compared to the yield of one bond.

Other findings were obtained from research by Carpenter et al. (2022), which discussed risk through two components: the quantity of risk (volatility) and the value of the risk itself. His research focuses on the rate of return on government bonds in the US and China. Interestingly, these two components support each other positively in the US *Treasury market*. The factor structure of the risk premium in the Chinese government bond market is similar to that in the US *Treasury market*; even though it is for the majority of the sample, the bond market in China is effectively segregated from the bond market in the US. However, in China, the number and price of the two risk factors show a negative unconditional correlation. Moreover, this correlation varies significantly over time. The same results were shown by Daniel et al. (2020) and Feldhütter et al. (2016), who stated that the risk factor for price volatility affects the rate of return on government bonds.

Based on the background and inter-academic debates above, it is important to discuss the relationship between risk and government bond *returns to determine risk pressure in influencing government bond returns*. In addition, this study can analyze the phenomenon of risk-taking behavior on bond returns. This research focuses on the risk and performance analysis of government bonds in Indonesia. The performance of government bonds is measured using the rate of return as research has been conducted. Based on the problem description, this study will study whether risk exposure is problematic in the Indonesian bond market. This study provides additional information regarding the relationship between risk and bond *returns* in Indonesia. Therefore, this research has two main objectives. First, this study will analyze the risk exposure and yield on government bonds in Indonesia. Second, examining risk-taking behavior affecting the performance of government bonds in Indonesia.

2. Literature review

Signaling theory assumes that company managers or insiders know more about the quality of their companies than other people outside the company. This theory is often used in the entrepreneurship literature and is one of the important theories for human resource management in the employee recruitment process. This theory is also frequently used these days in the management literature. Signaling theory serves to describe how when the behavior of both individuals and companies has access to different information. This is because different information will affect the decision-making process for individuals, households, businesses, and the government.

The information provided to outsiders consists of public information that can be obtained freely and confidential or private information that can be obtained only for certain individuals. According to, this confidential information will eventually lead to asymmetric information. In other words, asymmetric information arises when individuals who know the confidential information can make decisions that benefit those with it. However, for more than a century, formal economic models of the decision-making process have been based more and more on the assumption of perfect information. In contrast, imperfect information has often been ignored. Many economists assume that companies or markets with imperfect information will still behave like markets with perfect

information.

Based on the research, there are two important players in the *signaling theory*: those who give signals (*signalers*) and those who receive signals (*receivers*). The signal giver must determine and decide how they must do it to send the signal or information they have to other people. The signal giver in this case is like a manager who has complete information about the resources to the products they have that outsiders do not own. The information provided by insiders can be either positive or negative information considered useful to outsiders. However, companies should provide positive information to convince outsiders about the company's quality.

In short, not all confidential information is useful for passing signals to outsiders. Two characteristics can be said to make the signal effective. First is the ability to observe signals (*Signal Observability*), which means that insiders who observe outsiders can receive the signals they will give or not. Second, the signal cost *is* when a company realizes that giving signals to outsiders requires greater costs and is not in accordance with the expected benefits. This condition will then cause an incorrect signal to occur, and this condition can return to normal if the signal receiver can ignore the signal. Confidential information includes specific products or services owned by the company, the discovery or development of new products, the latest reports regarding company receipts, company legal entities, and cooperative organizations established by the company. Later, the signal receiver (receiver*)* needs to know how to describe the intent of the signal that has been given. The signal receiver is the third element in the signaling process; in this case, the receiver is an outsider who lacks information about a particular company.

In the latest year, Conterius et al. (2023) focused on understanding how the presence of foreign investors affects the yield and volatility of the domestic government bond market. The results indicate that an increased involvement of foreign investors reduces domestic government bond yields, both in the overall sample and developing countries, over the short and long term. A recent study by Shida (2023) highlights that the secondary market yield, issuer's syndication announcements, auction volume, and underpricing in preceding auctions have a notable positive impact on demand. Moreover, it indicates a favorable influence of central bank net purchases in the secondary market, particularly for short-term bonds. Still, it acknowledges adverse effects related to market volatility and the introduction of the leverage ratio for banks from a regulatory perspective.

When the signal receiver understands the signal or information provided earlier, they can decide whether to buy, register, or invest according to the signal given; for example, a shareholder who receives a signal from a company that the company can provide greater profits in the future if the shareholder buys the assets that the company owns. The same thing applies to consumers who receive signals that the goods or services they buy will generate large profits if they buy them because the goods or services they buy later are of high quality. Briefly, the process of signaling according to time is explained as follows: the signal giver whether it is a person, the government, or a company owns goods in the form of bonds then gives a signal of information related to government bonds, the signal is then sent to outside parties. The signal receiver then interprets the signal and chooses the product offered.

When associated with government bonds, the signal can be in the form of financial or non-financial information that provides insight to investors. Information about government bonds is attractive to investors when they make decisions to invest because it illustrates the future prospects for government bonds. Investors will assess the performance of government bonds based on various aspects. This signal is information regarding the company's condition to owners or interested parties. The signal can also be given by disclosing information on government bond data such as maturity, coupon rate, type of bond, and number of bonds issued.

Market risk is caused by investors' reactions to tangible and intangible events. Stock prices

fluctuate for many reasons. The frequency of price changes may be high or short or remain unchanged. A general rise in stock prices is a *bullish trend,* and vice versa. The reverse situation is referred to as a *bearish trend.* An investor can note this change from the stock price index on the stock market. Various factors affect market risk, from economic to political, entrepreneurial to social. The causes of this phenomenon are manifold. However, the magnitude depends on the attitude of investors. The initial reaction signals a fear of loss. Still, following the herd instincts of building a situation where it seems all investors are out for it, the emotional instability of such investors collectively leads to a growing overreaction. Market risk is a major constituent of systematic risk.

Default risk measures borrowers' probability of failing to repay their loan obligations. Borrowers have a higher risk of default with poor credit ratings and limited cash flow. For consumers, the risk of default can influence the rate and terms you will meet if the lender sees you as having a high risk of default. It can even cause you to be refused a loan. *Default* risk does not only apply to borrowers who want to take out loans. It also relates to the company issuing the bonds and whether they can make interest payments.

Inflation risk refers to the impact of inflation on investment. An increase in the price level of goods and services is generally called inflation. The direct impact of inflation is to delay consumption. In investment management, investment in securities is also considered as consumption. Thus, it means that an increase in the inflation rate reduces the purchasing power of investors and vice versa. Rational investors should include an allowance for purchasing power risk in their estimates of expected returns. Inflation risk impacts debt securities and equity markets in the same direction.

3. Research methods

The data used in this study are 1-year government bond *yield data, government bond index, composite bond index, and composite stock price index. Yield* government bonds with a tenor of 1 year are used to see the performance of bond mutual funds. The *benchmark* is measured using the government bond index and the composite bond index, while the JCI is used as a proxy for stock market performance. The data used is monthly, from January 2017 to December 2021.

The multi-factor analysis model commonly used in the bond performance literature; this model is the same as that used by (Blake et al., 1993) to look at the performance of bonds. The equation model in this study is:

$$r_{i,t} - r_{bench,t} = \alpha_i + \beta_{1,i}\left(Agg_t - r_{f,t}\right) + \beta_{2,i}\,Def_t + \beta_{3,i}\,Term_t + \beta_{4,i}\left(IHSG_t - r_{f,t}\right) + e_{i,t}$$

Information:

$r_{i,t} - r_{bench,t}$: The rate of return on bonds that exceeds the benchmark.

Agg : Aggregate bond market index returns and broad market risk capture.

Def: The difference in returns between the composite bond index and the government bond index index

IHSG: Stock market performance

This study used a multi-factor model to control risk exposure and investigate risk-adjusted returns on bond funds in a research sample.

Table 1. Variable Definition

No	Variable	Definition
1	Government Yields	The level of profit or yield actually obtained by investors with a 5-year tenor bond.
2	Yield benchmarks	The benchmark for bond yields is the 10-year government bond yield.
3	IOPs	Indonesian Government Bond Index
4	ICBI	Indonesia Composite Bond Index
5	JCI	Composite stock price index

4. Results and discussion

Table 2. Descriptive Statistics

Variable	Means	Standard Deviation	Min	Max	Number of Observations
Government Yield tenor of 5 years	6.410	0.850	5.040	8.400	60
Yield Benchmarks	7.030	0.590	5,942	8.600	60
JCI	6101.360	621.080	4538.930	7228.910	60
Government Bond Index	274.510	38.510	212.050	336.520	60
Composite Bond Index	277.410	42.340	209.110	344.060	60

The 5-year government yield is the level of profit or yield obtained by investors with a 5-year tenor bond. Based on the table, the lowest value of the 5-year tenor government yield is 5.04 and the highest value is 8.40, while the average value is 6.41 and has a standard deviation of 0.85. The yield benchmark is used as a benchmark for bond yields, namely the 10-year government bond yield. The average benchmark yield value is 7.03 with the highest value of 8.60 and the lowest of 5.94, while the standard deviation is 0.59.

The performance of the stock market was seen using the JCI; the highest value of the JCI in this study was 7228.91 and the lowest value was 4538.93. The standard deviation of the JCI is 621.08 with an average of 6101.36. The government bond index is used to see the performance of bonds issued by the government. The average value of the government bond index is 274.51, with the highest value being 336.52 and the lowest value being 212.05, while the standard deviation is 38.51.

The performance of corporate bonds is seen from the composite bond index, which has the lowest value of 209.11 and the highest value of 344.06. The average value of the composite bond index is 277.41 and the standard deviation is 42.34. The unit root test is a test that must be used before estimating the ARDL (Autoregressive Distributed Lag) test. This test is carried out to see whether there is a unit root, using the ADF (Augmented Dickey Fuller) test. The criteria that must be shown in this test are the T-test value < ADF Ttes with a level of 5 percent and ADF probability < Significant level with a value of 5 percent so that declared stationary. The ADF stationarity test can be seen in Table 3

Based on the unit root test results in Table 3, the GDP variable is stated to be stationary at the level level. The ADF value is greater than the critical value at the level of 1%, 5% or 10%. Likewise, with the probability (<0.05), whereas at the first different level all variables are stationary except for the PDB variable; this is evidenced by a probability of 0.3897 (>0.05).

The cointegration test is a test used to determine whether there is a long-term balance between variables. The cointegration test in this study uses the *Bound Test approach.* In this approach, cointegration can be seen from the F-statistic value with a critical value. There are two asymptotic limit values for testing cointegration when the independent variables are integrated into I(d) where ($0 \leq d \leq 1$). The lowest value (lower bound) assumes that the regressor is integrated at 1(0), while the highest value (upper bound) assumes that the regressor is integrated at I (1). If the F-statistic value is below the lower bound value, it can be concluded that cointegration does not occur. If the F-statistic value is above the upper bound value of 0, it can be concluded that cointegration has occurred. However, the result is inconclusive if the F-statistic is between the lower and upper bound values. The cointegration test results using the bound test approach can be seen in Table 5 below.

Table 3. Level Unit Root Test

Variable	ADF	Levels	t-statistic	Probability	Information
Government Yield tenor of 5 years	-1.828	1%	-3.525	0.363	Not Stationary
		5%	-2.902		Not Stationary
		10%	-2.588		Not Stationary
Yield Benchmarks	-2.279	1%	-3.525	0.181	Not Stationary
		5%	-2.902		Not Stationary
		10%	-2.588		Not Stationary
JCI	-8.430	1%	-3.525	0.000	stationary
		5%	-2.902		stationary
		10%	-2.588		stationary
Government Bond Index	0.559	1%	-3.528	0.987	Not Stationary
		5%	-2.904		Not Stationary
		10%	-2.589		Not Stationary
Composite Bond Index	0.560	1%	-3.528	0.987	Not Stationary
		5%	-2.904		Not Stationary
		10%	-2.589		Not Stationary

Source: Data processed with Eviews 10

Table 4. First Different Level Unit Root Test

Variable	ADF	Levels	t-statistic	Probability	Information
Government Yield tenor of 5 years	-7.236	1%	-3.527	0.000	stationary
		5%	-2.903		stationary
		10%	-2.589		stationary
Yield Benchmarks	-8.102	1%	-3.527	0.000	stationary
		5%	-2.903		stationary
		10%	-2.589		stationary
JCI	-9.951	1%	-3.528	0.000	stationary
		5%	-2.904		stationary
		10%	-2.589		stationary
Government Bond Index	-7.907	1%	-3.528	0.000	stationary
		5%	-2.904		stationary
		10%	-2.589		stationary
Composite Bond Index	-7.675	1%	-3.528	0.000	stationary
		5%	-2.904		stationary
		10%	-2.589		stationary

Source: Data processed with Eviews 10

Table 5. Cointegration Test Results of *Johansen Trace Statistics*

Hypothesized No.of CE(s)	Eigenvalue	Trace Statistics	critical values 5 Percent	Prob**
None*	0.535	156.613	125.615	0.000
At most 1*	0.469	104.460	95.753	0.011
At most 2	0.322	61.390	69.818	0.195
At most 3	0.242	34.950	47.856	0.450
At most 4	0.178	16.077	29.797	0.706
At most 5	0.038	2.722	15.494	0.978
At most 6	0.000	0.021	3.841	0.882

Information:
*(**) indicates rejection of the hypothesis at the 5% level of confidence
Trace indicates five cointegration equations at α = 5%
Trend assumption: Linear deterministic trend
Series: RRBENCH, DEF, IHSGR, MKTRF, SMB, HML, RF

SC: *Schwarz information criterion*
Interval lag: 1 to 2 *(in first differences)*

When viewed from a trace statistic greater than *the critical value* at a confidence level of α = 5%, based on the trace statistic, one form of the cointegration equation is obtained at a confidence level of 95%. Meanwhile, the results of the Johansen cointegration test based on *the max-eigen value statistics* indicate that there is one form of the cointegration equation at the 95% *confidence level.*

Table 6. The Johansen Maximum Eigenvalue Cointegration Test Results

Hypothesized No.of CE(s)	Eigenvalue	Maximum Eigenvalue	critical values 5 Percent	Prob**
None*	0.535	52.153	46.231	0.010
At most 1*	0.469	43.069	40.077	0.022
At most 2	0.322	26.440	33.876	0.294
At most 3	0.242	18.873	27.584	0.424
At most 4	0.178	13.354	21.131	0.420
At most 5	0.038	2.700	14.264	0.964
At most 6	0.000	0.021	3.841	0.882

Source: Data processed with Eviews 10

Information:
*(**) indicates rejection of the hypothesis at the 5% level of confidence
Trace indicates five cointegration equations at α = 5%
Trend assumption: Linear deterministic trend
Series: RRBENCH, DEF, IHSGR, MKTRF, SMB, HML, RF
SC: Schwarz information criterion
Interval lag: 1 to 2 (in first differences)

Table 7. Estimation Results

Variable	Coefficient	t-statistic	Prob.
Constant	-0.668	-19,673	0.000
DEF	-0.052	-12,219	0.000
IHSGR	4,840	1,773	0.076
MKTRF	-0.018	0.019	0.327
RF	48,658	9,846	0.000
SMB	-0.007	-0.240	0.810
HML	-0.010	-0.535	0.723
Resid (-1)^2	0.586	1,409	0.158
GARCH(-1)	0.297	1,052	0.292
R-squared		0.719	
Adjusted R-Square		1.017	

Source: Eviews 12 data processing

Table 7 in this study shows the results of the goodness of fit model test shown in the coefficient of determination, which explains the influence of the magnitude of the independent variables, namely DEF, IHSGR, MKT, SMB, HML and RF on the dependent variable RRbench. The coefficient of determination R2 Square obtained is 0.719, meaning that all independent variables can explain the dependent variable, namely the firm value of 71.9%.

The estimation results of the model are as follows:

- The DEF variable was found to have a negative relationship and a significant effect on the return on bonds. The DEF variable has a coefficient of -0.052 with a probability value of 0.000.
- The IHSGR variable found that IHSGR has a positive relationship and significant effect at

the 10% level on government bond returns in Indonesia. This is evidenced by the statistical results obtained, namely the coefficient on the IHSGR of 4,840 and a probability value of 0.076.

- The MKTRF variable shows that the *Market Factor* has a negative relationship and does not significantly influence government bond returns. The market factor regression coefficient obtained is -0.018 with a probability value of 0.327.
- *The risk factor* variable has a positive relationship and significantly affects government bond returns in Indonesia. This is because the coefficient value obtained is 48,658 and the probability value is 0.000.
- The SMB variable shows that *small minus big* has a negative relationship and does not significantly influence Indonesia's government bond return. Associated with large capitalization, it has a relatively smaller level of risk and provides a relatively smaller rate of return as well. This can be seen from the SMB variable, which has a coefficient of -0.007 and a probability of 0.810.
- The HML variable shows that *small minus big* has a negative relationship and does not significantly influence government bond returns in Indonesia. The high minus low variable does not affect government bond returns. Many investors only invest based on the game to gain relatively short profits. This can be seen from the HML variable which has a coefficient of -0.010 and a probability of 0.723.

Based on the research results, the default factor negatively and significantly affects government bond returns in Indonesia. Various previous studies examined bond performance, including Ferson et al. (2006) who found that bond market risk factors were sufficient to capture various bond fund risk exposures. The study used a multi-factor model to control for a fund's risk exposure regardless of the bond fund. We include factors and fundamentals related to economic conditions for a robustness check. The results are qualitatively similar to the results obtained in this study. Based on the model, α in Equation (1) can be interpreted as the part of the index-adjusted return that cannot be explained by this risk factor.

Table 7 shows risk returns were significantly negative over the full sample period. Def is the difference in returns between the high and medium yield indexes, $Term$ is the return spread between the medium- and short-term government bond indexes, and IHSGR is the return on the composite stock price index. Our analysis above shows that the performance of the two mutual funds with different evaluation approaches yields very different results. The index-adjusted returns show significant differences and variations in performance, which are consistent across fund styles. On the other hand, risk-adjusted returns are stable and consistently negative over time. If we measure the performance of bond funds relative to their benchmarks, many bond funds outperform their benchmarks even after the issuance of funds. The outstanding performance shown by the fund also varies over time and is correlated with the condition of the bond market. However, suppose we assess the performance of government bond funds based on the standard multifactor model. In that case, bond funds exhibit negative risk-adjusted returns, and negative risk-adjusted returns are mostly stable and persisting over the sample period. The risk exposure of bond funds differs substantially from their benchmarks.

This study found that joint stock performance has a positive relationship and significantly influences government bond returns in Indonesia. Baker and Wurgler (2008) found interesting things about the relationship between bonds and stocks associated with investor sentiment changes.

In addition, this study found that the *Market Factor* has a negative relationship and does not

significantly influence the return on government bonds in Indonesia. This government bond has a low credit risk because it is backed by full trust and credit from the government. Government bonds do present market risk if sold before maturity, and they also carry some inflation risk in that their relatively lower returns will not offset inflation. While not risk free, government bonds tend to be less risky than equity investments because they are issued by national governments, not corporations or stocks. Government bonds are considered relatively low risk compared to other debt securities.

Aside from credit risk, government bonds have a few other pitfalls to watch out for interest rate, inflation, and currency risks. Table 4 shows that the estimated spread yields positively both the realized covariance returns of stocks and bonds and the normalization afforded by the CAPM of bond betas. The coefficients on the distribution of yields are statistically significant except at the 12-month horizon in the covariance regression and significant across all bond horizons. These results suggest that at least part of the countercyclical variation in expected excess bond returns is driven by the countercyclical variation in bond risk as measured by the movement of bond returns over stock returns.

When the yield differential widens, bonds' real cash flow risk (or inflation) decreases. This encourages increased aggregate risk and discourages investors from all risky assets. The risk premium (or risk aversion) more than offsets the cash flow effect, and the bond risk moves cyclically.

Risk Factors found that it has a positive relationship and significant effect on government bond returns in Indonesia. *Small minus big (SMB)* has a negative relationship and has no significant effect on government bond returns in Indonesia. This is in accordance with Fama and French (1992), which is related to large capitalization having a relatively smaller risk level that provides a relatively lower rate of return. Some investors have recognized that increasing capitalization value means using certain stocks to get optimal stock returns with minimal risk (Bauer et al., 2018). Companies with large capitalization tend to have a level of stability to changes both internally and externally (Nitschka, 2018).

5. Conclusion

Based on the results of the research and the results of the analysis that has been tested in the previous chapters, the following conclusions can be drawn:

The default factor negatively and significantly affects government bond returns in Indonesia. Bond market risk factors are believed to be sufficient to capture the various risk exposures of bond funds.

Joint stock performance has a positive relationship and significantly influences government bond returns in Indonesia.

Market Factor has a negative relationship and has no significant effect on government bond returns.

The study results concluded that the risk exposure factor has a positive relationship and significantly affects yields on government bond returns in Indonesia.

The SMB variable shows that *small minus big* has a negative relationship and does not significantly influence Indonesia's government bond return. Associated with large capitalization, it has a relatively smaller level of risk and provides a relatively smaller rate of return as well.

High minus low does not affect government bond returns. Many investors only invest based on the game to gain relatively short profits.

References

1. Bauer, M. D., and Hamilton, J. D. (2018). Robust bond risk premia. *The Review of Financial Studies*, 31(2), pp. 399-448.

2. Blake, C. R., Elton, E. J., and Gruber, M. J. (1993). The Performance of Bond Mutual Funds. The Journal of Business, 66 (3), 371. https://doi.org/10.1086/296609
3. Carpenter, J. N., Lu, F., and Whitelaw, R. F. (2022). Government Bond Risk and Return in the US and China.
4. Conterius, S., Akimov, A., Su, J. J., and Roca, E. (2023). Do foreign investors have a positive impact on the domestic government bonds market? A panel pooled mean group approach. *Economic Analysis and Policy*, 77(71), pp. 863-875, https://doi.org/10.1016/j.eap.2022.12.031
5. Creal, D. D., and Wu, J. C. (2020). Bond Risk Premia in Consumption-Based Models. *Quantitative Economics*, 11(4), pp. 1461–1484. https://doi.org/10.3982/qe887
6. Daniel, K., Mota, L., Rottke, S., and Santos, T. (2020). The Cross-Section of Risk and Returns. *Review of Financial Studies*, 33 (5), pp. 1927–1979. https://doi.org/10.1093/rfs/hhaa021
7. Fan, J., Ke, Y., and Liao, Y. (2021). Augmented Factor Models with Applications to Validate Market Risk Factors and Forecasting Bond Risk Premia. *Journal of Econometrics*, 222(1), pp. 269–294. https://doi.org/10.1016/j.jeconom.2020.07.002
8. Fama, E. F., and French, K. R. (1992). The cross-section of expected stock returns. *the Journal of Finance*, 47(2), pp. 427-465. https://doi.org/10.1111/j.1540-6261.1992.tb04398.x
9. Febi, W., Schäfer, D., Stephan, A., and Sun, C. (2018). The Impact of Liquidity Risk on the Yield Spread of Green Bonds. Finance *Research Letters*, 27(9), pp. 53–59. https://doi.org/10.1016/j.frl.2018.02.025
10. Feldhütter, P., Heyerdahl-Larsen, C., and Illeditsch, P. (2018). Risk premia and volatilities in a nonlinear term structure model. *Review of Finance*, 22(1), pp. 337-380. https://doi.org/10.1093/rof/rfw052
11. Ferson, W., Henry, T. R., and Kisgen, D. J. (2006). Evaluating government bond fund performance with stochastic discount factors. *Review of Financial Studies*, 19(2), pp. 423–455. https://doi.org/10.1093/rfs/hhj015
12. Haddad, V., and Sraer, D. (2020). The Banking View of Bond Risk Premium. *Journal of Finance*, 75(5), pp. 2465–2502. https://doi.org/10.1111/jofi.12949
13. Kim, D., Li, C., and Wang, X. (2021). Risk-Taking and Performance of Government Bond Mutual Funds. *International Review of Financial Analysis*, 76(11), A. 101780. https://doi.org/10.1016/j.irfa.2021.101780
14. Korn, O., and Koziol, C. (2006). Bond Portfolio Optimization A Risk: Return Approach. *Journal of Fixed Income*. 15(4), pp. 48-60. https://doi.org/10.3905/jfi.2006.627839
15. Martin, B., and Swanson, A. (2022). A Markowitz-based alternative model: Hedging market shocks under endowment constraints. *Review of Financial Economics*, 40(4), pp. 335-347. https://doi.org/10.1002/rfe.1147
16. Nitschka, T. (2018). Bond Market Ride of Time Variation in Exposures to Global Risk Factors and The Role of US Monetary Policy. *Journal of International Money and Finance*, 83(3), pp. 44–54. https://doi.org/10.1016/j.jimonfin.2018.02.002
17. Ouyang, T., and Lu, X. (2021). Risk Evaluation on China Government Bonds with EWMAVaR and SVM Methods. *Security and Communication Networks*. pp. 1-8. https://doi.org/10.1155/2021/9617933
18. Pasricha, P., Selvamuthu, D., D'Amico, G., and Manca, R. (2020). Portfolio optimization of credit risky bonds: a semi-Markov process approach. *Financial Innovation*, 6, pp. 1-14. https://doi.org/10.1186/s40854-020-00186-1
19. Pratama, Y. Y., Andriana, I., and Umrie, H. R. H. (2020). The Analysis of Optimal Stock-Bond Portfolio Strategy: Empirical Study in LQ 45 Index Companies and Government Bonds Listed

on Indonesia Stock Exchange. *Jurnal Manajemen dan Bisnis Sriwijaya*, 18(3), pp. 145-160. https://doi.org/10.29259/jmbs.v18i3.12642

20. Shida, J (2023). Primary market demand for German government bonds. *Journal of International Money and Finance.* 137(33), A. 102909. https://doi.org/10.1016/j.jimonfin.2023.102909

IJAAF; Vol. 8, No. 3, Summer 2024, Serial 28

Iranian Journal of
Accounting, Auditing & Finance

Ferdowsi University of Mashhad

Quarterly

RESEARCH ARTICLE

Exploring the Evolution of Robust Portfolio Optimization: A Scientometric Analysis

Amirhossein Eskorouchi, Hossein Ghanbari

School of Industrial Engineering, Iran University of Science and Technology, Tehran, Iran

Emran Mohammadi*

Department of Industrial and Systems Engineering, Mississippi State University, Mississippi State 39762, USA

How to cite this article:
Eskorouchi, A., Ghanbari, H., & Mohammadi, E. (2024). Exploring the Evolution of Robust Portfolio Optimization: A Scientometric Analysis. Iranian Journal of Accounting, Auditing and Finance, 8(3), 75-92. doi: 10.22067/ijaaf.2024.44518.1402
https://ijaaf.um.ac.ir/article_44518.html

ARTICLE INFO

Article History
Received: 2023-09-01
Accepted: 2023-12-19
Published online: 2024-07-06

Abstract

In the wake of recent turbulent events in the global economy, the need for robust methods to navigate uncertainties in financial markets has become increasingly apparent. Robust portfolio optimization (RPO) offers a solution by devising investment strategies that perform well even under adverse scenarios of uncertain inputs such as returns and covariances. This paper conducts a systematic review of recent developments and extensions in the field of RPO. Leveraging bibliometric analysis and visual mapping techniques, we scrutinize 1085 articles published between 2000 and 2023. Our analysis traces the evolution and trends within RPO, examining the interconnectedness among articles, authors, sources, countries, and keywords. The insights gleaned from our study can guide future research endeavors in this domain and aid practitioners in making more informed investment decisions.

Keywords:
Bibliometric Analysis, Financial Markets, Robust Portfolio Optimization, Uncertainty, Scientometric Analysis

https://doi.org/10.22067/ijaaf.2024.44518.1402

NUMBER OF REFERENCES
51

NUMBER OF FIGURES
19

NUMBER OF TABLES
3

Homepage: https://ijaaf.um.ac.ir
E-Issn: 2717-4131
P-Issn: 2588-6142

*Corresponding Author: Emran Mohammadi
Email: e_mohammadi@iust.ac.ir
Tel: 09124304053
ORCID:

1. Introduction

The capital market represents the country's international development and is a critical tool for determining its economy's main direction (Fooeik et al., 2022; Ghanbari et al., 2022). Individuals, brokers, and fund managers invest billions of dollars annually in the capital markets. Thus, choosing which options to invest in to get the highest return with the least investment risk has become an important issue among economic activists (Kalayci et al., 2019). Constructing a portfolio of assets is one of the most common investment strategies in this regard. The problem of portfolio optimization (PO) is crucial when allocating funds optimally among financial assets to maximize return and minimize risk. A key study in PO was Markowitz's Mean-Variance (MV) model, which established the modern era of portfolio theory. In addition to considering the return on investment, in 1952, Markowitz suggested that the covariance between securities as a risk measure should also be considered when selecting assets to invest in. Yet, according to the academic literature, modern portfolio management has several shortcomings and offers mixed results, particularly in light of the 2007-2009 financial crisis shocks (see (Jobson and Korkie, 1981; Arreola Hernandez et al., 2017; Best and Grauer, 1991; Schubert, 2009)). To address the shortcomings of the early MV model, new constraints, objectives, and approaches were developed ((Sharpe, 1963; Konno and Yamazaki, 1991; Rockafellar and Uryasev, 1999; Skoruchi and Mohammadi, 2022)). As a result, the literature on PO problems has grown significantly in both volume and variety, allowing a diversity of classification systems to be used.

An obvious classification of the PO problem is to optimize the risk measure. In addition to using the variance of returns alone to define investment risk, several risk measures can provide a more accurate picture of risk in investments (Ortobelli et al., 2005; Buehler et al., 2019). In this case, researchers proposed a number of criteria for risk assessment, each of which addressed an aspect of the uncertainty debate and in some cases complemented each other (Ghanbari et al., 2023). In general, two main categories of risk measures have been proposed: volatility-based and downside-based (Catania and Luati, 2021; Mensi et al., 2019). While volatility risk measures refer to the fluctuation of a variable around a mean or other random parameter, downside risk measures examine only the destructive part of the risk, focusing on harmful fluctuations. Downside risk measures can be classified into two categories: semi-risk and quantile-based. Measures such as semi-variance (Rubinstein, 2002) and semi-standard deviation (Ledoit and Wolf, 2003) belong to the group of semi-risk measures, and measures such as Value-at-Risk (VaR) (Jorion, 2007) and Conditional-Value-at-Risk (CVaR) or expected shortfall (Rockafellar and Uryasev, 2002) belong to the group of quantile-based measures. In the context of volatility risk measures, which include mean-variance (Goldfarb and Iyengar, 2003), mean absolute deviation (Demiguel et al., 2007), lower partial moment (Fishburn, 1977), systematic risk (Sharpet, 1964), and factor-based portfolio models (Fama and French, 1992), Sharpe (1966) and Bernardo and Ledoit (2000) introduced the Sharpe Ratio and Omega Ratio, respectively, to evaluate portfolio performance simultaneously based on risk and return.

The literature on the mean-variance PO problems usually assumes that the problem parameters are known with certainty ignoring estimation errors. However, this framework requires the estimation of both the mean and the covariance matrices of the asset returns. These parameters are virtually unknown, and the resulting optimal solution heavily depends on the quality of the estimated parameters, which are based on some assumptions that may or may not hold (Eskorouchi et al., 2022). In other words, we live in an uncertain world where many uncertain factors affect asset returns. In this case, several approaches have been proposed in the literature to reduce the parameter sensitivity of PO models (see (Goldfarb and Iyengar, 2003) for a comprehensive list of these approaches and relevant research). Different approaches in the literature for handling uncertainty in mathematical programs include stochastic programming and robust methodology. The stochastic programming

methodology uses a decision tree and considers all possible scenarios. This makes the approach hard to solve because the resulting program dimension increases exponentially as the problem size increases (Masmoudi and Abdelaziz, 2018). Recent advances in robust Optimization have focused on developing methods to handle uncertainty in optimization problems by explicitly accounting for parameter uncertainty and optimizing worst-case performance over a set of plausible scenarios (Lu et al., 2022).

Robust Optimization has become an increasingly popular area of research over the past two decades, especially for problems with significant uncertainty in the input parameters (Dauod et al., 2019). One of the first approaches to robust Optimization was presented by Soyster (Soyster, 1973), but his method was criticized for being overly pessimistic and conservative. In response, Ben-Tal and Nemirovski (1999) developed a new robust method that was more optimistic and allowed for a wider range of possible outcomes. Their method uses an interior point-based algorithm to find the robust solution on a counterpart of the initial model. It includes a parameter Ω that controls the probability of deviation from the nominal constraints. While the implementation of Ben-Tal and Nemirovski's method changes an ordinary linear programming problem into a convex nonlinear problem, it has been shown to be effective in many PO problems, where the final optimal solution remains feasible despite uncertainty in different input parameters. Bertsimas and Sim (2003) developed a robust optimization approach aiming to preserve as much of the original problem structure as possible. Their method involves reformulating the robust optimization problem as a second-order cone program, which can be solved efficiently using standard optimization software. This approach has the advantage of maintaining the same problem structure as the original problem, which can be important for some applications. Additionally, their method may not provide solutions that are as optimistic as other robust optimization methods. Still, it has the advantage of being more accessible to practitioners accustomed to regular optimization techniques. Bertsimas and Sim's approach is effective in a wide range of applications, including PO, supply chain management, and transportation planning.

Robust portfolio optimization (RPO) aims to combat the sensitivity of optimal portfolios to errors in input estimates by imposing the model's constraints over a set of plausible parameter values rather than a single most likely value (Sadjadi et al., 2012). The new robust optimization problem is then solved, assuming the worst-case behavior within the plausible set of the parameter values (Lutgens and Sturm, 2003). Given the rising interest in RPO, several reviews have identified key findings and trends in the field, including developing new methods and their application to real-world problems, as indicated in Table 1.

Goldfarb and Iyengar (2003) introduced approaches for addressing RPO issues by reforming uncertainty frameworks into second-order cone programs. Zhang et al. (2017) presented an overview of enhanced iterations of the mean-variance portfolio selection model, incorporating robust Optimization. Milhomem and Dantas (2020) provided a comprehensive overview of exact and heuristic methods, software/programming languages, constraints, and types of analysis to solve the PO problem, emphasizing the importance of robust optimization techniques, fuzzy logic, and forecasting to mitigate estimation errors, with implications for both researchers and investors, along with identified trends and gaps for future exploration. Xidonas et al. (2020) compiled a categorized bibliography focused on applying robust mathematical programming to address issues in portfolio selection. Ghahtarani et al. (2022) provided an organized bibliography on robust mathematical programming for portfolio selection, providing a convenient resource for accessing relevant research and exploring future avenues.

Table 1. A selection of previous reviews on RPO

Year	Authors	Key Contribution
2003	Goldfarb and Iyengar	Presented methods to solve robust portfolio selection problems using uncertainty structures, reformulated as second-order cone programs.
2018	Zhang et al.	Provided a review of improved versions of the mean-variance portfolio selection model, including robust Optimization.
2020	Milhomem and Dantas	Explored methods of PO, focusing on robust techniques and forecasting to reduce estimation error, with implications for researchers and investors, highlighting trends and future research opportunities.
2020	Xidonas et al.	Provided a categorized bibliography on the application of robust mathematical programming to the portfolio selection problem.
2022	Ghahtarani et al.	Presented a categorized bibliography on robust mathematical programming for portfolio selection, offering quick access to related research and future directions.

This research aims to conduct a comprehensive Scientometric study in the area of RPO and provides an overview of the recent and current developments in this area.

In summary, the contributions of this research are highlighted as follows: 1) This study pioneers the incorporation of Scientometric analysis into the research topic by employing VOSviewer and Bibliometric tools, offering an effective framework for shaping and comprehending RPO. 2) This research categorizes a diverse array of documents related to the investigation of RPO. 3) Opportunities for further research can be revealed by applying maps of networks and conducting reviews of topic clusters, allowing for identifying emerging themes from both empirical and theoretical literature.

The structure of this paper is organized as follows: In Section 2, we demonstrate the data and methodology used in this review. Subsequently, we present the results of a bibliometric analysis that highlights recent trends in the research area under investigation. This analysis also provides an overview of the most influential authors, journals, affiliations, and documents. Section 4 contains a discussion of the strengths and limitations of the study. Finally, Section 5 concludes the paper and discusses future research directions.

2. Materials and methods

In the era of "Big Science" keeping up with all contributions and reviewing all scientific publications has become difficult for the research community (Zabavnik and Verbič, 2021). Bibliometrics solves this problem by providing statistical measures for evaluating the literature on a particular research area (Aria and Cuccurullo, 2017). Bibliometric analysis is a useful way to measure the influence of publications in the scientific community by statistically evaluating published articles, books, or book chapters (Broadus, 1987). There has been a growing interest in bibliometric analysis recently, with its applications being widely adopted in various scientific fields (Motamedi, 2023; Amiri et al., 2023; Wan et al., 2023). However, the application of bibliometric analysis in finance, particularly in the PO, is relatively new, and only a few researchers have focused on this subject in recent years. This paper focuses primarily on conducting a bibliometric analysis to identify emerging trends, outstanding publications, articles, journals, authors, countries, and institutions that have significantly impacted the development of the research area under investigation.

Bibliometric analysis requires the collection of relevant documents to create a database. To achieve this, it is crucial to define appropriate search terms in databases such as Web of Science and Scopus. The search terms must be carefully selected to ensure they retrieve documents relevant to the research

topic and are comprehensive enough to enable bibliometric analysis (Kilani and Kobziev, 2016; Xiang, 2014). This study adopted a two-step methodology to determine the final search terms. Firstly, we reviewed the literature to identify relevant keywords, see Table 1. Subsequently, we consulted subject matter experts and brainstormed amongst ourselves to finalize the search terms. The resulting list of keywords included "Portfolio Optimization", "Portfolio Selection", "Robust", and "Robustness".

Table 2. The main keyword combination structure

Level	Search Terms
1	Portfolio
	AND
2	Optimization OR Selection
	AND
3	Robust*

Based on the list of keywords extracted from Table 2, a search query was constructed using the "AND" and "OR" operators to obtain relevant documents from the Web of Science database. A total of 1,085 documents published between 2000 and 2023 were retrieved. After reviewing document titles and abstracts, 85 articles were excluded as irrelevant, leaving 1,000 articles for further analysis using Scientometrics. The bibliometric data collected included article titles, abstracts, keywords, full-text publications, and references. Figure 1 provides an overview of the bibliometric analysis procedure. It's worth noting that the collected data was cleansed of duplicates and erroneous entries before conducting the bibliometric analysis. The Web of Science is a vast bibliographic database containing scholarly literature from a wide range of fields (Dzikowski, 2018).

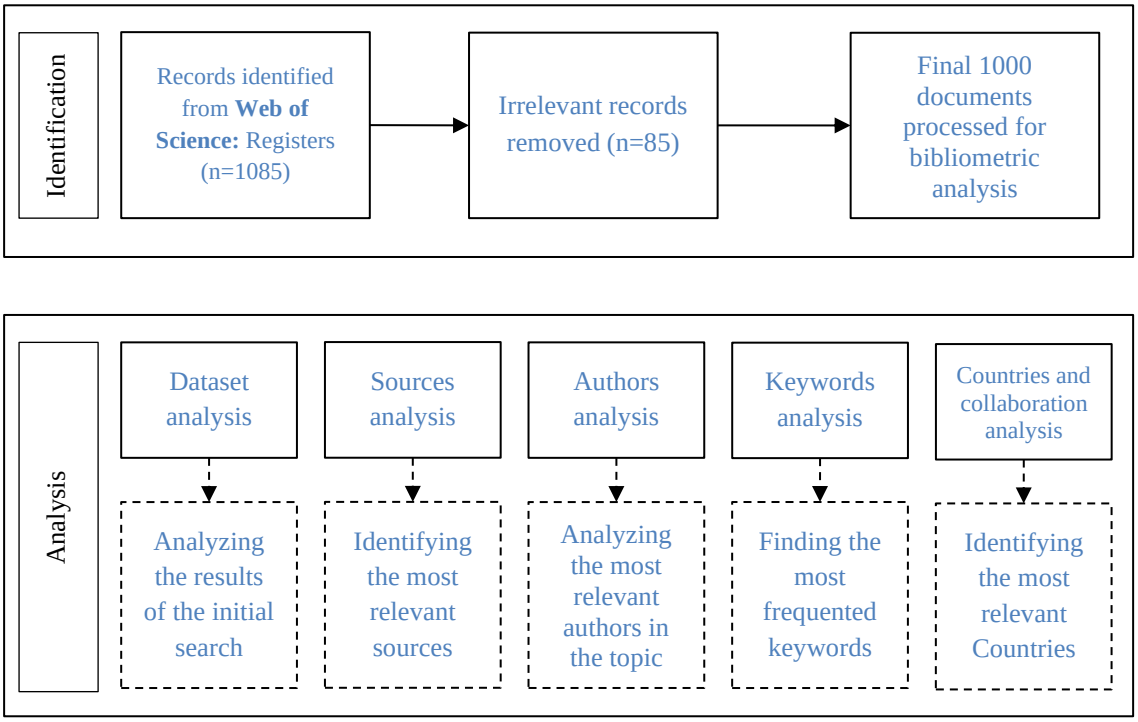

Figure 1. Literature Search Strategy

3. Bibliometrics analysis

The findings of this study have been categorized into five distinct subsections, including dataset analysis, source analysis, keywords analysis, authors analysis, and countries and collaboration analysis. Each subsection provides a comprehensive overview of the bibliometric data collected and analyzed.

3.1 Dataset analysis

Out of the 1000 documents selected for this study, a total of 440 sources and 2056 authors were identified. Table 3 provides a summary of the general information related to the papers analyzed in this study.

Table 3. An overview of the descriptive information

Description	Results
Timespan	2000:2023
Sources (Journals, Books, etc.)	440
Documents	1000
Annual Growth Rate %	8.83%
Document Average Age	6.670
Average citations per doc	17.200
References	23118
Author's Keywords (DE)	2479
Authors	2056
Authors of single-authored docs	83
Co-Authors per Doc	2.830

The document types are summarized in Figure 2, and as shown, the majority of the documents are articles.

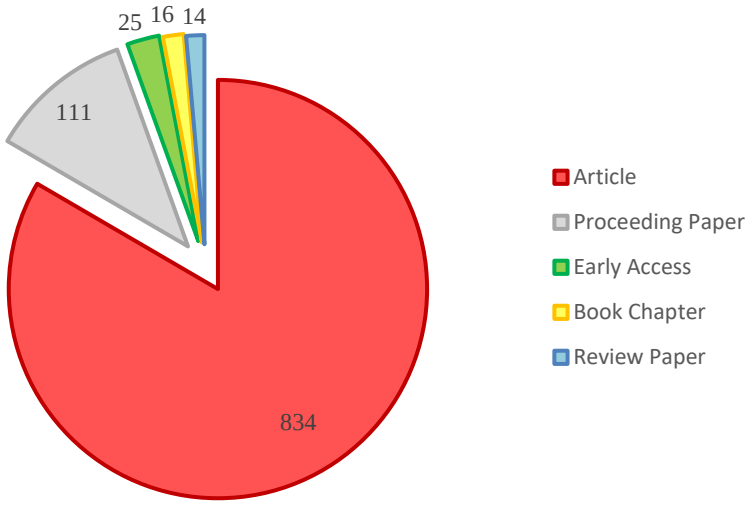

Figure 2. An overview of the type of the document

Figure 3 demonstrates a significant increase in the number of studies published in recent years, indicating a growing interest from the academic community. The annual growth rate has risen from one document in 2000 to over 100 documents in 2022. Figure 4 depicts the average annual citation

count, with 2003 exhibiting the highest value.

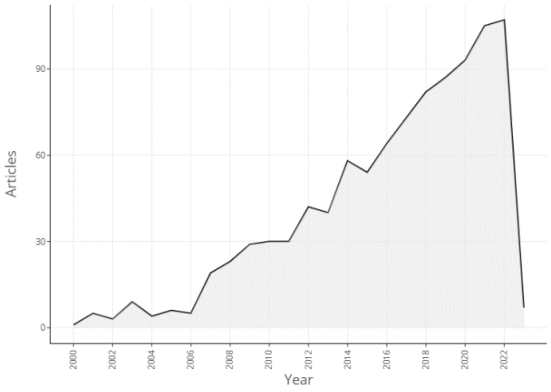

Figure 3. Annual scientific production

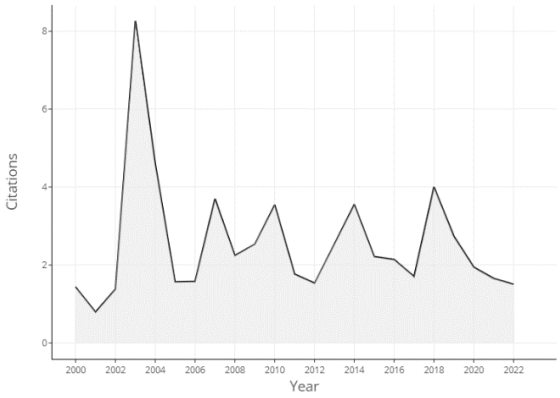

Figure 4. Average article citation per year

3.2 Sources analysis

Figure 5 presents a ranking of sources based on the number of articles published on RPO. The results indicate that this area has received significant attention, with a large number of articles being published in the European Journal of Operation Research (68), followed by Annals of Operation Research (30) and Quantitative Finance (23), respectively. These findings suggest that these sources are important references for researchers interested in this field. In Figure 6, the top 10 sources are ranked based on their h-index. The h-index is a quantitative measure that assesses the overall impact of researchers, journals, countries, and institutions and has been widely used since its introduction in 2005 (Hirsch, 2010). The European Journal of Operation Research and the Journal of Banking and Finance have the highest h-index among the analyzed sources, indicating their significant impact and influence.

Figure 5. Distribution of documents across sources

Figure 6. Top sources by H-index

This section analyzes the most impactful sources in the field of RPO. Figure 7 depicts the distribution of the most cited sources. The European Journal of Operation Research is ranked top with 1794 citations, followed closely by the Journal of Finance with 1552 citations.

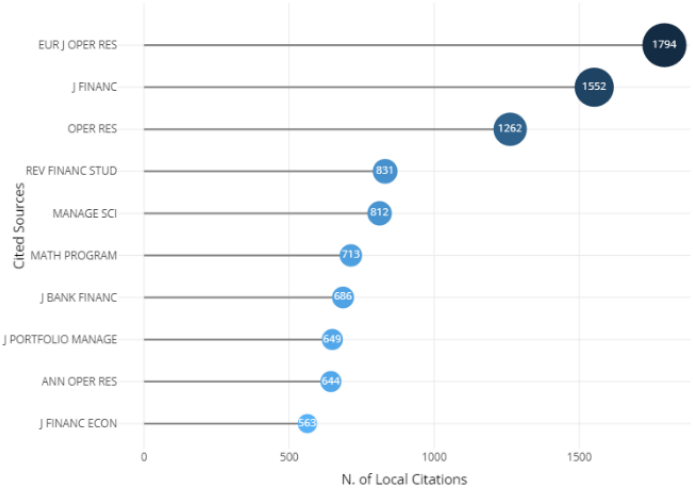

Figure 7. Most local cited resources

Bradford's Law is a bibliometric principle that states that the most frequently cited sources in a field tend to be concentrated in a small number of core journals or sources, followed by a larger number of less-cited sources. In the case of RPO, Figure 8 shows that only ten journals are included in zone 1 or the core area, which are the most frequently cited in the literature on this subject.

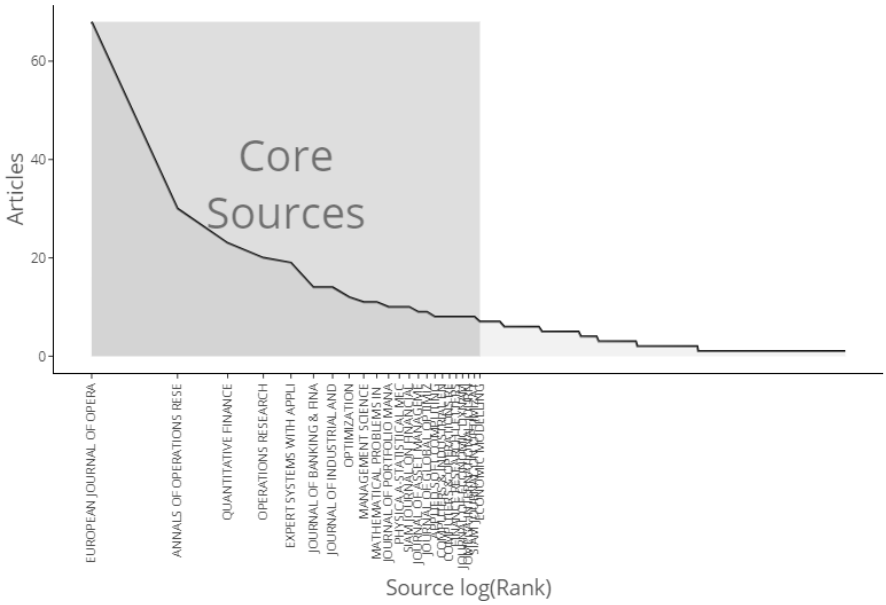

Figure 8. Source clustering through Bradford's Law

3.3 Authors Analysis

Figure 9 displays the top ten most influential authors based on the number of published articles in the field of RPO.

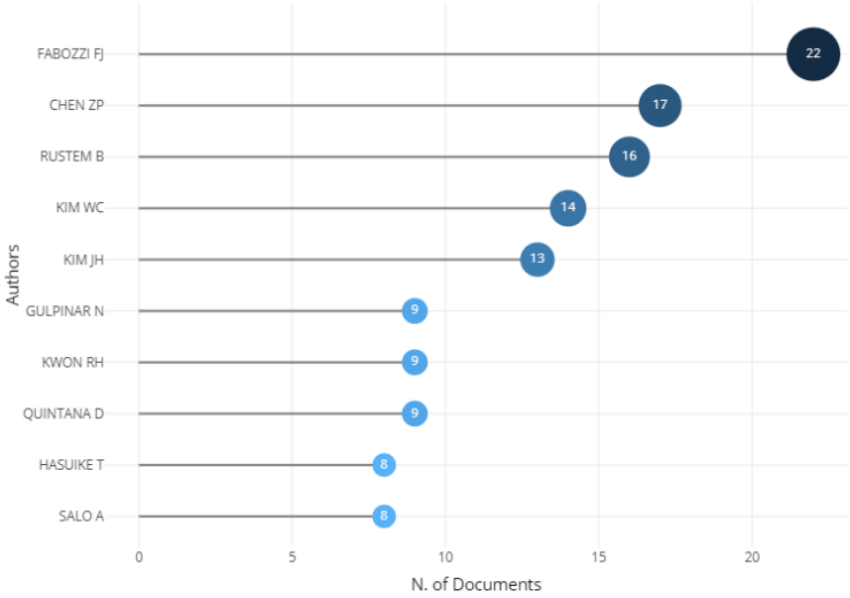

Figure 9. Number of publications by authors

Figure 10 presents the top authors and their publications on RPO analysis over the years. The intensity of color in the graph corresponds to the citation year, while the bubble size represents the number of articles published by each author in a given year. For instance, Fabozzi published his first article on this topic in 2006. The following year, he published two more papers and another one in 2008.

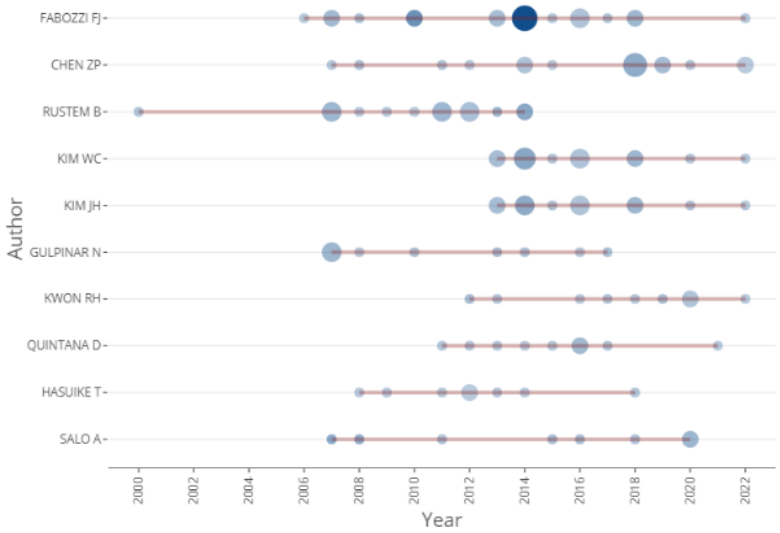

Figure 10. Top authors' production over time

3.4 Keywords Analysis

The most frequent keywords in the 2000–2023 period are presented in Figure 11.

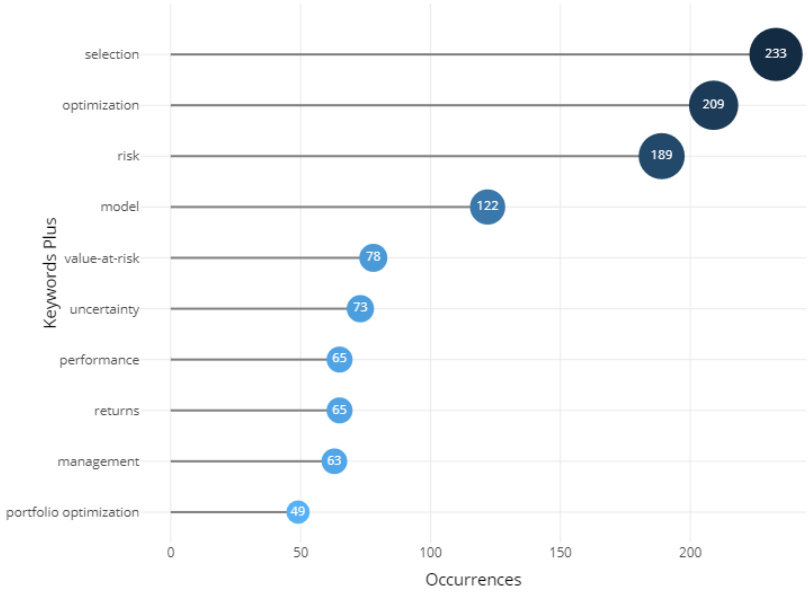

Figure 11. The most frequent keywords

In addition to identifying research topics, keyword analysis enables the study of their evolution over time. Figure 12 presents an overlay visualization of the keyword network.

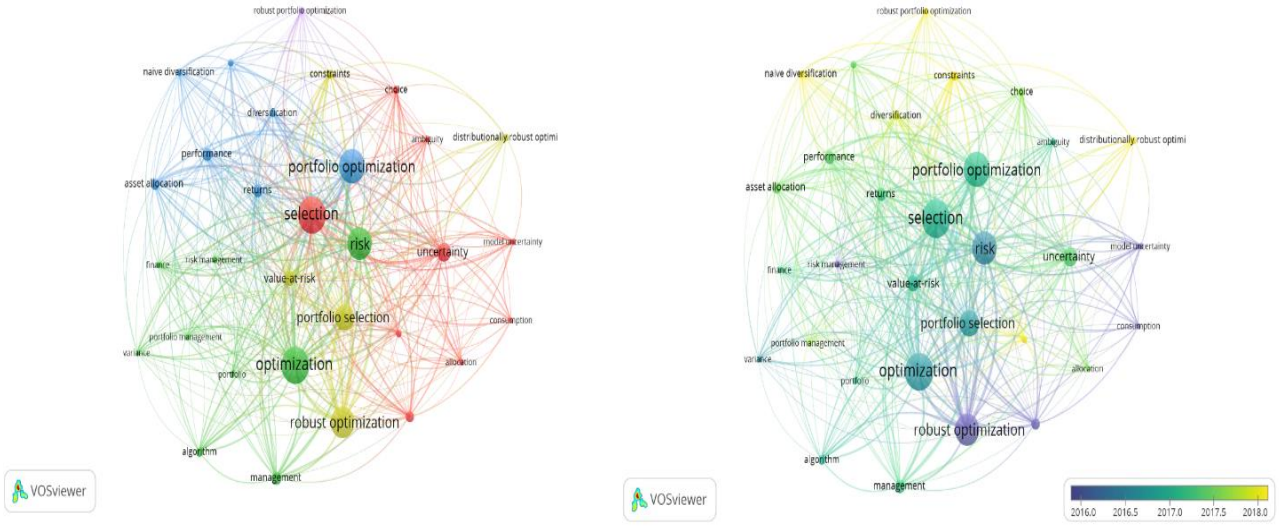

Figure 12. Network of co-occurring keywords

A trending topic analysis is an essential mapping tool that helps demonstrate the evolution of literature. Figure 13 illustrates the topics identified by examining the author's keywords.

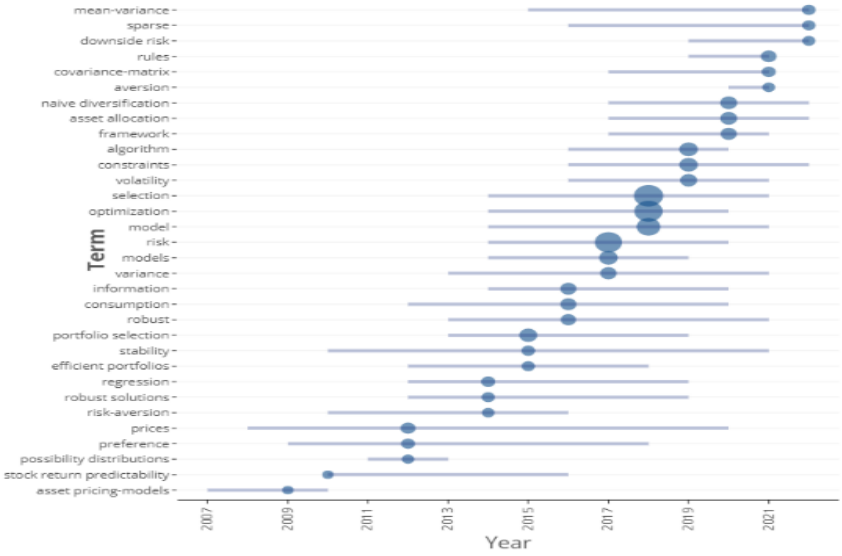

Figure 13. Trend topic over the year

The co-word or co-occurring keywords analysis identifies the most significant keywords in the analyzed bibliographic records. It helps determine which categories of analysis are most relevant in the field of study, with a larger size indicating a higher frequency. Figure 14 illustrates the co-occurring keyword analysis.

Figure 14. Word Cloud

The thematic map produced through this analysis presents a segmentation into four topic quadrants based on the density and centrality of the issues depicted in Figure 15. The upper-right quadrant, characterized by high density and centrality, features themes that require more profound scrutiny and examination. The analysis identified 13 major clusters of keywords, which can provide valuable insight into the field of study.

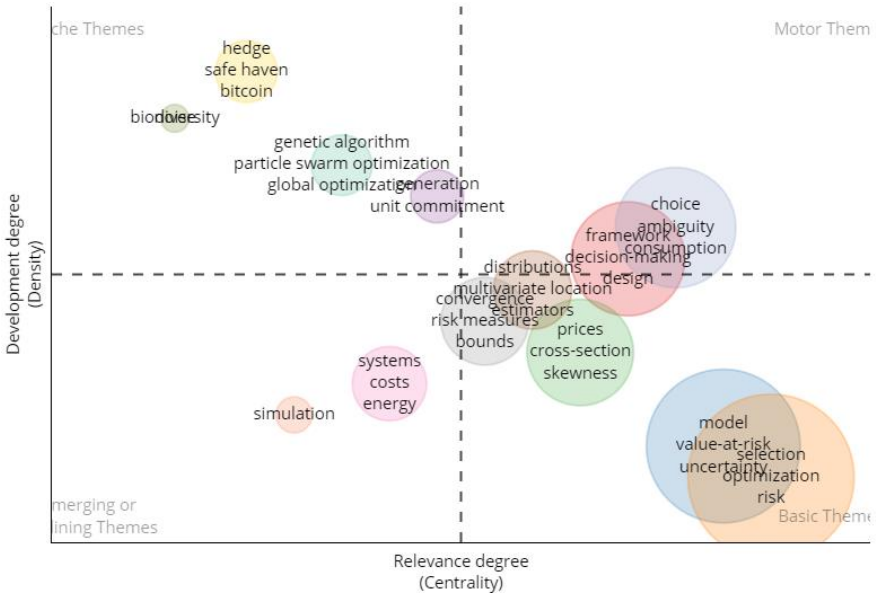

Figure 15. Thematic map

Thematic evolution is a bibliometric technique that provides a historical perspective on research and contributes to a science-based paradigm for directing further research themes. It emphasizes the most significant research themes of evolution across time, providing insights into the area's future direction (Moral-Munoz et al., 2018). Figure 16 illustrates the progression of the most frequently used terms in the study of RPO based on the co-occurrence network from 2000 to 2023. Two periods were selected as cut-off points: 2010 and 2020.

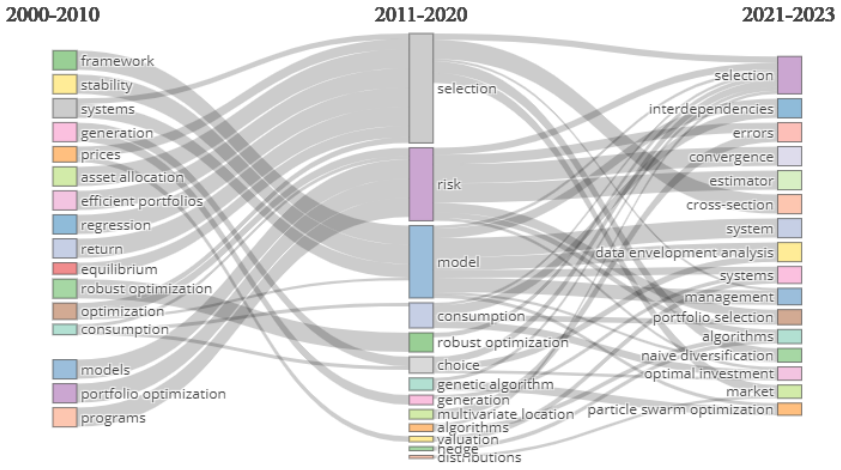

Figure 16. Thematic evolution

3.5 Countries and Collaboration Analysis

According to the bibliometric analysis conducted, the top countries contributing to research in the field of RPO, based on the number of citations, are the United States, China, France, the United Kingdom, and Canada, with 4192, 2258, 1469, 1292, and 1222 citations respectively. Figure 17 illustrates this distribution of citations among countries.

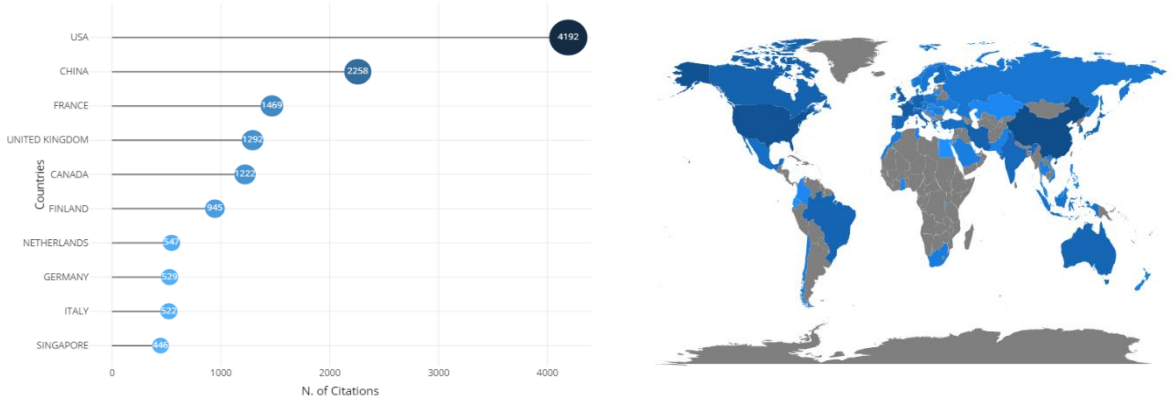

Figure 17. Top Contributing Countries

The production of these five top countries over time is shown as follows:

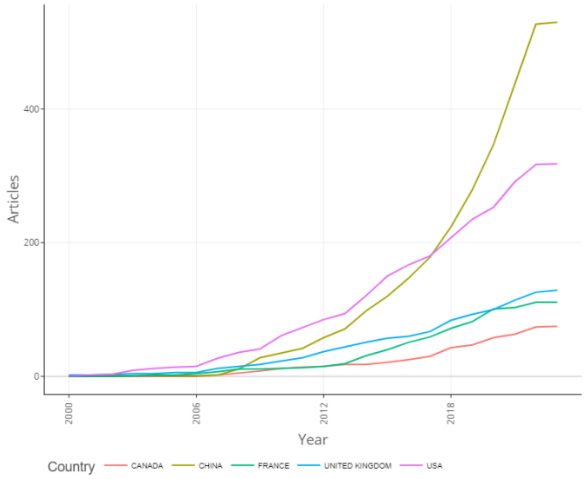

Figure 18. Countries' Production over Time

Multi Collaboration Production (MCP) involves multiple countries collaborating in production, while Single Collaboration Production (SCP) involves a single country handling the production process. For instance, Figure 19 demonstrates that approximately half of France's total productions were done in collaboration with other countries.

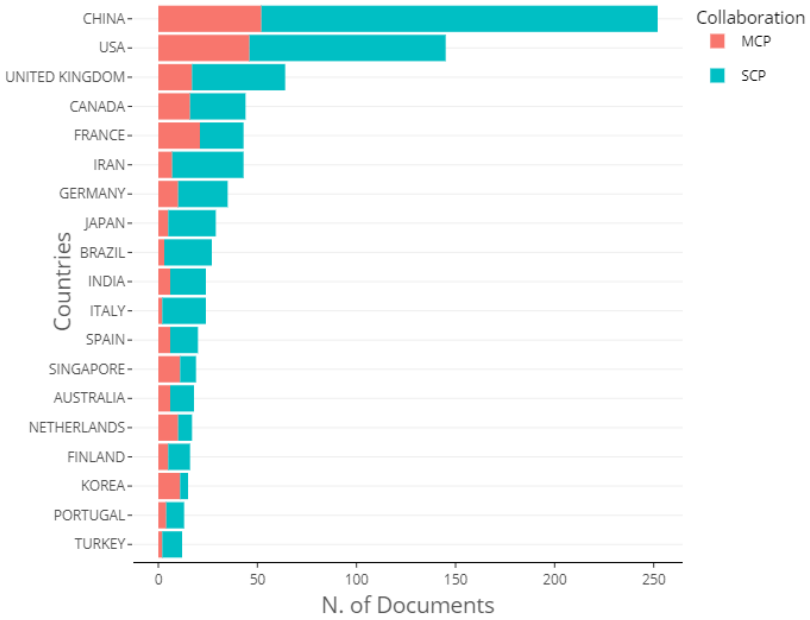

Figure 19. Corresponding Author's Country

4. Discussion

Numerous inferences and implications have been drawn from bibliometric and content analyses, which have been extensively discussed. The surge in scholarly works within the realm of RPO has been remarkable in recent years, reflecting an escalating curiosity within the academic community and, notably, experiencing a dramatic increase in the number of publications in 2022. Nevertheless, there has been a scarcity of studies specifically analyzing bibliometric data on RPO despite the significance of bibliometric studies as a tool for examining research quantity, directions, and interactions within the academic community. This study utilizes scientific mapping to analyze RPO research's structural and dynamic aspects. The conceptual structures reveal key themes and intellectual contributions, aiding in understanding trends. This approach also allows for tracking the development of concepts over time. Researchers can efficiently focus their investigations by highlighting prominent publications within theme clusters. The resulting thematic map provides insights into topic significance, aiding predictions of future theme expansion in the field.

This study delves into the expansive landscape of publications on RPO through a rigorous bibliometric analysis using the Web of Science database. The results illuminate key facets, starting with the substantial attention this field has garnered, notably in sources such as the European Journal of Operation Research, Annals of Operation Research, and Quantitative Finance. Given their significant publication output, these sources emerge as pivotal references for researchers exploring RPO. The study further refines our understanding by ranking the top sources based on their h-index, providing insights into their overall impact. Examining the most cited sources underscores the dominance of the European Journal of Operation Research, holding the highest citation count at 1794, closely followed by the Journal of Finance with 1552 citations. In addition to source analysis, the study identifies influential authors in the RPO domain, such as Fabozzi Fj, Chen Zp, and Rustem B. The geographical dimension is explored through a comprehensive bibliometric analysis, revealing the leading countries contributing to RPO research, including the United States, China, France, the

United Kingdom, and Canada. Furthermore, the study delves into collaboration patterns, distinguishing between MCP and SCP. An intriguing finding demonstrates that about half of France's RPO productions involve collaboration with other countries, shedding light on the dynamics of international research partnerships in this field.

This study focused solely on publications pertaining to RPO indexed in the Web of Science database. While the investigation did not extend to comparing datasets across different databases, it is important to note that such comparisons may yield varying sets of entries, and the analysis results can differ accordingly.

5. Conclusions

This paper has provided a comprehensive review of RPO using bibliometric analysis to identify articles, journals, authors, countries, and institutions that have contributed significantly to the field. Results indicate that articles on RPO have steadily increased since 2006. Furthermore, the United States, China, and France are the top three countries regarding contributing countries and institutions.

To further expand the current understanding of RPO, there are several potential avenues for future research. One promising area is to explore the uncertainty of Model Value at Risk. This topic evaluates the uncertainty associated with estimating portfolio risk using the Value at Risk (VaR) model, a widely used risk measurement tool. Studying the sources and effects of uncertainty in VaR models can improve the accuracy and reliability of risk management strategies in PO. Another area that deserves attention is selection optimization risk. This involves examining the risks associated with selecting assets for inclusion in a portfolio. Traditional PO techniques often assume that historical data accurately represent future market behavior. However, this assumption can lead to selection biases and miss critical risk factors. Addressing selection optimization risk can involve exploring alternative approaches that account for the uncertainties and biases inherent in the asset selection process.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgement

The authors would like to sincerely thank the editor for handling our manuscript and the reviewers for their precious comments and suggestions.

References

1. Aria, M., and Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, 11(4), pp. 959–975. https://doi.org/10.1016/j.joi.2017.08.007
2. Arreola Hernandez, J., Hammoudeh, S., Nguyen, D. K., Al Janabi, M. A. M., and Reboredo, J. C. (2017). Global financial crisis and dependence risk analysis of sector portfolios: a vine copula approach. *Applied Economics*, 49(25), pp. 2409–2427. https://doi.org/10.1080/00036846.2016.1240346
3. Ben-Tal, A., and Nemirovski, A. (1999). Robust solutions of uncertain linear programs. *Operations Research Letters*, 25(1), pp. 1–13. https://doi.org/10.1016/S0167-6377(99)00016-4
4. Bertsimas, D., and Sim, M. (2003). Robust discrete Optimization and network flows. *Mathematical Programming*, 98(1–3), pp. 49–71. https://doi.org/10.1007/s10107-003-0396-4

5. Best, M. J., and Grauer, R. R. (1991). On the Sensitivity of Mean-Variance-Efficient Portfolios to Changes in Asset Means: Some Analytical and Computational Results. *The Review of Financial Studies*, 4(2), pp. 315–342. https://doi.org/10.1093/RFS/4.2.315
6. Bernardo, A. E., and Ledoit, O. (2000). Gain, loss, and asset pricing. *Journal of Political Economy*, 108(1), pp. 144-172. https://doi.org/10.1086/262114
7. Broadus, R. N. (1987). Toward a definition of "bibliometrics." *Scientometrics*, 12(5–6), pp. 373–379. https://doi.org/10.1007/BF02016680
8. Buehler, H., Gonon, L., Teichmann, J., and Wood, B. (2019). *Deep hedging. Quantitative Finance*, 19(8), pp. 1271-1291. https://doi.org/10.1080/14697688.2019.1571683
9. Catania, L., and Luati, A. (2021). Quasi Maximum Likelihood Estimation of Value at Risk and. *Econometrics and Statistics*. https://doi.org/10.1016/j.ecosta.2021.08.003
10. Dauod, H., Serhan, D., Wang, H., Khader, N., Won Yoon, S., & Srihari, K. (2019). Robust receding horizon control strategy for replenishment planning of pharmacy robotic dispensing systems. *Robotics and Computer-Integrated Manufacturing, 59(10)*, pp. 177–188. https://doi.org/10.1016/j.rcim.2019.04.001
11. DeMiguel, V., Garlappi, L., and Uppal, R. (2009). Optimal versus naive diversification: How inefficient is the 1/N portfolio strategy?. The Review of Financial Studies, 22(5), pp. 1915-1953. https://doi.org/10.1093/rfs/hhm075
12. Dzikowski, P. (2018). A bibliometric analysis of born global firms. *Journal of Business Research*, 85(24), pp 281–294. https://doi.org/10.1016/j.jbusres.2017.12.054
13. Eskorouchi, A., Mohammadi, E., and Sajadi, S. J. (2022). *Robust Portfolio Optimization based on Evidence Theory*.
14. Fama, E. F., & French, K. R. (1992). The cross-section of expected stock returns. *the Journal of Finance*, *47*(2), pp. 427-465. https://doi.org/10.1111/j.1540-6261.1992.tb04398.x.
15. Fishburn, C, P. (1977). Mean-Risk Analysis with Risk Associated with Below-Target Returns. *American Economic Review*, 67(2), pp. 116–126. https://ideas.repec.org/a/aea/aecrev/v67y1977i2p116-26.html
16. Fooeik, A. M. L., Ghanbari, H., Bagheriyan, M., and Mohammadi, E. (2022). Analyzing the effects of global oil, gold and palladium markets: Evidence from the Nasdaq composite index. *Journal of Future Sustainability*, 2(3), pp. 105–112. https://doi.org/10.5267/j.jfs.2022.9.010
17. Ghahtarani, A., Saif, A., and Ghasemi, A. (2022). Robust portfolio selection problems: a comprehensive review. *Operational Research*, 22(4), pp. 3203-3264. https://doi.org/10.1007/s12351-022-00690-5
18. Ghanbari, H., Fooeik, A. M. L., Eskorouchi, A., and Mohammadi, E. (2022). Investigating the effect of US dollar, gold and oil prices on the stock market. *Journal of Future Sustainability, 2*(3), pp. 97–104. https://doi.org/10.5267/j.jfs.2022.9.009
19. Ghanbari, H., Safari, M., Ghousi, R., Mohammadi, E., and Nakharutai, N. (2023). Bibliometric analysis of risk measures for portfolio optimization. *Accounting*, 9(2), pp. 95-108. https://doi.org/10.5267/j.ac.2022.12.003
20. Goldfarb, D., and Iyengar, G. (2003). Robust portfolio selection problems. *Mathematics of operations research*, 28(1), pp. 1-38. https://doi.org/10.1287/moor.28.1.1.14260
21. Hirsch, J. E. (2010). An index to quantify an individual's scientific research output that takes into account the effect of multiple coauthorship. *Scientometrics*, *85*(3), pp. 741–754. https://doi.org/10.1007/s11192-010-0193-9
22. Jobson, J. D., and Korkie, R. M. (1981). Putting Markowitz theory to work. *The Journal of Portfolio Management*, 7(4), pp. 70–74. https://doi.org/10.3905/JPM.1981.408816
23. Jorion, P. (2007). Value at Risk: The New Benchmark for Managing Financial Risk. In *Journal*

of Chemical Information and Modeling 53 (9) pp. 1-602. https://thuvienso.hoasen.edu.vn/handle/123456789/10569

24. Kalayci, C. B., Ertenlice, O., and Akbay, M. A. (2019). A comprehensive review of deterministic models and applications for mean-variance portfolio optimization. *Expert Systems with Applications*, 125(26), pp. 345–368. https://doi.org/10.1016/j.eswa.2019.02.011
25. Kilani, M. Al, and Kobziev, V. (2016). An Overview of Research Methodology in Information System (IS). *OALib*, *03*(11), pp. 1–9. https://doi.org/10.4236/oalib.1103126
26. Konno, H., and Yamazaki, H. (1991). Mean-Absolute Deviation Portfolio Optimization Model and Its Applications to Tokyo Stock Market. *Management Science*, 37(5), pp. 519–531. https://doi.org/10.1287/mnsc.37.5.519
27. Ledoit, O., and Wolf, M. (2003). Improved estimation of the covariance matrix of stock returns with an application to portfolio selection. *Journal of Empirical Finance*, 10(5), pp. 603-621. https://doi.org/10.1016/S0927-5398(03)00007-0
28. Lu, Y., Young, S. N., Wang, H., and Wijewardane, N. (2022). Robust Plant Segmentation of Color Images Based on Image Contrast Optimization. *Computers and Electronics in Agriculture*, 193 (41), pp. 711-723. https://doi.org/10.1007/s10479-017-2466-7.
29. Lutgens, F., Sturm, J., and Kolen, A. (2006). Robust one-period option hedging. Operations Research, 54(6), pp. 1051-1062. https://doi.org/10.1287/opre.1060.0352
30. Masmoudi, M., and Abdelaziz, F. Ben. (2018). Portfolio selection problem: a review of deterministic and stochastic multiple objective programming models. *Annals of Operations Research*, 267(1–2), 335–352. https://doi.org/10.1007/s10479-017-2466-7
31. Mensi, W., Hammoudeh, S., Rehman, M. U., Al-Maadid, A. A. S., and Kang, S. H. (2020). Dynamic risk spillovers and portfolio risk management between precious metals and global foreign exchange markets. *The North American Journal of Economics and Finance*, 51, pp. 101086. https://doi.org/10.1016/j.najef.2019.101086
32. Milhomem, D. A., and Dantas, M. J. P. (2020). Analysis of new approaches used in portfolio optimization: a systematic literature review. *Production*, 30(5), pp. 20190144. https://doi.org/10.1590/0103-6513.20190144
33. Moral-Munoz, J. A., Arroyo-Morales, M., Herrera-Viedma, E., and Cobo, M. J. (2018). An Overview of Thematic Evolution of Physical Therapy Research Area From 1951 to 2013. *Frontiers in Research Metrics and Analytics*, *3*(13), pp. 1–11. https://doi.org/10.3389/frma.2018.00013
34. Motamedi, N. (2023). Bibliometric Analysis and Topic Modeling of Information Systems in Maternal Health Publications. *International Journal of Information Science and Management*, 21(2), 85–101. https://doi.org/10.22034/ijism.2023.1977814.0/DOR
35. Ortobelli, S., Rachev, S. T., Stoyanov, S., Fabozzi, F. J., and Biglova, A. (2005). The proper use of risk measures in portfolio theory. *International Journal of Theoretical and Applied Finance*, 8(08), 1107-1133. https://doi.org/10.1142/S0219024905003402.
36. Amiri, M. R., Saberi, M. K., Ouchi, A., Mokhtari, H., and Barkhan, S. (2023). Publication performance and trends in altmetrics: A bibliometric analysis and visualization. *International Journal of Information Science and Management (IJISM)*, 21(1), 97-117. https://doi.org/10.22034/ijism.2022.1977686.0/https
37. Rockafellar, R. T., and Uryasev, S. (2000). Optimization of conditional value-at-risk. *Journal of Risk*, 2, pp. 21-42. http://www.ise.u .edu/uryasev
38. Rockafellar, R. T., and Uryasev, S. (2002). Conditional value-at-risk for general loss distributions. *Journal of Banking & Finance*, 26(7), pp. 1443-1471.

https://doi.org/10.1016/S0378-4266(02)00271-6
39. Rubinstein, M. (2002). Markowitz's" portfolio selection": A fifty-year retrospective. *The Journal of Finance*, 57(3), pp. 1041-1045. https://www.jstor.org/stable/2697771
40. Sadjadi, S. J., Gharakhani, M., and Safari, E. (2012). Robust optimization framework for cardinality constrained portfolio problem. *Applied Soft Computing Journal*, 12(1), pp. 91–99. https://doi.org/10.1016/j.asoc.2011.09.006
41. Schubert, C. (2009). Investigating the complex nature of the stressorcortisol association is possible: A response to Michaud et al. *Stress*, 12(5), pp. 464–465. https://doi.org/10.1080/10253890802603925
42. Sharpe, W. F. (1963). A Simplified Model for Portfolio Analysis. *Management Science*, 9(2), pp. 277–293. https://doi.org/10.1287/mnsc.9.2.277
43. Sharpe, W. F. (1966). Mutual fund performance. *The Journal of Business*, 39(1), pp. 119-138. https://www.jstor.org/stable/2351741
44. Sharpet, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *Journal of Finance*, 19(3), pp. 425-442. https://doi.org/10.1111/j.1540-6261.1964.tb02865.x
45. Skoruchi, A., and Mohammadi, E. (2022). Uncertain portfolio optimization based on Dempster-Shafer theory. *Management Science Letters*, 12(3), pp. 207–214. https://doi.org/10.5267/j.msl.2022.1.001
46. Soyster, A. L. (1973). Technical Note—Convex Programming with Set-Inclusive Constraints and Applications to Inexact Linear Programming. *Operations Research*, 21(5), pp. 1154–1157. https://doi.org/10.1287/opre.21.5.1154
47. Wan, G., Student, P. D., and Dawod, A. Y. (2023). A Bibliometric and Visual Analysis in the Field of Environment, Social and Governance (ESG) Between 2004 and 2021 Nopasit Chakpitak. *International Journal of Information Science and Management*, 21(2), pp. 103–125. https://doi.org/10.22034/ijism.2023.1977765.0/DOR
48. Xiang, J. (2014). Research on Teaching Methods for Communication Engineering Students in Colleges. *Open Journal of Social Sciences*, 02(05), pp. 9–12. https://doi.org/10.4236/jss.2014.25003
49. Xidonas, P., Steuer, R., and Hassapis, C. (2020). Robust portfolio optimization: a categorized bibliographic review. *Annals of Operations Research*, 292(1), pp. 533-552. https://doi.org/10.1007/s10479-020-03630-8
50. Zabavnik, D., and Verbič, M. (2021). Relationship between the financial and the real economy: A bibliometric analysis. *International Review of Economics and Finance*, 75(4), pp. 55–75. https://doi.org/10.1016/j.iref.2021.04.014
51. Zhang, Y., Li, X., and Guo, S. (2018). Portfolio selection problems with Markowitz's mean–variance framework: a review of literature. *Fuzzy Optimization and Decision Making*, 17, pp. 125-158. https://doi.org/10.1007/s10700-017-9266-z

IJAAF; Vol. 8, No. 3, Summer 2024, Serial 28

Iranian Journal of
Accounting, Auditing & Finance

Ferdowsi University of Mashhad

Quarterly

RESEARCH ARTICLE

Exploring the Nexus between Corporate Tax Avoidance, Organizational Capital, and Firm Characteristics

Hamideh Asnaashari
Department of Accounting, Management and Accounting Faculty, Shahid Beheshti University, Tehran, Iran
Reza Daghani*
Department of Accounting, Management and Accounting College, Allameh Tabatabai University
Morteza Bagheri
Department of Accounting, Management and Accounting Faculty, Shahid Beheshti University, Tehran, Iran
Seyed Sadegh Hadian
Department of Accounting, Economic and Administrative Science Faculty, Ferdowsi University of Mashhad, Mashhad, Iran

How to cite this article:
Asnaashari, H., Daghani, R., Bagheri, M., & Hadian, S. S. (2024). Exploring the Nexus between Corporate Tax Avoidance, Organizational Capital, and Firm Characteristics. Iranian Journal of Accounting, Auditing and Finance, 8(3), 93-110. doi: 10.22067/ijaaf.2024.44439.1404
https://ijaaf.um.ac.ir/article_44439.html

ARTICLE INFO

Article History
Received: 2023-11-10
Accepted: 2024-02-29
Published online: 2024-07-06

Keywords:
Corporate Tax Avoidance, Organizational Capital, CEO Overconfidence, Firm Size, Tehran Stock Exchange

Abstract

Tax avoidance practices wield a substantial influence on the fiscal landscape, shaped by the strategic decisions of businesses and their organizational capital (OC), a vital reservoir of strategic assets unique to each firm. This study delves into the nuanced relationship between corporate tax avoidance and OC within the Iranian context, while also examining the moderating effects of firm size and CEO overconfidence. Leveraging a dataset spanning from 2016 to 2021, comprising 142 firms listed on the Tehran Stock Exchange, and employing advanced multivariate regression techniques, our analysis unveils a significant and positive association between tax avoidance strategies and OC. Notably, this relationship remains consistent across firms of varying sizes, indicating that size does not significantly moderate this association. Furthermore, our investigation reveals the influential role of CEO overconfidence in shaping the intricate interplay between tax avoidance and OC. These findings contribute to the ongoing discourse on corporate tax strategies, offering insights applicable to firms of diverse sizes and magnitudes.

https://doi.org/10.22067/ijaaf.2024.44439.1404

NUMBER OF REFERENCES
96

NUMBER OF FIGURES
-

NUMBER OF TABLES
4

Homepage: https://ijaaf.um.ac.ir
E-Issn: 2717-4131
P-Issn: 2588-6142

*Corresponding Author: Reza Daghani
Email: iaee.org@gmail.com
Tel: 091220031540
ORCID:

1. Introduction

Economists argue that taxes constitute a highly suitable and stable source of national income, effectively serving as a tool for enacting economic policies and steering the economy toward key objectives (Daneshvar et al., 2023; Gupta and Jalles, 2022; Seidman and Stomberg, 2017; Gallemore and Labro 2015). Taxation is a vital and enduring revenue stream for governments, fulfilling the dual role of funding public expenditures and executing financial strategies aimed at equitable income and wealth distribution across society (Arvin et al., 2021; Gurdal et al., 2021). Tax, essentially, represents an amount imposed by the government on a company's profits. However, this imposition presents a trade-off, as taxes paid reduce both profits and shareholders' liquidity. As per the taxation framework, firms must allocate some of their earnings to the government before considering distributions to stakeholders. Corporations and their shareholders are motivated to pursue tax avoidance strategies to optimize shareholder profits (Karami et al., 2016; Mousavi et al.,2012). Recent studies reveal that managers might engage in tax avoidance practices that cater to their interests, which may not always align with the broader interests of shareholders (Jacob et al., 2021; Dyreng and Hanlon, 2021).

Strategic ambiguity within tax structures allows managers to exploit shareholders opportunistically (Desai and Dharmapala, 2006). Determining a firm's payouts is a multifaceted process influenced by various factors. Among these factors, the presence of hidden assets assumes a critical role. These assets encompass intangible elements that might not be readily apparent from a firm's financial statements or public disclosures. Organizational capital (OC) constitutes a distinctive intangible asset inherent to the firm (Dessein and Prat, 2022; Martín-de-Castro et al., 2016; Eisfeldt and Papanikolaou, 2013). It encapsulates the accumulated knowledge, expertise, and unique practices an organization has developed. This intangible asset enhances a firm's ability to navigate complex business environments, adapt to changing circumstances, and ultimately achieve its strategic goals (Barbieri et al., 2021; Saeedi et al., 2020).

While previous studies on tax avoidance document that it is motivated by economic reasons and managerial incentives (Seidman and Stomberg, 2017; Moghaddam and Sahraie, 2017; Amiram et al., 2013; Mughal, 2012; Demeré et al.,2020; Desai, 2004). Recent research indicates that other conditions, such as behavioural factors, are crucial in tax avoidance (Malik et al., 2018; Li et al., 2022). Therefore, it is expected that the attitudes and dispositions of those who directly or indirectly determine the decision to pay corporate tax influence their tax avoidance decisions.

The escalating significance of OC and the pronounced impact of corporate tax avoidance on firm-level outcomes presents a compelling rationale for probing the interplay between OC and corporate tax avoidance. OC applies firm-specific knowledge to business practices and processes, enabling firms to navigate intricate tax regulations adeptly and efficiently capitalize on divergent tax rates, incentives, and circumstances. Consequently, firms enriched with robust OC are inclined to exhibit higher levels of tax avoidance, culminating in enhanced tax efficiency (Hasan et al., 2021). Given that tax avoidance boosts cash flow and post-tax profits, firms with substantial OC may be motivated to engage in further tax avoidance to optimize returns for both managerial bodies and shareholders (Esnaashari and Nourmohammadi, 2018). This study seeks to address a fundamental question building upon the existing body of research: How does OC influence tax avoidance in a manner that translates to reduced tax liabilities for companies with higher OC levels?

Moreover, Literature has emphasized the significance of company size as a determining and moderating factor in various organizational behaviours and outcomes (Sopiyana, 2022; Saragih and Hendrawan, 2021). In this regard, the influence of OC on tax avoidance practices might not be uniform across firms of varying sizes. Larger firms with more extensive resources may have distinct capacities to leverage OC for tax efficiency, potentially impacting the relationship between OC and

tax avoidance. The second question is about the impact of company size on the relationship between OC and tax avoidance.

Finally, tax avoidance activities are often associated with CEO overconfidence stemming from goal congruence (Ilaboya and Aronmwan, 2022; Sumunar et al., 2019; Olsen and Stekelberg, 2016). This is due to the tendency of overconfident CEOs to make decisions based on their own inflated self-perceptions, which can then be adopted by employees within the organization. Overconfident CEOs are more likely to take risks and make bold decisions. Regarding tax planning, they may be more willing to adopt aggressive tax avoidance strategies, believing they can successfully navigate any potential challenges. In addition, CEO overconfidence can shape the utilization of OC within the organization. It may be more inclined to leverage the firm's OC to pursue tax avoidance goals, leading to more effective tax planning. Therefore, the last question is developed: Does CEO overconfidence impact the relationship of OC-Tax avoidance?

The rest of our research is organized as follows: the next section frames the study into a Literature review and hypotheses development. Part three describes the research methodology and the sample selection procedure. Section four then presents the main results and implications drawn from statistical analyses, and eventually, the last district offers the conclusion.

2. Literature review and hypotheses development

2.1 Tax avoidance

There is an expectations gap between management and the tax system. In this respect, tax avoidance is an attempt to achieve management's goals and management' expectations (Zhang et al., 2022; Heidarpour et al., 2010). Fadhila and Handayani (2019) describe tax avoidance as an attempt to evade tax lawfully against the taxpayer because it does not involve tax regulation.

Tax avoidance is a strategy employed to decrease or circumvent tax liabilities, which involves utilizing tax laws in a manner not explicitly outlined by governing bodies. (Hoseini and Safari Gerayli, 2018; Esnaashari and Valizadeh Larijani, 2018). However, shareholders require management to invest in profitable activities other than tax avoidance to avoid costs that impair shareholder interests (Francis et al., 2014; Pasternak and Rico, 2008). Tax avoidance is explained from several theoretical perspectives. Agency theory assumes that conflicts of interest may arise between managers and shareholders, leading to managers engaging in tax avoidance activities to maximize their profits at the expense of shareholders (Francis et al., 2022). The legal perspective defines tax avoidance as using the tax system for personal gain to reduce the amount of tax payable utilizing the law itself (Pasternak and Rico, 2008). The difference between tax laws and accepted accounting principles can lead to legitimate tax avoidance (Slemrod, 2004).

Tax avoidance can also negatively impact a firm's performance; for example, Chen et al. (2010) and Hanlon and Slemrod (2009) found reputational losses, and Salehi et al. (2019) and Graham and Tucker (2006) showed an increase in the litigation risk.

However, the extent of corporate tax avoidance is influenced by the characteristics of governance, managerial motivations, and the level of environmental uncertainty (Armstrong et al. 2015; Goh et al. 2016; Abdelfattah et al. 2020; Huang et al., 2017).

Armstrong et al. (2015) found that firms with more vital governance structures and better alignment between executive and shareholder interests are less likely to engage in tax avoidance. Goh et al. (2016) suggest that tax avoidance behaviours can increase the ambiguity of the firm's information environment and the measurement of uncertainty and information asymmetry. Desai et al. (2004) provide an example of Enron, stating that tax avoidance activities increase the opportunity for firm managers to manipulate earnings, misleading investors. Jbir et al. (2021) document a

significant association between managers' compensation, board members' characteristics, and tax evasion activities. Abdelfattah et al. (2020) show a meaningful positive relationship between corporate tax avoidance and social responsibility. Jihene and Moez (2019) demonstrate a positive relationship between managers' compensation and corporate tax avoidance. Furthermore, a meaningful negative relationship exists between managers' compensation and tax avoidance in firms that have undergone proper auditing.

2.2 Organizational capital

Firm-level OC is the accumulation of unique knowledge within a firm that enables enhanced operational efficiency, investment decisions, and innovation performance, encompassing various aspects of technology, business practices, processes, and designs (Lev et al., 2009; Sajadi et al., 2023). The concept of OC has been explored from the firm's resource-based view (RBV) and the knowledge-based view (KBV). Following the RBV, OC is recognized as a valuable, scarce, and difficult-to-replicate resource that firms can leverage to gain a competitive edge and achieve superior performance (Barney, 1991). In contrast, the KBV posits that knowledge-based assets and capabilities are the enduring sources of competitive advantage, attainable and nurtured through knowledge creation, transfer, and integration (Beygpanah et al., 2021). As firms accumulate and internalize firm-specific knowledge concerning business practices and processes, their comprehension of the intricate corporate tax code may improve. Although OC is integral to a firm's core competencies, its efficacy is contingent upon its maturity (Eisfeldt and Papanikolaou, 2014).

Two perspectives exist regarding the nature of OC within firms. One school of thought views OC as rooted in an organization's employees and social networks (Eisfeldt and Papanikolaou 2013). Conversely, another perspective perceives OC as residing within the organization, grounded in its practices, processes, and systems, which remain relatively unchanged even when employees are replaced (Lev & Radhakrishnan 2005; Lev et al. 2009). This latter viewpoint aligns with the RBV's notion that critical resources are non-tradable, difficult to imitate, and challenging to substitute (Dierickx and Cool 1989).

At national and firm levels, OC drives growth and competitiveness. Atkeson and Kehoe (2005) determined that institutional capital contributes over 40 percent of the cash flow generated by intangible assets in the US national income accounts. Similarly, on the firm level, Some studies point to corporate capital associated with enhanced operational performance, increased investment, and heightened innovation, thereby resulting in favourable future operating outcomes, stock returns, and trading performance (Enache and Srivastava, 2018; Hasan and Cheung, 2018; Li et al., 2018; Lev et al., 2009).

Sajadi and Ghajar Bigi (2021) demonstrated OC's positive and significant impact on cash retention. Similarly, Akbari and Ahmadi (2021) established an essential positive relationship between OC and a firm's value. Furthermore, Badertscher et al. (2013) observed that investment in OC can enhance a firm's financial performance.

2.3 The relationship between tax avoidance and organizational capital

A firm with a higher OC will likely be doing more tax avoidance. Our predictions are based on the following arguments. Previous research has argued that tax avoidance is a crucial business strategy (Cai and Liu, 2009; Hasan et al., 2021). Designing, administering, and complying with tax systems is a knowledge-intensive activity that comes with significant costs and requires substantial economic resources (Hasseldine et al., 2012). Different theories are proposed in the Literature for the relationship between tax avoidance and OC: The resource-based view (RBV) theory suggests that firms can use their OC, such as knowledge, skills, and abilities, to create a competitive advantage and

achieve better performance. According to RBV, firms with high OC are more likely to engage in tax avoidance to maximize their after-tax earnings and gain a competitive advantage over their rivals (Hasan et al., 2021).

Agency theory indicates that the relationship between tax avoidance and OC depends on the firm's ownership structure. In a dispersed ownership structure, where the shareholders are not the key decision-makers, the managers may engage in tax avoidance to maximize their gains. However, in a concentrated ownership structure, where the shareholders have a more significant influence on the firm's decisions, the managers may have a stronger incentive to avoid tax to maximize the value of the OC (Piekkola, 2014; Shahraki et al., 2019).

Signalling theory suggests that firms use tax avoidance to signal their financial health and reduce information asymmetry. According to this theory, firms with high OC may engage in tax avoidance to signal their superior performance and financial health to investors and stakeholders, thereby reducing information asymmetry and increasing access to capital markets (Hasan et al., 2021; Esnaashari, 2017).

Recent research has examined the relationship between tax avoidance and OC, suggesting that firms with high OC may engage in more tax planning activities to increase their tax efficiency (Hasan et al., 2021). Moreover, key talent and shareholders may share the cash flows generated by OC. Tax avoidance activities can increase cash flows and after-tax earnings, motivating firms with high OC to engage in more tax planning activities (Hasan et al., 2021).

It should be noted that the relationship between tax avoidance and OC is complex and context-dependent. In some cases, tax avoidance may contribute to the growth and development of OC. Chen and Hsu (2013) found that firms with high levels of intangible assets were more likely to engage in tax planning, which can help reduce their tax liability and free up resources for investment in research and development. However, some research has shown that tax avoidance can have a negative impact on OC. Bloomfield (2011) found that firms engaged in higher levels of tax avoidance were more likely to experience a decline in their reputation and brand image, which can ultimately affect their ability to attract and retain skilled employees. Additionally, firms that engage in tax avoidance may be perceived as less socially responsible, negatively affecting their relationships with stakeholders and overall organizational performance (Hanlon and Heitzman, 2010).

Hosseini Mianroudi and Imani (2022) found the impact of OC on the relationship between tax avoidance and firm value. It was found that OC does not significantly affect this relationship. Hasan et al. (2021) found an association between OC, tax avoidance, and firm value. Furthermore, OC was found to have a strong and significant mitigating effect on the relationship between tax avoidance activity and corporate value. In this regard, the first hypothesis is developed as follows:

H1: There is a significant impact of OC on tax avoidance behaviour.

2.4 The moderating effect of size on tax avoidance and organizational capital

Recent studies have begun to investigate the moderating effect of firm size on the relationship between organizational capital and tax avoidance. Size, often measured by indicators such as total assets or revenue, introduces additional complexities to this dynamic. Numerous studies have found essential links between organizational characteristics, corporate governance structures, management motivations, and tax avoidance (Jbir et al., 2021; Jihene and Moez, 2019; Chen et al., 2014; Huang et al., 2017). Large firms typically have greater access to financial and human resources, enabling them to invest in building and leveraging organizational capital. This may result in a stronger positive relationship between organizational capital and tax avoidance in larger firms. Their size provides them with the capacity to implement complex tax strategies effectively. On the other hand, small firms may face constraints regarding resource availability and expertise. While they may also possess

organizational capital, their ability to translate it into effective tax planning strategies might be more limited compared to their larger counterparts. As a result, the relationship between organizational capital and tax avoidance may be weaker or non-existent in smaller firms.

Taufiq and Tertiarto (2018) found that Company Size does not increase the impact of Intellectual Capital on Corporate Values. Damayanty and Putri (2021) examine the moderating role of capital intensity and tax avoidance. Damayanty and Putri (2021) investigate the moderating effect of company size on the relationship between capital intensity and tax avoidance. It has been found that a company's size can positively impact its capital intensity.

Maula et al. (2019) analyzed the impact of Leverage, Size, and Capital Intensity on tax avoidance. The findings indicated that leverage significantly affected tax avoidance, whereas size and capital intensity did not significantly impact tax avoidance. Susanti (2017) investigated the impact of corporate social responsibility disclosure and firm size on tax avoidance. The study found that only firm size affects tax avoidance.

Abdelfattah and Aboud (2020) explored the relationship between tax avoidance, corporate governance, and social responsibility. Their results showed a clear and important link between corporate tax avoidance and social responsibility. Chen et al. (2014) focused on the relationship between tax avoidance and corporate value. As a result, it was found that an increase in tax avoidance leads to a decrease in corporate value. Huang et al. (2017) examine the relationship between environmental concerns and corporate-level tax avoidance. Managers facing a more uncertain environment will likely engage in tax avoidance activities more frequently. Several studies by Corvino et al. (2019), Hernández et al. (2020), and Saragih and Hendrawan (2021) have demonstrated that the size of a company can moderate the relationship between its characteristics and performance. Moreover, Sopiyana (2022) and Fauzan et al. (2019) have shown that the size of a company and its sales growth can influence its tax avoidance practices. Aminah et al. (2017) discovered that the size of a company, the intensity of its fixed assets, and its leverage do not have an impact on tax avoidance. Therefore, we propose the following hypotheses:

H2: The firm's size significantly moderates the relationship between tax avoidance and OC.

2.5 The moderating role of CEO Overconfidence on tax avoidance and organizational capital

The connection between overconfidence and tax avoidance is a subject of interest in behavioural economics and finance. Studies suggest that managers who exhibit overconfidence may be more likely to engage in aggressive tax planning and avoidance tactics. This may be due to their belief that tax authorities will not closely scrutinize their decisions or their perceived ability to navigate complex tax laws. Consequently, overconfident managers may take on more significant tax risks, potentially leading to an increased tendency toward tax avoidance practices (Hsieh et al., 2018). Aliani et al. (2017) show a positive correlation between CEO overconfidence and the desire to minimize corporate tax liabilities.

Similarly, Chyz et al. (2019) found a positive link between indicators of corporate tax avoidance and CEO overconfidence. Tax avoidance can be a strategic tool for managing earnings, allowing companies to meet their earnings targets while reducing tax obligations and increasing cash flow (Desai and Dharmapala, 2009). Therefore, CEOs who exhibit overconfidence are more likely to support tax avoidance strategies, resulting in lower effective corporate tax rates (Olsen and Stekelberg, 2016). Studies have shown that a CEO's confidence level can impact the relationship between a company's characteristics and its performance indicators (Wan et al., 2022; Gurdgiev and Ni, 2023). We are interested in investigating whether CEO overconfidence, as a moderating factor, enhances or reduces the impact of organizational culture on tax avoidance. Based on these findings, the third hypothesis can be formulated as follows:

H3: CEO overconfidence has a significant moderating effect on tax avoidance and OC.

3. Research methodology

We obtain financial data from the comprehensive database for issuers' (CODAL) annual files and stock market data from the Rahavard Novin software. Our initial sample includes all available publicly traded firms in the Tehran Stock Exchange (TSE) over six years between 2015 and 2019. We exclude firms from the financial services industry. We then remove observations with missing information and compute dependent. (tax avoidance), independent (i.e., OC), and control variables.

The sample was determined by systematic deletion. So, firms that have the following features were included in the sample:

- The firm was listed before 2015 and remained listed until 2019.
- The firm's stock did not experience significant trading breaks during the research period (i.e., it did not stop trading on the stock market for more than three months).
- The firm's financial Year ended on March 20 (Iranian end year)

Based on the criteria, a sample of 142 firms was selected for our analysis.

3.1 Research model and variables' measurement

To examine the association between tax avoidance and OC, consistent with prior research (Hasan et al., 2021), we estimated model (1).

Model(1)

$$ETR_{it} = \beta_0 + \beta_1 OC_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 ROA_{it} + \beta_5 MB_{it} + \beta_6 PPT_{it} + \beta_6 CHREV_{it} + \sum industry + \sum year + + \varepsilon_{it}$$

Tax avoidance (ETR_{it}) is measured in the following way (Delgado et al., 2023; Cain et al., 2017; Huang et al.,2016):

$$ETR_{i,t} = \frac{TTE_{i,t}}{PTE_{i,t}}$$

Where:

$TTE_{i,t}$: Total corporate tax expense of firm i in year t;

$PTE_{i,t}$: the pre-tax profit of firm i in year t;

OC_{it} Organizational capital follows Hasan et al. (2021) and Peters and Taylor (2017) to estimate OC based on SG&A expenses. SG&A expenses cover the operating costs of the firm

It is not included in direct manufacturing costs (or cost of goods sold). In other words, SG&A includes all non-production expenses.

$$OC_{it} = ABSALSE_{it} - ABCOST_{it}$$

Where:

$ABSALSE_{it}$ is the abnormal sale of firm i in year t, measured by the following formula:

$$ABSALSE_{it} = REV_{it} - (\beta_0 * EMP_{it}^{\beta 2} * PPE_{it}^{\beta 3} * \varepsilon_{it})$$

in which $\beta_3, \beta_2, \beta_0$ and ε_{it} are determined by the following:

$$\log\left(\frac{Rev_{it}}{Rev_{it-1}}\right) = \beta_0 + \beta_1 log\left(\frac{SG\&A - CAP_{it}}{SG\&A - CAP_{it-1}}\right) + \beta_2 log\left(\frac{EMP_{it}}{EMP_{it-1}}\right) + \beta_3 log\left(\frac{PPE_{it}}{PPE_{it-1}}\right) + \varepsilon_{it}$$

$Rev_{it\,(it-1)}$ is sales of firm i in year t (t-1); $SG\&A - CAP_{it(it-1)}$ is capitalized sale, general and

administrative expenses of the firm i in year t((t-1) and $EMP_{it(it-1)}$ is the number of employees of the firm i in year t (t-1).

$ABCOST_{it}$ is the abnormal cost of firm i in year t, measured by the following formula:

$$ABCOST_{it} = Cost_{it} - (\beta_0 * EMP_{it}^{\beta 2} * PPE_{it}^{\beta 3} * \varepsilon_{it})$$

in which $\beta_3, \beta_2, \beta_0$ and ε_{it} are determined by the following:

$$\log\left(\frac{Cost_{it}}{Cost_{it-1}}\right) = \beta_0 + \beta_1 log\left(\frac{SG\&A - CAP_{it}}{SG\&A - CAP_{it-1}}\right) + \beta_2 log\left(\frac{EMP_{it}}{EMP_{it-1}}\right) + \beta_3 log\left(\frac{PPE_{it}}{PPE_{it-1}}\right) + \varepsilon_{it}$$

$Cost_{it(it-1)}$ is operating expenses of the firm i in year t(t-1), and the other variables are presented earlier.

Firm size ($SIZE_{it}$): is the logarithm of the annual sale of firm i in year t (Rego and Wilson, 2012; Saeedi et al., 2020);

Financial leverage (LEV_{it}): it is measured through the ratio of total debt to total assets (Huang et al., 2016);

Return on assets (ROA_{it}): This ratio is calculated by dividing the net profit by the market value (Diyanti Dilami et al., 2015);

Growth (MB_{it}): It is measured by the ratio of market value to book value (Huang et al., 2016; Moshayekhi and Seyyedifar, 2015);

PPT= Property, plant, and equipment to total assets (Hasan et al., 2021; Delgado, 2023);

CHREV= yearly percentage change in sales over the prior Year;

industry is a dichotomous indicator variable based on two-digit TSE industry codes to control for industry-fixed effects. The Year is also a dichotomous indicator variable to control for year-fixed effects.

To examine the effect of size on the relationship between OC and tax avoidance, we split the sample into two groups of large and small firms by median of $SIZE_{it}$ and estimated model (1) in each group (Hesarzadeh 2022). Furthermore, the effect of CEO overconfidence on this relationship was investigated by model (2):

Model (2)

$$ETR_{it} = \beta_0 + \beta_1 OC_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 ROA_{it} + \beta_5 MB_{it} + \beta_6 PPT_{it} + \beta_6 CHREV_{it} + \beta_6 OC_{it} * OVCON_{it} + \sum industry + \sum year + + \varepsilon_{it}$$

Where:

$OVCON_{it}$: It measures the CEO's overconfidence in their different investment and funding decisions. Thus, it takes the value of one if the firm meets at least one of the following three criteria and zero otherwise: (1) Excess investment is in the top mean of firms within the industry, where excess investment is the residual from a regression of total asset growth on sales growth; (2) Net acquisitions from the statement of cash flows are in the top mean of firms within the industry; (3) The dividend yield is zero (Tehrani and Hesarzadeh 2009; Schrand and Zechman, 2012; Kim and Zhang, 2016).

4. Findings

4.1 Descriptive statistics

Table 1 presents descriptive statistics of the variables used in the regression analyses.

Table1. Descriptive statistics

	Mean	Median	Std. Dev	Min	Max	Small	Large
ETR	-0.892%	0.083%	4.499%	-12.344%	6.847%	-0.666%	-1.118%
OC	0.031%	0.398%	11.285%	-21.168%	20.924%	0.440%	-0.378%
ROA	14.836%	12.218%	14.925%	-29.773%	68.198%	21.951%	7.721%
LEV	51.893%	53.105%	19.641%	1.386%	95.285%	46.633%	57.153%
PPT	24.880%	21.023%	17.217%	0.006%	96.851%	21.239%	28.521%
CHREV	37.048%	24.185%	64.857%	-90.919%	781.554%	40.680%	33.416%
SIZE	5.378	5.348	0.986	0.699	8.583	6.042	4.714
MB	5.801	3.354	7.087	0.523	53.559	4.451	7.152

This table displays various statistics related to firms, including their ETR (mean: -0.89%, median: 0.08%) and OC (mean: 0.03%, median: 0.3%), with a standard deviation of 0.11. The mean statistics also indicate that firms have a high level of leverage (LEV = 0.51) and significant growth opportunities (MTB = 5.80), profitability (ROA = 0.14), and change in revenues (CHREV = 0.37). On average, firms have 24.8% of their total assets in physical assets. The table also provides the mean values for small and large firms, with the cutoff being the median size for each year. Small firms have a mean ETR of -0.67%, while large firms have a mean ETR of -1.12%. Additionally, the OC rates for large firms are typically lower than those for small firms. We report the pairwise correlation coefficients for the variables in our model in Table 2.

Table 2. Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) ETR	1.000							
(2) OC	0.861***	1.000						
(3) ROA	0.267***	0.320***	1.000					
(4) LEV	-0.072**	-0.133***	-0.582***	1.000				
(5) SIZE	0.234***	0.260***	0.652***	-0.355***	1.000			
(6) MB	0.165***	0.266***	0.195***	0.071**	1.000			
(7) PPT	-0.079**	-0.082**	-0.255***	-0.165***	-0.084**	1.000		
(8) CHREV	0.541***	0.665***	0.281***	-0.200***	0.249***	0.247***	-0.085**	1.000

**** p<0.01, ** p<0.05, * p<0.1*

The correlations between ETR and OC were positive and significant, suggesting higher ETR comes with larger levels of OC. There were positive and significant correlations between ROA and ETR as well.

4.2 Research findings

We estimated our model as a pooled-cross-sectional model controlling for industry and year-fixed effects. The results of the hypothesis testing in the research are as follows:

According to Table 3, all models were highly significant, with an adjusted R2 of around 79%. We found a significant positive relationship between OC and tax avoidance in the sample. This confirms our first hypothesis. In both large and small firms, the positive coefficient of OC, as a moderating variable, suggests that an increase in OC is associated with an increase in tax avoidance. However,

the relationship's magnitude is similar regardless of size, so the results in Table 3 do not support our second hypothesis. Among the control variables, the LEV coefficient is positive and significant, while the MB coefficient is negative and significant in all three samples.

The moderating effect of management overconfidence in OC-tax avoidance is illustrated in Table 4.

Table 3. The moderating role of size

	TOTAL SAMPLE	SMALL FIRMS	LARGE FIRMS
	(1)	(2)	(3)
OC	0.350***	0.355***	0.354***
	(34.110)	(20.520)	(27.410)
ROA	0.017	0.023	0.023
	(1.570)	(1.250)	(1.580)
LEV	0.019**	0.028*	0.013
	(2.620)	(2.460)	(1.360)
SIZE	0.000	0.002	-0.004
	(0.240)	(1.010)	(-1.230)
MB	-0.000*	-0.000*	-0.000*
	(-2.570)	(-2.580)	(-2.410)
PPT	0.000	-0.006	-0.001
	(0.060)	(-0.620)	(-0.110)
CHREV	-0.002	-0.008**	0.003
	(-1.230)	(-2.670)	(1.440)
CONSTANT	-0.027	-0.056***	0.006
	(-1.950)	(-3.34)	(0.240)
Year	fixed	fixed	fixed
industry	fixed	fixed	fixed
N	852	426	426
R2	0.792	0.787	0.835
adj. R2	0.764	0.742	0.801
F-statistic	28.230	17.550	24.480

The dependent variables in columns (1), (2), and (3) are ETR. Standard errors are reported in parentheses. All variables are defined in the "Research model and variables' measurement" section. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level (two-tailed), respectively.

According to the data in Table 4, the average value for overconfidence among CEOs is 0.66, indicating that 66% are overconfident. It's worth noting that CEO overconfidence significantly impacts the relationship between OC and tax avoidance in the overall sample. Our findings are in line with previous research conducted by Ilaboya and Aronmwan (2022), Chyz et al. (2019), and Hsieh et al. (2018), indicating that CEO overconfidence is linked to corporate tax avoidance and diminishes the impact of OC on tax avoidance. These results suggest that the behavior of top decision-makers in a company can impact the organization's overall performance. This trend is consistent among larger companies as well.

Table 4. The moderating effect of CEO Overconfidence

	TOTAL SAMPLE	SMALL	LARGE
	(1)	(2)	(3)
OC	0.446***	0.464***	0.416***
	(26.600)	(17.880)	(19.040)
OVCON*OC	-0.133***	-0.163***	-0.084***
	(-7.100)	(-5.640)	(-3.440)
OVCON	-0.007***	-0.005	-0.007*
	(-3.340)	(-1.450)	(-2.400)
ROA	0.016	0.018	0.021
	(1.560)	(1.020)	(1.400)
LEV	0.019**	0.029**	0.012
	(2.790)	(2.660)	(1.280)
SIZE	-0.000	0.003	-0.003
	(-0.080)	(1.230)	(-0.850)
MB	-0.000*	-0.000*	-0.000*
	(-2.430)	(-2.300)	(-2.370)
PPT	0.001	-0.007	0.002
	(0.210)	(-0.730)	(0.190)
CHREV	-0.000	-0.004	0.004*
	(-0.090)	(-1.480)	(2.020)
CONSTANT	-0.021	-0.048**	0.000
	(-1.570)	(-2.970)	(0.020)
YEAR	fixed	fixed	fixed
INDUSTRY	fixed	fixed	fixed
N	852	426	426
R-sq	0.805	0.805	0.842
adj. R-sq	0.778	0.763	0.808
F	29.980	19.010	24.800

The dependent variables in columns (1), (2), and (3) are ETR. Standard errors are reported in parentheses. All variables are defined in the "Research model and variables' measurement" section. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level (two-tailed), respectively.

5. Conclusion

The primary objective of this study was to investigate the intricate relationship between tax avoidance practices within firms and OC. The study's findings shed light on a fascinating dynamic: firms with higher levels of OC exhibit a distinct approach to handling tax-related matters. Firstly, firms rich in OC tend to foster a culture of continuous learning and knowledge accumulation. This proactive learning process results in meticulous documentation and archival of critical data. This wealth of codified, integrated, and institutionally ingrained knowledge regarding business performance and processes is a guiding compass for the organization's future endeavours. In contrast, tax avoidance represents a fundamental corporate strategy, necessitating intricate design, adept management, and adaptable tax systems tailored for knowledge-driven activities. This endeavour often demands substantial financial resources, making it a resource-intensive work.

However, firms with substantial OC efficiently leverage their codified business practices, well-structured processes, and sophisticated systems to streamline tax planning. This optimization helps them identify and capitalize on tax avoidance opportunities at a reduced cost. Consequently, these firms demonstrate a remarkable ability to allocate their corporate profits across various sectors to maximize returns. They benefit from diverse tax rates, exemptions, and credits, further enhancing their tax efficiency. These findings align closely with previous research by Hasan et al. (2021) and Hosseini Mianrudi and Imani (2022), corroborating the positive relationship between OC and tax

avoidance strategies. However, the company's size doesn't impact this relationship. This finding does not align with Fauzan et al. (2019) but is aligned with Aminah et al. (2017).

Moreover, an intriguing revelation emerged from this study: the influential role of CEO overconfidence in shaping the organization's expenditure structure concerning tax avoidance. Overconfident CEOs tend to overestimate their decision-making prowess in tax-related matters, exerting a considerable influence on the firm's approach to tax avoidance. This result is consistent with Ilaboya and Aronmwan (2022), Sumunar et al. (2019), Chyz et al. (2019), Aliani et al. (2017), and Desai and Dharmapala (2009).

Indeed, some suggestions for future work based on this study's findings and implications are as follows: Tax reforms can significantly alter the tax landscape, and understanding how firms with different levels of OC adapt to these changes is crucial. Hence, it is essential to explore how tax law and regulation alterations influence the connection between tax avoidance and OC. Additionally, delving into the trade-offs between tax efficiency and the long-term value for shareholders presents an intriguing avenue for future research.

References

1. Abdelfattah, T., and Aboud, A. (2020). Tax avoidance, corporate governance, and corporate social responsibility: The case of the Egyptian capital market. *Journal of International Accounting, Auditing and Taxation*, 38(7), A. 100304. https://doi.org/10.1016/j.intaccaudtax.2020.100304
2. akbari, S., and Ahmadi, M. (2022). The effect of organizational capital on the value of companies listed on the Tehran Stock Exchange. *Journal of Accounting and Management Vision*, *4*(54), pp. 98-110.
3. Aliani, K., Mhamid, I., and Rossi, M. (2017). Does CEO overconfidence influence tax planning? Evidence from Tunisian context. *International Journal of Managerial and Financial Accounting*, 8(3-4), pp, 197-208. https://doi.org/10.1504/IJMFA.2016.081851
4. Aminah, A., Chairina, C., and Sari, Y. Y. (2017). The influence of company size, fixed asset intensity, leverage, profitability, and political connection to tax avoidance. *AFEBI Accounting Review*, 2(2), pp, 107-120. https://doi.org/10.47312/aar.v2i02.88
5. Amiram, D., Bauer, A. M., Frank, M. M., Gow, I., Harris, T., Healy, P., ... and Thornock, J. (2013). Corporate tax avoidance and managerial incentives generated by shareholder dividend tax policy. *In CAAA Annual Conference and the European Accounting Association*, pp. 1-58. https://doi.org/10.2308/accr-52315
6. Armstrong, C. S., Blouin, J. L., Jagolinzer, A. D., and Larcker, D. F. (2015). Corporate governance, incentives, and tax avoidance. *Journal of Accounting and Economics*, 60(1), pp, 1-17. https://doi.org/10.1016/j.jacceco.2015.02.003
7. Arvin, M. B., Pradhan, R. P., and Nair, M. S. (2021). Are there links between institutional quality, government expenditure, tax revenue and economic growth? Evidence from low-income and lower middle-income countries. *Economic analysis and policy*, 70(18), pp. 468-489. https://doi.org/10.1016/j.eap.2021.03.011
8. Atkeson, A., and Kehoe, P. J. (2005). Modeling and measuring organization capital. *Journal of Political Economy*, 113(5), pp. 1026-1053. https://doi.org/10.1086/431289
9. Badertscher, B. A., Katz, S. P., and Rego, S. O. (2013). The separation of ownership and control and corporate tax avoidance. *Journal of Accounting and Economics*, 56(2-3), pp. 228-250.
10. Barbieri, B., Buonomo, I., Farnese, M. L., and Benevene, P. (2021). Organizational capital: A resource for changing and performing in public administrations. *Sustainability*, 13(10), A. 5436. https://doi.org/10.3390/su13105436

11. Barney, J. (1991). Firm resources and sustained competitive advantage. Journal of Management, 17(1), pp. 771–792. https://doi.org/10.1177/014920639101700108
12. Beygpanah, B., Asnaashari, H., Hoshi, A., and Assadi, G. (2021). The effect of human resource situation on the audit quality in the audit firms. Journal of Professional Auditing Research, 1, pp. 128-149. https://doi.org/ 10.30479/JFAK.2022.18054.3048
13. Bloomfield, R. (2008). Discussion of "annual report readability, current earnings, and earnings persistence". Journal of Accounting and Economics, 45(2-3), pp. 248-252. https://doi.org/10.1016/j.jacceco.2008.04.002
14. Cai, H., and Liu, Q. (2009). Competition and corporate tax avoidance: Evidence from Chinese industrial firms. *The Economic Journal*, 119(537), pp. 764-795. https://doi.org/10.1111/j.1468-0297.2009.02217.x
15. Cain, M. D., McKeon, S. B., and Solomon, S. D. (2017). Do takeover laws matter? Evidence from five decades of hostile takeovers. *Journal of financial economics*, 124(3), pp. 464-485. https://doi.org/10.1016/j.jfineco.2017.04.003
16. Chen S., Chen X, Cheng Q., Shevlin, T. (2010) Are family firms more tax aggressive than non-family firms?. *Journal of financial economics*, 95(1), pp. 41–61. https://doi.org/10.1016/j.jfineco.2009.02.003
17. Chen, H. L., and Hsu, C. H. (2013). Entrepreneurial orientation and firm performance in non-profit service organizations: contingent effect of market orientation. *The Service Industries Journal*, 33(5), pp. 445-466. https://doi.org/10.1080/02642069.2011.622372
18. Chen, X., Hu, N., Wang, X., and Tang, X. (2014). Tax avoidance and firm value: evidence from China. *Nankai Business Review International*, 5(1), pp. 25-42. https://doi.org/10.1108/NBRI-10-2013-0037
19. Chyz, J. A., Gaertner, F. B., Kausar, A., and Watson, L., (2019). Overconfidence and Corporate Tax Policy, *Review of Accounting Studies*, 24(3), pp. 1114-1145. http://dx.doi.org/10.2139/ssrn.2408236
20. Corvino, A., Caputo, F., Pironti, M., Doni, F., and Bianchi Martini, S. (2019). The moderating effect of firm size on relational capital and firm performance: Evidence from Europe. *Journal of Intellectual Capital*, 20(4), pp. 510-532. https://doi.org/10.1108/JIC-03-2019-0044
21. Dierickx, I., and Cool, K. (1989). Asset stock accumulation and sustainability of competitive advantage. *Management Science*, 35(12), pp. 1504-1511. https://doi.org/10.1287/mnsc.35.12.1504
22. Damayanty, P., and Putri, T. (2021). The Effect of Corporate Governance on Tax Avoidance by Company Size as The Moderating Variable, ICOSMI. http://dx.doi.org/10.4108/eai.14-9-2020.2304404
23. Daneshvar M, RazaviHajiagha S H, AleshLankarani M. (2023)Identifying and Modeling Effective Factors on Tax Behavior. *Journal of Tax Research*, 30(56), pp. 125-148. https://doi:10.52547/taxjournal.30.56.6
24. Delgado, F. J., Fernández-Rodríguez, E., García-Fernández, R., Landajo, M., and Martínez-Arias, A. (2023). Tax avoidance and earnings management: a neural network approach for the largest European economies. *Financial Innovation*, 9(1), pp. 19. https://doi:10.1186/s40854-022-00424-8
25. Demeré, P., Donohoe, M. P., and Lisowsky, P. (2020). The economic effects of special purpose entities on corporate tax avoidance. *Contemporary Accounting Research*, 37(3), pp. 1562 1597. https://doi.org/10.1111/1911-3846.12580
26. Desai, M. and Dharmapala, D. (2006). Corporate tax avoidance and high-powered incentives. *Journal of Financial Economics*, 79(1), pp. 145-179.

https://doi.org/10.1016/j.jfineco.2005.02.002
27. Desai, M. A., and Dharmapala, D. (2009). Corporate tax avoidance and firm value. *The Review of Economics and Statistics*, 91(3), pp. 537-546. https://doi.org/10.1162/rest.91.3.537
28. Desai, M. A., Foley, C. F., and Hines, J. R. (2004). Economic effects of regional tax havens. Working paper, *National Bureau of Economic Research.* https://hdl.handle.net/2027.42/39179
29. Desai, M. A., and Hines Jr, J. R. (2004). Old rules and new realities: Corporate tax policy in a global setting. *National Tax Journal*, 57(4), pp. 937-960. https://doi.org/10.17310/ntj.2004.4.09
30. Dessein, W., and Prat, A. (2022). Organizational capital, corporate leadership, and firm dynamics. *Journal of Political Economy*, 130(6), pp.1477-1536. https://doi.org/10.1086/718985
31. Diyanti Dilami, Z., Rahnama Roodposhti, F., and Karami, S. (2015). Evaluation of the effect of tax avoidance on earnings informativeness of listed companies in the Tehran Stock Exchange. *Journal of Management Accounting*, 9(28), pp.15-37. (In Persian)
32. Dyreng, S., and Hanlon, M. (2021). Tax avoidance and multinational firm behavior. In chapter in the International Tax Policy Forum/Brookings Institution book: "Global Goliaths: *Multinational Corporations in the 21st Century Economy*. http://dx.doi.org/10.2139/ssrn.4359219
33. Eisfeldt, A. L., and Papanikolaou, D. (2013). Organization capital and the cross-section of expected returns. *The Journal of Finance*, 68(4), pp. 1365-1406. https://doi.org/10.1111/jofi.12034
34. Eisfeldt, A. L., and Papanikolaou, D. (2014). The value and ownership of intangible capital. *American Economic Review*, 104(5), 189-194. https://doi:10.1257/aer.104.5.189
35. Enache, L., and Srivastava, A., (2018). Should intangible investments be reported separately or commingled with operating expenses? New evidence. *Management Science*, 64(7), pp. 3446–3468. https://doi.org/10.1287/mnsc.2017.2769
36. Esnaashari, H. (2017). The relationship between loan financing with Expenses management and the effect of audit quality. *Financial Accounting Research*, 9(1), pp. 21-40. https://doi.org/10.22108/FAR.2017.21769
37. Esnaashari, H., and Nourmohammadi, M. (2018). The Relationship Between Tax Policy and Companies' Tax Burden in Inflationary Conditions. *Empirical Studies in Financial Accounting*, 15(58), pp. 59-78. https://doi.org/10.22054/qjma.2018.9426
38. Esnaashari, H., and Sajadi, S. A. (2018). The Effect of Size and Information Environment on the Relationship between Stock Returns and Trading Volume. *Accounting and Auditing Research*, 10(40), pp. 59-74. https://sid.ir/paper/365593/en
39. Esnaashari, H., and Valizadeh Larijani, A. (2018). Risk taking behavior over firm's life cycle and its relation with financial performance using generalized method of moments (GMM). *Financial Accounting Research*, 10(1), pp. 1-18. https://doi.org10.22108/FAR.2018.85018.0
40. Fadhila, Z. R., and Handayani, R. S. (2019). Tax amnesty effect on tax avoidance and its consequences on firm value (Empirical study on companies in Indonesia Stock Exchange). *Jurnal Dinamika Akuntansi* 11(1), pp. 34–47. https://doi.org/10.15294/jda.v11i1.19264
41. Fauzan, F., Dyah Ayu, A., and Nashirotun Nisa, N. (2019). The Effect of Audit Committee, Leverage, Return on Assets, Company Size, and Sales Growth on Tax Avoidance. *Riset Akuntansi dan Keuangan Indonesia*, 4(3). pp. 171-185. https://doi.10.23917/reaksi.v4i3.9338
42. Francis, B. B., Sun, X., Weng, C. H., and Wu, Q. (2022). Managerial ability and tax aggressiveness. *China Accounting and Finance Review*, 24(1), pp. 53-75. https://doi.org/10.1108/CAFR-02-2022-0002
43. Gallemore, J., and Labro, E., (2015). The importance of the internal information environment

for tax avoidance. *Journal of Accounting and Economics*, 60(1), pp. 149–167. https://doi.org/10.1016/j.jacceco.2014.09.005

44. Goh, B. W., Lee, J., Lim, C. Y., and Shevlin, T. (2016). The effect of corporate tax avoidance on the cost of equity. T*he Accounting Review*, 91(6), pp. 1647-1670. https://doi.org/10.2308/accr-51432
45. Graham, J. R., and Tucker, A. L. (2006) Tax shelters and corporate debt policy. *Journal of financial economics*, 81(3), pp. 563–594. https://doi.org/10.1016/j.jfineco.2005.09.002
46. Gupta, S., and Jalles, J. T. (2022). Do tax reforms affect income distribution? Evidence from developing countries. *Economic Modelling*, 110, A. 105804. https://doi.org/10.1016/j.econmod.2022.105804
47. Gurdal, T., Aydin, M., and Inal, V. (2021). The relationship between tax revenue, government expenditure, and economic growth in G7 countries: new evidence from time and frequency domain approaches. *Economic Change and Restructuring*, 54, pp. 305-337 https://doi.org/:10.1007/s10644-020-09280-x
48. Gurdgiev, C., and Ni, Q. (2023). Board diversity: Moderating effects of CEO overconfidence on firm financing decisions. *Journal of Behavioral and Experimental Finance*, 37(27),A. 100783. https://doi.org/10.1016/j.jbef.2022.100783
49. Hanlon, M., and Slemrod, J. (2009). What does tax aggressiveness signal? Evidence from stock price reactions to news about tax shelter involvement. Jou*rnal of Public Economics*, 93(1-2), pp. 126-141. https://doi.org/10.1016/j.jpubeco.2008.09.004
50. Hanlon, M., and Heitzman, S. (2010). A review of tax research. *Journal of Accounting and Economics*, 50(2-3), pp. 127-178. https://doi.org/10.1016/j.jacceco.2010.09.002
51. Hasan, M. M., Lobo, G. J., and Qiu, B. (2021). Organizational capital, corporate tax avoidance, and firm value. *Journal of Corporate Finance*, 70(1), A. 102050. https://doi.org/10.1016/j.jcorpfin.2021.102050
52. Hasan, M. M. (2018). Organization capital and firm life cycle. *Journal of Corporate Finance*, 48(29), pp. 556-578. https://doi.org/10.1016/j.jcorpfin.2017.12.003
53. Hasseldine, J., Holland, K., and van der Rijt, P. G. (2012). The management of tax knowledge. In *Taxation* (pp. 145-151). Routledge.
54. Heidarpour, F., Daghani, R., and Khodaveisi, J. (2010). The Role of Tax Auditing in Eliminating Audit Expectation Gap. *TAX JOURNAL, NEW SERIES* - 18(8 (56)), pp. 211-223. SID. https://sid.ir/paper/571907/en
55. Hernández, J. P. S. I., Yañez-Araque, B., and Moreno-García, J. (2020). Moderating effect of firm size on the influence of corporate social responsibility in the economic performance of micro-, small-and medium-sized enterprises. *Technological Forecasting and Social Change*, 151(56), A. 119774. https://doi.org/10.1016/j.techfore.2019.119774
56. Hesarzadeh R. (2022). The principles of writing theoretical foundations and testing hypotheses with moderator variables, Ferdowsi University of Mashhad publication, ISSN, pp. 978-964-386-551-1
57. Hoseini, M., and Safari Gerayli, M. (2018). The presence of women on the board and tax avoidance: evidence from Tehran stock exchange. *International Journal of Finance & Managerial Accounting*. 3(9), pp. 53–62. https://civilica.com/doc/1327793
58. Hosseini Mianroudi, S. M., and Imani, K. (2022). Investigating the effect of organizational capital on the relationship between tax avoidance and value of companies listed on the Tehran Stock Exchange. In Proceedings of the 5th Annual International Conference on Innovative Developments in Management, *Economics, and Accounting*, pp. 111-120. (In Persian)

59. Hsieh, T., Wang, Z., and Demirkan, S. (2018). Overconfidence and tax Avoidance: The role of CEO and CFO interaction. *Journal of Accounting and Public Policy*, 37(3), pp. 241–253. https://doi.org/10.1016/j.jaccpubpol.2018.04.004
60. Huang, H., Sun, L. and Zhang, J. (2017), Environmental Uncertainty and Tax Avoidance. *In Advances in taxation*, 24,. pp. 83-124. https://doi.org/10.1108/S1058-749720170000024002
61. Huang, H.H., Lobo, G.J., Wang, C., and Xie, H. (2016). Customer concentration and corporate tax avoidance. *Journal of Banking & Finance*. 72, pp. 184–200. https://doi.org/10.1016/j.jbankfin.2016.07.018
62. Ilaboya, O., and Aronmwan, E. (2022). Overconfident CEOs and corporate tax avoidance. Overconfident CEOs and corporate tax avoidance. *Journal of Accounting and Management*, 11(2), pp. 70-80. https://ssrn.com/abstract=4093039
63. Jacob, M., Rohlfing-Bastian, A., and Sandner, K. (2021). Why do not all firms engage in tax avoidance? *Review of Managerial Science*, 15(2), pp. 459-495. https://doi.org/10.1007/s11846-019-00346-3
64. Jbir, S., Neifar, S., and Makni Fourati, Y. (2021). CEO compensation, CEO attributes and tax aggressiveness: evidence from French firms listed on the CAC 40. *Journal of Financial Crime*, 28(4), pp. 1141-1160. https://doi.org/10.1007/s11846-019-00346-3
65. Jihene, F., Moez, D. (2019), The Moderating Effect of Audit Quality on CEO Compensation and Tax Avoidance: Evidence from Tunisian Context. *International Journal of Economics and Financial Issues*, 9(1), pp. 131-139. https://doi.org/10.32479/ijefi.7355
66. Karami, S., Rahnamaei Roudposhti, F., and Dianti Delami, Z. (2016). Evaluating the impact of tax avoidance on the informativeness of reported earnings in companies listed on the Tehran Stock Exchange. *Journal of Management Accounting*, 9(28). (In Persian)
67. Kim, J. B., Wang, Z., and Zhang, L. (2016). CEO overconfidence and stock price crash risk. *Contemporary Accounting Research*, *33*(4), pp. 1720-1749. https://doi.org/10.1111/1911-3846.12217
68. Lev, B., Radhakrishnan, S., and Zhang, W., .(2009). Organization capital. *Abacus*, 45(3), pp. 275–298. https://doi.org/10.1111/j.1467-6281.2009.00289.x
69. Li, K., Qiu, B., and Shen, R. (2018). Organization capital and mergers and acquisitions. *Journal of Financial and Quantitative Analysis*. 53(4), pp. 1871–1909. https://doi.org/10.1017/S0022109018000145
70. Li, Y., Al-Sulaiti, K., Dongling, W., Abbas, J., and Al-Sulaiti, I. (2022). Tax avoidance culture and employees' behavior affect sustainable business performance: the moderating role of corporate social responsibility. *Frontiers in Environmental Science*, 10, A. 964410. https://doi.org/10.3389/fenvs.2022.964410
71. Malik, S., Mihm, B., and Timme, F. (2018). An experimental analysis of tax avoidance policies. *International Tax and Public Finance*, 25, pp. 200-239. https://doi.org/10.1007/s10797-017-9448-1
72. Martín-de-Castro, G., Emilio Navas-López, J., López-Sáez, P., and Alama-Salazar, E. (2006). Organizational capital as competitive advantage of the firm. *Journal of Intellectual Capital*, 7(3), pp. 324-337.https://doi.org/10.1108/14691930610681438
73. Maula, H., Saifullah, M., Nurudin, N., and Zakiy, F. S. (2019). The influence of return on assets, leverage, size, and capital intensity on tax avoidance. *AFEBI Accounting Review*, 4(1), pp. 50-62. https://doi.org/10.47312/aar.v4i01.223
74. Moghaddam, A., and Sahraie, B. N. (2017). The Book- Tax Conformity & Earnings Management in the Tehran Stock Exchange. *Journal of Financial Analysis*, 1(1), pp. 65-94.
75. Moshayekhi, B., and Seyyedifar, S. (2015). Corporate governance and tax avoidance. *Journal*

of Financial Accounting Research, 6(20), pp. 83-103. https://doi.org/10.22103/jak.2015.964
76. Mughal, M. M. (2012). Reasons of tax avoidance and tax evasion: Reflections from Pakistan. *Journal of Economics and Behavioral Studies*, *4*(4), pp. 217-222. https://doi.org/10.22610/jebs.v4i4.320
77. Olsen, K. J., and Stekelberg, J. (2016). CEO Narcissism and Corporate Tax Sheltering. *The Journal of the American Taxation Association*, 38(1), pp. 1–22. https://doi.org/10.2139/ssrn.2446128.
78. Pasternak, M., and Rico, C. (2008). Tax interpretation, planning, and avoidance: Some linguistic analysis. *Akron Tax Journal*, 23(1), pp.2. http://ideaexchange.uakron.edu/akrontaxjournal/vol23/iss1/2
79. Piekkola, H. (2010). Making the Difference: The Organization Capital. *University of Vaasa, Department of Economics*.
80. Rego, S.O., and Wilson, R.. (2012). Equity risk incentives and corporate tax aggressiveness. *Journal of Accounting Research.* 50(3), pp. 775–810. https://doi.org/10.1111/j.1475-679X.2012.00438.x
81. Saeedi, A. ., Daghani, R. ., and Hajian, N. (2020). Firm-Specific Characteristics And The Disclosure Level: Evidence From The Tehran Stock Exchange. *Journal of Applied Business Research (JABR)*, 36(4), pp. 129–152. https://doi.org/10.19030/jabr.v36i4.10349
82. Sajadi, S. H., Asnaashari, H. and Shakeri, A. (2023). The Impact of Innovative Culture on the Implementation of Strategic Management Accounting Techniques. *Accounting and Auditing Review*, 30(1), pp. 1-27. https://doi.org/10.22059/ACCTGREV.2023.339692.1008659
83. Sajadi, S., and Ghajar Bigi, M. (2021). Examining the effect of organizational capital on cash holdings in listed companies on the Tehran Stock Exchange. *Journal of Modern Research in Management and Accounting*, 5(68), pp. 1-14. (In Persian).
84. Salehi, M., Khazaei, S., and Tarighi, H. (2019). Tax Avoidance and Corporate Risk: Evidence from a Market Facing Economic Sanction Country. *The Journal of Asian Finance, Economics and Business*, 6(4), pp. 45–52. https://doi.org/10.13106/JAFEB.2019.VOL6.NO4.45
85. Saragih, A. H., and Hendrawan, A. (2021). The moderating role of firm size on the association between managerial ability and tax avoidance. *Jurnal ASET Akuntansi Riset*, 13(1). https://doi.org/10.17509/jaset.v13i1.30783
86. Schrand, C.M., and Zechman, S.L.C. (2012). Executive overconfidence and the slippery slope to financial misreporting. *Journal of Accounting and Economics*, 53, pp. 311–329. https://doi.org/10.1016/j.jacceco.2011.09.001
87. Seidman, J. K., and Stomberg, B. (2017). Equity compensation and tax avoidance: Disentangling managerial incentives from tax benefits and reexamining the effect of shareholder rights. *The Journal of the American Taxation Association*, 39(2), pp. 21-41. https://doi.org/10.2308/atax-51755
88. Shahraki, M., Asadi, G., and Asnaashari, H. (2019). An Investigation of the Moral Hazard of Controlling Shareholders and Financing Constraints. *Applied Research in Financial Reporting*, 7(2), pp. 73-98.(in Persian)
89. Slemrod, J. (2004). The economics of corporate tax selfishness. *National Tax Journal*, 57(4), pp. 877-899.https://doi.org/10.17310/ntj.2004.4.06
90. Sopiyana, M. (2022). The Effect of Leverage and Firm Size on Tax Avoidance with Profitability as Moderating. *Scientific Journal Of Reflection: Economic, Accounting, Management and Business*, 5(1), pp. 29-37. https://doi.org/10.37481/sjr.v5i1.422

91. Sumunar, K. I., Jannah, L., and Aulia, D. (2019). CEO overconfidence, tax avoidance, and education foundation. *Jurnal Akuntansi dan Auditing Indonesia*, 23, pp. 99-105. https://doi.org/10.20885/jaai.vol23.iss2.art4
92. Susanti, M. (2017). Corporate social responsibility, size and tax avoidance. *Journal of Economic & Management Perspectives*, 11(1), pp. 1639-1650.
93. Taufiq, M., and Tertiarto, W. (2018). The effect of transfer pricing, capital intensity and financial distress on tax avoidance with firm size as moderating variables. *Modern economics*, 11, pp. 122-128. https://doi.org/10.31521/modecon.V11(2018)-20
94. Tehrani, R., and Hesarzadeh, R. (2009). The effect of free cash flow and financing constraints on over-investment and under-investment. Accounting and Auditing Research, 1(3), pp. 50-67. doi: 10.22034/iaar.2009.105195
95. Wan, L., Li, R., and Chen, Y. (2022). Negative performance feedback and corporate venture capital: the moderating effect of CEO overconfidence. *Applied Economics*, 54(16), pp. 1829-1843. https://doi.org/10.1080/00036846.2021.1982133
96. Zhang, X., Husnain, M., Yang, H., Ullah, S., Abbas, J., and Zhang, R. (2022). Corporate business strategy and tax avoidance culture: Moderating role of gender diversity in an emerging economy. *Frontiers in Psychology*, 13, A. 827553. https://doi.org/10.3389/fpsyg.2022.827553

IJAAF; Vol. 8, No. 3, Summer 2024, Serial 28

Iranian Journal of
Accounting, Auditing & Finance

Ferdowsi University of Mashhad

Quarterly

RESEARCH ARTICLE

Are Auditors Really Independent in Making Professional Judgment?

Reyhaneh Haghighi, Mohammad Ali Bagherpour Velashani*, Ali Ghanaei Chamanabad, Mohammad Reza Abbaszadeh

Faculty of Economics and Administrative Sciences, Ferdowsi University of Mashhad, Mashhad, Iran

How to cite this article:
Haghighi, R., Bagherpour, M. A., Ghanaei Chamanabad, A., & Abbaszadeh, M. R. (2024). Are Auditors Really Independent in Making Professional Judgment?. *Iranian Journal of Accounting, Auditing and Finance*, *8*(3), 111-130.
doi: 10.22067/ijaaf.2024.44946.1432
https://ijaaf.um.ac.ir/article_44946.html

ARTICLE INFO

Article History
Received: 2023-12-30
Accepted: 2024-02-21
Published online: 2024-07-06

Keywords:
Anxiety, Emotional Intelligence, Executive Functioning, Real Independence, Personality Traits

Abstract

This study scrutinizes the independence of auditors in making professional judgments, exploring the influence of personal characteristics on audit quality. Utilizing a descriptive survey approach, the research examines a sample of 425 auditors from audit organizations and the Iranian Association of Certified Public Accountants (IACPA). Data collection occurred through field surveys and questionnaires administered in 2022, with analysis conducted using Structural Equation Modeling (SEM) in "R" software version 4.0.2. The results reveal a significant association between auditors' independence and personality characteristics, indicating a potential impact on audit quality. Specifically, the findings suggest that auditors may not consistently demonstrate independence in their professional judgments. This study pioneers an investigation into auditors' genuine independence concerning personal traits, offering valuable insights for regulators, standard setters, and policymakers to consider in refining regulations and standards. Moreover, the research contributes to the expansion of literature in this critical domain.

https://doi.org/10.22067/ijaaf.2024.44946.1432

NUMBER OF REFERENCES
134

NUMBER OF FIGURES
1

NUMBER OF TABLES
3

Homepage: https://ijaaf.um.ac.ir
E-Issn: 2717-4131
P-Issn: 2588-6142

*Corresponding Author:
Mohammad Ali Bagherpour Velashani
Email: bagherpour@um.ac.ir
Tel: 09132279622
ORCID: 0000-0002-0255-0810

1. Introduction

The increasing demand for reliable information requires auditors to attest to the financial reports, making auditing an integral part of the financial reporting process (Gardner, 2000). The need for this attention and also consideration of independence in the Code of Ethics issued by the International Ethics and Standards Board for Accountants (IESBA 2018) emphasized the importance of auditors' independence to monitor the contractual arrangements between principals and agents in the agency theory literature. The auditors' independence and professional judgment are important in assuring the stakeholders (Bebeji et al., 2022; Balkir, 2000; Chiang, 2016). The impairment of independence in the audit processes, especially when making judgments, reduces audit quality. Therefore, identifying the factors affecting independence and professional judgment is important, and more research is required in this area. Reviewing the related literature shows that prior researchers do not investigate all the potential factors affecting real independence, especially in emerging markets requiring more research in this area. This provides the main reason for conducting the current study.

It is expected that auditors make similar and fair judgments in accordance with the audit standards framework; however, prior researches (Setiawan, 2018; Nolder and Riley, 2014) show that despite unique audit standards and Code of Ethics, auditors make different judgments on the same and similar issues implying that auditor's independence may be impaired. It indicates that other factors also affect auditors' independence, which justifies doing more research in this area.

According to the International Federation of Accountants (IFAC) (2018), auditors' independence has two dimensions: independence of mind (real independence) and independence in appearance. Reviewing prior research (such as Bartlett 1993, Teoh and Lim 1996) indicates that most of them have focused on independence in appearance and independence of mind is not well investigated. This is because of its nature, i.e., not observable and measurable, making it difficult for researchers to develop and apply a suitable proxy. This study tries to formulate and introduce a proxy for measuring real independence using professional judgment. According to 'IFAC (2018, pp1)', independence of mind (real independence) is 'the state of mind that permits the expression of a conclusion without being affected by influences that compromise professional judgment …' implying that professional judgment is the core of independence of mind.

Accordingly, it can be concluded that the factors, especially personality characteristics, affecting professional judgment can also affect independence of mind. Therefore, we can use professional judgment as a proxy for independence of mind (real independence). It should be considered that both of them (professional judgment and independence of mind) take place in the mind (Carvalho Júnior et al., 2017, IFAC 2018), so cognitive characteristics are expected to be more influential than other affecting factors.

According to cognitive studies, the variables affecting decision-making and judgment can be divided into four categories, including emotions (Vigil-Colet, 2007), cognitive skills (Bertrand and Schoar, 2003, Fischhoff 2010), personality type (Ji et al., 2018) and the feelings (Finucane et al., 2000, Mellers, 2000). It should be mentioned that some of these variables (e.g., cognitive skills and feelings) are not studied in the auditing context, providing another justification for doing this research. Prior researchers also show that people with higher cognitive skills make choices that comply more with expected ethical values (Cokely and Kelley 2009). Differences in cognitive skills can affect judgment, decision-making (Peters and Levin, 2008; Stanovich and West, 2008) and ultimately real independence. In addition, different sensitive reactions to internal and external factors can result in different judgments (Mellers, 2000).

Some theories, such as Carl Gustav Jung's (1921) and dual processing theory, indicate that emotion, cognitive skills, personality type, and feelings affect audit judgment. Also, the results of cognitive research indicate that the appropriate decision-making process requires a balance between

the feelings and perceptions of individuals (Damasio, 1994). Paying attention to cognitive skills and feelings can improve the quality of decision making and the degree of auditor risk-averse (Henninger et al., 2010; Jin et al., 2019; Damasio, 1994), leading to improved audit independence and quality.

Investigating cognitive factors and their interaction is also one of the innovations of this study. Incorporating them and their interactions in audit literature may provide a better understanding of auditors' judgment and decision-making processes, especially in emerging markets, which are not fully considered in auditing and accounting literature (Salehi and Dastanpoor, 2021). The third section provides the research method. The fourth section presents the study's findings, and the final section reports the conclusions, including implications and limitations.

2. Literature review

This section presents a review of the related theories (dual process theory and Carl Gustav Jung theory), auditor's independence and judgment, and cognitive factors affecting judgment.

2.1 Dual process theory

Recent decision-making theories seek to integrate cognitive, emotional and contextual information to explain decision-making processes' complexities. Dual processing theory is one of the most important theories in this field (Epstein et al., 1996). In this theory, individuals are influenced by two distinct nervous systems called the "rational-analytical" system and the "experiential-intuitive" system when making decisions. The "rational-analytical" system is a type of neural information processing that is slower, logical, analytical, and governed by rules. The "experiential-intuitive" system is a type of neural information processing that is faster, more associative, and driven by emotions and intuition. Although rational and strategic decision-making benefits humans, it is not the best option. Sometimes, making decisions based on emotions and intuition can also have an important effect on improving choices and increasing the quality of decision making. In other words, the integration of two processes can lead to improvement, especially in uncertain and risky situations. In such situations, the use of the "experiential-intuitive" system becomes more important. Epstein et al. (1996) believe that decision-making processes rely more on the "experiential-intuitive" system. Hence, dual processing theory integrates logical cognitive processes with emotional and contextual processing. In other words, the function of neural structures based on emotions, cognitive components, and their integration allows sound decision making in different fields.

In 1994, Damasio presented a somatic marker hypothesis that emphasized the role of emotion and emotional processing in better decision-making by providing a physical and emotional label. This "label" is reused during subsequent decisions based on experience. Bechara and Damasio (2005) also believed that physical somatic is combined with cognitive processes by pinpointing which particular alternative in a decision scenario should be chosen by working memory(a component of executive function).

2.2 Carl Gustavo Jung theory

Carl Gustav Jung identified four psychological functions: sensation, intuition, thinking and feeling. Like thinking and feeling, sensation and intuition are opposite components. Although each person experiences all four functions, Jung assumed that only one function is more dominant in each person. In addition, he believes that each of these four functions is different according to the general attitude of introversion and extroversion. Intuition and sensation are functions related to perception. Also, thinking and feeling are related to evaluating and interpreting perceptions. In other words, he considers perception and evaluation as two separate categories (Jung, 1921). Judgment and decision-

making is a process of understanding and evaluating information and options, as well as concluding based on perceptions (Pirtošek et al., 2009), so, attention to perceptions and evaluating them is essential to understand judgment better. Therefore, it can be implied that paying attention to personality characteristics and sensory processing when making decisions is important. In recent psychological research, such as those by Marjerison and Pan (2022) and Khoo et al. (2022), this theory was applied to examine decision-making.

Attribution theory also refers to how a person interprets an event and the causes of his behavior. This theory states that internal and external stimuli determine an individual's behavior. The discussion of this theory leads to the factors causing the existence of an event or events. This attribution theory can be used to understand what factors influence the auditor when doing an assignment (Wahidahwati and Asyik, 2022) as sensory processing shows the reaction of individuals to internal and external stimuli, so we can infer that the theory justifies the examination of this variable in the current study.

2.3 Auditor's independence

Auditor independence is explained as the basis of auditing (Previts and Merino, 1998) and is the essence of audit that provides objective assurance for financial statements and enhances the credibility and reliability of the financial reports (Quick and Warming, 2009).

The International Federation of Accountants (IFAC 2018) categorized independence into two dimensions: independence in fact (mind) (IIF) and independence in appearance (IIA). Both dimensions are critical elements in maintaining public confidence in the audit profession (Pany and Reckers, 1980). Independence, in fact (IIF), is the state of mind that allows the auditor to carry out the audit processes with objectivity, integrity, and professional skepticism. Independence in appearance (IIA) refers to the informed users' perception of the audit and auditors' following of audit standards.

Prior research shows that independence had more effect on corporate collapses of the early 21st century (Brown, 2005), which requires more research to identify the factors affecting this kind of independence.

Audit researchers investigated factors affecting independence such as gifts; purchase discount arrangement (Pany and Reckers, 1980); the audit firm size (Gul, 1989); the provision of management advisory services by the audit firm (Bartlett 1993, Teoh and Lim, 1996); the level of competition in the audit services mark (Gul, 1989); the client's financial condition (Gul, 1989, Gul and Tsui 1992); the nature of conflict issue (Knapp, 1985); the audit firm's tenure (Teoh and Lim, 1996); the degree of competition in the audit services market (Knapp, 1985, Gul, 1989); the audit fees or relative client size (Bartlett 1993, Teoh and Lim, 1996, Pany and Reckers, 1980); and the audit committee (Gul, 1989, Teoh and Lim, 1996). As can be seen, the investigated factors are mainly related to independence in appearance. It may be related to the fact that independence is unobservable (an inner variable) and not measurable, making it difficult for researchers to investigate.

Based on the above definition provided by IFAC (2018), this paper argues that audit judgment can be a good proxy for independence and hypothesizes that factors affecting audit judgment, especially psychological ones, can also affect independence. Deficiencies in auditors' psychological characteristics can negatively affect the audit process, especially when collecting information and making professional judgments. Demetriou et al. (2021) showed that depressed individuals have a negative bias in perceiving key cues, which can affect auditors' professional skepticism and judgment as well as independence requiring more research in this area. This paper investigated the effect of psychological characteristics on audit judgment (as a proxy of independence) and provided a model for independence based on this relationship.

2.4 Auditor's professional judgment

Judgment is a process of making a decision or drawing a conclusion among possible alternative solutions in uncertain and risky conditions (Fischhoff and Broomell 2020).

'The International Auditing and Assurance Standards Board (IAASB) (2018)', defines professional judgment as 'the application of relevant training, knowledge, and experience, within the context provided by auditing, accounting, and ethical standards, in making informed decisions about the courses of action that are appropriate in the circumstances of the audit engagement.'

Regarding the vital role of professional judgment in the audit process (Dawes and Hastie 2001), the quality of financial reports (Ionela 2016), the users' decisions (Firth, 1980) and the market (DeAngelo, 1981), it is necessary to study the factors that can affect it, i.e., psychology dimensions (emotion, cognitive skills, personality, and feelings), which is the subject of this research.

2.5 Emotion and professional judgment

There is no scientific consensus on the definition of emotion (Kleinginna and Kleinginna, 1981), and prior efforts to reach a specific definition have been unsuccessful (Eelen, 2018).

Sander et al. (2005) defined emotion as an "episode of interrelated, synchronized changes in the states of all or most of the five organismic subsystems in response to evaluating an external or internal stimulus event as relevant to major concerns of the organism.'

One of the factors that can affect and control emotions and its components is emotional intelligence (Goleman, 1995). Emotional intelligence (EI) has been defined as 'being able to motivate oneself and persist in the face of frustrations; to control impulse and delay gratification; to regulate one's moods and keep distress from swamping the ability to think; to empathize and to hope' (Goleman, 1995). Mayer et al. (2004) consider four interrelated abilities for emotional intelligence, including using emotions to facilitate decision-making, perceiving emotion (oneself and others), perceiving emotion, and managing emotion.

According to Goleman (1998), decisions are dynamically related to mood and emotions, and this relationship can enhance the quality of decision making. In this regard, Buontempo (2005) and Damasio (1994) show that emotions and emotional intelligence affect decision making.

Emotional intelligence plays a prominent role in situations involving judgment and decision making (Goleman, 1998), which is mainly the case in audit providing another justification for this research. Although the effects of emotional intelligence on an auditor's judgment have been investigated in prior audit research (Yang et al., 2018; Coget et al., 2011; Côté et al., 2010) and the effects of its interactions with other important psychological variables such as personality type and depression are considered in psychological research (Roman et al., 2019, Siu, 2009, Vigil-Colet, 2007, Furnham and Chamorro-Premuzic 2004), the effects of this interaction are not investigated in audit area.

Law et al. (2004) show that individuals with high emotional intelligence can effectively realize their emotions and regulate them for their tasks. Auditors deal with ethical dilemmas in their jobs and their emotional intelligence can help them take appropriate ethical action (Ismail 2015). Prior research (Mesmer-Magnus et al., 2010; Deshpande and Joseph, 2009; Angelidis and Ibrahim, 2011) show that people with high emotional intelligence tend to do more ethically than those with lower emotional intelligence. Therefore, auditors with high emotional intelligence are expected to make better judgments resulting in a high degree of independence.

2.6 Cognitive skills and judgment

Cognitive skills refer to an individual's ability to do a variety of mental activities that are mainly

related to learning and problem solving (Wehmeyer and Kelchner, 1994). They are applied in acquiring knowledge, manipulating information, reasoning, and how people learn, remember, and pay attention (Kiely, 2014; Danili and Reid, 2006).

Schneider and McGrew (2012) classified individual cognitive abilities into four categories: acquired knowledge (crystallized intelligence), domain-independent general capacities (fluid reasoning and memory), sensory-motor abilities (visual and auditory processing), and general speed (processing speed, reaction times, and psychomotor speed).

One of the most important components of cognitive skills is executive functions. Executive functions are basically the brain's management system, and its deficiency can have a major impact on one's ability to perform tasks such as planning, prioritizing, organizing, paying attention and remembering details, controlling emotional reactions, and decision making (Alvarez and Emory, 2006). Various studies, such as Baruch Fischhoff (2010), show that decision making is affected by executive function. Prior research (Németh et al., 2020; Guarino et al., 2019; Alvarez and Emory, 2006) also show that executive function can affect responding to environmental drivers, self-regulating thoughts and behaviors, flexibility, and decision making. In this regard, prior psychological research shows that deficiencies in executive functions are associated with behavioral problems such as anxiety, depression, and emotional problems (Fujii et al., 2013, Hollocks et al., 2014), neurotic personality (Buchanan, 2016, Bell et al., 2020) unadaptability and unconsciousness (Buchanan, 2016, Bell et al., 2020).

2.7 Personality (including disorders) and judgment

Personality is defined as a person's characteristic (trait) pattern of behaviors in the broad sense (including thoughts, feelings, and motivation)' '(Uher and Visalberghi, 2016)'. Personality traits reflect people's characteristic patterns of thoughts, feelings, and behaviors (Matthews et al., 2003).

Personality traits can also be conceptualized as a set of stable individual differences in people's motivational reactions to environmental stimuli (Denissen and Penke 2008). There are different models of personality traits in the field of psychology. The most important and popular of them, which is labeled as the Big Five (Denissen and Penke 2008, Bakker et al. 2006, Wang, 2014), is applied in this research. Multiple studies have evaluated the impact of personality traits on decision-making (Riaz and Batool, 2012; Bajwa et al., 2016; Bayram and Aydemir, 2017). The relationship between personality traits and judgment is also investigated in auditing, but the results are mixed (Muris et al., 2009), requiring more research in this area.

A personality disorder, a personality trait component, is a way of thinking, feeling and behaving that deviates from the expectations of the culture, causes distress or problems functioning, and lasts over time (American Psychiatric Association & American Psychiatric Association 2013). Psychologists believe that personality disorder is a common and chronic disorder and its prevalence is estimated to be 10-15% of the general population, which results in unreasonable decision making (Ekhtiari and Behzadi, 2001). Martin (2010) also shows that personality disorder can result in unethical behavior, which can be the case in the audit profession, requiring more research in this area.

In audit research, only the relationship between auditors' overconfidence and Machiavellian personality is investigated through judgment. While anxiety and depression are important personality disorders affecting decision making and judgment (Demetriou et al., 2021; Hartley and Phelps, 2012; Huys et al., 2015; Gur et al., 1992), they are not studied in prior research.

2.8 Feelings and Judgment

The word "feeling" was used to explain the physical sensation of touch through either experience or perception and other experiences, such as a feeling of warmth' and

sentience (VandenBos, 2006). Behavioral researchers concluded that feeling reactions (including feelings and mental states) play an important role in the judgment and decision-making process. Also, different reactions and sensory processing can result in different judgments (Finucane et al., 2000; Mellers, 2000). Psychological research such as Damsio (1994) suggests that the appropriate decision-making process requires a balance between feelings and perceptions of individuals. LeDoux (1993) concluded that people's perceptions of their reactions can help them choose and make decisions in different circumstances. Regarding the audit process, which is full of decision-making and judgment, it seems that doing research in this area can help auditors improve the quality of their decisions and judgments.

It is necessary to know and control the sources of feelings and reactions. If the sources are not properly managed, they will easily lead to bias in judgment and decision making (Golman, 1995). Sensory processing is one of these sources, the most basic psychological element underling how people perceive and react to environmental drivers. Dunn (2001) believes that each person has her/his unique way of processing sensory. People with high sensory processing tend to respond to lower sensory thresholds and can better recognize environmental differences (Aron and Aron 1997). A person with a low sensory threshold pays full attention and responds to drivers. When a person has a high threshold, it means that the person ignores drivers that other people easily notice (Dunn, 1997). Individuals with low sensory thresholds (high sensory processing) are more affected by emotion than others, as they are more sensitive to drivers. In addition, the performance of their emotional memory, especially negative emotions, is better. This finding is consistent with studies that show individuals with high sensory processing sensitivity have higher levels of anxiety, negative emotions, and depression (Aron et al., 2005; Liss et al., 2005; Bakker and Moulding, 2012; Listou Grimen and Diseth, 2016, Lionetti et al., 2019) affecting the level of attention and biased behavior resulting in unfair judgment. There is no research on this area in audit literature, which provides a new subject for doing research in audit and accounting, implying another justification for doing this research.

Stenmark and Redfearn (2022) show that individuals with higher sensory processing sensitivity (SPS) are more sensitive to stimuli and prefer to think about ethical problems. In the case of auditors, it can be argued that auditors with higher sensory processing may have higher level of independence.

Recently, Fernandez-Prieto et al. (2021) show that there is relationship between executive functions and sensory processing. Soler et al. (2019) showed that there is a positive correlation between sensory processing style and executive functions, but Adams et al. (2015) and Hebert (2015) did not find any relationship between them. Although these variables and their relationship are important in making judgments, they are not considered in prior audit research.

3. Research design

Since the study investigates psychological factors on audit judgment, it is categorized as a descriptive-correlative research, and as the researchers use questionnaires, it is also considered a surveying investigation. This research uses a library method for preparing research literature and questionnaires to collect statistical data. The questionnaires for each variable include 60-item revised NEO personality inventory (Costa and McCrae, 1985) for personality type, Bar-on (Bar-on 1997) and Facial expressions(1) for emotional intelligence, Adult sensory profile for Sensory processing, Barkley questionnaire (Barkley, 2011) and the SST test (Chikazoe, 2009) for executive function, Beck anxiety and depression inventory questionnaire (Beck and Steer, 1990) for anxiety and depression and Hurtt questionnaire (2010) and Zarefar auditing ethics Questionnaire (2016) for professional judgment. These questionnaires are chosen based on psychological experts.

1 https://greatergood.berkeley.edu/quizzes/ei_quiz

The statistical population consists of the auditors of the audit firms, which have had Grade A during the last three years. They should have at least 3 years- work experience.

A maximum of 425 people with an effect size of 0.2, a first type error of 0.05 and a power of 80% has been determined as a sample size using a special below formula for determining the sample size for modeling structural equations that distributed, and 83 questionnaires were collected and finally, 70 questionnaires were examined. The outbreak of COVID-19 and its consequences, especially in audit firms, has a significant effect on the cooperation of the auditors. The collected data were analyzed using R statistical software version 4.0.2.

Error Function:

$$\operatorname{erf}(x) = \frac{2}{\sqrt{\pi}} \int_0^x e^{-t^2} dt$$

The smaller bound sample size for a structural equation model:

$$n = \max(n_1, n_2)$$

Where:

$$n_1 = \left\lceil 50\left(\frac{j}{k}\right)^2 - 450\left(\frac{j}{k}\right) + 1100 \right\rceil$$

$$n_1 = \left\lceil \frac{1}{2_H}\left(A(\frac{\pi}{6}) - B + D\right) + H + \sqrt{\left(A\left(\frac{\pi}{6} - B + D\right) + H\right)^2 + 4_{AH}\,(\frac{\pi}{6} + \sqrt{A} + 2_B - C - 2_D)} \right\rceil$$

A=1-p^2

B=$p$arcsin($\frac{p}{2}$)

C=$p$arcsin(p)

D=$\frac{A}{\sqrt{3-A}}$

H=$\left(\frac{\partial}{z_{1-\alpha/2}-z_{1-\beta}}\right)^2$

Where:

J: is the number of observed variables,

k :is the number of latent variables,

ρ: is the estimated Gini correlation for a typical two-variable random vector,

δ: is the size of the predicted effect,

α : is the amount of type 1 error with Sidak correction,

β :is the amount of error Type two

z : usual standard score.

M: is the mean,

σ: is the standard deviation

erf : the error function

4. Results

Researchers use goodness-of-fit indicators to evaluate the fitness of the overall model with the observed data for the research model reported in Table 1. According to the obtained indicators, it can be seen that all the indicators are almost acceptable, so the results of the model are reliable.

Table 1. Goodness indicators

Index	RMSEA	SRMR	TLI	CFI	AGFI	GFI	χ^2/df
Optimal amount	006.0<	Near to zero	0.950>	0.950>	0.900>	0.900>	Between 1 to 3
Acceptable amount	0.100<	Near to zero	0.900>	0.900>	0.8>	0.800>	Between 1 to 5
NEO Personality Inventory	0.098	0.040	0.946	0.973	0.995	0.999	1.674
Bar-on Emotional Intelligence	0.167	0.137	0.769	0.845	0.960	0.980	2.811
Barkley Deficits in Executive Functioning	<0.001	0.003	1.000	1.000	0.999	1.000	0.094
Adult Sensory Profile	<0.001	<0.001	1.000	1.000	1.000	1.000	<0.001
Beck's Depression Inventory	<0.001	<0.001	1.000	1.000	1.000	1.000	<0.001
Judgment	<0.001	0.013	1.000	1.000	0.988	0.008	0.792

The Average variance extracted (AVE) and composite reliability (CR) indices and Cronbach's alpha value are reported in Table 4, respectively, showing the model's structure validity and reliability.

Table 2. Evaluation of convergence validity and structural reliability

Model	Cronbach's alpha	CR	AVE
NEO Personality Inventory	0.780	0.620	0.500
Bar-On Emotional Intelligence	0.897	0.919	0.457
Barkley Deficits in Executive Functioning	0.897	0.876	0.800
Adult Sensory Profile	0.854	0.926	0.807
Beck's Depression Inventory	0.898	0.912	0.777
Judgment	0.785	0.939	0.755

The results (Table 3) show a direct relationship between adults' sensory processing (PHB) and auditor's opinion (GH) (with intensity of 0.405). This shows that the sensory threshold (the level of stimulation that the person reacts to the stimulus) and the auditors' reaction to the environmental stimuli influence their opinion. In other words, the auditors' attention to environmental stimuli and their reactions can affect their concentration and emotions (Kamath et al., 2020), which can affect auditors' opinions and the quality of their judgments. Examining the results of behavioral research (Finucane et al., 2000; Mellers, 2000) also shows that reaction to environmental stimuli affects their ability to make professional judgments and decisions.

The research results show that there is a negative relationship between anxiety and the auditor's opinion (GH) (with an intensity of 0.255). Anxiety leads to a decrease in the level of concentration (Azizpour et al., 2013), which negatively affects decision-making (Karvay et al., 2022). In other words, anxious auditors have a lower concentration level and cannot focus when expressing opinions, affecting the quality of auditors' judgments and opinions. The research results align with Hartley and Phillips (2012).

The research results showed a negative relationship between emotional intelligence and deficits in executive function (with an intensity of 00.452). Individuals with higher emotional intelligence perform better in executive function components (such as time management planning) (Godini and Baghfalki, 2015; Arguedas et al., 2016). According to Jerome and Liss (2005), there is a direct relationship between emotional intelligence and sensory processing (aligned with the findings, with an intensity of 0.488), there is a negative relationship between emotional intelligence and anxiety and depression (aligned with the findings, with an intensity of 0.342), and according to findings, anxiety and sensory processing are related to opinions, It can be expected that emotional intelligence, deficits in executive function (KEB) and their interaction indirectly affect auditors' opinion.

Also, the results show that there is a relationship between deficits in executive function (KEB) and depression (A) (with an intensity of 0.557). Since depression has a negative effect on the level of concentration and decision-making (Azizpour et al., 2013; Karvay et al., 2022), it can affect their opinion and the quality of their judgment. The result of this research is aligned with Hartley and Phelps (2012).

Table 3. Estimating and evaluating the appropriateness of load factor

Factors	Non-standard estimation	Standard Error	T-statistics	P-Value	Load factor
PHB → GH	0.402	0.133	3.017	0.003	0.405
Ezterab → GH	-0.168	0.077	-2.18	0.029	-0.255
HH ↔ tip	15.107	3.476	4.346	<0.001	0.811
tip ↔ KEB	-29.615	9.442	-3.136	0.002	-0.483
tip ↔ PHB	24.914	9.193	2.71	0.007	0.409
tip ↔ A	-11.957	3.503	-3.413	0.001	-0.573
HH ↔ KEB	-13.623	4.284	-3.18	0.001	-0.452
HH ↔ PHB	14.599	4.413	3.308	0.001	0.488
HH ↔ A	-3.51	1.415	-2.48	0.013	-0.342
KEB ↔ A	18.792	5.098	3.686	<0.001	0.557

The model based on research findings is presented below:

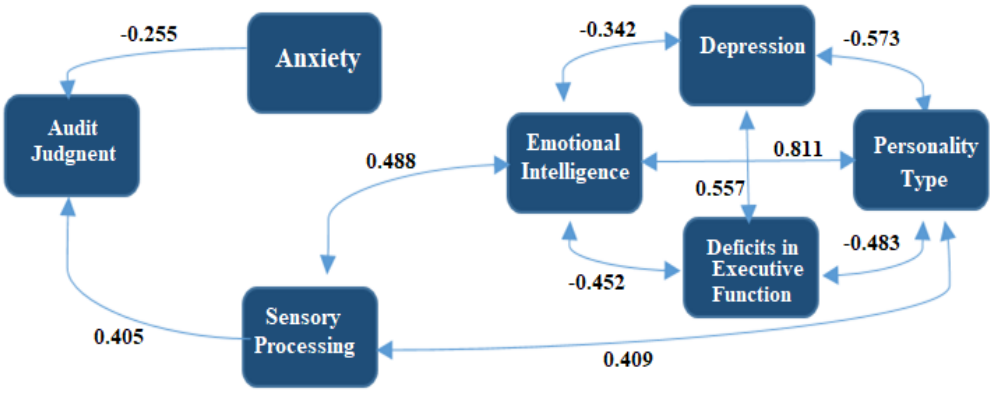

Figure 1. The final model

5. Conclusion and discussion

For the first time, this study developed a proxy for measuring independence in fact and provided a conceptual model of its affecting psychological factors. In general, the findings imply that auditors are not independent in some situations because of these factors. The summary of findings is presented below:

1. The sensory processing as a source of controlling feeling affects auditors' judgment. Accordingly, it can be argued that auditors in some situations are not really independent and do not act independently. This result is consistent with Bhattacharjee and Moreno (2002), Finucane et al. (2000) and Mellers (2000).
2. The anxiety affects auditors' judgment negatively. Because auditors with high anxiety show more negative biases in the interpretation of stimuli and also cannot have a high level of concentration, therefore it can be argued that such auditors have a lower quality of judgment and independence. The results of prior research (such as Chen et al., 2019; Leykin and DeRubeis, 2010) show that anxious people are weak in making immediate and intuitive decisions. This

implies that auditors with this characteristic may have weak judgment and independence. The finding is also consistent with Chen et al. (2018), Hartley and Phelps (2012) and Zinbarg and Yoon (2008).

3. Emotional intelligence plays a vital role in accurately recognizing feelings and controlling those (Wojciechowski et al., 2014; Porter et al., 2011). Also, individuals with this characteristic have a high skill in identifying inconsistencies and controlling stress (Nikolaou and Tsaousis, 2002) and better compliance ethics. Therefore, it can be said that the influence of emotional intelligence on an auditor's judgment can reduce auditors' tendency to engage in inefficient behavior and improve audit quality. It also helps auditors to comply with ethical requirements and independence of mind (real independence). The finding aligns with Jerome and Liss (2005).
4. Executive functions are important in controlling and directing behavior, performing tasks correctly, and controlling and managing pressures. Also, because executive function components can help control emotions (Tripathi, 2017), emotion control plays an important role in the quality of judgment and decision. The finding aligns with Arguedas et al. (2016) and Godini and Baghfalaki (2015). However, the research result is inconsistent with Del Missier et al. (2012), who showed that executive function is not the determined factor for different aspects of decision making.
5. Personality traits indirectly affect audit judgment and independence in relation to the above psychological variables. The finding aligns with Williams et al. (2010), Denburg et al. (2009), and Khalil (2016) but is not consistent with Bayram and Aydemir (2017) and El Othman et al.(2020).
6. Personality disorders such as depression can make it difficult for auditors to control and properly manage their emotions. In addition to affecting people's social relationships, the lack of proper management of emotions can also affect a person's job performance. Due to the fact that the audit profession is a teamwork profession and deals with different clients, emotion management is important for them. Also, past research (Suri et al., 2004) showed that the inability to manage feelings and emotions in depressed people leads to an increase in the sense of hopelessness and reduces the quality of decision-making; this can have a negative effect on the quality of auditors' judgment and independence of mind (real independence). The finding is aligned with Karvay et al. (2022), Hindmarch et al. (2013), and Leykin et al. (2011).

This study has limitations. Generalizability is the first limitation. Also, carelessly answering the questionnaire is another limitation. The outbreak of COVID-19 and its consequences is another limitation that affected the number of questionnaires received. The final limitation suggests that in addition to the variables, several more effective factors could not be considered in this paper.

Acknowledgements

Disclosure statement

No potential conflict of interest was reported by the author(s).

Reference

1. Adams, J. N., Feldman, H. M., Huffman, L. C., and Loe, I. M. (2015). Sensory processing in preterm preschoolers and its association with executive function. *Early human development*, 91(3), pp. 227-233. https://doi.org/10.1016/j.earlhumdev.2015.01.013
2. Alvarez, J. A., and Emory, E. (2006). Executive function and the frontal lobes: a meta-analytic review. *Neuropsychology review*, 16(1), pp.17-42. https://doi.org/10.1007/s11065-006-9002-x
3. American Psychiatric Association, D. S. M. T. F., and American Psychiatric Association.

(2013). Diagnostic and statistical manual of mental disorders: DSM-5 (Vol. 5, No. 5). Washington, DC: American psychiatric association.

4. Angelidis, J., and Ibrahim, N. A. (2011). The impact of emotional intelligence on the ethical judgment of managers. *Journal of Business Ethics*, 99(1), pp. 111-119. https://doi.org/10.1007/s10551-011-1158-5
5. Arguedas, M., Daradoumis, T., and Xhafa, F. (2016). Analyzing the effects of emotion management on time and self-management in computer-based learning. *Computers in Human Behavior*, 63, pp. 517-529. https://doi.org/10.1016/j.chb.2016.05.068
6. Aron, E. N., and Aron, A. (1997). Sensory-processing sensitivity and its relation to introversion and emotionality. *Journal of personality and social psychology*, 73(2), pp. 345. https://psycnet.apa.org/doi/10.1037/0022-3514.73.2.345
7. Aron, E. N., Aron, A., and Davies, K. M. (2005). Adult shyness: The interaction of temperamental sensitivity and an adverse childhood environment. *Personality and Social Psychology Bulletin*, 31(2), pp. 181-197. https://doi.org/10.1177/0146167204271419
8. Azizpour, M., Mohebbi, M., Khodaparast, M. H. H., and Varidi, M. (2013). Foam-mat drying of shrimp: characterization and drying kinetics of foam. *Agricultural Engineering International: CIGR Journal*, 15(3), pp. 159-165.
9. Bajwa, R. S., Batool, I., Asma, M., Ali, H., and Ajmal, A. (2016). Personality traits and decision making styles among university students (Pakistan). *Pakistan Journal of Life and Social Sciences*, 14(1), pp. 38-41.
10. Bakker, A. B., Van Der Zee, K. I., Lewig, K. A., and Dollard, M. F. (2006). The relationship between the big five personality factors and burnout: A study among volunteer counselors. *The Journal of social psychology*, 146(1), pp. 31-50. https://doi.org/10.3200/SOCP.146.1.31-50.
11. Bakker, K., and Moulding, R. (2012). Sensory-processing sensitivity, dispositional mindfulness and negative psychological symptoms. *Personality and individual differences*, 53(3), pp. 341-346. https://doi.org/10.1016/j.paid.2012.04.006
12. Balkir, I. H. (2000). Effects of analytical review results, optimism and patterns-for-coping on audit effort of accounting estimates (Doctoral dissertation, Concordia University).
13. Barkley, R. A. (2011). Barkley Adult ADHD Rating Scale—IV (BDEFS-LF)
14. Bar-on, R. (1997). The BarOn Emotional Quotient Inventory (BarOn EQ-i). Toronto, ON: Multi-Health Systems Inc.
15. Bartlett, R. W. (1993). A scale of perceived independence: New evidence on an old concept. *Accounting, Auditing & Accountability Journal*, 6(2), pp. 0-0. https://doi.org/10.1108/09513579310036378
16. Bayram, N., and Aydemir, M. (2017). Decision-making styles and personality traits. *International Journal of Recent Advances in Organizational Behaviour and Decision Sciences*, *3*(1), pp. 905-915. http://www.globalbizresearch.org/
17. Bebeji, A., Okpanachi, J., Nyor, T., and Ahmed, M. N. (2022). Independence factors influencing audit expectation gap in listed deposit money Banks in Nigeria. *Journal of Accounting and Taxation*, 14(1), pp. 1-12. https://doi.org/10.5897/JAT2019.0380
18. Bechara, A., and Damasio, A. R. (2005). The somatic marker hypothesis: A neural theory of economic decision. *Games and economic behavior*, 52(2), pp. 336-372. https://doi.org/10.1016/j.geb.2004.06.010
19. Beck, A. T., and Steer, R. A. (1990). Manual for the Beck anxiety inventory. *San Antonio, TX: Psychological Corporation*.
20. Bell, T., Hill, N., and Stavrinos, D. (2020). Personality determinants of subjective executive

function in older adults. *Aging & mental health*, 24(11), pp. 1935-1944. https://doi.org/10.1080/13607863.2019.1667300

21. Bertrand, M., and Schoar, A. (2003). Managing with style: The effect of managers on firm policies. *The Quarterly journal of economics*, 118(4), pp. 1169-1208. https://doi.org/10.1162/003355303322552775
22. Bhattacharjee, S., and Moreno, K. (2002). The impact of affective information on the professional judgments of more experienced and less experienced auditors. *Journal of Behavioral Decision Making*, 15(4), pp. 361-377. https://doi.org/10.1002/bdm.420
23. Brown, R. E. (2005). Enron/Andersen: crisis in us accounting and lessons for government. *Public Budgeting & Finance*, 25(3), pp. 20–32. http://dx.doi.org/10.1111/j.1540-5850.2005.00365.x
24. Buchanan, T. (2016). Self-report measures of executive function problems correlate with personality, not performance-based executive function measures, in nonclinical samples. *Psychological Assessment*, 28(4), pp. 372–385. https://doi.org/10.1037/pas0000192
25. Buontempo, G. (2005). Emotional intelligence and decision making: The impact on judgment biases. Columbia University.
26. Carvalho Júnior, C. V. D. O., Cornacchione, E., Rocha, A. F. D., and Rocha, F. T. (2017). Cognitive brain mapping of auditors and accountants in going concern judgments. *Revista Contabilidade & Finanças*, 28(73), pp. 132-147. https://doi.org/10.1590/1808-057x201703430
27. Chen, C. Y., Rossignac-Milon, M., and Higgins, E. T. (2018). Feeling distressed from making decisions: Assessors' need to be right. *Journal of personality and social psychology*, 115(4), pp. 743-761. https://psycnet.apa.org/doi/10.1037/pspp0000181
28. Chen, Y. P., Chan, A. T., Le, Q. T., Blanchard, P., Sun, Y., and Ma, J. (2019). Nasopharyngeal carcinoma. *The Lancet*, 394(10192), pp. 64-80. https://doi.org/10.1016/S0140-6736(19)30956-0
29. Chiang, C. (2016). Conceptualizing the linkage between professional scepticism and auditor independence. *Pacific Accounting Review*, 28(2), pp. 180-200. https://doi.org/10.1108/PAR-08-2015-0034
30. Chikazoe, J., Jimura, K., Hirose, S., Yamashita, K. I., Miyashita, Y., and Konishi, S. (2009). Preparation to inhibit a response complements response inhibition during performance of a stop-signal task. *Journal of Neuroscience*, 29(50), pp. 15870-15877. https://doi.org/10.1523/JNEUROSCI.3645-09.2009
31. Coget, J. F., Haag, C., and Gibson, D. E. (2011). Anger and fear in decision-making: The case of film directors on set. *European Management Journal*, 29(6), pp. 476-490. https://doi.org/10.1016/j.emj.2011.06.003
32. Cokely, E. T., and Kelley, C. M. (2009). Cognitive abilities and superior decision making under risk: A protocol analysis and process model evaluation. *Judgment and Decision making*, 4(1), pp. 20-33. https://doi.org/10.1017/S193029750000067X
33. Costa, P. T., and McCrae, R. R. (1985). The NEO Personality Inventory manual. Odessa, FL: Psychological Assessment Resources. https://psycnet.apa.org/record/2004-12703-172
34. Côté, S., Lopes, P. N., Salovey, P., and Miners, C. T. (2010). Emotional intelligence and leadership emergence in small groups. *The Leadership Quarterly*, 21(3), pp. 496-508. https://doi.org/10.1016/j.leaqua.2010.03.012
35. Damasio, A. R., and Sutherland, S. (1994). Descartes' error: Emotion, reason and the human brain. *Nature*, 372(6503), pp. 287-287.

36. Danili, E., and Reid, N. (2006). Cognitive factors that can potentially affect pupils' test performance. *Chemistry education research and practice*, 7(2), pp. 64-83. https://doi.org/10.1039/B5RP90016F
37. Dawes, R.M., and Hastie, R. (2001). Rational choice in an uncertain world: The psychology of judgement and decision making. *Thousand Oaks, CA: Sage Publications*, 33(6), pp. 817-818.
38. DeAngelo, L. E. (1981). Auditor size and audit quality. *Journal of accounting and economics*, 3(3), pp. 183-199. https://doi.org/10.1016/0165-4101(81)90002-1
39. Del Missier, F., Mäntylä, T., and De Bruin, W. B. (2012). Decision-making competence, executive functioning, and general cognitive abilities. *Journal of Behavioral Decision Making*, 25(4), pp. 331-351. https://doi.org/10.1002/bdm.731
40. Demetriou, E. A., Park, S. H., Pepper, K. L., Naismith, S. L., Song, Y. J., Thomas, E. E., ... and Guastella, A. J. (2021). A transdiagnostic examination of anxiety and stress on executive function outcomes in disorders with social impairment. *Journal of Affective Disorders*, 281(2), pp. 695-707. https://doi.org/10.1016/j.jad.2020.11.089
41. Denburg, N. L., Weller, J. A., Yamada, T. H., Shivapour, D. M., Kaup, A. R., LaLoggia, A., ... and Bechara, A. (2009). Poor decision making among older adults is related to elevated levels of neuroticism. *Annals of Behavioral Medicine*, 37(2), pp. 164-172. https://doi.org/10.1007/s12160-009-9094-7
42. Denissen, J. J., and Penke, L. (2008). Motivational individual reaction norms underlying the Five-Factor model of personality: First steps towards a theory-based conceptual framework. *Journal of research in personality*, 42(5), pp. 1285-1302. https://doi.org/10.1016/j.jrp.2008.04.002
43. Deshpande, S. P., and Joseph, J. (2009). Impact of emotional intelligence, ethical climate, and behavior of peers on ethical behavior of nurses. *Journal of Business Ethics*, *85*(3), pp. 403-410. https://doi.org/10.1007/s10551-008-9779-z
44. Dunn, W. (1997). The impact of sensory processing abilities on the daily lives of young children and their families: A conceptual model. *Infants and young children*, 9(4*)*, pp. 23-35.
45. Dunn, W. (2001). The sensations of everyday life: Empirical, theoretical, and pragmatic considerations. *American Journal of Occupational Therapy*, 55(6), pp. 608-620. https://doi.org/10.5014/ajot.55.6.608
46. Eelen, P. (2018).Classical Conditioning: Classical Yet Modern. *Psychologica Belgica*, 58(1), pp. 196–211. https://doi.org/10.5334%2Fpb.451
47. Ekhtiari, H., and Behzadi, A., (2001). Prefrontal cortex, decision making deficits, and assessment instruments. 3(11), pp. 64-86. (In Persian)
48. El Othman, R., El Othman, R., Hallit, R., Obeid, S., and Hallit, S. (2020). Personality traits, emotional intelligence and decision-making styles in Lebanese universities medical students. *BMC psychology*, 8(1), pp. 1-14.https://psycnet.apa.org/doi/10.1186/s40359-020-00406-4
49. Epstein, S., Pacini, R., Denes-Raj, V., and Heier, H. (1996). Individual differences in intuitive–experiential and analytical–rational thinking styles. *Journal of personality and social psychology*, 71(2), pp. 390-405. https://psycnet.apa.org/doi/10.1037/0022-3514.71.2.390
50. Fernandez-Prieto, M., Moreira, C., Cruz, S., Campos, V., Martínez-Regueiro, R., Taboada, M., ... and Sampaio, A. (2021). Executive functioning: A mediator between sensory processing and behaviour in autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 51(6), pp. 2091-2103.https://doi.org/10.1007/s10803-020-04648-4

51. Finucane, M. L., Alhakami, A., Slovic, P., and Johnson, S. M. (2000). The affect heuristic in judgments of risks and benefits. *Journal of behavioral decision making*, 13(1), pp. 1-17. https://doi.org/10.1002/(SICI)1099-0771
52. Firth, M. (1980). A note on the impact of audit qualifications on lending and credit decisions. *Journal of Banking & Finance*, 4(3), pp. 257-267. https://doi.org/10.1016/0378-4266(80)90023-0
53. Fischhoff, B. (2010). Judgment and decision making. *Wiley Interdisciplinary Reviews: Cognitive Science*, 1(5), pp. 724-735.
54. Fischhoff, B., and Broomell, S. B. (2020). Judgment and decision making. *Annual review of psychology*, 71(7), pp. 331-355. https://doi.org/10.1146/annurev-psych-010419-050747
55. Fujii, Y., Kitagawa, N., Shimizu, Y., Mitsui, N., Toyomaki, A., Hashimoto, N., ... and Kusumi, I. (2013). Severity of generalized social anxiety disorder correlates with low executive functioning. *Neuroscience letters*, 543(5), pp. 42-46. https://doi.org/10.1016/j.neulet.2013.02.059
56. Furnham, A., and Chamorro-Premuzic, T. (2004). Personality and intelligence as predictors of statistics examination grades. *Personality and individual differences*, 37(5), pp. 943-955. https://doi.org/10.1016/j.paid.2003.10.016
57. Gardner, H. (2000). A case against spiritual intelligence. *The international journal for the psychology of religion*, 10(1), pp. 27-34. https://doi.org/10.1207/S15327582IJPR1001_3
58. Godini, S., and Baghfalaki, A. (2015). Emotional intelligence and time management survey at different levels of management: A case study of the relationship between emotional intelligence and job satisfaction of employees of Razi University in Kermanshah. *International Journal of Applied Business and Economic Research*, 13(6), pp. 3689–3704. https://www.researchgate.net/publication
59. Goleman, D. (1995). Emotional Intelligence, Bantam Books, New York, NY.
60. Goleman, D. 1998. Working with emotional intelligence.
61. Listou Grimen, H., and Diseth, Å. (2016). Sensory processing sensitivity: Factors of the highly sensitive person scale and their relationships to personality and subjective health complaints. *Perceptual and motor skills*, 123(3), pp. 637-653. https://doi.org/10.1177/0031512516666114
62. Guarino, A., Favieri, F., Boncompagni, I., Agostini, F., Cantone, M., and Casagrande, M. (2019). Executive functions in Alzheimer disease: a systematic review. *Frontiers in aging neuroscience*, 10(1), pp. 1-24. https://doi.org/10.3389/fnagi.2018.0043
63. Gul, F. A. (1989). Bankers' perceptions of factors affecting auditor independence. *Accounting, Auditing & Accountability Journal*, 2(3), pp. 0-0(1). https://doi.org/10.1108/09513578910132303
64. Gul, F. A., and Tsui, J. S. (1992). An empirical analysis of Hong Kong bankers' perceptions of auditor ability to resist management pressure in an audit conflict situation. *Journal of International Accounting, Auditing and Taxation*, *1*(2), pp. 177-190. https://doi.org/10.1016/1061-9518(92)90015-8
65. Gur, R. C., Erwin, R. J., Gur, R. E., Zwil, A. S., Heimberg, C., and Kraemer, H. C. (1992). Facial emotion discrimination: II. Behavioral findings in depression. *Psychiatry research*, 42(3), pp. 241-251. https://doi.org/10.1016/0165-1781(92)90116-K
66. Hartley, C. A., and Phelps, E. A., (2012). Anxiety and decision-making. *Biological psychiatry*, 72(2), pp. 113-118. https://doi.org/10.1016/j.biopsych.2011.12.027
67. Hebert, K. (2015). The association between impulsivity and sensory processing patterns in

healthy adults. *British Journal of Occupational Therapy*, 78(4), pp. 232-240. https://doi.org/10.1177/0308022615575670

68. Henninger, D. E., Madden, D. J., and Huettel, S. A. (2010). Processing speed and memory mediate age-related differences in decision making. *Psychology and aging*, 25(2), pp. 262-270. https://psycnet.apa.org/doi/10.1037/a0019096
69. Hindmarch, T., Hotopf, M., and Owen, G. S. (2013). Depression and decision-making capacity for treatment or research: a systematic review. *BMC medical ethics*, 14(1), pp. 1-10. https://doi.org/10.1186/1472-6939-14-54
70. Hollocks, M. J., Jones, C. R., Pickles, A., Baird, G., Happé, F., Charman, T., and Simonoff, E. (2014). The association between social cognition and executive functioning and symptoms of anxiety and depression in adolescents with autism spectrum disorders. *Autism Research*, 7(2), pp. 216-228. https://doi.org/10.1002/aur.1361
71. Hurtt, R. K. (2010). Development of a scale to measure professional skepticism. *Auditing: A Journal of Practice & Theory*, 29(1), pp. 149-171. https://doi.org/10.2308/aud.2010.29.1.149
72. Huys, Q. J., Daw, N. D., and Dayan, P. (2015). Depression: a decision-theoretic analysis. *Annual review of neuroscience*, 38, pp. 1-23. https://doi.org/10.1146/annurev-neuro-071714-033928
73. **IAASB. (**2018**).** Standards, and Pronouncements. ISBN 978-1-60815-389-3
74. IFAC. (2018). Handbook of the International Code of Ethics for Professional Accountants. Available at: https://www.ifac.org/system/files/publications/files/IESBA-Handbook-Code-of-Ethics-2018.pdf
75. International Ethics Standards Board for Accountants (IESBA). (2018), International Code of Ethics for Professional Accountants, available at: https://www.iesbaecode.org/guide-to-thecode.html
76. Ionela, I. V. A. N. (2016). The importance of professional judgement applied in the context of the International Financial Reporting Standards. *The Audit Financiar journal*, 14(142), pp. 1127-1127. https://ideas.repec.org/a/aud/audfin/v14y2016i142p1127.html
77. Ismail, S. (2015). Influence of emotional intelligence, ethical climates, and corporate ethical values on ethical judgment of Malaysian auditors. *Asian Journal of Business Ethics*, 4(2), pp. 147-162. https://doi.org/10.1007/s13520-015-0047-x
78. Jerome, E. M., and Liss, M. (2005). Relationships between sensory processing style, adult attachment, and coping. *Personality and individual differences*, 38(6), pp. 1341-1352. https://doi.org/10.1016/j.paid.2004.08.016
79. Ji, M., Xu, Q., Xu, S., Du, Q., and Li, D. (2018). Proactive personality and situational judgment among civil flying cadets: The roles of risk perception and cognitive flexibility. *Transportation research part F: traffic psychology and behaviour*, 59(10), pp. 179-187. https://doi.org/10.1016/j.trf.2018.08.021
80. Jin, J. Y., Kanagaretnam, K., Liu, Y., and Lobo, G. J. (2019). Economic policy uncertainty and bank earnings opacity. *Journal of Accounting and Public Policy*, 38(3), pp. 199-218. https://doi.org/10.1016/j.jaccpubpol.2019.05.002
81. Jung, C. G. (1971). Personality types. *The portable Jung*, pp. 178-272.
82. Kamath, M. S., Dahm, C. R., Tucker, J. R., Huang-Pollock, C. L., Etter, N. M., and Neely, K. A. (2020),. Sensory profiles in adults with and without ADHD. *Research in Developmental Disabilities*, 104(6), A. 103696. https://doi.org/10.1016/j.ridd.2020.103696
83. Karvay, Y., Imbriano, G., Jin, J., Mohanty, A., and Jarcho, J. M. (2022). They're watching you: the impact of social evaluation and anxiety on threat-related perceptual decision-making. Psychological research, 86(4), pp. 1174-1183. https://doi.org/10.1007/s00426-021-01547-w

84. Khalil, R. (2016). Influence of extroversion and introversion on decision making ability. *International Journal of Research in Medical Sciences*, *4*(5), pp. 1534-1538.http://dx.doi.org/10.18203/2320-6012.ijrms20161224
85. Khoo, N. H. L., Li, F., Chen, C. H., Liu, Y., Trapsilawati, F., and Sourina, O. (2022). Attention Distribution and Decision-Making in the Process of Robot's Appearance Design and Selection. In *International Conference on Human-Computer Interaction*, Springer, Cham. 13314(6), pp. 535-544. https://doi.org/10.1007/978-3-031-06053-3_36
86. Kiely, K. (2014). "Cognitive function". In Michalos, Kim M. (ed.). *Encyclopedia of Quality of Life and Well-Being Research*. Springer. pp. 974–978. doi:10.1007/978-94-007-0753-5_426. ISBN 978-94-007-0752-8.
87. Kleinginna, P. R., and Kleinginna, A. M. (1981). A categorized list of emotion definitions, with suggestions for a consensual definition. *Motivation and emotion*, 5(4), pp. 345-379.https://doi.org/10.1007/BF00992553
88. Knapp, M. C. (1985). Audit conflict: An empirical study of the perceived ability of auditors to resist management pressure. *Accounting Review*, 60(2), pp. 202-211.http://www.jstor.org/stable/246786
89. Law, K. S., Wong, C. S., and Song, L. J. (2004). The construct and criterion validity of emotional intelligence and its potential utility for management studies. *Journal of applied Psychology*, *89*(3), pp. 483. https://psycnet.apa.org/doi/10.1037/0021-9010.89.3.483
90. LeDoux, J. E. (1993). Emotional memory systems in the brain. *Behavioural brain research*, *58*(1-2), pp. 69-79.
91. Leykin, Y., and DeRubeis, R. J. (2010). Decision-making styles and depressive symptomatology: Development of the Decision Styles Questionnaire. *Judgment and Decision making*, 5(7), pp. 506-515. https://doi.org/10.1017/S1930297500001674
92. Leykin, Y., Roberts, C. S., and DeRubeis, R. J. (2011). Decision-making and depressive symptomatology. *Cognitive therapy and research*, 35(4), pp. 333-341. https://doi.org/10.1007/s10608-010-9308-0
93. Lionetti, F., Pastore, M., Moscardino, U., Nocentini, A., Pluess, K., and Pluess, M. (2019). Sensory processing sensitivity and its association with personality traits and affect: A meta-analysis. *Journal of Research in Personality*, 81(8), pp. 138-152. https://doi.org/10.1016/j.jrp.2019.05.013
94. Liss, M., Timmel, L., Baxley, K., and Killingsworth, P. (2005). Sensory processing sensitivity and its relation to parental bonding, anxiety, and depression. *Personality and individual differences*, 39(8), pp. 1429-1439. https://doi.org/10.1016/j.paid.2005.05.007
95. Marjerison, R. K., and Pan, J. (2022). Decision-Making Styles of the Next Generation of Chinese Business Leaders. In *Handbook of Research on Emerging Business Models and the New World Economic Order* (pp. 365-386). IGI Global.https://doi.org/10.4018/978-1-7998-7689-2.ch018
96. Martin, M. W. (2010). Personality disorders and moral responsibility. *Philosophy, Psychiatry, & Psychology*, 17(2), pp. 127-129. https://doi.org/10.1353/ppp.0.0294
97. Matthews, G., Deary, I. J., and Whiteman, M. C. (2003). *Personality traits*. Cambridge, UK: Cambridge University Press.
98. Mayer, J. D., Salovey, P., and Caruso, D. R. (2004). TARGET ARTICLES:" Emotional Intelligence: Theory, Findings, and Implications". *Psychological inquiry*, 15(3), pp. 197-215. https://doi.org/10.1207/s15327965pli1503_02
99. Mellers, B. A. (2000). Choice and the relative pleasure of consequences. *Psychological bulletin*, 126(6), pp. 910. https://doi.org/10.5093/tr2010v26n1a3

100. Mesmer-Magnus, J., Viswesvaran, C., Deshpande, S. P., and Joseph, J. (2010). Emotional intelligence, individual ethicality, and perceptions that unethical behavior facilitates success. *Revista de Psicología Del Trabajo y de las Organizaciones*, 26(1), pp. 35-45. https://doi.org/10.5093/tr2010v26n1a3
101. Muris, P., Bos, A. E., Mayer, B., Verkade, R., Thewissen, V., and Dell'Avvento, V. (2009). Relations among behavioral inhibition, Big Five personality factors, and anxiety disorder symptoms in non-clinical children. *Personality and individual differences*, 46(4), pp. 525-529. https://doi.org/10.1016/j.paid.2008.12.003
102. Németh, N., Péterfalvi, Á. Czéh, B., Tényi, T., and Simon, M. (2020). Examining the relationship between executive functions and mentalizing abilities of patients with borderline personality disorder. *Frontiers in psychology*, 11, A. 525851. https://doi.org/10.3389/fpsyg.2020.01583
103. Nikolaou, I., and Tsaousis, I. (2002). Emotional intelligence in the workplace: Exploring its effects on occupational stress and organizational commitment. *The international Journal of organizational analysis*, 10(4), pp. 327-342. https://doi.org/10.1108/eb028956
104. Nolder, C., and Riley, T. J. (2014). Effects of differences in national culture on auditors' judgments and decisions: A literature review of cross-cultural auditing studies from a judgment and decision making perspective. *Auditing: A Journal of Practice & Theory*, *33*(2), pp. 141-164. https://doi.org/10.2308/ajpt-50657
105. Pany, K., and Reckers, P. M. (1980). The effect of gifts, discounts, and client size on perceived auditor independence. *Accounting Review*, 55(1), pp. 50-61. https://www.jstor.org/stable/246170
106. Peters, E., and Levin, I. P. (2008). Dissecting the risky-choice framing effect: Numeracy as an individual-difference factor in weighting risky and riskless options. *Judgment and Decision making*, 3(6), pp. 435-448. https://doi.org/10.1017/S1930297500000012
107. Pirtošek, Z., Georgijev, D., and Gregorič-Kramberger, M. (2009). Decision making and the brain: Neurologists' view. *Interdisciplinary Description of Complex Systems: INDECS*, 7(2), pp. 38-53. https://hrcak.srce.hr/clanak/114037
108. Porter, S., ten Brinke, L., Baker, A., and Wallace, B. (2011). Would I lie to you?"Leakage" in deceptive facial expressions relates to psychopathy and emotional intelligence. *Personality and Individual Differences*, 51(2), pp. 133-137. https://doi.org/10.1016/j.paid.2011.03.031
109. Previts, G. J., and Merino, B. D. (1998). A history of accountancy in the United States. Columbus: Ohio State University Press.
110. Quick, R., and Warming, R. B. (2009). Auditor Independence and the Provision of Non-Audit Services: Perceptions by German Investors. *International Journal of Auditing*, 13(2), pp. 141–162. http://dx.doi.org/10.1111/j.1099-1123.2009.00397.x
111. Riaz MN, Riaz MA, Batool N. (2012). Personality types as predictors of decision making styles. *Journal of Behavioural Sciences*, 22(2), pp. 99-114. https://openurl.ebsco.com
112. Roman, M., Bostan, C. M., Diaconu-Gherasim, L. R., and Constantin, T. (2019). Personality traits and postnatal depression: the mediated role of postnatal anxiety and moderated role of type of birth. *Frontiers in Psychology*, 10, pp. 1625. https://doi.org/10.3389/fpsyg.2019.01625
113. Salehi, M., and Dastanpoor, Z. (2021). The effects of psychological factors on the performance of independent auditors in Iran. *Current psychology*, 40(4), pp. 1621-1630. https://doi.org/10.1007/s12144-018-0084-4
114. Sander, D., Grandjean, D., and Scherer, K. R. (2005). A systems approach to appraisal mechanisms in emotion. *Neural networks*, 18(4), pp. 317-

352.https://doi.org/10.1016/j.neunet.2005.03.001
115. Schneider, W. J., and McGrew, K. S. (2012). The Cattell-Horn-Carroll model of intelligence. In D. P. Flanagan & P. L. Harrison (Eds.), Contemporary intellectual assessment: Theories, tests, and issues (3rd ed., pp. 99–144). https://psycnet.apa.org/record/2012-09043-004
116. Setiawan, W. Y. (2018). Gender Differences in Auditors' Judgments: Evidence from Indonesia. *Review of Integrative Business and Economics Research*, 7(1), pp. 350-358. http://buscompress.com/journal-home.html
117. Siu, A. F. (2009). Trait emotional intelligence and its relationships with problem behavior in Hong Kong adolescents. *Personality and individual differences*, 47(6), pp. 553-557. https://doi.org/10.1016/j.paid.2009.05.004
118. Soler, N., Hardwick, C., Perkes, I. E., Mohammad, S. S., Dossetor, D., Nunn, K., ... and Dale, R. C. (2019). Sensory dysregulation in tic disorders is associated with executive dysfunction and comorbidities. *Movement Disorders*, *34*(12), pp. 1901-1909. https://doi.org/10.1002/mds.27817
119. Stanovich, K. E., and West, R. F. (2008). On the relative independence of thinking biases and cognitive ability. *Journal of personality and social psychology*, *94*(4), pp. 672. https://psycnet.apa.org/doi/10.1037/0022-3514.94.4.672
120. Stenmark, C. K., and Redfearn, R. (2022). The role of sensory processing sensitivity and analytic mind-set in ethical decision-making. *Ethics & Behavior*, 32(4), pp. 344-358. https://doi.org/10.1176/appi.ajp.161.8.1502
121. Suri, R., Altshuler, L. A., and Mintz, J. (2004). Depression and the decision to abort. *American Journal of Psychiatry*, 161(8), pp. 1502-1502. https://doi.org/10.1176/appi.ajp.161.8.1502
122. Teoh, H. Y., and Lim, C. C. (1996). An empirical study of the effects of audit committees, disclosure of nonaudit fees, and other issues on audit independence: Malaysian evidence. *Journal of International Accounting, Auditing and Taxation*, *5*(2), pp. 231-248. https://doi.org/10.1016/S1061-9518(96)90007-5
123. Tripathi, A. (2017). Impact of internet addiction on mental health: An integrative therapy is needed. *Integrative Medicine International*, *4*(3-4), pp. 215-222. https://doi.org/10.1159/000491997
124. Uher, J., and Visalberghi, E. (2016). Observations versus assessments of personality: A five-method multi-species study reveals numerous biases in ratings and methodological limitations of standardized assessments. *Journal of Research in Personality*, 61(4), pp. 61-79. https://doi.org/10.1016/j.jrp.2016.02.003
125. VandenBos, G. (2006). *APA Dictionary of Psychology*. Washington, DC: American Psychological Association. https://psycnet.apa.org/record/2006-11044-000
126. Vigil-Colet, A. (2007). Impulsivity and decision making in the balloon analogue risk-taking task. *Personality and Individual Differences*, *43*(1), pp. 37-45. https://doi.org/10.1016/j.paid.2006.11.005
127. Wahidahwati, W., and Asyik, N. F. (2022). Determinants of auditor's ability in fraud detection. *Cogent Business & Management*, *9*(1), pp. 2130165. https://doi.org/10.1080/23311975.2022.2130165
128. Wang, C. H. (2014). Gender differences in the effects of personality traits on voter turnout. *Electoral Studies*, 34(6), pp. 167-176. https://doi.org/10.1016/j.electstud.2013.10.005
129. Wehmeyer, M. L., and Kelchner, K. (1994). Interpersonal cognitive problem-solving skills of individuals with mental retardation. *Education and Training in Mental Retardation and*

Developmental Disabilities, 29(4), pp. 265-278. http://www.jstor.org/stable/23879115

130. Williams, P. G., Suchy, Y., and Kraybill, M. L. (2010). Five-factor model personality traits and executive functioning among older adults. *Journal of Research in Personality*, 44(4), pp. 485-491. https://doi.org/10.1016/j.jrp.2010.06.002
131. Wojciechowski, J., Stolarski, M., and Matthews, G. (2014). Emotional intelligence and mismatching expressive and verbal messages: A contribution to detection of deception. *PLoS One*, 9(3), pp. e92570. https://doi.org/10.1371/journal.pone.0092570
132. Yang, L., Brink, A. G., and Wier, B. (2018). The impact of emotional intelligence on auditor judgment. *International Journal of Auditing*, 22(1), pp. 83-97. https://doi.org/10.1111/ijau.12106
133. Zarefar, A., and Zarefar, A. (2016). The Influence of Ethics, experience and competency toward the quality of auditing with professional auditor scepticism as a Moderating Variable. *Procedia-Social and Behavioral Sciences*, 219(31), pp. 828-832. https://doi.org/10.1016/j.sbspro.2016.05.074
134. Zinbarg, R. E., and Yoon, K. L. (2008). 12 RST and clinical disorders: anxiety and depression. *The reinforcement sensitivity theory of personality*, 360. https://doi.org/10.1017/CBO9780511819384.013