Risk committee and stock price crash risk in the Malaysian financial sector: the moderating role of institutional ownership

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Abstract

Purpose – The authors empirically investigate the impact of the existence of a stand-alone risk committee (RC) and its characteristics on the likelihood of stock price crash risk in listed financial firms on the Bursa Malaysia. The authors also test whether the effect of RC on crash risk is attenuating or amplifying by the level of institutional ownership.

Design/methodology/approach – The authors use a principal components analysis (PCA) to aggregate and derive a factor score for risk committee characteristics (i.e. independence, qualification, and size) as a proxy for the effectiveness of RC. The study also employs two distinct stock price crash risk measurements to corroborate the findings and partition institutional ownership into dedicated and transient to examine the potential impact of institutional shareholding on RC-stock price crash risk association.

Findings – Regression analysis reveals that only RC qualification has a significant negative impact on stock price crash risk. However, when RC characteristics are aggregated into one composite factor, the authors find that firms with effective RCs exhibit lower risk of stock price crash. The authors also find that firms with high level of institutional shareholdings and effective RCs are less likely to experience crash risk likelihood. The additional analyses indicate that the complementary moderating effect of institutional ownership on RC-crash risk nexus is likely to be driven by dedicated institutional ownership. The results are robust across two measures of stock price crash risk and regression specifications for a longer run window.

Originality/value – The study, to the best of the researchers' knowledge, is the first to provide evidence in an emerging market financial sector companies' perspective suggesting that effective RCs are individually and aggregately associated with lower stock price crash risk, which is further strengthened by dedicated institutional investors. These findings are unique and contribute to a small but growing body of literature documenting the need for effective RCs and specific institutional investors and their consequences of improvements in stock price crash risk environment. Results of our research in this area provide important insights to financial and capital market participants, investors, regulators, and policymakers in Malaysia.

Keywords Risk committee, Stock price crash risk, Financial sector, Institutional ownership

Paper type Research paper

1. Introduction

The existence of an internal governance mechanism in managing risk is necessary as the business world has become increasingly more complex and challenging. This is particularly

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important for emerging markets where external governance mechanism is very weak and ineffective. To that end, regulators, policymakers, and shareholder activist groups stressed on the need to establish an effective risk committee (RC hereafter) at the company's top management level. For example, paragraph 15.26 (b) of the Bursa Malaysia Listing Requirements stated that board of director must make "a statement about the state of risk management and internal control of the listed issuer as a group" in the corporate annual report. It has been suggested that the existence of RC is in line with agency theory to safeguard the interests of the company's investors by providing a fair return on investment and increasing firm value. Also, a RC plays a vital role in reducing the information asymmetry by ensuring that the risks faced by the company are well managed and the company owners get reliable corporate information. Extant literature concludes that RCs are capable of minimizing the impact of risk on companies, thereby improving the companies' financial performance (Aldhamari *et al.*, 2020; Elamer and Benyazid, 2018; Tao and Hutchinson, 2013).

Among different types of risks faced by a company listed on a stock exchange is the stock price crash risk. According to Francis *et al.* (2016), stock price crash risk stems from the desire of company top managers who have the intention to conceal a certain amount of information or bad news about the internal affairs of the company. Furthermore, top managers may also hide bad news in order to obtain higher equity compensation (Kim *et al.*, 2011b), expropriate corporate' s wealth (Chen *et al.*, 2011), avoid paying higher firm taxes (Kim *et al.*, 2011a), build their empire and maintain their career top position (Kim *et al.*, 2016). However, the inability to conceal this negative information for an extended length of time causes the firm management to release such information to public knowledge at once, leading to crashes in the company's share price. Hutton *et al.* (2009) and Jin and Myers (2006) opine that the concealment of information indicates the existence of information asymmetry between internal and external parties of the company; and accumulation of information for a long period can drive the information to spread in the market and result in continued stock devaluation. To protect corporations from stock price crash, in addition to internal governance mechanisms such as RC, institutional investors is regarded as a core external governance mechanism affecting the quality and quantity of financial information that could be associated with institutional investors' capability to mitigate agency conflicts between shareholders and managers.

The main purpose of this study is to explore the impact of RCs on the likelihood of stock price crash risk among listed financial firms in Malaysia and moderating role of institutional investors' ownership in such relationship. We concentrate on financial companies as the financial sector has the biggest market capitalization of Malaysian stock market (i.e. Bursa Malaysia). For instance, as at 30 June 2020, the sector accounting about 20% (Ringgit Malaysia [RM] 302.21 billion) of the whole market capitalization (RM1531 billion) (Bursa Malaysia, 2020) and the financial sector contributes about 10% of the nominal growth domestic product (Bank Negara Malaysia, 2021). Furthermore, the financial sector was the first required to set up the stand-alone committee for risk management in early 2000's (Aldhamari *et al.*, 2020) and only in 2017 the Malaysian Code on Corporate Governance (Securities Commission, 2017) strongly encourages the board of directors of companies operating in other sectors, especially large companies, to establish RC. Therefore, RC in financial firms especially in the aspect of risk management governance structure is more stable and mature as compared to RC in non-financial firms. Considering the maturity of RC that exists for almost 20 years and most likely risk management practices have become a culture in the financial sector, then it is very relevant for studies related to stock price crash risk conducted in this sector. A short study period using 2 and/or 3 years RC information of other sectors would limit a true and comprehensive picture of how RC can predict stock price crash risk and make it difficult to observe share price movements.

The Malaysia business environment provides us with a great platform to analyze the association between RC, institutional ownership, and stock price crash risk due to the following reasons. First, the major players of institutional investors in Malaysia are government-linked investment institutions (Abdul Wahab *et al.*, 2007). The presence of such investors in corporations may thus be to facilitate government policies and objectives, but not to improve good governance practices in firms. Second, financial sector lack of transparency (Muhmad *et al.*, 2016) and government-linked investment institutions or those close to the government owned more than 50% of share in the sector (Menon, 2017). This, in turn, may increase the financial institutions' ability to indulge in managerial negative bad news hoarding activities. Third, Malaysia business environment is characterized by relatively weak investor protection, poor regulation quality, severe agency and information asymmetry problems, and weak enforcement regime (Cheung and Chan, 2004; Claessens and Fun, 2002; La Porta *et al.*, 1998; Thillainathan, 1991). In such environment, RCs are less effective in reducing information asymmetry and suppressing managerial bad news hoarding behavior that may lead to crash risks. Finally, the institutional structure and framework of financial industry for developing countries including Malaysia is not efficient enough. For instance, the development of financial integration in the Association of Southeast Asian Nations or ASEAN economies (such as harmonization of national law) still left behind, compared the European Union (Haini, 2020).

Using a large dataset of financial firms from 2004 till 2018, our results reveal that the propensity of top managers (i.e. controlling shareholders in Malaysia) to conceal bad news from other investors which subsequently can lead to steep crash in stock price is mitigated by effective RC in general. More specifically, both composite RC and qualified RC exert inverse effects on future stock price crash risk. We also document that firms with high level of institutional shareholdings and effective RCs exhibit much lower likelihood of stock price crash risk. Our additional tests confirm that the complementary moderating effect of institutional ownership on RC-crash risk nexus is likely to be driven by dedicated institutional ownerships rather than transient institutional ownerships.

This paper makes several contributions to the literature. First, while prior studies that examined the determinants of stock price crash risk have centered on institutional investors stability (Callen and Fang, 2013; Tee *et al.*, 2021), real earnings management (Francis *et al.*, 2016), accounting conservatism (Kim and Zhang, 2016), tax avoidance level (Kim *et al.*, 2011b), short interest (Callen and Fang, 2015), stock liquidity (Chang *et al.*, 2016), powerful CEO (Mamun *et al.*, 2020), CEO age (Andreou *et al.*, 2017), CEO overconfidence (Kim *et al.*, 2016), inefficient governance (Andreou *et al.*, 2016), related party transactions (Habib *et al.*, 2021; Shen *et al.*, 2014), political incentives (Piotroski *et al.*, 2015), and managerial equity incentives (Kim *et al.*, 2011a), the role of RC in deterring crash risks still remains an empirical question. To the best of our knowledge, this research is the first to explore the association between RCs and the stock price crash risk in the financial sector in Malaysia. Our paper enriches these growing literature by providing fresh evidence that contributes to the agency and resource-dependency theory. Our findings suggest that, generally, firms with effective RCs are less prone to stock price crash risk. Second, this study adds to the large body of prior research that investigates the impact of institutional shareholding on corporate outcomes (e.g. Abdul Wahab *et al.*, 2007; Bhojraj and Sengupta, 2003; David *et al.*, 2001; Pucheta-Martínez and García-Meca, 2014) by exploring the moderating role of institutional shareholders on the relationship between RC and crash risk from the perspective of two conflicting arguments, such as active monitoring hypothesis and expropriation-led strategic alliance hypothesis.

Third, as far as we could ascertain, no studies have explored whether or not institutional ownership (as an external monitoring mechanism) can interact with RC (as an internal governance mechanism) in facing stock price crash risk in financial firms. In fact, there are few studies that analyze the impact of institutional ownership on stock price crash risk in non-financial firms (e.g. Callen and Fang, 2013 in the US, Haghighat *et al.*, 2015 and in Iran Tee, 2019 and Tee *et al.*, 2018 in Malaysia). We add to the literature by providing richer evidence of the monitoring role of RCs, along with institutional investors, in mitigating stock price crash risk in financial firms. Moreover, differentiating from Tee (2019) and Tee *et al.* (2018), our study classifies institutional investors according to their investment horizon and shows that only dedicated institutional investors play an effective monitoring role in alleviating the likelihood of crash risk. Our additional results contribute to active monitoring theory by concluding that higher dedicated institutional investors' ownership reduces the risk of stock price crashes. Fourth, we extend a recent study of Tee *et al.* (2021), who examine the likelihood of stock crashes for different types of politically connected firms in Malaysia, by emphasizing the crucial role of both internal and external governance tools, i.e. RC and institutional investors in predicting and mitigating the risk of stock price crash in financial sector. Fifth, further differentiating from prior literature on crash risk, we incorporate a big dataset of 15 years along with a large number of control variables to test both the primary effect of RC on stock crashes and moderating effect of institutional ownership on such relationship. Finally, in Malaysian context, our research will be of interest to policymakers, stock market participants, and shareholders when they evaluate managerial bad news hoarding behavior or the effect of internal and external governance mechanisms on crash risk of public companies. This research work is worthwhile and timely when most Malaysian companies face the financial crises and recent coronavirus (COVID-19) crisis, and policymakers and regulators put increasing emphasis on RC to assist firms managing their different types of risks during the crises periods and beyond.

The remainder of the paper is organized as follows: Section 2 provides the literature review and hypotheses development; Section 3 outlines the research methodology and data; Section 4 presents the empirical results; Section 5 reports additional analysis and robustness tests; and finally, Section 6 presents the concluding remarks.

2. Literature review and hypotheses development

2.1 Risk committees and stock price crash risk

Academic scholars maintain that engagement in bad news hoarding activities by managers reduces the transparency (Hutton *et al.*, 2009), thereby increasing information asymmetry and agency problems between insiders and shareholders (Jin and Myers, 2006). A vast body of literature provides evidence of ability of institutional investors stability, real earnings management, accounting conservatism, tax avoidance level, short interest, related party transactions, political incentives, and managerial equity incentives to predict stock crashes (Callen and Fang, 2013, 2015; Kim *et al.*, 2011a, b; Kim and Zhang, 2016; Piotroski *et al.*, 2015; Shen *et al.*, 2014). However, nothing is known about how RCs can alleviate drastic crash risks emanated from managerial bad news hoarding behavior. Recently, in Malaysia, there has been a growing emphasis from regulator and policy makers on better risk management and risk reporting. To satisfy this demand, companies are required by Bursa Malaysia to disclose a statement about risk management and internal affairs of the company. The need for a stand-alone RC has been clearly spell out in the revised code of corporate governance 2017, where large firms are recommended to form an RC that is accountable to oversee the risk management policies and procedures. It has been argued that the separation of RC committee from the audit committee would allow former committee members to concentrate on corporate risk process only and, thus, provide better quality risk monitoring, management, and reporting (Al-Hadi *et al.*, 2016). Furthermore, the creation of RC enables the company to identify and develop proper risk management strategies so as to protect shareholders' wealth. Abdullah and Said (2019) conclude that formation of the stand-alone committee will make risk management process more effective and alleviate financial risk.

There are two ways through which the RC can reduce crash risk. First, an effective RC is seen as a pivotal tool to improve the disclosure of risk-related information (Barakat and Hussainey, 2013; Tao and Hutchinson, 2013). This suggests that the RC through its disciplinary role as effective governance mechanism is likely to mitigate agency conflict and information asymmetry, leading to low likelihood corporate managers to conceal bad news. Al-Hadi *et al.* (2016) find that in Gulf Cooperation Council (GCC) countries, companies with a separate RC experience greater market risk disclosure. Second, the resource-dependency theory posits that firms with more resources are likely to form a stand-alone RC to mitigate operational risk and increase their performance. Prior studies suggest that the existence of the RC positively contributes to the process of risk monitoring and, as a result, improve financial company's performance (Aldhamari *et al.*, 2020; Ames *et al.*, 2018; Halim *et al.*, 2017; Minton *et al.*, 2014). In line with this argument, the stock price crash risk might be alleviated, because managers would have less propensity to engage in negative information hoarding activities to cover their bad performance in the presence of effective RC that manage and monitor risks and maximize shareholders values. Based on the above discussion, we hypothesize that:

H1. There is a negative association between a stand-alone RC and future stock price crash risk.

2.2 Risk committee characteristics and stock price crash risk

Risk committee characteristics are consisted of its independence, qualification, and size attributes. We use both the aggregate/composite and individual measures to examine the impact of RC on stock price crash risk and capture their effects separately, while expecting identical direction of relationship with crash risk.

2.2.1 Risk committee independence and stock price crash risk. Independent directors are viewed as an important corporate governance mechanism for monitoring management actions and safeguarding stakeholders' rights. According to the agency theory, the inclusion of independent directors on corporate boards is likely to constrain management opportunism and reduce agency costs arising from the divergence of managers-shareholders' interests (Jensen and Meckling, 1976). However, there is a void in the literature on how risk committee independence can prevent managerial bad news hoarding activities that may eventually lead to stock price crash risks.

The presence of independent directors in RCs is considered as a strategic move by the firm to improve risk management process. This is because independent directors can make impartial judgments on how risks are managed as they do not have any significant interest in the firm except that of being directors on the RC. Paragraph 9.3 of the MCCG 2017 states that majority of the RC members should be independent directors (Securities Commission, 2017). Moreover, Elamer and Benyazid (2018) opine that an RC with independent directors is able to determine risk for financial institutions at reasonable rate. Prior studies empirically conclude that having independent directors on corporate boards improves transparency level and reduces the information asymmetry between managers and company stakeholders (e.g. Carcello and Neal, 2003; Cheng and Courtenay, 2006; Wan-Hussin, 2009). These results suggest that independent directors in RCs are more likely to hinder managers from engagement in bad news hoarding activities that adversely affect transparency level, thereby reducing crash risks.

Independent directors have experience by working in other firms and, thus, they are expected to detect and constrain the intentional behavior of managers to hoard negative news and reduce crash risks. Furthermore, independent directors have greater incentives to avoid activities such as bad news hoarding activities that would damage their reputation as good monitor of risks. In the context of Malaysia, where the ownership is concentrated and governance system is relatively weak, we expect independent directors in RCs play important role in alleviating crash risks to avoid any risk that may affect firm performance and to protect their reputational capital. Our expectation is stated in the following hypothesis:

H2a. There is a negative association between the proportion of independent directors on the RC and future stock price crash risk.

2.2.2 Risk committee qualification and stock price crash risk. The presence of committee members with financial expertise and accounting background or experience is an important factor that may influence the effectiveness of board committees in discharging their oversight role. According to the agency theory, financially literate or experienced board members are able to effectively monitor managerial actions, safeguard the interest of the firm, and protect shareholders' rights. Certain scholars contend that qualified directors can contribute and add value to the firm via alleviating business uncertainties and taking prudent actions in managing the firm's problems (Al-Hadi *et al.*, 2016; Dionne *et al.*, 2013).

The primary function of RCs is to monitor and manage risks in the firm. The complexity of risks requires someone with relevant qualifications and experience to understand and manage different types of risks faced by the company. Directors with financial expertise and accounting background are expected to ensure that the firm is not exposed to unreasonable business risks and adheres to good risk management practices. Moreover, RCs with competent or experienced directors will be more able to identify risks and determine suitable risk management strategies. Although the business regulations in Malaysia did not specifically determine the level of qualification of this committee, the selection criteria must also consider the level of education or experience as a guidance for determining whether a director is qualified to be appointed to the RC or not.

A review of literature indicates that qualified directors in corporate board committees are likely to improve financial disclosure process and enhance transparency level (Agrawal and Chadha, 2005; Dhaliwal *et al.*, 2010). Furthermore, Al-Hadi *et al.* (2016) empirically document that RCs with qualified directors are more expected to enhance risk market disclosure than their counterparts. Based on the literature review, we conjecture that RCs whose members are well qualified will be aware of managerial bad news hoarding activities and firms with qualified RCs are less likely to experience crash risks. Our conjecture is formulated in the following hypothesis:

H2b. There is a negative association between the qualification of the RC directors and future stock price crash risk.

2.2.3 Risk committee size and stock price crash risk. The impact of board size on the effectiveness of the board oversight duties and corporate financial reporting quality is still a topic of interesting debate. Unfortunately, there is no common agreement regarding the effectiveness of large boards relative to small boards. On one hand, certain scholars argue that small boards normally easier to coordinate, quicker in making decision, less likely to have free-rider problems, and less likely to oppose innovation (Dimitropoulos and Asteriou, 2010; Vafeas, 2000). Moreover, small boards are more expected to effectively do their duties make it more difficult for CEOs to control (Jensen, 1993). Prior research works reveal that firms with small boards experience a high level of transparency and thus report a high quality financial information (e.g. Cho and Rui, 2009; Vafeas, 2000).

On the other hand, and in line with resource-based theory, scholars suggest that large boards are more likely to exploit the expertise and experience of board members, especially those who are independent and can provide environmental link (González and García-Meca, 2014; Wan Ismail *et al.*, 2010). Having such members in large boards will lead to better monitoring of top management actions and eventually enhance the transparency of accounting information (Kang and Kim, 2012). This is upheld by previous literature that empirically documented efficient role of large boards in enhancing the quality of financial statements through mitigating information asymmetry between controlling shareholders and corporate management (Kang and Kim, 2012; Wan Ismail *et al.*, 2010).

However, the MCCG did not clearly determine the optimum number of RC members. Nevertheless, it is reasonable that, in the presence of more members setting on the RCs, various ideas and recommendations on how the company should handle the risk will be discussed and the outcomes of the discussion will be more conclusive. The study of Al-Hadi *et al.* (2016) shows that firms with large RC members are associated with greater risk market disclosure. Consistent with resource-based view, we expect that a larger RC would be more capable of effectively monitoring managerial bad news hoarding behavior and firms with large RCs are less likely to experience crash risks. Our expectation is formulated in the following hypothesis:

H2c. There is a negative association between the size of the RC and future stock price crash risk.

2.3 Risk committee, institutional ownership, and stock price crash risk

Institutional ownership is seen as central factor influencing the quantity and quality of financial information disseminated by corporations. Extant studies evidence that institutional investors with significant motivations to monitor management actions improve earnings quality (Pucheta-Martínez and García-Meca, 2014; Velury and Jenkins, 2006), enhance corporate performance (Abdul Wahab *et al.*, 2007) and value (David *et al.*, 2001; Salehi *et al.*, 2011), lower cost of debt financing (Bhojraj and Sengupta, 2003; García-Meca *et al.*, 2015), and mitigate information asymmetry (Heflin and Shaw, 2000). Institutional investors have strong incentives and greater experience and expertise to monitor management at lower cost than individual shareholders (Shleifer and Vishny, 1986) to protect their sizable investments in companies (Lin *et al.*, 2014; Velury and Jenkins, 2006). Prior literature indicates that firms with institutional investors as largest shareholders engage significantly in lower earnings management (e.g. Bushee, 1998; Chung *et al.*, 2002; Farooq and El Jai, 2012; Hadani *et al.*, 2011; Jiambalvo *et al.*, 2002; Jiraporn and Gleason, 2007; Lin *et al.*, 2014).

However, little is known about how stock price crash risk is related to institutional ownership (Tee, 2019; Tee *et al.*, 2018). In the literature, there are two competing views–monitoring versus expropriation-with respect to how institutional ownership impacts on stock price crash risk. Based on active monitoring hypothesis, institutional investors have strong incentive to monitor due to their large stake of shareholdings, higher voting rights, and long-term investment horizons (An and Zhang, 2013; Callen and Fang, 2013). As a result, they restrain company managers from engaging in information hoarding activities and extraction of the firm's cash flows. Through their overseeing activities, institutional investors are priori likely to curb management discretions to engage in earnings manipulation which could exacerbate informational asymmetries between shareholders and managers and increase the likelihood managers hoarding bad news to maintain stock prices and gain personal benefits. Hence, institutional investors are likely to result in attenuating bad news hoarding activities because, they can demand more information to increase the level of transparency that eventually would lower the crash risks.

On the other hand, in line with the expropriation view and strategic alliance hypothesis, institutional investors may exacerbate the tendency of managers to engage in bad news hoarding activities and would increase crash risk (An and Zhang, 2013; Callen and Fang, 2013). This is because they are more focused on trading for current income and have less incentives to incur monitoring costs. Moreover, the private benefits hypothesis contends that institutional investors tend to vote strategically that are advantageous to their personal interests, thus increasing the likelihood of financial misreporting (Lin *et al.*, 2014) and companies with opaque financial reporting are more prone to share price crashes (Hutton *et al.*, 2009).

While empirical literature is relatively scare, there are some evidence for both opposing views mentioned above. Haghighat *et al.* (2015) show that institutional ownership is negatively affected firms' crash risk in Iran, meaning institutional monitoring mitigates managerial bad-news hoarding by improving the flow of firm-specific information into individual stock prices. Park and Song (2018) examines the effect of ownership structure on firm-specific stock price crash risk in Korean listed firms and document a negative association between largest shareholder, usually institutions, and its affiliates' ownership concentration and stock price crash risk, that indicates resolving information asymmetry and prevent bad news from being withheld. Again, Tee *et al.* (2018) provide evidence that higher institutional ownership can attenuate positive association between politically connected firms and stock price stock crashes in Malaysia. In particular, only local institutional investors can weaken the nexus between politically connected firms and crash risk, suggesting that while institutional ownership imply effective monitoring, different types of institutional investors can produce different monitoring outcomes. In the US context, An and Zhang (2013) find negative (positive) relationship between dedicated (transient) institutional investors and crash risk. In the same vein, Callen and Fang (2013) also report that dedicated institutions serve a monitoring role in reducing stock price crash risk, while transient institutions drive stock price crash risk and opaque financial reporting exacerbates this impact on crash risk. This hypothesis aims at verifying if institutional ownership weakens or strengthens the correlation between RC and future stock price crash risk. These clues show both accentuating and attenuating effects of institutional investors depending on their investment horizon. Nevertheless, the moderating effect of institutional ownership on the association between the RC and stock price cash risks still remains an empirical question, as there is no study in Malaysian financial sector. Referring Tee *et al.* (2018) in Malaysian context and the extent that institutional ownerships play significant governance role, as advocated by the active monitoring hypothesis, it seems plausible to conjecture that institutional investors would demand effective RC to mitigate the likelihood of bad news hoarding activities by company managers. Accordingly, institutional monitoring mitigates the risk of stock price crash and thus moderates the negative association between RC and stock price crash risk. In view of this argument concerning the potential impact of institutional ownership on stock price crash risk, we propose the following testable hypothesis:

H3. The association between RCs and future stock price crash risk is moderated by the level of institutional ownership.

3. Research methodology and data

3.1 Measurement of variables

3.1.1 Measurement of stock price crash risk. Borrowing from crash risk literature, this study constructs two measures of firm-specific crash risk. To calculate firm-specific measures of crash risk, we estimate firm-specific weekly returns from the following expanded market model regression for each firm and year:

$$r_{\mathrm{i,t}} = \alpha_j + \beta_{1,j} r_{m,t-2} + \beta_{2,j} r_{m,t-1} + \beta_{3,j} r_{m,t} + \beta_{4,j} r_{m,t+1} + \beta_{5,j} r_{m,t+2} + \varepsilon_{i,t} \quad (1)$$

Where *r, j, t* is the return of firm *j* in week *t*, and r_m, *t* is the market return in week *t* which is represented by the return on FTSA Kuala Lumpur Composite Index (KLCI). This paper includes the lead and lag terms for the market index return to allow for non-synchronous trading (Dimson, 1979). The firm-specific weekly return for firm j in week t, Wj, t, is defined as the natural logarithm of one plus the residual return from Equation (1). We use the natural logarithm of the raw residual returns to reduce the positive skew in the return distribution and ensure symmetry (Callen and Fang, 2013, 2015; Chen *et al.*, 2001). The first measure of crash risk is the negative conditional skewness of firm-specific weekly returns (NCSKEW), consistent with Francis *et al.* (2016), Kim *et al.* (2011a), and Kim and Zhang (2016). NCSKEW for a given firm in a fiscal year is calculated by taking the negative of the third moment of firm-specific weekly returns for each year and dividing it by the standard deviation of firm-specific weekly returns raised to the third power. Specifically, for each firm j in year t, NCSKEW is computed as:

$$NCSKEW = -\left[n(n-1)^{3/2}\sum w_{i,t}^{3}\right] \Big/ \left[(n-1)(n-2)\left(\sum w_{i,t}^{2}\right)^{3/2}\right] \tag{2}$$

Congruous with Francis *et al.* (2016), Kim *et al.* (2011a), and Kim and Zhang (2016), the second measure of crash risk is the down-to-up volatility measure of the crash likelihood (DUVOL). This paper uses DUVOL because such measure does not involve third moments and, thus, is less likely to be excessively impacted by a small number of extreme weekly returns (Chen *et al.*, 2001). For each firm j over a fiscal-year period t, we separate firm-specific weekly returns into two subsamples: "down" weeks when the returns are below the annual mean, "up" weeks when the returns are above the annual mean. We then separately compute the standard deviation of firm-specific weekly returns for each of these two subsamples. DUVOL is the natural logarithm of the ratio of the standard deviation on the "down" weeks to the standard deviation on the "up" weeks, as portrayed in the following model:

$$DUVOL_{i,t} = log\left\{\left[(n_u-1)\sum_{Down} w_{i,t}^{2} \Big/ (n_d-1)\sum_{up} w_{i,t}^{2}\right]\right\} \tag{3}$$

For both NCSKEW and DUVOL, a higher value indicates that the company is more prone to stock price crashes (Callen and Fang, 2013; Francis *et al.*, 2016). This paper employs only NCSKEW and DUVOL because these two measures of crash risk, which are based on the distribution of stock returns, can provide more robust identification of crash risk likelihood. Financial data to estimate firm-specific crash risk is obtained by the DataStream database.

3.1.2 Measurement of experimental variables. The major experimental variables of interest in this paper are RC existence and RC characteristics. RC existence (RCEX) captures the existence of a stand-alone RC. Specifically, based on prior works (Abdullah and Said, 2019; Aldhamari *et al.*, 2020; Al-Hadi *et al.*, 2016; Hines and Peters, 2015; Yatim, 2010), RCEX is an indicator variable that takes one if the firm has a separate RC in the fiscal year and 0 otherwise.

To analyze the impact of RC characteristics on crash likelihood, we use the following disaggregated variables that represent the characteristics of RC:

RC independence (RCINDP): Based on the MCCG, a member of RC is classified as an independent, if he/she is not an officer of the company, is independent from the management and controlling investors and is not representative of concentrated or family holdings of its shares. In the current study, following previous research works (Aldhamari *et al.*, 2020; Elamer and Benyazid, 2018; Ng *et al.*, 2013; Yeh *et al.*, 2011), we use the proportion of independent RC members during the fiscal year to measure RC independence.

RC qualification (RCQUAL): Following Aldhamari *et al.* (2020) and Tao and Hutchinson (2013), we use academic (e.g. bachelors/master/PhD) or professional (e.g. Certified Public Accountant/Chartered Financial Analyst/Association of Chartered Certified Accountants) qualifications in finance/accounting to define the qualifications of RC members. RCQUAL, then, is the proportion of RC members with academic or professional qualification in accounting/finance during the fiscal year.

RC size (RCSIZE): RCSIZE is represented by the number of directors on the RC (Aldhamari *et al.*, 2020; Al-Hadi *et al.*, 2016; Battaglia *et al.*, 2014).

Academic scholars argue that the use of just one attribute of board committee cannot provide a comprehensive picture of the effectiveness of a committee as these attributes complement each other and endogenously related. By ignoring one of the components of the committee, it may cause the committee to fail perform its responsibilities properly and the committee might become ineffective (Connelly *et al.*, 2012; García *et al.*, 2007). Working in the same line with these arguments, we develop a factor score using a principal component analysis (PCA) of the three RC characteristics discussed above. The score is used as an aggregate/composite independent variable (RCFACTOR) to capture the RC characteristics as a whole as well as to measure RC effectiveness (see Appendix 2). The combination of three RC variables would assist in minimizing measurement errors, increasing the power of analysis and mitigating multicollinearity concern (Jolliffe, 2002).

Institutional ownership, another experimental variable we use, following the work of Koh (2007), is the percentage of shares owned by institutional investors in the firm relative to the total share outstanding (INSOWN). Academic scholars argue that institutional investors are not a homogenous group due to their different incentives and investment strategies which may impact their costs of monitoring (Almazan *et al.*, 2005; Cornett *et al.*, 2007; Koh, 2007). Therefore, we breakdown the INSOWN into two categories: dedicated institutional ownership and transient institutional ownership to analyze their impact on stock price crash risk separately and capture institutional investors heterogeneity in the additional analysis. Dedicated institutional investors include Government-Linked Investment Companies (GLICs), namely Employees Provident Fund, Lembaga Tabung Angkatan Tentera (Armed Forces Fund Board), Lembaga Tabung Haji (Malaysian Hajj Pilgrims Fund Board), Permodalan Nasional Berhad, Khazanah Nasional Berhad, Minister of Finance Incorporated, and other government linked companies etc. Transient institutional investors, for examples, are mutual funds, banks, and insurance companies.

While dedicated institutional ownership (DEDOWN) is measured by the percentage of shares owned by dedicated institutional investors in the firm, transient institutional ownership (TRAOWN) is represented by the percentage of shares owned by transient institutional investors in the firm relative to total share outstanding. Data on RC and institutional ownership variables are retrieved from the annual reports of the sample firms sourced from the Bursa Malaysia’s website.

3.1.3 Control variables. Based on prior studies, we add several additional variables to control for other possible determinants of crash likelihood. Our main control variables include negative skewness of firm-specific weekly returns (NCKEW), share turnover (TURN), firm-specific weekly returns (RET), share volatility (SDRET), firm size (SIZE), firm growth (MTB), firm leverage (LEV), firm profitability (ROE), and number of analysts following the firm (ANA). While the rest of control variables’ data is obtained by the DataStream database, data on number of analysts following the firm is extracted from I/B/E/S. We develop factor score using a principal component analysis of four board of director characteristics namely board independence (BODIND), board size (BODSIZE), board qualification (BODQUAL), and female directors (FEMAL). The score is used as aggregated control variable (BODFACTOR) to capture the effectiveness of board of directors as a whole. We also control for audit committee independence (ACINDP) and audit committee size (ACSIZE). Effective board of directors and audit committees are likely to monitor managerial bad news hoarding behavior. In addition, our study controls for the existence of chief risk officer (CROEX) and audit quality (AUDQUAL) as firms with chief risk officer and high audit quality are less likely to experience crash risks. Data on BODFACTOR, ACINDP, ACSIZE, CROEX, and AUDQUAL are extracted from the annual reports of the sample firms. Appendix 1 provides a summary of variable definitions and measurements used in this study.

3.2 Sample

Our sample is based on all financial firms listed in the Bursa Malaysia. We focus on financial firms because RCs are much more common among companies in financial sector (Ames *et al.*, 2018; Elamer and Benyazid, 2018). Risk crash data (i.e. one-year ahead data) are from fiscal year 2005–2019, whereas data on experimental and control variables are from fiscal year 2004–2018. As a result, the overall sample period spans years 2004–2019. Our sample period starts with 2004, because it was not until 2003 that financial listed firms in Malaysia were required to establish a stand-alone RCs [1]. Moreover, because the data for calculating one-year ahead of NCSKEW and DUVOL became unavailable from the DataStream database at the time this study was conducted, the last year for extracting data on stock price crash risk was 2019. After excluding observations with missing values for RC, crash risk data, and control variables, our final panel unbalanced sample data ended up with 430 firm-year observations. Table 1 shows the distributions of sample firms by year. As displayed in the table, the number of firm-year observations across the study sample years is relatively uniform. However, all our regression specifications controlled for any variations in year distribution of sample companies through including year fixed effects in the regression models.

3.3 Models specification

Pertaining to the main purpose of the study, we employ the following regression equation to examine the impact of RC existence and RC characteristics on future stock price crash risk:

$$\begin{aligned}\text{CrashRisk}_{it+1}(\text{NCSKEW}_{it+1}\ \text{or DUVOL}_{it+1}) = {} & \alpha_0 + \alpha_1\text{RCEX}_{it} + \alpha_2\text{NCSKEW}_{it} + \alpha_3\text{TURN}_{it} \\ & + \alpha_4\text{RET}_{it} + \alpha_5\text{SDRET}_{it} + \alpha_6\text{SIZE}_{it} \\ & + \alpha_7\text{MTB}_{it} + \alpha_8\text{LEV}_{it} + \alpha_9\text{ROE}_{it} + \alpha_{10}\text{ANA}_{it} \\ & + \alpha_{11}\text{BODFACTOR}_{it} + \alpha_{12}\text{CROEX}_{it} \\ & + \alpha_{13}\text{AUDQUAL}_{it} + \alpha_{14}\text{ACINDP}_{it} \\ & + \alpha_{15}\text{ACSIZE}_{it} + \text{YEAR} + \varepsilon_{it}\end{aligned} \quad (4)$$

Years	No. of obs	%
2004	27	6.28
2005	27	6.28
2006	26	6.04
2007	27	6.28
2008	28	6.51
2009	28	6.51
2010	28	6.51
2011	28	6.51
2012	29	6.74
2013	31	7.21
2014	31	7.21
2015	30	6.98
2016	30	6.98
2017	30	6.98
2018	30	6.98
Total	430	100

Table 1. Distribution of sample firms by year

$$\text{CrashRisk}_{it+1}(\text{NCSKEW}_{it+1}\text{ or DUVOL}_{it+1}) = \beta_0 + \beta_1\text{RCFACTOR}_{it} + \beta_2\text{NCSKEW}_{it} + \beta_3\text{TURN}_{it} + \beta_4\text{RET}_{it} + \beta_5\text{SDRET}_{it} + \beta_6\text{SIZE}_{it} + \beta_7\text{MTB}_{it} + \beta_8\text{LEV}_{it} + \beta_9\text{ROE}_{it} + \beta_{10}\text{ANA}_{it} + \beta_{11}\text{BODFACTOR}_{it} + \beta_{12}\text{CROEX}_{it} + \beta_{13}\text{AUDQUAL}_{it} + \beta_{14}\text{ACINDP}_{it} + \beta_{15}\text{ACSIZE}_{it} + \text{YEAR} + \varepsilon_{it} \quad (5)$$

Where CrashRisk is proxied by NCSKEW or DUVOL. RCEX is the existence of a stand-alone RCs, and RCFACTOR is factor analysis of RC characteristics for independence, qualification, and size (RCINDP, RCQUAL, and/or RCSIZE). We replace RCFACTOR with RCINDP, RCQUAL, and RCSIZE to examine the individual impact of RC attributes on future crash risk. To help ensure that the association between RCs and future crash risk is not driven by other factors, we include a set of control variables that prior research found to have potential impact on crash risk. The control variables represent firm-level characteristics as discussed in sub-section 3.1.3.

Given the panel unbalanced nature of data where firm-year observations are relatively uniform across the years, we use feasible generalized least squares (FGLS) regression approach. Again, following the lead-lag method, we use one year ahead dependent variables to address endogeneity in the regression models, so the crash risk variables are measured in year t+1, while independent and control variables are measured in year t. Endogeneity is a common concern in this type of study that may stem from reverse causality or simultaneity and unobserved heterogeneity. It is possible that the crash risk associated with a firm could potentially influences investors behavior and thus leads to changes in the firms' ownership structure. To take care of such endogeneity issue in the regression equations, we follow prior studies (see Callen and Fang, 2013, as an example), and use the current value of independent and control variables to mitigate any concern of reverse causality. Also, we use year fixed effects in FGLS regression approach to control unobserved heterogeneity. Furthermore, we introduce the current negative return skewness (NCSKEW_t) as control variable to capture the persistence of the third moment of firm-specific share returns (Kim *et al.*, 2011a). It is noteworthy that only companies with individual RC characteristics are eligible to be included in the regression analysis using Equation (5). Analyses of Equation (4) are based on the full sample of 430 firm-year observations, whereas analyses of Equation (5) are based on RC-subsample that consists of 256 firm-year observations. It is obvious that some sample companies form a stand-alone RC without considering distinct characteristics of member directors. Our main focus is the impact of RCs on future crash risk as represented by the coefficients, which we expect to be negative and significant, α_1 and β_1.

Again, to investigate whether the relation between RCs and future stock price crash risk is moderated by the level of institutional ownership, we specify the following regression equation:

$$\text{CrashRisk}_{it+1}(\text{NCSKEW}_{it+1}\text{ or DUVOL}_{it+1}) = \alpha_0 + \alpha_1\text{RCEX}_{it} + \alpha_2\text{INSOWN}_{it} + \alpha_3\text{RCEX}*\text{INSOWN}_{it} + \alpha_4\text{NCSKEW}_{it} + \alpha_5\text{TURN}_{it} + \alpha_8\text{RET}_{it} + \alpha_6\text{SDRET}_{it} + \alpha_7\text{SIZE}_{it} + \alpha_8\text{MTB}_{it} + \alpha_9\text{LEV}_{it} + \alpha_{10}\text{ROE}_{it} + \alpha_{11}\text{ANA}_{it} + \alpha_{12}\text{BODFACTOR}_{it} + \alpha_{13}\text{CROEX}_{it} + \alpha_{14}\text{AUDQUAL}_{it} + \alpha_{15}\text{ACINDP}_{it} + \alpha_{16}\text{ACSIZE}_{it} + \text{YEAR} + \varepsilon_{it} \quad (6)$$

$$\begin{aligned}\text{CrashRisk}_{\text{it}+1}(\text{NCSKEW}_{\text{it}+1}\text{ or DUVOL}_{\text{it}+1}) = {} & \beta_0 + \beta_1\text{RCFACTOR}_{\text{it}} + \beta_2\text{INSOWN}_{\text{it}} \\ & + \beta_3\text{RCFACTOR} * \text{INSOWN}_{\text{it}} \\ & + \beta_4\text{NCSKEW}_{\text{it}} + \beta_5\text{TURN}_{\text{it}} + \beta_6\text{RET}_{\text{it}} \\ & + \beta_7\text{SDRET}_{\text{it}} + \beta_8\text{SIZE}_{\text{it}} + \beta_9\text{MTB}_{\text{it}} \\ & + \beta_{10}\text{LEV}_{\text{it}} + \beta_{11}\text{ROE}_{\text{it}} + \beta_{12}\text{ANA}_{\text{it}} \\ & + \beta_{13}\text{BODFACTOR}_{\text{it}} + \beta_{14}\text{CROEX}_{\text{it}} \\ & + \beta_{15}\text{AUDQUAL}_{\text{it}} + \beta_{16}\text{ACINDP}_{\text{it}} \\ & + \beta_{17}\text{ACSIZE}_{\text{it}} + \text{YEAR} + \varepsilon_{\text{it}} \qquad (7)\end{aligned}$$

To control for the potential effect that institutional ownership may have on crash risk, the continuous variable INSOWN is included in Equations (6) and (7). We also include interaction terms RCEX*INSOWN and RCFACTOR*INSOWN to test whether the effect of RC existence and RC characteristics on crash risk is impacted by the level of institutional ownership. We do not make any expectation on $\alpha3$ and $\beta3$ because the two side effects of institutional ownership as discussed in Section 2.3. We winsorize RCQUAL, RCSIZE, TURN, RET, SDRET, MTB, LEV and ROE at 1 and 99% to normalize the variables. Our study employs feasible generalized least square (FGLS) estimations to account for any heteroskedasticity and autocorrelation problems.

4. Empirical analysis

4.1 Descriptive statistics

Panel A of Table 2 presents descriptive statistics for the key variables used in our study. The mean values of future stock price crash risk measures, NCSKEW_{t+1} and DUVOL_{t+1} are −0.259 and −0.195, respectively. The mean and standard deviation of DUVOL are roughly close to the statistics reported by Callen and Fang (2013), Chen *et al.* (2001), and particularly Lee *et al.* (2019) in Malaysia. Although financial firms in Malaysia are regulated by Bank Negara Malaysia to establish a separate RC, only 59.8% of sample firms set up a stand-alone RC. This is almost identical to a Malaysian study by Aldhamari *et al.* (2020) which is 60%. Moreover, on average, only 22% of RC members have an academic/professional qualification. Panel A reports that 41.5% of the members are independent directors. The statistic is relatively comparable to a study by Elamer and Benyazid (2018) who report that about 53.87% of RC members are independent. The mean size of the RC is 2.416. Panel A also reports that the mean value for institutional ownership is 69.57%. The average shareholding of the dedicated institutional investors, DEDOWN, is 60.20%, whereas that of the transient institutional investors, TRAOWN, only stands at 9.08%.

Panel B of Table 2 presents a Pearson correlation matrix for all variables included in the main regression models. The coefficients in the panel indicate that RC variables are highly correlated. For instance, the correlations between RCEX and RCINDP and between RCEX and RCSIZE are 0.87 and 0.84, respectively. This upholds utilizing the factor analysis of the three RC characteristics in the regression models to alleviate any potential multicollinearity concern.

4.2 Regression results

Panel A of Table 3 presents the regression results of the existence of stand-alone RC on future stock price cash risk (as measured by 1-year ahead NCSKEW and DUVOL, respectively).

Table 2.
Descriptive statistics and correlation matrix

Variables	Mean	SD	P25	Median	P75	Min	Max
Panel A: Summary statistics (N = 430)							
$NCSKEW_{t+1}$	−0.259	1.112	−0.893	−0.198	0.433	−4.458	4.152
$DUVOL_{t+1}$	−0.195	0.833	−0.734	−0.193	0.378	−2.956	1.945
$RCEX_t$	0.598	0.491	0	1	1	0	1
$RCINDP_t$	0.415	0.394	0	0.50	0.75	0	1
$RCQUAL_t$	0.220	0.269	0	0	0.333	0	1
$RCSIZE_t$	2.416	2.357	0	3	4	0	10
$RCFACTOR_t$	−0.000	1.541	−1.682	0.358	1.345	−1.682	3.147
$INSOWN_t$ (%)	69.572	20.269	54.640	73.050	87.250	5.770	98.160
$DEDOWN_t$ (%)	60.203	23.247	45.750	63.725	81.120	0	95.320
$TRAOWN_t$ (%)	9.078	12.469	0.920	4.255	11.120	0	71.370
$NCSKEW_t$	−0.260	1.109	−0.903	−0.204	0.433	−4.458	4.152
$TURN_t$	0.002	0.063	−0.006	0.000	0.007	−0.593	0.503
RET_t	−0.040	0.250	−0.167	−0.043	0.079	−0.935	1.389
$SDRET_t$	0.034	0.019	0.020	0.030	0.042	0.006	0.118
$SIZE_t$ (log)	15.832	2.285	13.995	15.357	17.924	11.873	20.507
MTB_t	0.361	0.533	0.104	0.169	0.339	0.018	5.210
LEV_t (%)	11.096	15.238	0.20	7.235	13.90	0	74.690
ROE_t (%)	10.642	19.987	5.820	10.955	16.090	−261.520	184.220
ANA_t (log)	1.258	1.209	0	1.099	2.564	0	3.332
$BODIND_t$	0.514	0.121	0.417	0.50	0.60	0.222	1
$BODSIZE_t$	8.067	2.210	6	8	9	3	14
$BODQUAL_t$	0.354	0.183	0.250	0.333	0.444	0	1
$FEMAL_t$	0.122	0.117	0	0.111	0.20	0	0.50
$BODFACTOR_t$	0.000	1.147	−0.859	−0.104	0.698	−2.347	4.116
$CROEX_t$	0.286	0.452	0	0	1	0	1
$AUDQUAL_t$	0.900	0.300	1	1	1	0	1
ACINDP	0.841	0.162	0.667	0.800	1	0.333	1
ACSIZE	3.595	0.860	3	3	4	2	7

(*continued*)

Variables		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
Panel B: Pearson correlation matrix (N = 430)																						
NCSKEW $_{t+1}$	A	*1*																				
$DUVOL_{t+1}$	B	*0.91*	1																			
RCEX	C	*0.10*	0.09	1																		
RCINDP	D	*0.11*	0.09	*0.87*	1																	
RCQUAL	E	0.06	0.02	*0.67*	*0.70*	1																
RCSIZE	F	*0.12*	*0.10*	*0.84*	*0.75*	*0.59*	1															
NCSKEW	G	0.04	0.04	*0.13*	*0.12*	0.07	*0.12*	1														
RET	H	0.07	0.05	−0.00	0.01	0.045	0.03	*−0.56*	1													
SDRET	I	*−0.12*	*−0.12*	*−0.28*	*−0.37*	*−0.28*	*−0.34*	*−0.29*	*0.18*	1												
TURN	J	0.06	0.05	−0.02	−0.04	−0.05	−0.01	−0.09	*0.12*	*0.23*	1											
MTB	K	0.09	0.08	0.05	0.05	0.07	*0.15*	−0.01	*0.12*	−0.01	0.03	1										
ROE	L	0.02	0.00	0.05	*0.12*	*0.13*	*0.11*	−0.04	*0.18*	−0.07	0.04	0.19	1									
LEV	M	0.07	0.09	*−0.14*	*−0.28*	*−0.22*	*−0.15*	0.09	*−0.11*	*0.19*	0.00	*−0.19*	−0.04	1								
SIZE	N	0.08	*0.10*	*0.33*	*0.37*	*0.22*	*0.41*	0.04	0.06	*−0.51*	0.00	*−0.38*	*0.10*	0.01	1							
ANA	O	*0.10*	*0.12*	*0.45*	*0.49*	*0.35*	*0.57*	0.09	0.05	*−0.45*	−0.02	0.04	*0.17*	−0.05	0.75	1						
BODFACT	P	−0.01	−0.01	−0.03	0.08	*0.21*	−0.03	0.00	0.02	−0.02	−0.04	−0.01	0.03	0.01	−0.05	−0.01	1					
CROEX	Q	0.06	0.09	*0.41*	*0.37*	*0.16*	*0.31*	0.07	−0.03	*−0.18*	−0.02	*−0.21*	−0.00	*0.13*	*0.48*	*0.42*	0.04	1				
AUDQUAL	R	0.09	0.07	*0.29*	*0.25*	*0.21*	*0.27*	0.06	−0.03	*−0.17*	0.02	−0.08	*0.10*	0.04	*0.39*	*0.34*	−0.05	*0.21*	1			
INSOWN	S	0.01	0.01	*0.24*	*0.24*	*0.13*	*0.17*	−0.02	0.07	*−0.29*	−0.03	0.01	*0.17*	*−0.18*	*0.42*	*0.39*	*−0.11*	*0.21*	*0.32*	1		
ACINDP	T	−0.00	0.01	−0.00	*0.15*	*0.13*	0.09	−0.00	0.00	−0.09	−0.04	−0.01	−0.01	−0.09	−0.01	0.00	*0.31*	−0.02	0.09	−0.14	1	
ACSIZE	U	*0.12*	*0.12*	*0.29*	*0.31*	*0.24*	*0.40*	*0.13*	−0.00	*−0.21*	−0.03	*0.19*	*0.14*	0.09	*0.19*	*0.37*	−0.01	0.03	*0.18*	0.02	*−0.10*	1

Note(s): Definitions of the variables are in Appendix 1. Italics values indicate statistical significant at the 5% level or better

Table 2.

Table 3.
Regression results

Panel A. FGLS regression results on existence of separate RC and future crash risk (NCSKEWt+1 and DUVOLt+1)

Variables	$NCSKEW_{t+1}$ (1)	$DUVOL_{t+1}$ (2)
Intercept	−1.380 (−1.56)	−0.590 (−0.86)
$RCEX_t$	0.121 (1.03)	0.043 (0.48)
$NCSKEW_t$	0.095 (1.59)	0.039 (0.90)
$TURN_t$	−2.678 (−0.86)	−1.893 (−0.85)
RET_t	0.788*** (2.45)	0.541** (2.23)
$SDRET_t$	−5.450 (−1.34)	−6.406** (−2.09)
$SIZE_t$	0.045 (0.95)	0.020 (0.55)
MTB_t	0.437** (2.20)	0.283* (1.87)
LEV_t	0.012*** (2.57)	0.011*** (2.89)
ROE_t	−0.004 (−0.63)	−0.005 (−0.99)
ANA_t	−0.095 (−1.40)	−0.053 (−1.00)
$BODFACTOR_t$	−0.038 (−0.84)	−0.016 (−0.45)
$CROEX_t$	0.149 (1.23)	0.185** (1.96)
$AUDQUAL_t$	0.260 (1.37)	0.126 (0.86)
ACINDP	0.165 (0.57)	0.153 (0.68)
ACSIZE	0.121** (2.06)	0.104** (2.24)
Year fixed effect	Yes	Yes
Wald χ^2	83.81	88.13
Prob > χ^2	0.000	0.000
N	430	430

Panel B. FGLS regression results on RC characteristics and future crash risk ($NCSKEW_{t+1}$ and $DUVOL_{t+1}$)

Variables	$NCSKEW_{t+1}$ (1)	$DUVOL_{t+1}$ (2)	$NCSKEW_{t+1}$ (3)	$DUVOL_{t+1}$ (4)	$NCSKEW_{t+1}$ (5)	$DUVOL_{t+1}$ (6)	$NCSKEW_{t+1}$ (7)	$DUVOL_{t+1}$ (8)
Intercept	−1.813 (−1.53)	−0.322 (−0.34)	−0.767 (−0.64)	0.257 (0.27)	−1.735 (−1.39)	−0.268 (−0.26)	−1.876 (−1.61)	−0.543 (−0.56)
$RCINDP_t$	0.313 (1.12)	0.231 (1.04)						
$RCQUAL_t$			−0.721*** (−3.13)	−0.554*** (−3.00)				
$RCSIZE_t$					−0.003 (−0.08)	−0.002 (−0.05)		

(*continued*)

Table 3.

Panel B. FGLS regression results on RC characteristics and future crash risk ($NCSKEW_{t+1}$ and $DUVOL_{t+1}$)

Variables	$NCSKEW_{t+1}$ (1)	$DUVOL_{t+1}$ (2)	$NCSKEW_{t+1}$ (3)	$DUVOL_{t+1}$ (4)	$NCSKEW_{t+1}$ (5)	$DUVOL_{t+1}$ (6)	$NCSKEW_{t+1}$ (7)	$DUVOL_{t+1}$ (8)
$RCFACTOR_t$							−0.142* (−1.71)	−0.111* (−1.69)
$NCSKEW_t$	0.074 (1.03)	0.029 (0.52)	0.052 (0.74)	0.019 (0.35)	0.078 (1.07)	0.032 (0.57)	0.074 (1.04)	0.034 (0.61)
$TURN_t$	−4.039 (−0.88)	−0.524 (−0.15)	−3.358 (−0.462)	−0.306 (−0.09)	−3.875 (−0.84)	−0.510 (−0.15)	−3.848 (−0.84)	−0.868 (−0.25)
RET_t	0.429 (1.07)	0.316 (1.03)	0.500 (1.27)	0.368 (1.23)	0.420 (1.05)	0.288 (0.94)	0.468 (1.18)	0.315 (1.03)
$SDRET_t$	−4.444 (−0.83)	−10.059** (−2.22)	−11.438** (−2.27)	−13.644*** (−2.90)	−6.406 (−1.27)	−10.934** (−2.41)	−8.945* (−1.77)	−11.511*** (−2.46)
$SIZE_t$	0.064 (1.01)	−0.009 (−0.18)	0.038 (0.61)	−0.022 (−0.44)	0.074 (1.10)	−0.002 (−0.04)	0.085 (1.37)	0.012 (0.23)
MTB_t	0.473* (1.92)	0.230 (1.19)	0.393 (1.60)	0.173 (0.90)	0.482* (1.88)	0.230 (1.15)	0.507** (2.07)	0.255 (1.32)
LEV_t	0.008 (1.01)	0.012* (1.89)	0.004 (0.60)	0.008 (1.38)	0.005 (0.71)	0.010 (1.63)	0.003 (0.36)	0.007 (1.11)
ROE_t	−0.003 (−0.35)	−0.003 (−0.34)	−0.003 (−0.30)	−0.001 (−0.19)	−0.003 (−0.30)	−0.002 (−0.22)	−0.003 (−0.30)	−0.001 (−0.09)
ANA_t	−0.083 (−1.03)	−0.025 (−0.40)	−0.073 (−0.92)	−0.018 (−0.29)	−0.096 (−1.19)	−0.032 (−0.51)	−0.094 (−1.18)	−0.031 (−0.50)
$BODFACTOR_t$	−0.031 (−0.54)	0.019 (0.39)	0.045 (0.74)	0.070 (1.46)	−0.024 (−0.42)	0.024 (0.51)	−0.000 (−0.01)	0.039 (0.81)
$CROEX_t$	0.171 (1.26)	0.167 (1.57)	0.144 (1.09)	0.160 (1.56)	0.174 (1.25)	0.170 (1.56)	0.128 (0.93)	0.148 (1.39)
$AUDQUAL_t$	0.448 (1.25)	0.275 (1.01)	0.394 (1.09)	0.252 (0.92)	0.384 (1.07)	0.232 (0.86)	0.372 (1.03)	0.229 (0.83)
ACINDP	0.140 (0.42)	0.173 (0.65)	0.352 (1.12)	0.377 (1.49)	0.259 (0.76)	0.253 (0.92)	0.480 (1.39)	0.445 (1.61)
ACSIZE	0.067 (1.02)	0.048 (0.91)	0.059 (0.92)	0.042 (0.83)	0.073 (1.10)	0.050 (0.96)	0.072 (1.10)	0.050 (0.95)
Year fix.effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wald χ^2	47.86	48.84	57.28	58.54	46.14	47.81	49.87	51.20
Prob > χ^2	0.015	0.012	0.001	0.000	0.022	0.014	0.009	0.007
N	256	256	256	256	256	256	256	256

Note(s): The definitions of the variables are in Appendix 1. z-statistics are in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Contradictory to our expectation, the estimated coefficients of RCEX are positive and statistically insignificant for both measures of crash risk. Therefore, our H1 is not substantiated. This finding is not in coincident with resource-dependency theory's view that a stand-alone RC has more time and skills to manage and monitor corporate's potential risks, assist firms in minimizing information asymmetry, which in turn enhances transparency and mitigate stock price crash risks. The unexpected result suggests mere formation of stand-alone RC is not sufficient to mitigate stock price crashes unless it plays active role. The Blue-Ribbon Committee recommends board committees to meet regularly, have independent and qualified members to be more active in overseeing the financial reporting process and internal control (BRC, 1999). Abdullah (2010) opines that the establishment of board committees by Malaysian public firms is only to satisfy the requirements of the regulatory bodies and avoid being penalized. Therefore, it is plausible that mere presence of ineffective RCs may increase agency costs that emanated from corporate managers to engage in negative bad news hoarding activities.

Turning to control variables, we find that the estimated coefficients on RET are positive for the two measures of crash risk and SDRET is negative for $DUVOL_{t+1}$ and statistically significant. These results are consistent with Habib *et al.* (2021)'s argument that crashes are less likely to occur in firms with lower stock performance and/or high stock volatility. Moreover, in consonance with Chen *et al.* (2001)'s conjecture that growth stocks are more likely to crash, the estimated coefficients on MTB are significantly positive across the two measures of crash risk. The estimated coefficients on LEV are also positive and highly significant at $p < 0.01$ for the two measures of crash risk, which is in contrast to the findings in the literature (Callen and Fang, 2013; Hutton *et al.*, 2009), i.e. a high level of debt increases debt holders monitoring of managerial bad news hoarding activities. Additionally, the estimated coefficient on CROEX is only significant for $DUVOL_{t+1}$ and takes on sign opposite to that predicted by the literature. The estimated coefficients on ACSIZE are positive and statistically significant for the two measures of crash risk. The rest of control variables do not seem to statistically affect crash risk across the two columns of crash risk variables.

Panel B of Table 3 reports the regression results of the effect of individual RC characteristics as well as aggregate/composite RCFACTOR on future stock price crash risk. We run our models by including one RC attribute at a time to avoid any multicollinearity issue. Columns 1 and 2 presents the regression results for RC independence–RCINDP. The estimated coefficients of RCINDP are positive and statistically insignificant for the two measures of crash risk, indicating that the presence of independent members in RCs is not expected to enhance transparency, mitigate information asymmetry, and thus reducing the likelihood of crash risks. As such, our H2a is not substantiated. The finding is not consistent with both agency and resource-dependency theory's view that independent directors are more capable of detecting and managing different types of corporate risks, as they have vast experience of working in other companies. The positive and insignificant results can be justified by the fact that in Malaysian and more broadly in Asian family-owned companies, outside directors are not truly independent directors due to the involvement of family members in the selection and appointment of independent directors (Chen and Nowland, 2010). Extant studies in Malaysia provide evidence that independent directors failed to mitigate earnings restatement activities (Abdullah *et al.*, 2010) and improve earnings predictability (Aldhamari and Ku Ismail, 2014).

The impact of RC qualification, RCQUAL, on future stock price crash risk is presented in Columns 3 and 4. The estimated coefficients on RCQUAL are both negative and statistically significant for the two measures of crash risk (−0.721 and −0.554, respectively, both significant at $p < 0.01$). So, our H2b is substantiated. This novel finding implies that future crash risk is alleviated by qualified RCs, consistent with the agency theory argument that RCs with competent or experienced directors will be more able to curb managerial bad news hoarding behavior. Villiers *et al.* (2022) opine that by holding more qualifications and richer work experience, RC members tend to better comprehend risk management. In terms of economic effects, we find that one standard deviation increase in RCQUAL leads to an approximately 75% reduction in 1-year ahead NCSKEW around its mean [2]. The corresponding value for the DUVOL as measurement of crash risk is 76% [3]. The result indicates that the relationship between RCQUAL and crash risk is not only statistically significant but economically significant as well.

While Columns 5 and 6 present the findings for RCSIZE, the association between RCFACTOR and future stock price crash risk is demonstrated in columns 7 and 8. The estimated coefficients of RCSIZE are negative but statistically insignificant. Thus, our H2c is not substantiated. The result is inconsistent with resource-dependency theory's notion that a large RC facilitates the accumulation of risk management skills, experience, and external links of different individuals, which, in turn, may mitigate crash risk. The insignificant finding could be justified by the competing arguments regarding the effectiveness of large boards relative to small boards (i.e. the two-side effects of board committee size). However, when we aggregate the three attributes of RC in one composite factor, we find negative and significant coefficients of RCFACTOR across the two measures of crash risk (−0.142 and −0.111, respectively, both significant at $p < 0.10$). The result suggests that companies with effective RCs exhibit lower stock price crash risk, which is in line with our expectation. Overall, we document support for aggregate RC attributes reducing the likelihood of crass risk.

In Table 4, we introduce two interactive variables RCEX*INSOWN and RCFACTOR*INSOWN to test whether the impact of the existence of RC and RC characteristics on future stock price crash risk is influenced by the level of institutional ownership. As reflected in columns 3 and 7 of Table 4, RCFACTOR is still negative and statistically significant for the two measures of crash risk after introducing institutional ownership as a stand-alone moderating variable (−0.163 and −0.125, both significant at $p < 0.10$). The negative and significant coefficients of RCFACTOR uphold our earlier argument of ability RC attributes to reduce likelihood of crash risk. Table 4 also shows that while the estimated coefficients of RCEX*INSOWN are positive and statistically insignificant for the two measures of crash risk in columns 2 and 6, the estimated coefficients on RCFACTOR*INSOWN are negative and statistically significant for the two measures of crash risk in columns 4 and 8 (−0.011 and −0.008, significant at $p < 0.01$ and $p < 0.05$, respectively). Therefore, our H3 is not substantiated for the former interaction variable (RCEX*INSOWN), whereas H3 is substantiated for the latter interaction variable (RCFACTOR*INSOWN). Institutional ownership appears to have no moderating effect of stand-alone RC and crash risk nexus where distinct characteristics of member directors are pursued in many company's RCs. In contrast, institutional ownership exerts complementary moderating effect on the inverse relationship between RC characteristics (composite) and crash risk, i.e. strengthening the RC attributes and crash risk nexus. In other words, the economic benefits of RC attributes to mitigate stock price crash risk are augmented for firms with high level of institutional ownership.

The plausible reason for the positive and insignificant results of RCEX*INSOWN could be that institutional investors may perceive that forming a stand-alone RC is costlier to them which may eventually decrease firm's value. Furthermore, Abdul Wahab *et al.* (2007) argue that most institutional investors in Malaysia invest heavily in government-linked companies which are typically secretive and less transparent. Based on strategic alliance hypothesis, institutional investors have different channels through which they can access private information that can be utilized for making investment decision. Therefore, institutional investors are expected to discourage the firms with stand-alone RCs to release any disappointing information to the public as otherwise the equity values will also be negatively

Table 4. FGLS regression results on RC, institutional ownership, and future crash risk ($NCSKEW_{t+1}$ and $DUVOL_{t+1}$)

Variables	$NCSKEW_{t+1}$ 1	2	3	4	$DUVOL_{t+1}$ 5	6	7	8
Intercept	−1.349 (−1.52)	−1.147 (−1.28)	−1.900 (−1.63)	−3.396*** (−2.59)	−0.571 (−0.83)	−0.467 (−0.67)	−0.537	−1.621 (−1.52)
$RCEX_t$	0.121 (1.04)	−0.288 (−0.72)			0.043 (0.47)	−0.136 (−0.46)		
$RCFACTOR_t$			−0.163* (−1.87)	0.612* (1.88)			−0.125* (−1.81)	0.452* (1.81)
$INSOWN_t$	−0.002 (−0.74)	−0.005 (−1.27)	−0.003 (−0.69)	0.012* (1.73)	−0.001 (−0.36)	−0.002 (−0.70)	−0.002 (−0.57)	0.009* (1.69)
$RCEX_t \times INSOWN_t$		0.006 (1.07)				0.003 (0.63)		
$RCFACT_t \times INSOWN_t$				−0.011*** (−2.48)				−0.008** (−2.40)
$NCSKEW_t$	0.093 (1.56)	0.092 (1.55)	0.070 (0.98)	0.038 (0.52)	0.039 (0.89)	0.037 (0.86)	0.035 (0.63)	0.009 (0.15)
$TURN_t$	−2.910 (−0.93)	−3.473 (−1.10)	−3.550 (−0.77)	−5.553 (−1.23)	−1.953 (−0.87)	−2.133 (−0.95)	−0.461 (−0.13)	−1.678 (−0.49)
RET_t	0.777** (2.42)	0.778** (2.43)	0.452 (1.14)	0.315 (0.80)	0.539** (2.22)	0.535** (2.21)	0.310 (1.02)	0.210 (0.69)
$SDRET_t$	−5.432 (−1.33)	−4.568 (−1.10)	−9.205* (−1.81)	−4.263 (−0.75)	−6.449** (−2.10)	−6.082** (−1.95)	−11.950** (−2.53)	−9.364** (−1.98)
$SIZE_t$	0.053 (1.08)	0.049 (1.00)	0.106 (1.54)	0.121* (1.76)	0.023 (0.61)	0.020 (0.53)	0.024 (0.43)	0.041 (0.73)
MTB_t	0.442** (2.22)	0.423** (2.13)	0.545** (2.19)	0.650*** (2.60)	0.285* (1.88)	0.273* (1.79)	0.281 (1.43)	0.391** (1.96)
LEV_t	0.011** (2.30)	0.011** (2.19)	0.001 (0.09)	0.008 (0.95)	0.010*** (2.75)	0.010*** (2.72)	0.006 (0.88)	0.011* (1.70)
ROE_t	−0.003 (−0.45)	−0.003 (−0.40)	−0.002 (−0.24)	−0.003 (−0.34)	−0.005 (−0.87)	−0.005 (−0.84)	−0.000 (−0.06)	−0.003 (−0.41)
ANA_t	−0.098 (−1.43)	−0.083 (−1.20)	−0.106 (−1.29)	−0.121 (−1.49)	−0.538 (−1.01)	−0.046 (−0.85)	−0.039 (−0.61)	−0.060 (−0.95)
$BODFACTOR_t$	−0.039 (−0.87)	−0.046 (−1.00)	0.008 (0.13)	0.034 (0.56)	−0.016 (−0.46)	−0.018 (−0.51)	0.043 (0.89)	0.068 (1.39)
$CROEX_t$	0.156 (1.29)	0.143 (1.18)	0.125 (0.91)	0.103 (0.77)	0.188** (1.99)	0.183* (1.92)	0.147 (1.38)	0.119 (1.13)
$AUDQUAL_t$	0.294 (1.52)	0.340* (1.68)	0.350 (0.98)	0.373 (0.97)	0.134 (0.91)	0.153 (1.01)	0.215 (0.79)	0.231 (0.82)
ACINDP	0.133 (0.46)	0.149 (0.52)	0.452 (1.29)	0.360 (1.04)	0.140 (0.62)	0.145 (0.64)	0.436 (1.55)	0.349 (1.26)
ACSIZE	0.119** (2.02)	0.115** (1.97)	0.064 (0.96)	0.047 (0.71)	0.103** (2.21)	0.101** (2.16)	0.045 (0.84)	0.029 (0.54)
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wald χ^2	83.47	85.66	50.21	59.20	88.24	88.94	51.75	59.73
Prob > χ^2	0.000	0.000	0.011	0.002	0.000	0.000	0.008	0.002
N	430	430	256	256	430	430	256	256

Note(s): The definitions of the variables are in Appendix 1. z-statistics are in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

influenced. Another plausible reason for such unexpected finding may be the substitution of monitoring effect between institutional and risk committees.

With respect to RCFACTOR*INSOWN, the result implies that firms with high level of institutional shareholding and effective RC are less exposed to price crash risk. The negative and significant coefficients may be regarded as complementary monitoring effect of institutional investors and risk committees. The result coincides with active monitoring hypothesis contention that institutional investors with large stake of shares are more likely to curb management discretions to engage in earnings manipulation which could exacerbate informational asymmetries between shareholders and managers and increase the likelihood managers hoarding bad news to maintain stock prices and gain personal benefits. Institutional investors with high share ownership are viewed by the market as long-term actors who invest their money in firms over long time horizon. Therefore, they are expected to have greater incentives and tendencies to closely oversee managers and board of directors. Furthermore, institutional investors have power to elect members in board committees to protect their interest and thus board members in RCs are expected to play an active role in deterring misreporting activities for firms with substantial institutional shareholdings.

5. Additional analysis and robustness tests

5.1 Additional analysis: types of institutional investors and stock price crash risk

In the main analysis, we have explored the possible moderating impact of the ownership of all institutional investors on RC-crash risk association. However, institutional investors are not a homogenous group due to their different investment strategies, incentives, and ability to engage in corporate governance (Almazan *et al.*, 2005; An and Zhang, 2013; Koh, 2007). How *et al.* (2014) note that the impact of institutional ownership on analyst following varies depending on the type of institutional investors in Malaysia. Furthermore, Tee (2019) and Tee *et al.* (2018) conclude that the monitoring effect of institutions on stock price crash risk should be tested from the perspective of business ties and domiciles of institutional investors. Therefore, we separate the shareholding of all institutional investors into two categories: dedicated institutional ownership (DEDOWN) and transient institutions ownership (TRAOWN). We then re-run regressions pertaining to RCFACTOR of Table 4 using these two new variables of institutional ownership to analyses their moderating effect on the relationship between composite factor of RC characteristics and stock price crash risk [4]. The definition of these two variables is discussed in the earlier sub-section 3.1.2. The results are reported in Table 5. As shown in the table in Columns 1,3, 5 and 7, RCFACTOR is still negative and statistically significant after introducing DEDOWN and TRAOWN as stand-along moderating variables. However, our variables of interest are the interactions of RCFATOR with the new variables of institutional ownership. Columns 2 and 4 of Table 5 present the regression results of the interaction between RCFACTOR and DEDOWN, whereas those of TRAOWN are presented in Columns 6 and 8 of Table 5.

We find that the estimated coefficients on the interactive variable, RCFACTOR*DEDOWN are negative and statistically significant across the two measures of crash risk in Columns 2 and 4 (−0.007 for $NCSKEW_{t+1}$ and $DUVOL_{t+1}$, respectively, both significant at $p < 0.05$). However, interactive variable RCFACTOR*TRAOWN reported in Columns 6 and 8 are not found to be significantly associated with the two measures of crash risk. These findings suggest that the moderating impact of institutional ownership found in the main analysis (i.e. Table 4 Columns 4 and 8) is likely to be driven by dedicated institutions. The results are in coincidence with Potter (1992)'s assertion that dedicated institutional owners mitigate pressures for myopic investment behavior because their holdings provide tendencies to monitor top managers. The findings are also consistent with prior research works who report that dedicated institutional investors

Table 5. FGLS regression results on RC characteristics (RCINDP, RCQUAL, and RCSIZE), dedicated/transient institutional ownership, and future crash risk ($NCSKEW_{t+1}$ and $DUVOL_{t+1}$)

	Dedicated				Transient			
	$NCSKEW_{t+1}$		$DUVOL_{t+1}$		$NCSKEW_{t+1}$		$DUVOL_{t+1}$	
Variables	1	2	3	4	5	6	7	8
Intercept	−1.868 (−1.59)	−2.971** (−2.29)	−0.496 (−0.51)	−1.521 (−1.44)	−1.826 (−1.53)	−1.851 (−1.54)	−0.590 (−0.60)	−0.596 (−0.60)
$RCFACTOR_t$	−0.162** (−1.93)	0.254 (1.14)	−0.128* (−1.90)	0.239 (1.45)	−0.150* (−1.83)	−0.138 (−1.23)	−0.116* (−1.77)	−0.126 (−1.35)
$DEDOWN_t$	−0.002 (−0.80)	0.008 (1.44)	−0.002 (−0.80)	0.007* (1.75)				
$RCFACT_t \times DEDOWN_t$		−0.007** (−2.05)		−0.007** (−2.43)				
$TRAOWN_t$					0.002 (0.45)	0.003 (0.40)	0.001 (0.16)	−0.000 (−0.01)
$RCFACT_t \times TRAOWN_t$						−0.001 (−0.16)		0.001 (0.14)
$NCSKEW_t$	0.075 (1.06)	0.055 (0.76)	0.037 (0.66)	0.009 (0.16)	0.075 (1.07)	0.076 (1.08)	0.038 (0.68)	0.037 (0.66)
$TURN_t$	−3.674 (−0.80)	−5.694 (−1.24)	−0.399 (−0.11)	−2.009 (−0.58)	−3.737 (−0.81)	−3.663 (−0.80)	−0.832 (−0.24)	−0.904 (−0.26)
RET_t	0.433 (1.08)	0.334 (0.84)	0.297 (0.97)	0.167 (0.54)	0.474 (1.19)	0.471 (1.13)	0.317 (1.03)	0.312 (1.01)
$SDRET_t$	−8.493 (−1.64)	−6.089 (−1.11)	−11.857*** (−2.57)	−10.043** (−2.16)	−9.237* (−1.84)	−8.883* (−1.66)	−11.363** (−2.40)	−11.396** (−2.37)
$SIZE_t$	0.097 (1.53)	0.124* (1.92)	0.019 (0.37)	0.054 (1.01)	0.082 (1.28)	0.082 (1.28)	0.014 (0.26)	0.016 (0.29)
MTB_t	0.516** (2.11)	0.599** (2.42)	0.265 (1.38)	0.381** (1.94)	0.495** (1.99)	0.497** (1.99)	0.255 (1.32)	0.257 (1.33)
LEV_t	0.001 (0.17)	0.003 (0.40)	0.006 (0.97)	0.008 (1.25)	0.003 (0.43)	0.003 (0.45)	0.007 (1.11)	0.007 (1.05)
ROE_t	−0.001 (−0.10)	0.000 (0.01)	0.000 (0.03)	−0.000 (−0.00)	−0.002 (−0.26)	−0.002 (−0.26)	−0.000 (−0.03)	−0.000 (−0.01)
ANA_t	−0.098 (−1.24)	−0.120 (−1.50)	−0.036 (−0.59)	−0.066 (−1.06)	−0.091 (−1.14)	−0.091 (−1.13)	−0.033 (−0.53)	−0.033 (−0.54)
$BODFACTOR_t$	0.007 (0.11)	0.028 (0.48)	0.043 (0.90)	0.066 (1.39)	0.005 (0.08)	0.003 (0.06)	0.039 (0.80)	0.039 (0.82)
$CROEX_t$	0.100 (0.72)	0.088 (0.64)	0.130 (1.19)	0.106 (0.98)	0.094 (0.63)	0.096 (0.64)	0.141 (1.19)	0.139 (1.18)
$AUDQUAL_t$	0.345 (0.96)	0.341 (0.92)	0.206 (0.75)	0.183 (0.65)	0.353 (0.96)	0.356 (0.97)	0.220 (0.79)	0.214 (0.76)
ACINDP	0.472 (1.37)	0.476 (1.40)	0.457* (1.65)	0.401 (1.47)	0.492 (1.44)	0.434 (1.40)	0.458* (1.65)	0.457 (1.65)
ACSIZE	0.062 (0.93)	0.046 (0.69)	0.045 (0.84)	0.026 (0.49)	0.072 (1.09)	0.071 (1.08)	0.051 (0.96)	0.050 (0.96)
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wald Chi^2	51.36	57.95	53.26	60.26	52.26	51.91	52.24	52.11
Prob > Chi^2	0.009	0.002	0.005	0.001	0.007	0.011	0.007	0.010
N	256	256	256	256	256	256	256	256

Note(s): The definitions of the variables are in Appendix 1. z-statistics are in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

constrain aggressive earnings management (Koh, 2007) and are more likely to demand higher quality audits (Han *et al.*, 2013).

5.2 Robustness test: regression specifications for a longer run window

Our study so far tested the effect of RC variables and institutional ownership on future stock price crash risk for a 1-year ahead window. In this analysis, we examine whether RC variables and institutional ownership can predict 2-years ahead crash risk to validate our main results and mitigate any further concerns with reverse causality and simultaneity issues. Specifically, we used 1-year lagged ($_{t-1}$) of RC variables, INSOWN, and the interactions between INSOWN and RC variables and re-run regressions of Tables 3 and 4. The untabulated findings suggest that the main findings remain robust after expanding the forecast window to 2-years ahead. For example, the estimated coefficients on RCQUAL are −0.485 ($p < 0.05$) and −0.543 ($p < 0.01$) for the NCSKEW and DUVOL measures of crash risk, respectively. The estimated coefficients on RCFACTOR are −0.165 and −0.154 both significant at $p < 0.05$ for the NCSKEW and DUVOL measures of crash risk, respectively. In terms of moderating effect of INSOWN, the estimated coefficients on RCFACTOR*INSOWN are −0.034 and −0.023 both significant at $p < 0.01$ for the NCSKEW and DUVOL measures of crash risk, respectively. These results indicate that our explanatory variables of interest (i.e. RCQUAL, RCFACTOR and RCFACTOR*INSOWN) have ability to predict 2-year ahead crash risk.

6. Conclusion

Recently, a series of burgeoning studies have begun to investigate how real earnings management, accounting conservatism, tax avoidance level, powerful CEO, short interest, related party transactions, political incentives, and managerial equity incentives are related to stock crashes. We extend these growing research works by embarking on a hitherto unexplored area, which is the associations between RCs, institutional shareholding, and stock price crash risk. Our paper finds that effective RCs (as reflected by the composite factor of RC characteristics and qualified RC) can deter managerial bad news hoarding behavior in general or, more specifically, stock price crash risk. We also find that firms with high level of institutional shareholdings and effective RCs are less likely to be subject to crash risk likelihood. The additional results indicate that the moderating impact of institutional ownership on RC-crash risk association is more likely to be driven by dedicated institutional ownerships. Our study, to some extent, highlights economic benefits of both RCs (as an internal governance mechanism) and institutional investors (as an external governance mechanism) in Malaysia to reduce stock price crashes.

However, our paper carries some practical implications. First, our results uphold the requirements of regulatory bodies in Malaysia that public companies must engage qualified members in their board committees including RC. Reducing the likelihood of stock price crash risk is crucial from risk management perspectives for public companies in general and more specifically for financial sector companies. So, mere formation of RCs with unqualified members to comply with regulatory requirements does not meet the primary purpose of firms' risk management and safeguard interest of all stakeholders. As such, formation of effective RCs with qualified members is essential for companies. Second, following on, regulators should also impose stricter requirements to hire truly independent members in RCs. They may also consider qualified female directors on RCs. It is for the economic well-being of the companies and stakeholders not to recruit politically affiliated directors as well as someone having any sorts of financial interest in the company. Qualified female directors are relatively rare working in Malaysian public companies, particularly in financial sector companies, who can contribute towards developing and implementing risk management strategies including constraining stock price crash risk. Therefore, these initiatives of regulatory bodies could lead to formation of effective RCs and mitigate risk. Third, shareholders and prospective investors may incorporate information on RC and institutional shareholdings in their assessment of predicting future stock price crash risks of firms before making any investment decision. Both governance tools, internal and external, should remain in place for contributing to the process of better-quality monitoring risk, in particular deterring crash risk. Finally, our findings on dedicated institutional investors suggest companies to consider the investment horizon of institutional investors before adopting any strategy to attract institutional investors. Policymakers, regulatory agencies, investors, and other stakeholders need to be aware of different categories of institutional investors as well as their diverse investment motives. More precisely, dedicated institutional investors in Malaysia, through their holding of substantial ownership blocks over a long horizon, exert active governance role for preventing crash risks. Thus, dedicated institutional investors (long-term owners) should get priority in firms' ownership structure portfolio over transient institutional investors (short-term owners) for getting appropriate monitoring of protecting firms' interest. Therefore, future research works are welcome to consider different types of dedicated institutional investors when modeling the relationship between RC, institutional ownership, and stock price crash risk.

Notes

1. In 2003, Bank Negara Malaysia (Central Bank of Malaysia) requires all financial companies in Malaysia to form a stand-alone RC which should consist of not less than three directors, a majority of whom must be non-executive and to be shared by independent director.
2. (0.721 coefficient on RCQUAL $\times$ 0.269 SD of RCQUAL)/(0.259 mean of NCSKEW).
3. (0.554 coefficient on RCQUAL $\times$ 0.269 SD of RCQUAL)/(0.195 mean of DUVOL).
4. We did not interact DEDOWN/TRAOWN with the existence of a stand-alone RC as institutional ownership found not to have any significant impact on RCEX-crash risk association in the main analysis.

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Appendix 1

Variables	Acronyms	Expected sign	Definitions	Sources
Crash risk	NCSKEW		The negative skewness of firm-specific weekly returns over fiscal year t+1. The firm-specific weekly return is the natural log of one plus the residual, where the residual is computed from the expanded market model. Please refer to Equations (1) and (2) for details	DataStream and authors' calculation
	DUVOL		The natural log of the ratio of the standard deviation of firm specific weekly returns for the "down-weeks" sample to the standard deviation of firm specific weekly returns for the "up-weeks" sample over fiscal year t+1	DataStream and authors' calculation
Risk committee variables				
RC existence	RCEX	–	An indicator variable that takes one if the firm has a separate RC at the end of fiscal year t and 0 otherwise	Hand-collected
RC independence	RCINDP	–	Proportion of independent RC members during the fiscal year t	Hand-collected
RC qualification	RCQUAL	–	Proportion of RC members with academic or professional qualification in accounting/finance during the fiscal year t	Hand-collected
RC size	RCSIZE	–	The number of directors on the RC at the end of fiscal year t	Hand-collected
RC index	RCFACTOR	–	A factor score using a principal component analysis of RC characteristics, namely RCINDP, RCQUAL and RCSIZE	
Institutional shareholding variables				
Institutional ownership	INSOWN	?	Percentage of shareholdings by institutional investors over total outstanding shares at the end of fiscal year t	Hand-collected
Dedicated institutional ownership	DEDOWN	?	Percentage of shareholdings by dedicated institutional investors over total outstanding shares at the end of fiscal year t	Hand-collected
Transient institutional ownership	TRAOWN	?	Percentage of shareholdings by transient institutional investors over total outstanding shares at the end of fiscal year t	Hand-collected
Control variables				
Share turnover	TURN+	+	The average monthly share turnover over fiscal year t minus the average monthly share turnover over the previous year t−1, where monthly share turnover is calculated as the monthly share trading volume divided by the number of shares outstanding over the month	DataStream and authors' calculation

(*continued*)

Table A1.
variable definitions and data sources

Variables	Acronyms	Expected sign	Definitions	Sources
Firm-specific weekly returns	RET	+	The cumulative firm-specific weekly returns over fiscal year *t*	DataStream
Share volatility	SDRET	+	The standard deviation of firm-specific weekly returns over fiscal year *t*	DataStream
Firm size	SIZE	+	The natural log of book value of assets at the end of fiscal year *t*	DataStream
Firm growth	MTB	+	Market value over book value of assets at the end of fiscal year *t*	DataStream
Firm leverage	LEV	–	Total debt over total assets at the end of fiscal year *t*	DataStream
Firm profitability	ROA	–	Operating income over total assets at the end of fiscal year *t*	DataStream
Firm-specific information environment	ANA	+	The natural log of one plus the number of analysts following the firm at the end of fiscal year *t*	I/B/E/S
Board index	BODFACTOR	–	A factor score using a principal component analysis of board characteristics, namely BODIND, BODSIZE, BODQUAL and FEMAL	
Chief risk officer	CROEX	–	An indicator variable that takes one if the firm has CROEX at the end of fiscal year *t* and 0 otherwise	Hand-collected
Audit quality	AUDQUAL	–	An indicator variable that takes one if the firm was audited by any BIG4 audit companies at the end of fiscal year *t* and 0 otherwise	Hand-collected
Audit committee independence	ACINDP	–	Proportion of independent members on an audit committee during the fiscal year *t*	Hand-collected
Audit committee size	ACSIZE	–	The number of members on an audit committee at the end of fiscal year *t*	Hand-collected
Additional variables				
Board independence	BODIND		Proportion of independent board members during the fiscal year *t*	Hand-collected
Board size	BODSIZE		The number of directors on the board at the end of fiscal year *t*	Hand-collected
Board qualification	BODQUAL		Proportion of board members with academic or professional qualification in accounting/finance during the fiscal year *t*	Hand-collected
Female representation	FEMAL		Proportion of female directors setting on the board during the fiscal year *t*	Hand-collected

Table A1.

Appendix 2

Table A2.
Principal component analysis for RC and board attributes

Component	Eigenvalue	Difference	Proportion	Cumulative
Panel I: Principal component analysis for RC characteristics				
RCINDP	2.373	1.968	0.791	0.791
RCQUAL	0.405	0.183	0.135	0.926
RCSIZE	0.222		0.074	1.000
Rotation: Promax				
	Variance	Proportion		
	2.3733	0.7911		
Panel II: Principal component analysis for board characteristics				
BODSIZE	1.315	0.205	0.330	0.330
BODQUAL	1.110	0.266	0.277	0.606
BODIND	0.844	0.112	0.211	0.817
FEMAL	0.732		0.183	1.000
Rotation: Promax				
	Variance	Proportion		
	1.3146	0.3296		

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