



The Impact of Firm Characteristics on Future Stock Price Crash Risk: Evidence from Egypt

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Abstract

Purpose: the objective of the study is to investigate the impact of firm characteristics on future stock price crash risk (FSPCR) by concentrating on six of these characteristics which are firm size (F-SIZE), return on assets (ROA), return on equity (ROE), firm leverage (LEV), audit quality, and board characteristics. FSPCR has been measured by Negative skewness of weekly returns (NCSKEW) and Down-to-up volatility (DUVOL).

Design/methodology: The study was conducted on a sample consisting of 50 firms listed in the Egyptian Stock Exchange (ESE) belonging to four sectors which are basic resources, real state, travel & leisure, and food, beverages, & tobacco during the period from 2018 to 2021 with a total of (200) observations. In order to evaluate the study hypotheses, the study used the generalized least squares (GLS) method instead of the ordinary least square (OLS) method to overcome the problems of both heteroskedasticity and the normality of residuals. The study also conducted an additional analysis to determine the extent of differences among the sectors of the study sample with regard to the NCSKEW and DUVOL.

Findings: The study concluded that there was an impact of some of the firm characteristics on FSPCR. In more detail, the results of the study indicated that there was a significant negative impact of F-SIZE, ROA, LEV, industrial specialization of the audit firm (SPEC), board size (B-SIZE), and the board independency (IND) on FSPCR. And a significant positive impact of CEO duality (DUAL). While an insignificant impact of ROE and BIG4 on FSPCR. Additional analysis indicated that there were no differences among ESE sectors of the study sample regarding (NCSKEW) and (DUVOL).

Originality/value: The study makes a contribution to the existing literature and helps future researchers by combining some of the firm characteristics such as (F-SIZE, ROA, ROE, LEV, audit quality, and board characteristics) and analyzing their impact on FSPCR as a way to mitigate FSPCR, and assist investors such as creditors, suppliers, banks, and shareholders in better understanding FSPCR effects and modifying their investment behavior and helps auditors evaluate the company's ability to continue.

Keywords: future stock price crash risk, firm characteristics, corporate governance, audit quality, board characteristics.

1. Introduction

Future Stock Price Crash risk (FSPCR) is an undesirable event in business as asymmetric differences in stock returns may reduce shareholder wealth and, as a result, have a negative impact on the stability, growth, and development of the capital market (Sultana et al., 2022). Despite the fact that FSPCR has been an ongoing issue for investors and the government ever since significant corporate frauds occurred in the early 2000s, they concentrated more on research into it following the 2008 financial crisis (Liao & Ouyang 2017; Chen et al., 2017a; Silva, 2019). FSPCR disturbs investor confidence, decreases shareholder value, raises financial market volatility, and affects equity valuation, and option pricing (Jin & Myers, 2006; Zhu, 2016; Habib et al., 2018).

So, understanding what causes FSPCR is critical when it comes to investment decisions and risk management. As a result, the researchers believe it is critical to investigate this concept from several perspectives in order to determine why this risk exists and how such risks might be mitigated.

According to prior literature that is interested in FSPCR, there are a wide variety of reasons that lead to FSPCR. The concept of FSPCR is founded conceptually on the idea that managers have a tendency to keep bad news hidden for long periods of time, allowing bad news to accumulate, when bad news accumulates to a specific degree, it is released all at once, raising the likelihood of FSPCR (Jin & Myers, 2006; Hutton et al., 2009; Callen & Fang, 2013; Kim et al., 2016; Liu & Zhong, 2018; Fu & Zhang, 2019). Also, heterogeneity in investors' beliefs is considered one of the most important factors affecting FSPCR (Hong & Stein, 2003; Habib et al., 2018). Moreover, default risks which refer to the possibility that the firm will not be able to meet its financial obligations (corporate failure) cause FSPCR (Zhu, 2016; Habib et al., 2018).

Furthermore, information blockage is another theoretical framework for explaining the risk of a firm's FSPCR. According to this model, the firm's stock price upward trend may encourage optimistic investors to engage in active trading on the stocks, resulting in increased trading volume in the stock market while pessimistic investors are doubtful of the genuine nature of the signals they receive regarding an increase in trading volume on the stock as a result of a rise in its price, so they wait to participate in trading until the firm's stock price falls (Cao et al., 2002). As a result, information blockage occurs. When the economic outlook becomes pessimistic and pessimistic marginal investors enter the market, a price correction is unavoidable (Habib et al., 2018). As a result, information blockage generates negative returns skewness after price increases, but positive skewness after price decreases (Zhu, 2016).

In addition, volatility feedback effects are considered another source of FSPCR (French et al., 1987; Hutton et al., 2009; Habib et al., 2018). Also, the fundamental nature of firms' operations is considered another reason for FSPCR could be the fact that some stocks are potentially more prone to crash due to the fundamental nature of their operations (Habib et al., 2018). Also, according to agency theory, executive managers take advantage of their power to withhold bad

news from external users. Managers have a variety of incentives and reasons to keep bad news hidden, including increasing compensation contracts and avoiding legal issues (Kothari et al., 2009). This action led to information asymmetry and thereby financial reporting opacity; such actions led to FSPCR.

Governance is one of these characteristics. A variety of prior studies have attempted to forecast crash risk by attempting to link it to both internal and external corporate governance mechanisms because corporate governance is important to minimize agency costs and enhance a firm's information environment on behalf of its shareholders through reducing asymmetry in the disclosure of both good and bad news (Xing et al., 2023). Furthermore, according to El-Deeb & Albanna (2018) high corporate governance raises earning quality, which lowers information asymmetry, lowers information risk, and ultimately mitigates FSPCR.

So, it's worth noting that mitigating the FSPCR by investigating the determinants that influence FSPCR has become an essential investigation topic for capital market participants and a popular topic for academic studies (Elsayed, 2021). The vastness and broadness of corporate governance literature, over the last few decades, demonstrate the critical role that corporate governance systems play in preserving shareholders' interests (Andreou et al., 2016). Due to FSPCR issues, investors allocate more funds to stocks of well-regime firms (effective corporate governance) (Sultana et al., 2022). Studying FSPCR is especially crucial in developing countries since corporate governance attributes differ from nation to nation and between different firms due to various ownership structures and corporate governance -as a characteristic of the firm- Therefore, the study will assess the impact of board characteristics as an internal government mechanism and audit quality as an external government mechanism on the possibility of FSPCR in Egypt's non-financial sectors.

A substantial and growing number of studies have been published describing the impact of each of these characteristics on FSPCR and have a clear contradiction in results. According to prior studies, the impact of F-SIZE on FSPCR is conflicting. There is a broad consensus that F-SIZE has a significant positive impact on FSPCR (Kim et al., 2014; Lee, 2016; Hao et al., 2018; Yeung & Lento, 2018; Abdel-Wanes, 2021; Choi & Park, 2022). While having a significant negative impact on FSPCR (Khajavi & Zare, 2016; Dai et al., 2019). On the other hand, Andreou et al. (2016) have concluded that F-SIZE has an insignificant impact.

There is also an inconsistency in findings regarding the impact of LEV on FSPCR. According to Khajavi & Zare (2016); Yeung & Lento (2018); Chae et al. (2020); Abdel-Wanes (2021) LEV has a significant positive impact on FSPCR. While Andreou et al. (2016); Hao et al. (2018); Elsayed (2021) have concluded that LEV has a significant negative impact on FSPCR. On the other hand, Kim et al. (2014); Lee (2016); Dai et al. (2019) have found that there is an insignificant impact of LEV on FSPCR.

Furthermore, there is a disagreement in the conclusions about the impact of ROA on FSPCR, based on prior studies. Kim et al. (2014); Hao et al. (2018)

discovered that ROA has a significant positive impact on FSPCR. While Lee (2016); Elsayed (2021) concluded that ROA has a significant negative impact on FSPCR. Furthermore, there is a disagreement in the conclusions about the impact of ROE on FSPCR, based on previous studies. Andreou et al. (2016) discovered a positive impact of ROE on FSPCR, but Choi & Park (2022) discovered a negative impact.

Numerous studies have been released examining the impact of audit quality on FSPCR such as (Robin & Zhang, 2015; Khajavi & Zare, 2016; Lim et al., 2016; Yeung & Lento, 2018; Li et al., 2019; Chae et al., 2020; Salehi et al., 2022) and there is a clear contradiction in results, leading the study to investigate at the impact of audit quality on FSPCR. According to (Robin & Zhang, 2015; Khajavi & Zare, 2016; Lim et al., 2016; Yeung & Lento, 2018; Chae et al., 2020), there is a significant negative impact of audit quality on FSPCR. While Khajavi & Zare (2016); Zulfiqar et al. (2022) discovered that audit quality has an insignificant impact on FSPCR. On the other hand, Abdel-Wanes (2021) found that improving audit quality increases FSPCR when using OLS, GLS, and GLM, but not when using GMM. Furthermore, Sultana et al. (2022) have found that audit quality measured by (BIG4) has a significant positive impact on FSPCR. In the same context, Salehi et al. (2022) have found that audit quality measured by (fees) has a significant positive impact on FSPCR.

Numerous studies have been conducted on the impact of board characteristics on FSPCR such as (Andreou et al., 2016; Yeung & Lento, 2018; Jeon, 2019; Jebran et al., 2019; Hunjra et al., 2020; Wattanatorn & Padungsaksawasdi, 2022; Zulfiqar et al., 2022; Jin et al., 2022). Despite using many measures for board characteristics, such as board size (B-SIZE), CEO duality (DUAL), board independence (IND), and gender diversity, they came to different conclusions regarding the impact of each one on FSPCR. It is crucial to note that the bulk of those research such as Andreou et al. (2016); Jebran et al. (2019); Hunjra et al. (2020); Wattanatorn & Padungsaksawasdi (2022); Zulfiqar et al. (2022); Jin et al. (2022) mentioned that stronger board characteristics leading to stronger governance and ultimately mitigating FSPCR. On the other hand, board characteristics do not significantly affect the likelihood of FSPCR, according to (Yeung & Lento, 2018; Jeon, 2019). These results lead this study to look into how board characteristics impact the FSPCR.

Given the above analysis, the relationship between firm characteristics and FSPCR is difficult to define and requires further analysis in the Egyptian context which may be different from other countries and developed countries in particular.

The study makes a contribution to the existing literature and helps future researchers by combining some of the firm characteristics such as (F-SIZE, ROA, ROE, LEV, audit quality, and board characteristics) and analyzing their impact on FSPCR. Furthermore, it helps investors such as creditors, suppliers, banks, and shareholders to make the appropriate investment decisions by taking into consideration firm characteristics when addressing crash risk. It is known that

crash risk might cause firms to bankrupt and inability to continue. So, this study will help auditors to assess the firm's ability to continue.

The remainder of the study is structured as follows. Section 2 reviews the literature and develops the hypotheses, and section 3 describes the empirical methodology. Section 4 discusses the empirical results, and section 5 concludes.

2. Literature Review & Hypothesis Development

2.1. Literature Review

2.1.1. Future Stock Price Crash Risk

In the light of prior literature, there are two philosophies for identifying firm-specific FSPCR hereafter. The first philosophy relates to sudden movement of the stock price, and the second relates to the shape of the return distributions (Elsayed, 2021). There are many previous literatures that adopted the first philosophy in defining FSPCR, where it can be defined as the infrequency of extreme negative stock returns (Defond et al., 2015). Likewise, kim et al. (2011a) defined crash weeks in a given fiscal year for a given firm as those weeks during which the firm experiences firm-specific weekly returns 3.2 standard deviations below the mean firm-specific weekly returns over the entire fiscal year. While Lim et al. (2016) defined it as the probability that stock price falls dramatically after bad news releases. Moreover, Zhu (2016) defined it as the likelihood of sudden but infrequent large price decreases. Whereas Stock price crash refers to an extreme collapse in equity value that causes a severe decline in shareholders' wealth (Dang et al., 2018). And also, it refers to the phenomenon in which a stock price falls sharply within a short period of time (Cheng et al., 2020).

On the other hand, there are numerous literature which define FSPCR according to the second philosophy, where Hutton et al. (2009) defined it as a tail event of sufficient magnitude to fall in the lower 0.1% of the normal distribution. While Callen & Fang (2015) related FSPCR to negative skewness in the distribution of returns for individual stocks. Whereas Ak et al. (2016) defined it as a large and sudden negative stock return relative to the distribution of returns leading up to the crash. It also defined as the third moment of stock return that shows negative skewness (Arianwuri et al., 2017). Moreover, Li et al. (2017) investigated that FSPCR is an important characteristic of the distribution of returns, which measures the negative skewness. Also, Lobo et al. (2020) investigated that it refers to the large negative outliers in the distribution of residual stock returns. In the same context. kim et al. (2019) defined it as the likelihood that extreme negative outliers occur in firm-specific return distributions.

2.1.2. Firm characteristics

There are many firm characteristics that are thought to affect a lot of financial and accounting aspects of firms, such as firm value and earnings management, and hence affect FSPCR. F-SIZE is one of these characteristics which is defined as the amount and diversity of production capacity and capability it possesses, or the amount and diversity of services it can supply to its clients synchronously

(Shaheen & Malik, 2012; Abeyrathna & Priyadarshana, 2019). While, ROA is one of the ratio analyses that refers to the firm's profitability, which is considered an important indicator to assess the firm's value (Husna & Satria, 2019). ROA is a ratio that indicates how much a firm's assets contribute to net income (Shil, 2009; Saputra, 2022). Furthermore, ROE is also one of the ratio analyses that refer to the firm's profitability, which is considered an important indicator to assess the firm's value (Husna & Satria, 2019). Additionally, it is employed to assess a firm's success in producing profits for shareholders (Ichsan & Suhardi, 2015). Moreover, LEV is one of the most important means of firm financing all over the world (Benkraiem et al., 2023). LEV is one of the financial ratios analyses by comparing the liabilities of the firm by its shareholder equity, and has been used to assess how much of a firm's assets are financed by debt and to assess the extent to which firms can meet their debts on the maturity date (Alkhatib & Marji, 2012; Jihadi et al., 2021). It also represents the firm's ability to pay all of its commitments, in both the short and long term (Fujianti & Satria, 2020).

Another attribute of firm characteristics is audit quality. It is difficult to make a specific definition of audit quality, this difficulty arises from the multifaction of proxies used to measure audit quality (Rajgopal et al., 2021). Despite the fact that regulators and enforcement agencies have come to consensus on the characteristics of audit quality (Tritschler, 2013). Academic studies and professional regulations have defined audit quality in different ways. Where academic studies have focused on the actual results of the audit quality process. While, professional regulations have been interested in the extent to which the auditors have committed to generally accepted auditing standards, rules, and professional conduct ethics.

Finally, board characteristics is one of the internal corporate governance mechanisms which play a key important role in enhancing corporate governance as it protects shareholders' interests and improves firm performance (Chen, 2014; Kao et al., 2020; Karkowska & Acedański, 2020; Yu, 2022). Additionally, it has a vital role to balance the costs of decision-making with the benefits of advisory services (Karkowska & Acedański, 2020; Uyar et al., 2022). And it is essential in the monitoring of executive management in favor of its shareholders in order to mitigate the conflict of interest that can arise between them (Zhou et al., 2017). Furthermore, it has a significant impact in mitigating agency conflicts as well as improving corporate governance (Kao et al., 2020; Yu, 2022).

2.2. Hypothesis development

2.2.1. Basic firm characteristics and future stock price crash risk

Numerous prior studies have investigated the impact of basic firm characteristics on FSPCR and have concluded contradictory results. So, this study will focus on some of these characteristics, such as F-SIZE, ROA, ROE, and LEV. The impact of F_SIZE on FSPCR has been widely investigated in previous studies. Nevertheless, the results of this relationship are contradictory. Harvey & Siddique (2000); Chen et al. (2001); Lee (2016) argue that larger firms are implied by firms' overpriced stock price; hence, any changes in the prices of these

firms will have a higher FSPCR. Similarly, Zhu (2016) state that when large firms are exposed to default risks, they tend to hide bad news, and when extremely bad news for these firms is announced, FSPCR is more likely to occur. In the same context, Hutton et al. (2009); Kim et al. (2014); Choi & Park (2022) showed a positive impact of F_SIZE on FSPCR. On the other hand, Khajavi & Zare (2016) have found that F-SIZE has a significant negative impact on FSPCR as investors, regulators, and politicians take larger firms into their account because of its special circumstances. This prompts numerous supervisory agencies to verify the validity of the information that these firms provide. Therefore, it is unlikely that large firms will withhold bad news leading to mitigating FSPCR. Furthermore, Dai et al. (2019) have also found that firms with a large size decrease earning management practices because internal control systems in larger firms are more likely to be effectively designed and executed than those in smaller firms, which reduces earnings management behavior and achieves transparency, which ultimately mitigates FSPCR. In the same context, Eid & Almaleeh (2023) showed a negative impact of F_SIZE on FSPCR.

Moreover, according to prior studies, ROA has a significant impact on FSPCR. Firms that are able to increase ROA means that they have a high-performance level, which gives investors a good feeling and improves the firm's stock prices, which means that a high ROA indicates good firm prospects, and investors will respond favorably to these signals, causing the firm's value to rise and ultimately mitigate FSPCR (Lee, 2016). Which is consistent with the study of Elsayed (2021) which state that there is a negative impact of ROA on FSPCR. On the other hand, Kim et al. (2014); Hao et al. (2018) discovered that ROA have a significant positive impact on FSPCR.

Furthermore, there is a disagreement in the results about the impact of ROE on FSPCR, based on prior studies. Andreou et al. (2016) discovered a positive impact of ROE on FSPCR, on the other hand, Choi & Park (2022) found a negative impact on FSPCR.

Additionally, the impact of LEV on FSPCR has received considerable interest, yet the findings of previous studies are discrepancy. Khajavi & Zare (2016) argue that the probability of financial distress increases with LEV, and these firms with high LEV are more likely to face legal action, suggesting stronger litigation need for conservatism, which can raise the likelihood of FSPCR. In the same vein, Yeung & Lento (2018) suggest that one drawback of relying on loans is that marginal investors experience anxiety about continuing the investment process, which prompts them to sell their stock of those firms, which causes a decline in those stocks' values from their real values and exposes these firms to FSPCR. In the same context, Chae et al. (2020); Abdel-Wanes (2021) have found that there is a positive impact of LEV on FSPCR. On the other hand, Kim et al. (2014); Hao et al. (2018) have found a negative impact of LEV on FSPCR because a high level of LEV reflects the confidence of creditors in the firm's performance, which ultimately affects the confidence of investors. Also, Andreou et al. (2016) state that high LEV decreases free cash flows according to managerial discretion, which may lead to fewer unproductive investments, assisting in lowering agency

costs, and then leading to decreased FSPCR. In the same context, Elsayed (2021) has found that there is a negative impact of LEV on FSPCR.

Given the above analysis, there are contradictory results relating to the impact of basic firm characteristics on FSPCR, which requires further analysis of the impact of basic firm characteristics on FSPCR in the Egyptian context. Thus, the first hypothesis was developed as follows:

H1: The basic firm characteristics have a significant impact on FSPCR measures of the listed firms in ESE.

2.2.2. Audit quality and future stock price crash risk

Audit quality is one of the external government mechanisms and one of the tools used to verify the credibility of financial reports used by investors and financial analysts. Therefore, it is a key factor in mitigating FSPCR (Callen & Fang, 2017; Habib et al., 2018). According to Lim et al. (2016) high audit quality leads to mitigation of FSPCR, especially for firms that have been audited by BIG4, as a high level of audit quality improves the transparency of financial information, reduces errors, lowers earning management practices, minimizes agency costs, and finally increases the ability to detect withholding bad news. Furthermore, Feng et al. (2021); Chae et al. (2020) argue that BIG4 is more likely to restrict managerial manipulation and hence mitigate FSPCR. This negative association between audit quality and FSPCR is more pronounced for firms that transfer from non-specialist to specialist auditors (Chae et al., 2020). Moreover, Khajavi & Zare (2016) mentioned that there is a significant negative impact of audit quality measured by SPEC on FSPCR and argue that higher audit quality limits accounting information's manipulation by managers and leads to exploring doubtful accounting practices. In the same context, Yeung & Lento (2018) stated that higher audit quality mitigates FSPCR and this association becomes stronger after applying IFRS. In the same context, Chae et al. (2020) have found a negative impact of audit quality on FSPCR.

On the other hand, Abdel-Wanes (2021) indicated that audit quality has a significant positive impact on FSPCR through financial statement manipulation and non-disclosure, which occurs as a result of the auditor's tendency to increase his fees. In the same context, Sultana et al., (2022), reported that there was a significant positive impact of audit quality on FSPCR.

In light of these findings, there is a clear contradiction in results, which requires further analysis to investigate the impact of audit quality on FSPCR in the Egyptian context which may be different from other countries and developed countries in particular. Therefore, the second hypothesis was developed as follows:

H2: The audit quality has a significant impact on FSPCR measures of the listed firms in ESE.

2.2.3. Board characteristics and future stock price crash risk

The board of directors is considered one of the most important internal corporate government mechanisms, especially in the top management's monitoring (Jeon, 2019; Hunjra et al., 2020) Which includes various stakeholders and shareholders, and it serves a monitoring role (Chindasombatcharoen et al., 2022). Several studies present ample evidence of the impact of board characteristics on FSPCR. According to B-SIZE, Gubitta & Gianecchini (2002) reported that the monitoring role of the board could be more effective when the B-SIZE is larger since there are various motivations for directors and boards, and hence mitigate FSPCR. Moreover, Kyereboah & Biekpe (2006) mentioned that larger boards have a diversity of experience to help make better decisions and are more difficult for a strong CEO to dominate, which is better for firm performance and hence mitigates FSPCR. Corporate governance becomes essential when the B-SIZE is small because it is easy for them to manipulate earnings for their own benefit at the expense of the public interest. Therefore, it becomes necessary to keep an eye on the opportunistic behaviors of such managers given the possibility that these manipulations could harm stakeholders (Jeon, 2019) in the same context, Andreou et al. (2016); Hunjra et al. (2020) have also showed a negative impact of B-SIZE on FSPCR. On the other hand, according to stewardship theory, the board of directors with fewer members facilitates communication, expedites the decision-making process, increases dedication, increases the visibility of each member's contribution, and fosters commitment (Gubitta & Gianecchini, 2002; Chindasombatcharoen et al., 2022). Also, Kyereboah & Biekpe (2006) explained that large boards are less efficient and simpler for a CEO to manage. Furthermore, a smaller B-SIZE assures greater internal control and aids in the reduction of agency conflicts between owners and management (Ayadi & Boujelbène, 2015). This is consistent with the study by Jebran et al. (2019) which state that B-SIZE has a positive association with FSPCR.

On the results of the IND, the inclusion of independent directors (outsiders), will boost the representation of differing perspectives on the board of directors, as they can provide additional advice as well as access to resources and information required by the firm (Chen, 2014; Husted & Filho, 2019; Uyar et al., 2022). Independent directors are more motivated to perform their duties well because their career advancement in the directorship market depends on their reputation (Uyar et al., 2022). More independent directors on a board are thought to be more effective at monitoring management and protecting stockholders from profitable managerial behavior (Jeon, 2019). In the same context, independent directors with various types of experience assist in improving the balance of power within firms and performing effective monitoring to lower agency costs (Jin et al., 2022). Moreover, Independent directors can improve information transparency and, as a result, mitigate FSPCR (Cao et al., 2019). In the same context, Jin et al. (2022); (Xing et al., 2023) have showed a negative impact of IND on FSPCR. On the other hand, Battaglia et al. (2014) argue that insider directors will be better able to assist managers in making difficult decisions because they are more knowledgeable about market conditions and the firm. In the same context, John et al. (2016) state that because of the expertise required to understand and monitor the industry's complex operations, independent directors may not be able to

contribute significantly to the firm's decision-making process which in the end leads to misunderstanding of firm's operations and higher the probability of FSPCR.

Finally, DUAL is a practice in which the chief executive officer serves as the chairman of the board, it is one of the most difficult topics in strategic leadership (Uyar et al., 2022). According to agency theory, the board chair's and CEO's positions should not be held concurrently in order to defend the interests of shareholders, because DUAL reduces board control and increases CEO entrenchment (Aktas et al., 2019; Yu, 2022). The prevailing assumption is that a discrete board leadership structure provides an independent check on the CEO's behavior, therefore boosting the efficiency of board monitoring and the performance of the firm (Dahya, 2009). In the same context, Hunjra et al. (2020) have found that DUAL has a negative impact on FSPCR

On the other hand, from the perspective of the stewardship theory, the CEO dualities eliminate uncertainty in decision-making, boost the firm performance since it assures cohesive leadership, indicates firm stability, and fosters trust in the management (Aktas et al., 2019; Yu, 2022). Furthermore, it can lead to expertise and knowledge, as well as making crucial business decisions in a timelier manner and minimizing both costs and inefficiencies that may be caused by separating the two roles (Aktas et al., 2019).

As a consequence, the impact of board characteristics on FSPCR is difficult to define and requires further analysis in the Egyptian context which may be different from other countries and developed countries in particular. Therefore, the third hypothesis was developed as follows:

H3: The board characteristics have a significant impact on FSPCR measures of the listed firms in ESE.

H4: There are significant differences among ESE sectors regarding FSPCR measures.

3. Empirical Methodology

3.1. Sample selection

The initial sample of the study comprised four sectors listed on the ESE which are basic resources, real estate, travel & leisure, and food, beverages, & tobacco during the period from 2018 to 2021, which were 82 firms. The study started in 2018 as the first year for collecting data of the study since corporate governance reports became accessible for firms listed in the ESE. The majority of the study's data were not available prior to that date. Also, the study relied on these four sectors as the market capitalization of these sectors represents 57% of the total market capitalization of the non-financial sectors listed on the ESE. The sample firms were chosen according to some criteria. Firstly, firms have more than 26 trading weeks of data on stock return. Secondly, firms that issued their annual financial statements on 31 December. Thirdly, firms that issued their financial statements in the Egyptian pound. Finally, firms that have enough financial data to

calculate crash risk measures and characteristics of firms (Elsayed, 2021). The final sample included 50 firms representing 60.9% of firms listed on ESE and 200 observations. This can be illustrated in table (1) below:

Table (1) The study sample

| No. | Sector | Total Firms Number | Excluded Firms Number | Final sample | Percentage |
|-----|-----------------------------|--------------------|-----------------------|--------------|------------|
| 1 | Basic Resources | 16 | 6 | 10 | 20% |
| 2 | Real Estate | 34 | 12 | 22 | 44% |
| 3 | Travel & Leisure | 9 | 4 | 5 | 10% |
| 4 | Food, Beverages and Tobacco | 23 | 10 | 13 | 26% |
| SUM | | 82 | 32 | 50 | 100% |

3.2. Variables Measurement

The dependent variable is FSPCR. There are two popular measures used by most prior literature based on firm-specific weekly returns, determined as the market model's residuals (Chen et al., 2001). To make sure that the influence of the market is removed, the starting point is the market model regression shown below:

$$R_{it} = \alpha_i + \beta_1 R_{m(t-2)} + \beta_2 R_{m(t-1)} + \beta_3 R_{mt} + \beta_4 R_{m(t+1)} + \beta_5 R_{m(t+2)} + \varepsilon_{i,t}$$

Where R_{it} is the stock return of firm i at week t , while R_m is the value-weighted market return at week t . The market index return's lead and lag terms are provided to alleviate the issue of nonsynchronous trading (Jin & Myers, 2006), whereas $\varepsilon_{i,t}$ is the random error implies to the stock extremely return of firm i at week t . The firm-specific weekly returns for firm i in week t is computed as the natural logarithm of one plus the residual return from the market model.

$$W_{it} = \ln(1 + \varepsilon_{i,t})$$

The first measure of crash risk is based on skewness (NSKEW) which is a continuous variable that represents the magnitude of the crash risk (Eid & Almaleeh, 2023). When a firm's crash risk is high, the firm's specific weekly returns will be skewed to the left. It is calculated by dividing the negative of the third moment of weekly returns of firm i in year t by the standard deviation of weekly returns raised to the third power in order to normalizing the weekly returns distribution (Chen et al., 2001).

$$NSKEW = - \left[\frac{n(n-1)^{\frac{3}{2}} \sum W_{i,t}^3}{(n-1)(n-2) \left\{ \sum W_{i,t}^2 \right\}^{3/2}} \right]$$

Where $W_{i,t}$ represents the sequence of demeaned weekly returns to stock i during period t , and n is the number of observations on weekly returns during the period. This measure is multiplied by -1, this mean that a higher value corresponds to greater crash risk (Habib et al., 2018).

The second measure of crash risk is DUVOL “down-to-up volatility” Since it does not involve third moments, it is less likely to be affected by extreme weekly returns. For each firm i over a fiscal-year t , separating firm-specific weekly returns into up weeks & down weeks; (up weeks) when the weekly returns are above the annual mean, and (down weeks) when the weekly returns are below the annual mean. And then calculating the standard deviation of firm-specific weekly returns for each of these two groups separately, and then taking natural logarithm of the ratio of the standard deviation on the down weeks to the standard deviation on the up weeks (Chen et al., 2001).

$$DUVOL = \log \left\{ (n_u - 1) \sum_{Down} w_{i,t}^2 / (n_d - 1) \sum_{Up} w_{i,t}^2 \right\}$$

Where $W_{i,t}$ represents the sequence of demeaned weekly returns to stock i during period t , and n is the number of observations on weekly returns during the period. A higher value of DUVOL indicates greater crash risk (Habib et al., 2018).

While the independent variable is firm characteristics can be measured in the table (2) below:

Table (2) Independent variable measurement

| Variable | Measurements | Studies |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| Firstly: Variables related to basic firm characteristics | | |
| F_SIZE | The natural logarithm of total assets. | (Dai et al., 2019) (Abdel-Wanes, 2021) |
| ROA | The ratio of net income after tax to total assets. | (Silva, 2019) (Chae et al., 2020) |
| ROE | The ratio of net income after tax to equity. | (Andreou et al., 2016) (Yeung & Lento, 2018) |
| LEV | The ratio of total liabilities to total assets. | (Yeung & Lento, 2018) (Chae et al., 2020) |
| Secondly: Audit quality as an external government mechanism | | |
| BIG4 | A dummy variable equal to 1 if the firm is audited by one of the Big4 audit firms and 0 otherwise. | (Chae et al., 2020) (Abdel-Wanes, 2021) |
| SPEC | A dummy variable equal to 1 if the audit firm is specialized in the sector and 0 otherwise. The industrial specialization of the audit firm (SPEC) has been determined as follows: 1. Compute the market share through the following equation: The total assets of the firms in the sector that have been audited by the audit firm / The total assets of all firms in that sector. 2. Calculate the comparison ratio as follows: (1/ no of firms in the sector) *0.5 3. The audit firm is considered specialized if its | (Khajavi & Zare, 2016) (Rusmin & Evans, 2017) |

| | | |
|---------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------|
| | market share is greater than the comparison ratio, and vice versa | |
| Thirdly: Board characteristics as an internal government mechanism | | |
| B_SIZE | The total number of directors on the firm's board of directors. | (Husted& Filho, 2019) (Kao et al., 2020) |
| IND | The percentage of independent directors on the firm's board of directors. | (Kao et al., 2020) (Uyar et al., 2022) |
| DUAL | A dummy variable equals 1 if the firm's CEO and chair of the board are the same person and 0 otherwise. | (Kao et al., 2020) (Uyar et al., 2022) |

3.3. Data source and analytic methods

Data for all variables are obtained from the annual financial statements of the firms, the annual reports of the board of directors, the Governance annual report, the disclosure report on the board of directors and shareholder structure, as well as some websites such as the ESE (<http://www.egx.com.eg>), Investing database (<https://www.investing.com/>), and Mubasher information (<https://www.mubasher.info>). Multiple linear regression analysis with STATA 15 was used for analyzing the data. STATA is appropriate for analyzing panel data with multiple variables.

3.4. Model specification

The study investigates whether the firm characteristics will influence FSPCR measures which are NCSKEW & DUVOL, this can be designed by the regression models as follows:

$$NCSKEW_{i,t} = \alpha_i + \beta_1 F_SIZE_{i,t} + \beta_2 ROA_{i,t} + \beta_3 ROE_{i,t} + \beta_4 LEV_{i,t} + \varepsilon_{it} \quad (1)$$

$$DUVOL_{i,t} = \alpha_i + \beta_1 F_SIZE_{i,t} + \beta_2 ROA_{i,t} + \beta_3 ROE_{i,t} + \beta_4 LEV_{i,t} + \varepsilon_{it} \quad (2)$$

$$NCSKEW_{i,t} = \alpha_i + \beta_1 BIG4_{i,t} + \beta_2 SPEC_{i,t} + \varepsilon_{it} \quad (3)$$

$$DUVOL_{i,t} = \alpha_i + \beta_1 BIG4_{i,t} + \beta_2 SPEC_{i,t} + \varepsilon_{it} \quad (4)$$

$$NCSKEW_{i,t} = \alpha_i + \beta_1 B_SIZE_{i,t} + \beta_2 IND_{i,t} + \beta_3 DUAL_{i,t} + \varepsilon_{it} \quad (5)$$

$$DUVOL_{i,t} = \alpha_i + \beta_1 B_SIZE_{i,t} + \beta_2 IND_{i,t} + \beta_3 DUAL_{i,t} + \varepsilon_{it} \quad (6)$$

4. Empirical Results

4.1. Validation tests of the models

The degree of study models' quality and validity for statistical analysis can be evaluated by four tests as follows:

4.1.1. Jarque-Bera normality test

Jarque Bera serves as a measure of normality of the residuals (Damodar, 2004). If the model's P-value is higher than 0.05, the null hypothesis will be accepted meaning that residuals are normally distributed.

Table (3): Jarque-Bera normality test

| Models | NCSKEW | | DUVOL | |
|--------------|----------------|---------|----------------|---------|
| | Test statistic | P-value | Test statistic | P-value |
| Hypothesis 1 | 57.93 | 0.000 | 264.9 | 0.000 |
| Hypothesis 2 | 63.98 | 0.000 | 256.7 | 0.000 |
| Hypothesis 3 | 50.08 | 0.000 | 178.6 | 0.000 |

The P-value of the Jarque-Bera normality tests are lower than 0.05 as shown in table (3) which led to reject the null hypothesis which means that residuals are not normally distributed.

4.1.2. The Multicollinearity test

The multicollinearity test was used in the study to determine the severity of the multicollinearity problem in the study models. Because of this problem, the study model's capacity to describe the impact on the dependent variable is weak because it may lead to a variety of unfavorable outcomes, including uncertainty in the regression coefficients, not reaching statistical significance, a change in the predicted coefficients' signs, or significant changes in the estimated coefficients after a few additional or fewer removed observations (Asteriou & Hall, 2021). The study determined the values of the Variance Inflation Factor (VIF) and Tolerance using the collinearity diagnostics measure. There is no multicollinearity problem in the study models if the VIF value is below (10) and the tolerance value is greater than (0.05) (O'brien, 2007).

Table (4): The Multicollinearity test results

| Variables | Collinearity Statistics | |
|-----------|-------------------------|------|
| | VIF | TOL |
| F_SIZE | 3.753 | .266 |
| ROA | 2.379 | .42 |
| ROE | 1.863 | .537 |
| LEV | 1.682 | .595 |
| BIG4 | 1.276 | .783 |
| SPEC | 1.196 | .836 |
| B_SIZE | 1.186 | .843 |
| IND | 1.118 | .894 |
| DUAL | 1.018 | .982 |

The results in table (4) indicate that there is no multicollinearity problem in these models as the VIF values for all variables are below 10 and the tolerance values are above 0.05. So, these six models are able to explain the impact on FSPCR.

4.1.3. The Autocorrelation Test

The autocorrelation test was used to determine the extent to which the autocorrelation problem existed in the study models. As such problem leads to an unreal impact of firm characteristics on FSPCR. The Wooldridge test was used to verify an autocorrelation problem in the residuals, which could lead to biased and inconsistent estimations of the variances of the regression coefficients, invalidating hypothesis testing and overestimating R2 (Asteriou & Hall, 2021). If

the Wooldridge test results are higher than 0.05, the null hypothesis—that there is no first-order autocorrelation among the study variables—is accepted (Drukker, 2003).

Table (5): Wooldridge test

| Models | NCSKEW | | DUVOL | |
|---------------------|-----------|----------|-----------|----------|
| | F (1, 49) | Prob > F | F (1, 49) | Prob > F |
| Hypothesis 1 | 0.520 | 0.4744 | 0.671 | 0.4166 |
| Hypothesis 2 | 0.805 | 0.3741 | 0.205 | 0.6524 |
| Hypothesis 3 | 0.488 | 0.4883 | 0.697 | 0.4078 |

The Wooldridge test results for the six models were higher than 0.05, indicating that the null hypothesis—that there is no first-order autocorrelation among the study variables—is accepted.

4.1.4. The Heteroscedasticity test

One of the key assumptions on which linear regression models and ordinary least squares (OLS) rely is the assumption of homoscedasticity, which states that the disturbances (error terms) should have a constant or equal variance (Asteriou & Hall, 2007). When the residuals' variance varies unevenly throughout a range of observed values, this is known as heteroskedasticity (Asteriou & Hall, 2007). Heteroskedasticity causes an uneven spread of the residuals while performing a regression analysis, applying a regression model without taking heteroskedasticity into account would result in unbiased parameter values and invalid standard errors (Asteriou & Hall, 2007).

The Breusch-Pagan test was used to examine for heteroskedasticity. This test's null hypothesis was that the error variance is homoscedasticity. If the null hypothesis is rejected, then there is a heteroskedasticity problem in the study data.

Table (6): Breusch-Pagan / Cook-Weisberg test

| Models | NCSKEW | | DUVOL | |
|---------------------|------------------|---------|------------------|---------|
| | Chi ² | p-value | Chi ² | p-value |
| Hypothesis 1 | 4.54 | 0.0331 | 9.68 | 0.0019 |
| Hypothesis 2 | 3.07 | 0.0796 | 2.93 | 0.0872 |
| Hypothesis 3 | 12.86 | 0.0003 | 43.21 | 0.0000 |

As the P-values for the six models are significant for the heteroscedasticity test, the null hypotheses (Constant variance) will be rejected which means that there is a heteroscedasticity problem.

In the light of prior validation tests, the data revealed problems with heteroskedasticity and the normality of residuals. Thus, in order to investigate the four hypotheses, the study used Generalized Least Squares (GLS) to correct for heteroskedasticity and the normality of the residuals problem.

4.2. Descriptive statistics

The study relied on the descriptive analysis by dividing the study variables into Continuous variables and Discrete variables through panel A and panel B. This can be illustrated in the table (7) as follows:

Table (7): Descriptive Statistics

| Panel A: Continuous variables | | | | |
|-------------------------------|-----------|-----------|---------------------|--------------------|
| Variable | Mean | Std. Dev. | Min | Max |
| NCSKEW | 0.537 | 2.641 | -4.691 | 7.395 |
| DUVOL | 0.271 | 1.196 | -1.412 | 4.244 |
| F_SIZE | 20.875 | 2.154 | 17.227 | 26.199 |
| ROA | 0.019 | 0.126 | -1.316 ¹ | 0.253 |
| ROE | 0.069 | 1.250 | -13.785 | 7.708 |
| LEV | 0.486 | 0.326 | 0.0087 | 3.177 ² |
| B_SIZE | 8.005 | 2.627 | 3.000 | 15.000 |
| IND | 0.205 | 0.186 | 0.000 | 1.000 |
| Panel B: Discrete variables | | | | |
| Variable | Value (1) | | Value (0) | |
| | Frequency | % | Frequency | % |
| BIG4 | 70 | 35% | 130 | 65% |
| SPEC | 88 | 44% | 112 | 56% |
| DUAL | 108 | 54% | 92 | 46% |

The results in the table (7) showed the descriptive statistics for all variables used in the regressions. The mean value of NCSKEW for sample firms is (0.537) with a minimum and a maximum (-4.691, 7.395) respectively, while, the mean value of DUVOL is (0.271) with a minimum and a maximum (-1.412, 4.244) respectively.

Furthermore, the F-SIZE mean value reported (20.875) with a minimum (17.227) and a maximum (26.199) which indicates that the sample includes large firms, this mean was comparable to the presented value of Ben-Nasr & Ghouma (2018) which reached (20.877), but more than the mean of Hardies et al. (2021) which reached (17.198) and Wu et al. (2020) which was (15.282) while less than the mean value of Chen et al. (2017b) which was (21.173).

In addition, the mean value of ROA as an indicator of accounting performance was (0.019) With a minimum and a maximum (-1.316, 0.253) respectively, which reveals that Egyptian firms performed financially well during the research period, which was similar to that reported by Liao & Ouyang (2017) which reached (0.039), but less than the mean value of Ben-Nasr & Ghouma (2018) which was (0.106), and Callen & Fang (2015) which was (0.1120). Whereas, the mean value of ROE was (0.069) which also reveals that Egyptian firms performed financially well during the research period. With a minimum and a maximum (-13.785, 7.708) respectively. Which is higher than the mean value of Hutton et al. (2009) which was (-0.011).

¹ This outlier ratio belongs to Cairo Oils & Soap (COSG) firm in 2021 since its assets were 94,321,576 L.E, while its net losses were 124,132,738 L.E.

² This high LEV ratio also belongs to Cairo Oils & Soap (COSG) firm because the assets of this firm is highly below its liabilities and have a negative equity, so its LEV is higher than one.

While, the mean value of LEV was (0.486) with a minimum and a maximum (0.0087, 3.177) respectively. The high financial LEV indicates that the sample firms depend on debts with a large percentage to finance their activities. There is also a large discrepancy between the sample firms with regard to financial LEV, and this is shown by the minimum and maximum value of the financial LEV. This mean was equivalent to the value of Jia et al. (2018) where reached (0.527), but lower than the mean of Davydov (2016) where reached (0.650), while the LEV mean value is bigger than the study of Habib & Hasan (2018) where reached (0.170).

Moreover, the B-SIZE mean value was (8.005) with a minimum value of (3) and a maximum value of (15) and a standard deviation 2.627 which indicates that there was a great diversity regarding the number of boards in the sample firms. This is similar to the mean values of Yeung & Lento (2018), and Husted & Filho (2019), where they reached (9.164, 9.28) respectively. While the B-SIZE mean value was slightly smaller than the amount reported by Uyar et al. (2022), where reached (10.509), but more than the value reported by Linck et al. (2008) where reached (7.5).

While the mean value of IND was (0.205), with a minimum value of (0) and a maximum value of (1). This is similar to the mean value of Tulung & Ramdani (2018) which was (0.29), while the IND 's mean value was slightly more than the value reported by Rashid (2018) where reached (0.126), but smaller than the value reported by Cheng et al. (2022), Yeung & Lento (2018) where reached (0.374, 0.363) respectively.

As for the discrete variables, which were represented in Big4, SPEC, and DUAL, it was found that 35% of the sample firms have been audited by Big4 reached 70 firms, while 65% of the sample firms have not been audited by Big4 reached 130 firms. Moreover, 44% of firms have been audited by a specialized audit firm, reaching 88 firms, while 56% of the sample firms have not been audited by a specialized audit firm, reaching 130 firms. Whereas, 54% of firms have a chief executive officer (CEO) serve as a chairman of the board of directors reaching 108 firms. While 46% of the sample firms have a CEO a separate person from the chair of the board of directors reached 92 firms.

4.3. The impact of basic firm characteristics on future stock price crash risk

The study relied on the GLS regression analysis to determine the extent to which basic firm characteristics have an impact on FSPCR measures which are NCSKEW and DUVOL. This can be illustrated by the table (8) as follows:

Table (8): GLS regression analysis results for the impact of basic firm characteristics on future stock price crash risk measures

| Variables | Model (1): NCSKEW | | | | Model (2): DUVOL | | | |
|---------------|-------------------|-------|---------|-------------|------------------|------|---------|-------------|
| | β | S.E. | T-stat. | P-value | B | S.E. | T-stat. | P-value |
| F_SIZE | -0.208 | .062 | -3.36 | .001 | -0.062 | .025 | -2.425 | .015 |
| ROA | -2.096 | 1.014 | -2.067 | .039 | -1.369 | .459 | -2.981 | .003 |
| ROE | -.151 | .126 | -1.197 | .231 | -.046 | .046 | -1.002 | .316 |

| | | | | | | | | |
|----------------------------------|--------|-------|--------|-------------|-------|------|--------|-------------|
| LEV | -1.285 | .423 | -3.037 | .002 | -.513 | .21 | -2.436 | .015 |
| Constant | 4.407 | 1.468 | 3.002 | .003 | 1.28 | .618 | 2.07 | .038 |
| Wald chi² | 70.57 | | | | 46.54 | | | |
| Prob > chi² | 0.000 | | | | 0.000 | | | |

The results of GLS in models (1) and (2) indicated that F_SIZE, ROA, and LEV have a negative and significant impact on FSPCR measures, which are NCSKEW and DUVOL, as the regression coefficients (β) were (-.208, -2.096, -1.285) respectively for DNCKEW, and (-.062, -1.369, -.513) respectively for DUVOL. Additionally, the significance values were (0.001, 0.039, 0.002) respectively for DNCKEW, and (0.015, 0.003, 0.015) respectively for DUVOL. While ROE has an insignificant impact on FSPCR measures.

These results revealed that firms with large size have a lower FSPCR, because firms with large size decrease earning management practices because internal control systems in larger firms are more likely to be effectively designed and executed than those in smaller firms which reduce earnings management behavior and achieves transparency which ultimately mitigates FSPCR. These results were consistent with the studies of (Khajavi & Zare, 2016; Dai et al., 2019). While these results were inconsistent with the studies of (Kim et al., 2014; Lee, 2016; Hao et al., 2018; Yeung & Lento, 2018; Abdel-Wanes, 2021) where F-SIZE has a positive impact on FSPCR.

Moreover, the results showed a negative impact of ROA on FSPCR because firms that are able to record increasing ROA means that firms have strong performance, which gives investors a good feeling and improves the firm's stock price. This means that a high ROA indicates good firm prospects, and investors will respond favorably to these signals, causing the firm's value to rise and ultimately mitigate FSPCR. These results were consistent with the studies of (Lee, 2016; Elsayed, 2021). While Kim et al. (2014); Hao et al. (2018) found that ROA has a positive impact on FSPCR.

Furthermore, the results indicated a negative impact of LEV on FSPCR because a high level of LEV reflects the confidence of creditors in the firm's performance, which ultimately affects the confidence of investors. Also, high LEV decreases free cash flows according to managerial discretion, which may lead to fewer unproductive investments, assisting in lowering agency costs and then leading to decreased FSPCR. These results were consistent with the studies of (Kim et al., 2014; Hao et al., 2018). While these results were inconsistent with the studies of (Khajavi & Zare, 2016; Yeung & Lento, 2018; Chae et al., 2020; Abdel-Wanes, 2021) where there was a positive impact of LEV on FSPCR.

Additionally, it concluded from the results for assessing the accuracy of the regression models (1), and (2) that the values of Wald chi² reached (70.57, 46.54) respectively. It was also noted that the regression models have a strong fit as the Prob > chi² values were (0.000, 0.000) respectively. As a result, the regression equations are as follows:

$$\text{NCSKEW}_{i,t} = 4.407 - 0.208 \text{ F_SIZE}_{i,t} - 2.096 \text{ ROA}_{i,t} - 0.151 \text{ ROE}_{i,t} - 1.285 \text{ LEV}_{i,t}$$

$$\text{DUVOL}_{i,t} = 1.28 - 0.062 \text{ F_SIZE}_{i,t} - 1.369 \text{ ROA}_{i,t} - 0.046 \text{ ROE}_{i,t} - 0.513 \text{ LEV}_{i,t}$$

To sum up, the main firm characteristics of the Egyptian firms listed on ESE have a negatively significant impact on each of NCSKEW and DUVOL, consequently, it can be **accepted** the first hypothesis (H1) related to "The basic firm characteristics have a significant impact on FSPCR measures of the listed firms in ESE".

4.4. The impact of audit quality on future stock price crash risk

The study relied on the GLS regression analysis to determine the extent to which audit quality has an impact on FSPCR measures which are NCSKEW and DUVOL. This can be explained by the table (9) as follows:

Table (9): GLS regression analysis results for the impact of audit quality on future stock price crash risk measures

| Variables | Model (3): NCSKEW | | | | Model (4): DUVOL | | | |
|----------------------------------|-------------------|------|---------|-------------|------------------|------|---------|-------------|
| | β | S.E. | T-stat. | P-value | B | S.E. | T-stat. | P-value |
| BIG4 | .446 | .307 | 1.451 | .147 | .205 | .12 | 1.706 | .088 |
| SPEC | -1.076 | .288 | -3.739 | .000 | -.307 | .113 | -2.728 | .006 |
| Constant | .696 | .156 | 4.467 | .000 | .253 | .079 | 3.197 | .001 |
| Wald chi² | 15.268 | | | | 7.70 | | | |
| Prob > chi² | 0.0005 | | | | 0.0213 | | | |

The results of GLS in models (3) and (4) reported that SPEC has a negative and significant impact on FSPCR measures, which are NCSKEW and DUVOL, as the regression coefficients (β) were (-1.076, -.307) respectively, at significant values were (0.000, 0.006) respectively. While BIG4 has an insignificant impact on FSPCR measures.

The results indicated that the SPEC reduces FSPCR because specialized audit firms have a large number of firms in a particular sector, which may make them work under pressure, leading them to depend on their prior experience when auditing those firms rather than focusing on the special nature of each firm. These results were in line with the studies of (Robin & Zhang, 2015; Khajavi & Zare, 2016; Yeung & Lento, 2018).

Moreover, it concluded from the results for assessing the accuracy of the regression models (3), and (4) that the values of Wald chi² reached (15.268, 7.70) respectively. It was also noted that the regression models have a strong fit as the Prob > chi² values were (0.0005, 0.0213) respectively. As a result, the regression equations are as follows:

$$\text{NCSKEW}_{i,t} = 0.696 + 0.446 \text{ BIG4}_{i,t} - 1.076 \text{ SPEC}_{i,t}$$

$$\text{DUVOL}_{i,t} = 0.253 + 0.205 \text{ BIG4}_{i,t} - 0.307 \text{ SPEC}_{i,t}$$

So as a result, the audit quality of the Egyptian firms listed on ESE has a negatively significant impact on each of NCSKEW and DUVOL, consequently, it

can be accepted the second hypothesis (H2) related to "The audit quality has a significant impact on FSPCR measures of the listed firms in ESE".

4.5. The impact of board characteristics on future stock price crash risk

The study depended on the GLS regression analysis to determine the extent to which board characteristics has an impact on FSPCR measures which are NCSKEW and DUVOL. This can be illustrated by the table (10) as follows:

Table (10): GLS regression analysis results for the impact of board characteristics on future stock price crash risk measures

| Variables | Model (5): NCSKEW | | | | Model (6): DUVOL | | | |
|----------------------------------|-------------------|------|---------|--------------|------------------|------|---------|--------------|
| | β | S.E. | T-stat. | P-value | B | S.E. | T-stat. | P-value |
| B_SIZE | -0.155 | .041 | -3.8 | 0.000 | -0.037 | .016 | -2.396 | 0.017 |
| IND | -1.601 | .533 | -3.001 | 0.003 | -0.276 | .175 | -1.577 | 0.115 |
| DUAL | 1.169 | .204 | -5.738 | 0.000 | .485 | .091 | -5.354 | 0.000 |
| Constant | 2.52 | .46 | 5.478 | 0.000 | .754 | .165 | 4.561 | 0.000 |
| Wald chi² | 52.65 | | | | 40.10 | | | |
| Prob > chi² | 0.000 | | | | 0.000 | | | |

The results of GLS in models (5) and (6) suggested that B_SIZE has a negative and significant impact on FSPCR, which are NCSKEW and DUVOL, as the regression coefficients (β) were (-0.155 & -0.037) respectively, at significant values were (0.000, 0.017) respectively. The results were consistent with the agency theory which states that larger boards have a diversity of experience to help make better decisions, are more difficult for a strong CEO to dominate, and serve a controlling role which is better for firm performance (Kyereboah & Biekpe, 2006).

Furthermore, the results indicated a positive impact of DUAL on FSPCR, which are NCSKEW and DUVOL, as the regression coefficients were (1.169, 0.485) respectively, at significant level (0.000, 0.000) respectively. This result shows that when the firm has a chief executive officer (CEO) who serves as the chairman of the board of directors, this will expose the firm to FSPCR. These results are in accordance with the agency theory, DUAL reflects a concentration of control in management (agent) and a decrease in shareholder control exercised through the board of directors which could encourage opportunistic behavior that ultimately leads to FSPCR (Aktas et al., 2019; Chindasombatcharoen et al., 2022; Yu, 2022).

Moreover, the results indicated a negative impact of the IND on FSPCR via NCSKEW only and an insignificant impact on DUVOL. The regression coefficient was (-1.601) for NCSKEW, at a significant level (0.003). This result shows that when the firm has a large number of independent directors, this will help in decreasing the probability of FSPCR. This result supports the notion which states that independent directors are frequently hired to improve decision-making, increase access to valuable resources, and have higher motivation to monitor management. They are also motivated to perform their duties well

because their career advancement in the directorship market depends on their reputation which ultimately leads to a decrease in the probability of FSPCR.

Additionally, it concluded from the results for assessing the accuracy of the regression models (5), and (6) that the values of Wald chi2 reached (52.65, 40.10) respectively. It was also noted that the regression models have a strong fit as the Prob > chi2 values were (0.000, 0.000) respectively. As a result, the regression equations are as follows:

$$NCSKEW_{i,t} = 2.52 - 0.155 B_SIZE_{i,t} - 1.601 IND_{i,t} + 1.169 DUAL_{i,t}$$

$$DUVOL_{i,t} = 0.754 - 0.037 B_SIZE_{i,t} - 0.276 IND_{i,t} + 0.485 DUAL_{i,t}$$

Overall, the results of the GLS indicate that the board characteristics of the Egyptian firms listed on ESE has a significant impact on each of NCSKEW and DUVOL, consequently, it can be **accepted** the third hypothesis (**H3**) related to "**The board characteristics has a significant impact on FSPCR measures of the listed firms in ESE**".

4.6. The differences among sectors in terms of future stock price crash risk

To examine to what extent there are differences among ESE sectors in terms of FSPCR, the study depended on the Kruskal-Wallis test. A significance level lower than (0.05) will indicate the existence of significant differences among ESE sectors regarding FSPCR (Pallant, 2020). This can be illustrated by the table (11) as follows:

Table (11) Kruskal-Wallis test results for the differences among sectors in terms of FSPCR measures

| Sectors | NCSKEW | | | | DUVOL | | | |
|-----------------------------|-----------|------------------|------|-------------|-----------|------------------|------|-------------|
| | Mean rank | Chi ² | Sig. | Sector rank | Mean rank | Chi ² | Sig. | Sector rank |
| Basic resources | 93.30 | 1.823 | .610 | 4 | 95.43 | 2.692 | .442 | 4 |
| Real Estate | 98.38 | | | 3 | 97.09 | | | 3 |
| Travel and Leisure | 111.35 | | | 2 | 118.65 | | | 1 |
| Food, Beverages and Tobacco | 105.46 | | | 1 | 103.19 | | | 2 |

The results presented in Table (11) show that the test significance level for NCSKEW is (0.610) which is higher than (0.05) indicating no significant differences among ESE sectors regarding NCSKEW for a chi-square value of (1.823). This is evident from the decrease in the mean rank of NCSKEW among ESE sectors which is a value between the minimum and maximum ranges (93.30, 105.46) respectively. The mean ranks of the sectors (food, beverages, and tobacco; travel, and leisure; real estate; and basic resources) amounted to (105.46, 111.35, 98.38, 93.30) respectively, which indicate the decline in the mean rank of NCSKEW among ESE sectors, highlighting there are no significant differences among ESE sectors regarding NCSKEW.

Furthermore, the results in Table (11) reveal that the test significance level for DUVOL is (0.442) which is higher than (0.05) indicating no significant differences among ESE sectors regarding DUVOL for a chi-square value of

(2.692). This is evident from the decrease in the mean rank of DUVOL among ESE sectors which is a value between the minimum and maximum ranges (95.43, 118.65) respectively. The mean ranks of the sectors (travel, and leisure; food, beverages, and tobacco; real estate; and basic resources) amounted to (118.65, 103.19, 97.09, 95.43) respectively, which indicate the decline in the mean rank of DUVOL among ESE sectors, highlighting there are no significant differences among ESE sectors regarding DUVOL.

This may be due to that the NCSKEW and DUVOL depend on the weekly returns of firms and the nature of ESE is that if the market goes up (down) almost all firms go up (down) but in different percentages. Consequently, the **fourth hypothesis (H4) is rejected** related to "**There are significant differences among ESE sectors regarding FSPCR measures**".

5. Conclusions

The current study has been designed to achieve its key objective, which is to determine the impact of firm characteristics on FSPCR measures, which are NCSKEW and DUVOL. The study used a sample consisting of 50 firms listed on the ESE from 2018 to 2021. Therefore, the current study has investigated to what extent basic firm characteristics have an impact on FSPCR measures. Furthermore, examining the extent to which audit quality measured by BIG4 and SPEC has an impact on FSPCR measures. Moreover, investigating the extent to which board characteristics, measured by B-SIZE, IND, and DUAL, has an impact on FSPCR measures. Finally, testing the differences among ESE sectors in terms of both FSPCR measures which are NCKEW and DUVOL.

The findings revealed that there was significant negative impact of F-SIZE which is consistent with the study of (Khavari & Zare, 2016; Dai et al., 2019), ROA which is consistent with the study of (Lee, 2016; Elsayed, 2021), and LEV which is consistent with the study of (Andreou et al., 2016; Hao et al., 2018; Elsayed, 2021) on FSPCR measured in two alternative measurements, which are NCSKEW and DUVOL. These results mean that the larger (smaller) firms decrease (increase) the likelihood of FSPCR, and the higher (lower) ratio of ROA decrease (increase) the likelihood of FSPCR in the sample of the study, besides that firms that depend more heavily on debt financing are less prone to potential FSPCR. Additionally, there was a significant negative impact of SPEC on FSPCR measures which is consistent with the study of (Khajavi & Zare, 2016; Sultana et al., 2022). This result means that SPEC mitigates FSPCR because specialized audit firms have a large number of firms in a particular sector, which leads them to depend on their prior experience when auditing those firms rather than focusing on the special nature of each firm.

Furthermore, there was significant negative impact of B_SIZE which is consistent with the study of (Andreou et al., 2016; Hunjra et al., 2020) and IND which is consistent with the study of (Jin et al., 2022; Xing et al., 2023) on FSPCR. This means that the larger (smaller) B-SIZE, the lower (higher) the probability of FSPCR, because larger boards have a diversity of experience to help make better decisions, are more difficult for a strong CEO to dominate, and

serve a controlling role which is better for firm performance. Moreover, when the firm has a large number of independent directors, this will help in decreasing the probability of FSPCR, because independent directors are frequently hired to improve decision-making, increase access to valuable resources, and have higher motivation to monitor management. While there was a significant positive impact of DUAL which is consistent with the study of (Aktas et al., 2019; Yu, 2022) on FSPCR. This result indicates that when the firm has a chief executive officer (CEO) who serves as the chairman of the board of directors, this will expose the firm to FSPCR, because DUAL reflects a concentration of control in management (agent) and a decrease in shareholder control which could encourage opportunistic behavior of management that ultimately leads to FSPCR. Finally, there were no differences among ESE sectors in terms of FSPCR whether it has been measured by NCSKEEW or DUVOL.

According to the study's results, the following recommendations can be given: Firstly, when making any decisions, it is preferable to rely on SPEC as a measure of audit quality, as the study has proven that SPEC mitigates the probability of FSPCR. Secondly, the necessity of disclosing the violations of the audit offices in the periodic reports of the quality control unit of the auditors. Thirdly, the necessity of integrating mechanisms related to governance in the decision-making process, given that this information provides preliminary evidence of confidence in financial reports and the quality of profit information and shows the extent to which this information expresses the real performance of the firm. This requires firms to link and integrate strategic information related to governance with other financial information. Fourthly, a need to encourage practices that organize and enhance the process of applying, reporting, and disclosure governance information while promoting a consistent approach to achieving comparability and compliance with them within the requirements of listing or continuing to be listed in the stock exchange or explaining the reasons for not doing so as well as reviewing the penalties for non-compliance considering that the report on the quality of governance will clarify The monitoring role of the board of directors has evolved over time. Fifthly, the necessity of investing in firms with large size, high rates of ROA, high financial LEV, large boards of directors, with a large percentage of independent members within the board, and taking into account the independence of the chairman of the board of directors from the CEO, which reflects the confidence of creditors in the firm's performance.

The study believes that the issue of FSPCR of firms is still in need of further study and examination, especially in the Egyptian environment. There are many determinants that need to be investigated for their impact on FSPCR to help firms avoid it. So, the study suggests investigating the impact of other firm characteristics such as ownership structure, firm age, and audit committee. Investors should take FSPCR into account when making investment decisions, as FSPCR might cause firms to bankrupt and inability to continue. Other stakeholders such as banks and supervisory authorities should also take FSPCR into account.

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أثر خصائص الشركة على مخاطر انهيار أسعار الأسهم المستقبلية دليل من البيئة المصرية

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الملخص:

الهدف: استهدفت الدراسة اختبار أثر خصائص الشركة على مخاطر انهيار أسعار الأسهم المستقبلية من خلال التركيز على ست خصائص تتمثل في حجم الشركة، العائد على الأصول، العائد على حقوق الملكية، الرافعة المالية، وجودة المراجعة وخصائص مجلس الإدارة. وتم قياس مخاطر الانهيار عن طريق معامل الالتواء السالب للعوائد الأسبوعية وتقلبات العوائد الأسبوعية للسهم من أسفل الى أعلى.

التصميم / المنهجية: أجريت الدراسة على عينة مكونة من ٥٠ شركة مدرجة في البورصة المصرية تنتمي إلى أربعة قطاعات هي الموارد الأساسية، العقارات، السياحة والترفيه والأغذية والمشروبات والتبغ خلال الفترة من ٢٠١٨-٢٠٢١ بإجمالي عدد مشاهدات ٢٠٠ مشاهدة. ولأغراض اختبار فروض الدراسة اعتمدت الدراسة على طريقة المربعات الصغرى المعممة بدلا من طريقة المربعات الصغرى العادية للتغلب على مشكلة تباين الخطأ العشوائي للبيانات وعدم تبعية الأخطاء للتوزيع الطبيعي. كما قامت الدراسة بإجراء تحليل إضافي لتحديد مدى وجود فروق بين قطاعات عينة الدراسة فيما يتعلق بمعامل الالتواء السالب للعوائد الأسبوعية وتقلبات العوائد الأسبوعية للسهم من أسفل الى أعلى.

النتائج: توصلت الدراسة إلى وجود أثر لبعض خصائص الشركة على مخاطر انهيار أسعار الأسهم، وبشكل أكثر تفصيلا اشارت نتائج الدراسة إلى وجود أثر سلبي لحجم الشركة، العائد على الأصول، الرافعة المالية، التخصص الصناعي للمراجع، حجم مجلس الإدارة واستقلاليته على مخاطر انهيار أسعار الأسهم المستقبلية. فضلا عن وجود أثر إيجابي لازدواجية مجلس الإدارة. بينما لم يكن هناك أي أثر لكل من العائد على حقوق الملكية وحجم مكتب المراجعة على مخاطر انهيار أسعار الأسهم المستقبلية. وأشار التحليل الإضافي إلى عدم وجود فروق بين قطاعات عينة الدراسة فيما يتعلق بمعامل الالتواء السالب للعوائد الأسبوعية وتقلبات العوائد الأسبوعية للسهم من أسفل الى أعلى.

الإصالة / القيمة: تساهم الدراسة في الأدبيات الموجودة ومساعدة الباحثين المستقبليين من خلال الجمع بين بعض خصائص الشركة مثل حجم الشركة، العائد على الأصول، العائد على حقوق المساهمين، الرافعة المالية، جودة المراجعة، وخصائص مجلس الإدارة وتحليل تأثيرها على مخاطر انهيار أسعار الأسهم المستقبلية كوسيلة للتخفيف من مخاطر انهيار أسعار الأسهم ومساعدة المستثمرين مثل الدائنين والموردين والبنوك والمساهمين على فهم أفضل لتأثيرات مخاطر الانهيار وتعديل سلوكهم الاستثماري ومساعدة المراجعين على تقييم مدى قدرة الشركة على الاستمرار.

الكلمات المفتاحية: مخاطر انهيار أسعار الأسهم المستقبلية، خصائص الشركات، حوكمة الشركات، جودة المراجعة، خصائص مجلس الإدارة.