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Information asymmetry and dividend payout in an emerging market: Does corporate governance quality matter?

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ABSTRACT

Numerous studies have explored the impact of information asymmetry on firms' dividend policies. These studies have generally focused on advanced capital markets and have provided conflicting evidence on the quality of the information environment and dividend policy. Our paper, thus, tries to address this gap in current understanding by examining the connection between asymmetric information and dividend payout policies and whether this connection is moderated by corporate governance quality (CGQ) in an emerging economy, the United Arab Emirates (UAE). Using a panel sample of non-financial firms traded on the UAE stock exchanges over the period from 2009 to 2022, we document that dividend payments are negatively influenced by information asymmetry problems. We also document that the negative connection between information asymmetry and dividend policy is less pronounced in firms with strong corporate governance systems, consistent with the conjecture that such firms face lower agency and asymmetric information problems and hence pay higher dividends.

1. Introduction

Until the mid-20th century, dividend payouts were simply perceived as a spontaneous form of showing gratitude to shareholders for their loyalty and consideration of the firm. Modigliani and Miller (1961) groundbreaking theory changed this perception. They proposed that dividend policy, under a perfect and efficient capital market, is irrelevant to firm value. Their work introduced many controversies in corporate finance. Furthermore, Black (1976) proclaimed dividends to be a 'puzzle' that questions a firm's strategy for acquiring dividend policies. To alleviate this puzzle, numerous scholars have offered several theories and empirical research to explain the dividend behavior of firms, namely, agency theory (e.g., Easterbrook, 1984), life cycle theory (e.g., Fama and French, 2001), signaling theory (e.g., Rock and Miller, 1985), catering theory (Baker and Wurgler, 2004) and pecking order theory (e.g., Myers, 1984). Despite the large body of work, corporate dividend behavior remains an unresolved puzzle, even in developed markets (Benlemlih, 2019).

Motivated by the above debate, the main aim of this paper is to revisit the association between information asymmetry and firms' dividend policies of UAE public firms. Specifically, we seek to address the following questions: (1) How does information asymmetry affect dividend policy? and (2) Does the link between information asymmetry and dividend policy differ for firms with strong corporate governance? The interest in choosing the UAE-listed firms arises from six factors. First, the UAE has the second-largest economy in the Arabian Gulf (after Saudi Arabia), with a GDP of US$415.02 billion in 2021 (World Bank, 2021). This may be due to the country's rich natural resources (10% of the total world supply of oil reserves) coupled with a very competitive and robust economy that attracts US$20.67 billion in foreign portfolio investment, accounting for 31% of the total FDI inflow to the MENA region (World Bank, 2021). It is therefore not surprising that the UAE has become a major international hub for business and a key focus for foreign as well as institutional investors. Second, the UAE tax regime exempts capital gains and dividends from taxation, thereby keeping firm profits

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protected (Felimban et al., 2022). This fact is presumed to reduce the attractiveness of share repurchases in the UAE. Third, the corporate governance practices of the Emirati firms are distinguished from those in Anglo-Saxon countries, such as the USA and UK. This is because many firms' boards contain ruling family members, who may affect board key decisions (Al-hadi et al., 2016). Fourth, this study focuses on the UAE context because as concluded by Chazi et al. (2011), dividend plays a pivotal role in attracting foreign stockholders as well as in maintaining sound credit ratings for UAE firms. Nevertheless, there have been extremely few empirical studies on corporate dividend payouts in the Emirati context, except for the Chazi et al. (2011) study which relies upon questionnaire data to inquire about financial officers' decisions on dividend policy. Fifth, the Emirates Securities and Commodities Authority (SCA) has recently released a code of corporate governance to enhance stockholders' confidence in capital markets. By investigating the interaction effect of CGQ on the information asymmetry-divided policy nexus, this study might provide useful feedback to UAE regulators about the outcome of the code requirements for listed firms. Finally, like other emerging economies, the UAE capital market is featured by concentrated corporate ownership, especially by government and families, high degrees of firm-stockholder asymmetry, and low levels of transparency (Al-Malkawi et al., 2014). In addition, financial constraints faced by firms are often heavier in emerging economies as opposed to advanced economies (Mansour, 2014). Arguably, these issues may influence corporate dividend policies. Given the uniqueness of the UAE institutional settings, this study seems warranted.

We build upon past work in answering these questions. Regarding the first research question, there are three arguments that could relate information asymmetry to corporate payout policies. On the one hand, the first argument is based on the signaling hypothesis of Bhattacharya (1979), John and Williams (1983), and Rock and Miller (1985)). Under the signaling framework, better-informed managers tend to utilize dividends as a mechanism to communicate their inside information to less-informed market participants. Therefore, firms with consistent practice of distributing large dividends are associated with favorable future opportunities, and vice versa (Basiddiq and Hussainey, 2012; Li and Zhao, 2008). Following this line of argument, a positive relationship is expected between information asymmetry and corporate payout policies. On the other hand, the second argument is based on the pecking order theory (Myers, 1984). Firms with substantial information asymmetry problems among market participants tend to experience higher costs of external capital, resulting in under-investment problems (Al-Hiyari et al., 2022). Such issues can be reduced by relying on low-cost internal funds (e.g., retained earnings) to finance their investment programs. Given that dividend payouts adversely affect firms' retained earnings, an inverse relationship is expected between the information asymmetry–corporate dividend payouts relationship (Deshmukh, 2005). Finally, the agency theory of Jensen (1986) also provides implications for the link between information asymmetry and dividend payouts. According to this theory, managers with substantial free cash flow have tendencies to underpay dividends and invest firms' resources in negative net present value (NPV) projects for personal interests such as increasing their compensation, power, and prestige. Therefore, when information quality is low and investors do not have adequate information about managerial activities, managers are expected to refrain from distributing dividends (Koo et al., 2017). Given these different arguments on the relationship between information asymmetry and corporate dividend payouts, this issue remains an open question.

Empirical findings on the link between information asymmetries and dividend payouts are mixed and largely focused on the U.S and other developed countries. For example, previous U.S studies (Deshmukh, 2005; Khang and King, 2006; Li and Zhao, 2008) and U.K (Basiddiq and Hussainey, 2012) find that firms with substantial information asymmetry problems are less inclined to distribute dividends, which is inconsistent with the traditional signaling hypothesis inference. However, Aggarwal et al. (2012) find evidence that information asymmetry has a positive influence on corporate dividend payouts of foreign firms that are cross-listed in U.S. stock exchanges. Similarly, Morri et al. (2020) show that information asymmetry has a positive impact on dividend payments, and this positive impact is stronger in firms operating in Europe compared to those in the U.S. The inconsistent empirical findings suggest that there are mediation or moderation factors, which are largely overlooked in prior research. Recent exceptions are Lin et al. (2017) who include ownership structure as a moderator variable between information asymmetry and dividend policy. Their results reveal that, in comparison with non-state-controlled firms, state-controlled firms with severe information problems among investors are associated with higher dividends.

Given the competing theoretical perspectives and the mixed empirical findings, the current paper attempts to reduce the ambiguity surrounding the nexus of the link between information asymmetry and corporate dividend payouts by investigating the interaction role of CGQ on this nexus, thus improving our understanding of why firms distribute cash dividends to their stockholders. Our investigation is motivated by the greater flexibility on the part of management in determining the amount of retained earnings to pay out as dividends (Sharma, 2011). Although it is true that managers may adopt a dividend policy to convey privileged information on firms' future cash flows (Aggarwal et al., 2012), past literature also reports that poorly monitored executives are inclined to make unwise dividend decisions to maximize their own utility (Jiraporn et al., 2011; Koo et al., 2017). Therefore, to cope with this managerial opportunism, corporate governance structures are designed to ensure that management acts in the best interest of owners. As Kanagaretnam et al. (2007) indicate, firms with good monitoring mechanisms are associated with lower degrees of information asymmetry and hence lower opportunities for adverse selection and moral hazard. To the extent that it is true, the effectiveness of corporate governance should have a significant effect on corporate dividend payouts by attenuating information asymmetry among market participants.

Using a data panel of 607 firm- year observations from 59 firms traded on the UAE stock exchanges in the period 2009–2021, we document that firms tend to distribute less cash dividends when information asymmetry problems are more severe. This finding does not provide support for the view that dividend payout is employed as a mechanism for communicating managements' private information to stock markets. More importantly, we demonstrate that corporate governance quality moderates the link between information asymmetry and corporate dividend payouts. That is, good corporate governance weakens the inverse linkage between information asymmetry and corporate dividend payments. In sum, the empirical results suggest that firms with stronger corporate governance systems can alleviate information asymmetry problems, resulting in higher dividend payments.

This study makes at least three significant contributions. First, we add to the fierce and ongoing debate about the information asymmetry–dividend policy nexus (Basiddiq and Hussainey, 2012; Deshmukh, 2005; Harakeh et al., 2020; Khang and King, 2006; Li and Zhao, 2008) by focusing on firms operating in one of the developing economies, namely, the UAE. Second, we extend the corporate finance literature by studying the unexplored question of the impact of CGQ on the relation between information asymmetry and corporate dividend policies. We offer new evidence that the inverse connection between information asymmetry and dividend policy is less pronounced in firms with sophisticated corporate governance systems, suggesting that such firms are associated with lower agency and asymmetric information problems, hence higher dividend payments. Finally, since there are significant similarities between the UAE and other Gulf countries (e.g., Saudi Arabia) in terms of the business and institutional environments, the results based on this paper are likely to attract the attention of policymakers in these countries to vital issues concerned with information asymmetry, corporate governance quality, and dividend payouts.

The remainder of this work is structured as follows. The next section describes the institutional background of the work. This is followed by a

discussion of the prior literature and the development of this paper's primary hypotheses. Section four provides important information about the methodology utilized to answer the research questions. Regression results are reported in the fifth section, while the last section presents concluding remarks.

2. Institutional background

The UAE, located in Western Asia, is one of the most modern and cosmopolitan counties in the world. In addition to being the second largest and most diversified economy in the Middle East, it is also the seventh-largest producer and exporter of oil with a Gross Domestic Product (GDP) of 415.02 billion USD as of the year 2021. In the early years, the escalating oil and gas rates made UAE leaders consider forming a capital market as a financial source for the country. Therefore, after appropriate regulations were set and legislatures were fulfilled, in the year 2000, the UAE stock exchanges and the Emirates Securities and Commodities Authority (SCA), were established. In 2015, all publicly traded firms were required to construct their financial reports in accordance with International Financial Reporting Standards (IFRS). In 2019, the UAE had the third largest stock market capitalization (247 billion USD) among the MENA countries with a stock market turnover ratio at a level of 10.51 indicating that UAE stock markets have greater liquidity. Yet, the stock markets in the UAE are quite small when viewed on an international scale (Al-Shboul and Alsharari, 2019).

As mentioned earlier, the UAE stock markets formed merely in the year 2000 and corporate governance regimes were not introduced until 2009 when the government felt the need to build trust and a good investor base. These regulations were set in compliance with international standards. In the year 2016, the regulations were updated to comply with the commercial companies' law no. 2 of 2015 to further enhance CG regimes. The CG code places emphasis on several elements. First and foremost, of those elements are the board structure and members. The CG code obligates Public Joint Stock Companies (PJSC) to implement the U-form or Unitary board structure where a sole specialized unit is formed to take control with executives, non-executives, and independent boards of directors. The number of directors must be between 3 and 11 members. While Limited Liability Companies (LLC) must follow either the U-form or Two-tiered structure based on the number of partners. If the LLC has more than seven partners, it must establish a supervisory board over the managers. If not, then the management rests in the hands of the manager (Choueiri and Macharia, 2019).

Moreover, the CG code gives importance to the nationality and gender of the members present on the board. According to the CG code, the chairman and most of the board members in PJSCs must be Emirati and 20% of them must be females. Whereas, for LLCs, the Emirati shareholding must be no less than 51%. All firms are obligated to comply with the CG code and any incompliance is subject to serious penalties for the firm (Choueiri and Macharia, 2019).

The UAE, being a part of the Gulf Cooperation Council (GCC), has different operational and economic characteristics compared to Western countries. What makes UAE different is the mass earnings generated from the oil trade. These earnings reflect profitably on income statements for large firms in the UAE leading to greater dividend distribution and stronger shareholder trust. Apart from this, as Manneh (2014) states, dividends earned from local and foreign investments in the UAE are not taxed. This absence of tax keeps company profits protected. However, these dividend payments are still subject to the firm's internal rules and regulations.

3. Literature review and hypotheses development

3.1. Literature review

A primary question that has attracted significant research attention is whether and how information asymmetries influence firms' dividend payments. From an agency theory perspective, managers often seek to increase their own benefits at the expense of owners (Jensen and Meckling, 1976). For instance, the prior literature has shown that managers have tendencies to engage in empire-building activities and invest free cash flow in unprofitable projects (Al-Hiyari et al., 2022; Biddle et al., 2009). According to Jensen (1986), one of the effective ways to prevent 'owners' expropriation, is to minimize funds available to CEOs via distributing higher dividends. Easterbrook (1984) adds that dividend payout can increase managers' reliance on external funds as opposed to internally generated funds and thus expose them to more frequent monitoring by capital providers. Therefore, dividend payment can be employed as a tool to device the shareholder-manager conflict (Martono et al., 2020). Nevertheless, as long as managers can use their discretion over payout policy, they can act opportunistically by retaining the excess earnings in the firm for their personal interests (Easterbrook, 1984).

A stream of prior studies has studied the determinants of corporate dividend payout policies. Benlemlih (2019), for instance, shows that firms with higher CSR performance are more prone to distribute larger dividends. Zadeh (2022) shows that improved audit quality plays a pivotal role in mitigating agency problems and promoting dividend payments, particularly in firms with greater information asymmetry, fewer financial restrictions, and those with weaker monitoring mechanisms. Additionally, the governance role provided by the board of directors can discourage managers from misusing free cash flow. Sharma (2011) demonstrates that firms with long-tenured independent directors have a stronger tendency to pay dividends. Moreover, Jacob and Lukose (2018) find evidence, based on Indian data, that domestic institutional ownership has a positive effect on dividend payouts. Furthermore, prior work indicates that the level of shareholder protection can affect corporate dividend policies. For example, Athari et al. (2016) demonstrate that firms with better shareholder protection pay higher dividend payouts.

Recently, some studies have examined the influence of R&D activities and innovation on the magnitude of dividend payments (Bates et al., 2009; Gugler, 2003; Hasan et al., 2022; Kim et al., 2020; Lahiri and Chakraborty, 2014; Yang et al., 2020). For example, Hasan et al. (2022) find an inverse connection between R&D expenditures and dividend payouts in BRICS countries. Gugler (2003) uses a sample of Austrian firms and finds a similar result. In this study, we focus on exploring the moderating role of CGQ on the information asymmetry–dividend policy nexus.

3.2. Hypotheses development

Extent literature recognizes that information asymmetry is one of the main factors that lead to agency conflicts between inside managers and outside market participants. For instance, previous studies identified two key drivers of financial market frictions: adverse selection and moral hazard– caused by the presence of information asymmetry, which may influence dividend payment policies. With respect to the information asymmetry of adverse selection, Koo et al. (2017) point out that higher information asymmetry encourages capital suppliers to demand a larger risk premium, resulting in a rise in a firm's cost of capital. As such, entrenched managers have incentives to manipulate dividend policy to ensure excess earnings are kept inside the firm. Regarding the moral hazard phenomena, prior research indicates that the existence of severe information problem reduces the ability of the outside market participants to monitor managerial activities (Richardson, 2000). This is likely to result in lower underpayment of dividends due to agency issues (e.g., empire-building ambitions). To summarize, agency theory predicts an inverse connection between information asymmetry and corporate dividend payouts.

Insights into the information asymmetry–dividend policy link are also provided by pecking order theory (Myers, 1984). This perspective assumes that managers acting as agents of shareholders know more than

outside shareholders about the underlying economics of their firms (Fosu et al., 2016). Therefore, when the cost of adverse selection is abnormally high, managers tend to adopt a specific pattern regarding financing their investments. Managers initially prefer internally generated funds (retained earnings), followed by secured or risky debts and, lastly, equity (Myers, 1984). Consequently, to avoid costly external financing, managers tend to keep earnings inside the firm instead of distributing them out as dividends, predicting an inverse relationship between information asymmetry and dividend policy. This argument has various theoretical and empirical support.

By contrast, signaling theory predicts that firms with high information asymmetry are inclined to pay dividends. The notion is that managers will employ dividend policy as a tool to communicate inside information to capital providers (Bhattacharya, 1979; John and Williams, 1983; Rock and Miller, 1985). This behavior is practiced because, in comparison with shareholders, managers possess valuable information about their firms' prospects (Basiddiq and Hussainey, 2012). The theory assumes that, when information asymmetry is high, capital providers attempt to protect themselves against potential losses stemming from trading with corporate insiders by increasing the cost of capital and offering low prices for firms' securities (Muslim, 2021; Wolk et al., 2013; Yulianto et al., 2021) As such, managers have tendencies to minimize information risk by conveying their favorable information via dividends to the market.

Empirical findings on the linkage between information asymmetry and corporate dividend payments are far from conclusive. For example, Li and Zhao (2008) document that U.S. firms with higher information asymmetry, as captured by analyst earnings forecast errors and forecast dispersion, are less likely to distribute dividends. Using a sample of 446 listed firms in the U.S, Deshmukh (2005) also document a positive relationship between dividend payments and analyst following. This suggests that the asymmetric information problem reduces dividend payments, which is in line with the pecking order hypothesis. Basiddiq and Hussainey (2012) analyze a sample of U.K firms in 2007 and report similar results. On the other hand, Morri et al. (2020) find, based on U.S data, a positive association between information asymmetry and dividend policy. Aggarwal et al. (2012) findings further support the conclusion reported by (Morri et al., 2020). The inconsistent empirical findings can be attributed to the lack of variation in information asymmetry across firms listed in advanced markets (Aggarwal et al., 2012).

In our setting where there is a dearth of literature on dividend payments, we believe that signaling theory will not illustrate firms' propensity to pay dividends. The reason for this is the presence of severe information gap among market participants due to factors like high ownership concentration and weak corporate governance mechanisms, which could result in expropriation activities (Chazi et al., 2011). Given that dividend payments can restrict majority shareholders from obtaining private gains at the expense of minority shareholders (Lin et al., 2017), we anticipate an inverse connection between information asymmetry and corporate dividend payouts in the UAE context. This is confirmed by DeAngelo et al. (2004) who conclude that signaling theory provides weak explanations for firm dividend policies. In addition, Lin et al. (2017) investigated a sample of Chinese-listed firms from 2003 to 2012 and found evidence that corporate dividend payouts are inversely related to degrees of information problem, consistent with agency prediction. Based on the preceding discussion, we develop the following hypothesis:

H1. : Ceteris paribus, there is a statistically negative association between information asymmetry and dividend payments.

As discussed above, managers may not always act in the best interests of capital suppliers due to the presence of agency problem that arises from the divergence of ownership and control, information gap between shareholders and managers, and conflicting shareholder and management objectives (Dey, 2008). As a result, they may adopt a suboptimal dividend policy to maximize their own wealth at the expense of capital suppliers (Jiraporn et al., 2011). An effective corporate governance structure can mitigate this problem by restricting managerial opportunism over free cash flows and reducing information asymmetry among market participants (Al-Hiyari, 2017; Al-Hiyari et al., 2022).

Grounded in agency theory, prior research has reported a myriad of evidence on the informational effects of corporate governance mechanisms. For instance, Kanagaretnam et al. (2007) examine how and reveal that firms with better corporate governance have lower degrees of information asymmetry around quarterly earnings announcements. Ajinkya et al. (2005) report that firms with a higher proportion of independent directors and greater institutional ownership are more likely to issue frequent and accurate earnings forecasts. Jiang et al. (2008) indicate that absolute discretionary accruals are lower, and earnings quality is higher for firms with good corporate governance. In addition, prior research suggests that corporate governance is negatively related to the cost of capital (Zhu, 2014). Therefore, we hypothesize that a sound governance system may be able to mitigate the adverse effect of information asymmetry and thus reduce the financial constraints, leading to higher dividend payouts.

Regarding the moral hazard of information asymmetry, prior literature suggests that firms with better corporate governance are less likely to adopt suboptimal dividend policy (Jiraporn et al., 2011). However, there are two conflicting arguments as to how corporate governance quality, by alleviating the free cash flow issue, can affect dividend policy. First, the "outcome" argument suggests that managers have incentives and abilities to abuse free cash flow for personal interests and recognizes that effective corporate governance systems are needed to constrain such self-interest activity (Jensen, 1986; La Porta et al., 2000). Therefore, the anticipated dividend policy is contingent on the effectiveness of corporate governance mechanisms. For firms with stronger corporate governance structures, managers are less likely to act opportunistically by abusing the free cash flow, thus increasing the attractiveness of distributing dividends to shareholders (Jiraporn et al., 2011). On the other hand, the "substitute argument indicates that managers are motivated to establish a favorable reputation with capital providers that the free cash flow issue is restricted so that they can obtain external funds on attractive terms (La Porta et al., 2000). One of the methods that can be used to build a such reputation is by distributing funds in the form of dividends. However, given that agency costs have been shown to be less in firms with strong corporate governance mechanisms, it is reasonable to expect a decrease in managers' tendencies to use dividends as a device to establish a reputation. Consequently, CGQ should be negatively related to dividend payments (Adjaoud and Ben-Amar, 2010).

Previous studies indicate that a country's legal and institutional factors affect firms' dividend policies. For example, La Porta et al. (2000) find evidence consistent with the notion that dividends are the outcome of enhanced monitoring by minority stockholders to force firms to disgorge excess cash through dividends, thereby reducing the possibility of expropriation by corporate insiders. Specifically, they find that firms with strong shareholder protections distribute larger dividends. In emerging countries, the majority of empirical studies find evidence consistent with the prediction of the outcome model. For example, Rajput and Jhunjhunwala (2019) find, based on Indian data, that corporate governance is positively correlated with the decision to pay dividends. Similarly, Kowalewski et al. (2008) use a sample of 154 listed firms in Poland and document that firms with stronger control mechanisms pay higher dividends. Consequently, it is logical to anticipate that minority stockholders prefer dividends over retaining excess funds inside the firms. Based on the discussion, we conjecture that firms with strong corporate governance are associated with lower information asymmetry and agency problems, thereby higher dividend payments. Accordingly, we postulate:

H2. : Ceteris paribus, the higher (lower) corporate governance quality, the more (less) positive is the association between information asymmetry and dividend payments.

4. Research methodology

4.1. Data and sample selection

The data utilized in this work is extrapolated from the Refinitiv Eikon database. We start our data sampling procedure by identifying 1755 firm-years representing 126 firms traded on UAE stock exchanges during the fiscal years 2009–2021. Following the practice of prior research, 944 firm years belonging to the financial sector are dropped from that list, since these firms are subject to different regulations that lead to a unique nature of accruals structure (Albersmann and Quick, 2020). We drop 204 firm years with missing or incomplete data on variables required for multivariate regression analyses. We then winsorise all continuous variables at the upper and bottom 1% to reduce the effects of outliers. The final sample size comprises 607 firm-years from 59 different firms between 2009 and 2021. Table 1, Panel A, summarizes the sample construction.

Table 1, Panel B, outlines the industry composition as defined by the industry classification benchmark (ICB) universe. As can be seen from the tables, most of the firm-year observations are concentrated in industrials (36.74%), real estate (21.58%), and consumer staples (13.36%).

4.2. Variable design and definition

4.2.1. Dependent variable

The dependent variable in the regressions is the dividend payout level, which is the ratio of cash dividends to the book value of assets. We use total assets as a scaler instead of market capitalization and earnings for many reasons. First, earnings are subject to accounting manipulations by using unethical accounting practices so that the numbers match a predetermined target (Benlemlih, 2019). Second, Aivazian et al. (2003) point out that the payout ratio may suffer from instability when earnings are low, and hence, the inferences may be flawed. Finally, we do not utilize the dividend yield measure as a proxy for dividend payout, since the manager does not exert direct influence on firms' security prices (Jory et al., 2017). Nevertheless, we scale dividends by sales in robust checks, as sales are also less prone to accounting conventions.

Table 1
Sample selection and industry distribution of sample.

Panel A: Sample construction	
	Firm-year observations
All firms listed on the Abu Dhabi Securities Market and Dubai Financial Market	1755
(–) Firms belonging to the financial industry	944
(–) Firms with incomplete data	204
Final selected sample	**607**

Panel B: Sample composition by industry		
Industry Classification Benchmark	Number of observations	Percent
Consumer Discretionary	75	12.36%
Consumer Staples	84	13.84%
Energy	16	2.64%
Health Care	20	3.29%
Industrials	223	36.74%
Real Estate	131	21.58%
Telecommunications	45	7.41%
Utilities	13	2.14%
Total	**607**	**100%**

4.2.2. Independent and moderating variables

Theoretically, obtaining relevant and reliable information is considered by capital providers as the most critical prerequisite for making effective investment decisions. However, due to the presence of asymmetric information in stock markets, capital providers may make suboptimal financial decisions, leading to significant losses in their investment portfolios (Huynh et al., 2020). Rock and Miller (1985) assert that information asymmetry arises when corporate insiders have relevant information that is not available to outside users of financial statements. In this vein, it is argued that the degree of information asymmetry is not directly observable by capital suppliers, so following the previous work (e.g., Cho et al., 2013), we use the bid-ask spread as a proxy for corporate information asymmetry. Bid-ask spread captures the compensations that capital providers require for the perceived information risk involved in dealing with corporate insiders who know more about the firm's underlying economics (Goh et al., 2016). This variable is calculated as the annual average of $(Ask\ price - Bid\ price)/((Ask\ price + Bid\ price)/2$. It is important to note that there are other proxies for information asymmetry, such as analysts' forecast error. However, this proxy was not employed to capture market information asymmetry due to limited data.

Regarding our moderating variable, we follow the approach suggested by Al-Gamrh et al. (2018) and gauge corporate governance quality using a composite CGQ index. The index comprises 14 dummy questions that are relevant to the UAE context. Each question is assigned a score of 1 if the answer is "yes", and 0 otherwise. Consistent with Al-Gamrh et al. (2018), we group the questions into three sub-indexes: ethics and conflicts of interest (4 questions), board composition and functioning (4 questions), and disclosure (6 questions). Each sub-index is calculated as the sum of points obtained for each question divided by number of questions. Consequently, the overall index is derived for each firm using the following equation:

$$\text{CGQ index} = \frac{\sum \text{weighted average of the three subindexes}}{3} \times 100$$

As can be seen from the above equation, our composite CGQ index is based on a percentile rank term ranging from 0 (minimum) to 100 (maximum). Table 2 gives a summary description of the questions used to construct the CGQ index.

4.2.3. Control variables

We control for a set of potential variables that have been identified in the literature. First, we control for firm profitability (ROA). Firms with better financial performance tend to generate large amounts of free cash flow; this illustrates their ability to make a high level of dividends (Benlemlih, 2019). Therefore, a positive association is anticipated between ROA and dividend payouts. Second, we include firm size (SIZE) as a control variable. According to Ye et al. (2019), the larger the firm, the more favorable the firm profits and the more tendency to pay dividends by the managers. Moreover, such firms are more likely to lessen the agency cost and thus tend to use a dividend policy to alleviate the agency conflict. Therefore, we hypothesize a positive relationship between SIZE and dividend payouts. Third, we control for firms' asset tangibility (TANG) and assign no prediction for its coefficient. According to Koo et al. (2017), firms with a high level of fixed assets are associated with increased capital expenditures and thus lower amounts of cash available for dividend purposes. Alternatively, it can be argued that tangible assets can facilitate access to external financing, hence enabling firms to pay higher dividends (Koo et al., 2017). Fourth, we include firm leverage (LEV) and expect a negative sign on its coefficient. As indicated by the pecking order theory, managers of highly leveraged firms prefer to constrain accumulated earnings and thus appear reluctant to distribute dividends (Jacob and Lukose, 2018). Fourth, we control for growth in assets and market-to-book ratio. The expectation is that companies with better growth prospects have a lower propensity to distribute dividends because they have lower amounts of free cash flows

Table 2
Components of corporate governance index.

No.	Description	Compliance (%)
Subindex–Disclosure		**77.75%**
1	Does the firm report on potential conflicts of interest? (e.g, related party transactions).	98.19%
2	Does the firm indicate in its website, annual report, or in any other mean, the penalties against top executives in the case of non-compliance with corporate governance regulations?	4.12%
3	Does the firm announce its audited financial statements on the due date? (e.g, before March 31)	95.22%
4	Does the firm apply the International Financial Reporting Standards? (IFRSs)	97.03%
5	Does the firm hire one of the large international accounting firms?	89.13%
6	Does the firm provide information about the compensation of the CEO and board members on its website or annual report?	82.54%
Subindex–Board composition and functioning		**91.27%**
7	Are the roles of the chairman and CEO segregated?	93.74%
8	Does the firm have oversight committees, such as compensation and/or nomination and/or audit committees?	96.21%
9	Does the board include mainly outside independent directors? (e.g., at least one-third of the board members are independent, and the majority are outsiders)	90.77%
10	Does the board consist of 5–9 members?	84.35%
Subindex–Ethics and conflicts of Interest		**50.82%**
11	Is the firm free from any the SCA fines and/or penalties related to governance misconducts or other securities law violations during the prior year?	97.36%
12	Does the firm have an in-house internal audit department?	42.34%
13	Does the company have any social and human development programs?	27.51%
14	Did the company make any important contributions to protect the environment, such as using environmentally friendly materials?	30.97%
Equally weighted average of the three subindexes		**73.28%**

Al-Gamrh et al. (2018) and Garay and González (2008)

and less resilience in their dividends. In addition, these firms attempt to avoid costly external financing by refraining from paying dividends (Gul, 1999). Sixth, consistent with Chen et al. (2017), we use stock return volatility (RISK) to control for total firm risk. The assumption is that high-risk firms are less likely to distribute dividends; therefore, an inverse connection is expected between total risk and dividend payouts. Finally, studies by Khalfan and Wendt (2020) and Sharma (2011) show that older firms are more likely to distribute dividends to shareholders. Therefore, we control for firm age (AGE) and anticipated its coefficient to have a positive sign. The measures for the test variables are contained in Table 3.

4.3. Model specification and estimation procedure

We employ the following model to empirically investigate the effect of bid-ask spreads on corporate dividend policy (H1).

$$\mathrm{DPL}_{it} = \beta_0 + \beta_1 \mathrm{SPREAD}_{it-1} + \beta_2 \sum \mathrm{Control}_{it-1} + \mathrm{Industry\ FE} + \mathrm{Year\ FE} + \varepsilon Model \quad (1)$$

Where all variables are described in Table 3.

H2 is proposed to examine whether CGQ moderates the relationship between bid-ask spreads on dividend policy. To test this hypothesis, we include in the second model an interaction SPREAD*CGQ between bid-ask spreads and firm-level governance quality, yielding the following regression model:

$$\mathrm{DPL}_{it} = \beta_0 + \beta_1 \mathrm{SPREAD}_{it-1} + \beta_2 \mathrm{CGQ}_{it-1} + \beta_3 \mathrm{SPREAD} \times \mathrm{CGQ} + \beta_4 \sum \mathrm{Control}_{it-1} + \mathrm{Industry\ FE} + \mathrm{Year\ FE} + \varepsilon Model \quad (2)$$

Table 3
Variable definitions.

Variable level	Symbol	Measure
Dependent variable	DPL	Cash dividend deflated by total assets.
Independent and moderating variables	SPREAD	The annual average of (*Ask price* − *Bid price*)/((*Ask price* + *Bid price*)/2.
	CGQ	The index of corporate governance quality developed byAl-Gamrh et al. (2018); it comprises of 14 dummy questions, covering 3 governance attributes.
Control variables	TANG	The ratio of fixed assets to total assets.
	ROA	The ratio of net income before extraordinary items to total assets.
	GROWTH	Percentage change in total assets.
	MBV	Market-to-book ratio, calculated as market capitalization divided by book value of equity
	LEV	Total liabilities deflated by total assets.
	RISK	Annual average of the standard deviation of daily stock returns.
	SIZE	Log of total assets.
	AGE	Log of firm age.

The above models are estimated using a Tobit specification since the dependent variable (DPL_{it}) is censored between 0 and 1. Consistent with Yarram and Dollery (2015), we employed a panel Tobit estimator to rigorously test the hypotheses developed in this study. The main advantage of utilizing panel data in econometric analysis as opposed to cross-section or time series data is that it can take care of unobserved firm heterogeneity (Das, 2019). All explanatory variables are lagged by one-year to deal with potential endogeneity issues, as in Al-Najjar and Kilincarslan (2016). In addition, the variables utilized to create interaction terms are mean-centered to alleviate the potential multicollinearity issue (Asante-Appiah, 2020). Finally, we include industry fixed effects employing the Industry Classification Benchmark (ICB) code because corporate divided behavior may vary across industries in the sample.

5. Empirical results

5.1. Descriptive statistics and univariate analysis

Summary statistics for each variable included in the multivariate regression analyses are seen in Table 4. It is observed that, on average, 66.12% of the sample firms distribute cash dividends. It is also observed that dividend payouts in our sample constitute 2.3% of total assets with a range between 0% and 75.5%. In terms of the independent variable, the mean bid-ask spread (SPREAD) is 0.278 and the median is 0.198, which is similar to that documented by Cho et al. (2013). Regarding our moderating variable (CGQ), the overall corporate governance quality score ranges from 38.3% to 93.3% with a mean value of 73.3% and a standard deviation of 15.14. The mean score is higher than those obtained by Al-Gamrh et al. (2018) who investigated Emirate firms during the period 2008–2012. An explanation for this might be due to the use of a different sample and time-period (2009—2021).

Descriptive statistics of firm attributes are similar to those shown in the prior work. The average (median) of GROWTH is 0.057 (0.015), and the average (median) of ROA is 0.019 (0.033). The average (median) of LEV is 0.406 (0.404), and the average (median) of TANG is 0.357 (0.342). Moreover, the average MBV is 1.280, and the median is 0.794. The mean of stock return volatility (RISK) is 0.041 and the median is 0.036. Lastly, the average (median) natural log of total assets (SIZE) is 14.809 (14.748), and the average (median) natural logarithm of firm age (AGE) is 2.880 (2.996).

Table 5 reports the pairwise correlation coefficients among the key predictor variables included in the regressions. The largest absolute correlation coefficient is 0.354 between SIZE and LEV, which implies that the multicollinearity phenomenon is not present in our regression

Table 4
Descriptive statistics.

	N	Mean	Median	Minimum	Maximum	St. dev.
Dependent variable						
DPL	607	0.023	0.012	0.000	0.755	0.043
Independent and moderating variables						
SPREAD	607	0.278	0.198	0.043	1.876	0.319
CGQ	607	0.733	0.752	0.383	0.933	15.14
Control variables						
TANG	607	0.357	0.342	0.001	0.927	0.261
ROA	607	0.019	0.033	-0.369	0.186	0.086
GROWTH	607	0.057	0.015	-0.373	2.523	0.312
MBV	607	1.280	0.794	0.206	10.240	1.555
LEV	607	0.406	0.404	0.047	0.966	0.211
RISK	607	0.041	0.036	0.007	1.219	0.030
SIZE	607	14.809	14.748	10.706	18.645	1.747
AGE	607	2.880	2.996	0.693	3.850	0.742

Notes:
Table 3 provides a description of variables used in the study.
Dividend payers account for 66.12% of sample firms.

analyses. Variance inflation factor (VIF) statistics confirm this inference with the largest VIF value being 1.47.

5.2. Multiple regression results: panel data analysis

Results of the multivariate estimations are displayed in Table 6. Model (1) shows the regression results without the interaction term between SPREAD and CGQ (H1), while Model (2) displays the results with the interaction term (H2). As shown in Table 5, the models $\chi 2$ are significant at $p < 0.01$ and the McFadden's Adj-R^2 ranges from 13.17% (model 1) to 14.09% (model 2).

H1 predicts a negative association between information asymmetry and dividend payouts. Consistent with hypothesis 1 (H1), the results of the first regression model revealed that the coefficient of bid-ask spread (SPREAD) is negatively and significantly linked with the level of dividend payout ratio ($\beta = -0.118$, $p = 0.068$), indicating that companies with high information asymmetry pay a lower magnitude of dividend, which is inconsistent with the prediction of the signaling theory of dividends. In the UAE, the underdeveloped capital markets and the weak corporate governance mechanisms make dividend policies more crucial for firm operations. Therefore, in emerging market settings, dividend payout is not a device for communicating managers' private information to market participants. This is in line with the conclusion provided by Lin et al. (2017) in China.

H2 predicts that CGQ affects the connection between information asymmetry and dividend payouts. In Model (2), we find that the coefficient of SPREAD × CGQ is positive and statistically significant ($\beta = 0.241$, $p = 0.048$), suggesting that CGQ weakens the negative connection between information asymmetry and dividend payouts. This result highlights the relevance of corporate governance in reducing agency costs and mitigating the information gap between managers and outside stockholders, leading to higher dividend payments. H2 is therefore validated.

Regarding control variables, Table 6 reveals that the estimated coefficient of (ROA) is positive and significant at 1% level, implying that higher levels of profits enable firms to distribute cash dividends to stockholders. Yarram and Dollery (2015) found a similar result. Growth level (*MBV*; GROWTH)appears to have a negative influence on corporate dividend payments. This result implies that high-growth firms prefer to conserve excess cash to finance future capital investments. Similar results were obtained by Jory et al. (2017), Saeed and Zamir (2021), and Yarram and Dollery (2015). In line with (e.g., Bradford et al., 2013; Yusof and Ismail, 2016), we find that firms with a high debt ratio are reluctant to distribute higher amounts of cash dividends as the coefficients of (LEV) are negative and statistically significant. This suggests that leverage plays a role in alleviating agency concerns associated with free cash flows, and thus decreases the size of dividend payments. However, the result does not support signaling theory, which predicts that firms have tendencies to distribute higher dividends to indicate that they are not in financial trouble (Al-Najjar and Belghitar, 2011; Khan et al., 2022). Finally, the return volatility (RISK) variable has a negative influence on the dividend payout of UAE firms, which is consistent with previous studies on this topic (Chen et al., 2017).

5.3. Robustness checks

In this section, we execute several additional analyses to confirm the reliability of our main findings. First, we examine the impact of information asymmetry on dividend policy employing an alternative measure for dividend payout ratio (dividends as a percentage of total sales). As shown in Table 7, the results for both SPREAD (Model 1) and the interaction term between SPREAD × CGQ (Model 2) remain qualitatively identical to those presented previously in Table 6. Second, although we have used lagged values of all independent variables in our main regression models, the findings may be driven by the potential endogeneity issue. To address this issue, we re-estimate the original models using the dynamic panel system GMM methodology. Regression results are displayed in Table 8. Once again, the GMM results in Table 8 reveal that the interaction term between SPREAD and CGQ has a positive and significant coefficient, which is consistent with our Hypothesis 2. Three, we construct an alternative measure of the CGQ variable, following the approach proposed by Larcker et al. (2007). Specifically, we rely on the principal component analysis (PCA) to condense the information content of numerous governance variables into a single factor that captures the multifaceted dimensions of CGQ.[1] The primary advantage of utilizing PCA is its capability to derive automatic weights for variables used in the analysis without the need for the *ex ante* identification of the weights (Florackis and Ozkan, 2009). Un-tabulated results are substantively similar to those displayed in Table 6. Four, to ensure our findings are not unduly influenced by the COVID-19 pandemic, we re-estimate the model on the whole sample (pre- and during the COVID-19 pandemic) employing interaction variable[2] SPREAD × CGQ × COVID). Again, the un-tabulated results support the conclusions derived from Table 6. Finally, we re-estimate models (1) and (2) using pooled Tobit regression with robust standard errors clustered at both firm and year levels. The results (un-tabulated) offer further support for the hypothesis that the relation between the informational problem and corporate dividend payments is moderated by corporate governance quality.

6. Discussion and conclusion

To date, extant scholarly work on the association between information asymmetry on corporate dividend policy has provided limited insights into developing countries. More specifically, only a little attention has been given to emerging countries. We endeavor to address the gap in the existing work by analyzing the nexus between information asymmetry on dividend policy with the advantage of focusing on publicly listed firms from UAE capital markets. We believe that UAE capital markets have unique institutional settings that are significantly different from those of advanced countries. For instance, the mass earnings from oil and natural gas trades, the absence of taxes, and the high prevalence

[1] The variables used to construct CGQ are limited to those shown in Table 2.
[2] COVID is a dummy variable, coded 1 for the Covid-19 period data set, and zero otherwise

Table 5
Correlation matrix.

	SPREAD	CGQ	TANG	ROA	GROWTH	MBV	LEV	RISK	SIZE	AGE	VIF
SPREAD	1.000										1.22
CGQ	-0.117 * **	1.000									1.19
TANG	0.075 *	0.037	1.000								1.05
ROA	-0.120 * **	0.269 * **	-0.003	1.000							1.26
GROWTH	-0.086 * *	0.094 * *	0.003	0.253 * **	1.000						1.11
MBV	0.004	0.064 *	-0.031	0.046	0.161 * **	1.000					1.20
LEV	0.018	-0.043	0.050	-0.259 * **	-0.019	0.276 * **	1.000				1.47
RISK	0.134 * **	0.028	0.023	0.112 * **	-0.054	-0.035	-0.136 * **	1.000			1.12
SIZE	-0.285 * **	0.094 * *	0.081 * *	0.120 * **	0.084 * *	-0.010	0.354 * **	-0.208 * **	1.000		1.39
AGE	-0.167 * **	0.073 *	0.022	0.111 * **	-0.029	0.098 * *	-0.158 * **	0.067 *	-0.242 * **	1.000	1.13

Notes: symbols * , * *, * ** indicate statistical significance at the 10%, 5%, 1% levels, respectively. Table 3 provides a description of variables used in the study.

Table 6
Random-effects panel Tobit regression estimates.

	Dependent variable: *dividend/assets*			
	Model (1)		Model (2)	
Variable	Coefficient	p-value	Coefficient	p-value
Intercept	-0.015	0.476	-0.030	0.389
Independent and moderating variable				
SPREAD	-0.118	0.068 *	-0.188	0.034 * *
CGQ			0.168	0.008 * **
SPREAD × CGQ			0.241	0.048 * *
Control variables				
TANG	0.007	0.394	0.008	0.293
ROA	0.090	0.001 * **	0.082	0.005 * **
GROWTH	-0.004	0.080 *	-0.004	0.092 *
MBV	-0.085	0.000 * **	-0.090	0.000 * **
LEV	-0.020	0.075 *	-0.033	0.002 *
RISK	-0.120	0.000 * **	-0.117	0.000 * **
SIZE	0.003	0.150	0.003	0.146
AGE	-0.001	0.839	-0.001	0.778
Year dummies	Yes		Yes	
Industry dummies	Yes		Yes	
McFadden Adj-R^2	13.17%		14.09%	
Wald chi2	217.08 * **		272.65 * **	

Notes: symbols * , * *, * ** indicate statistical significance at the 10%, 5%, 1% levels, respectively. Table 3 provides a description of variables used in the study.

Table 7
Robustness test using alternative measure of dividend payout ratio.

	Dependent variable: *dividend/sales*			
	Model (1)		Model (2)	
Variable	Coefficient	p-value	Coefficient	p-value
Intercept	0.158	0.364	0.178	0.301
Independent and moderating variable				
SPREAD	-0.127	0.040 * *	-0.105	0.002 * *
CGQ			0.176	0.000 * **
SPREAD × CGQ			0.192	0.065 *
Control variables				
TANG	-0.004	0.901	-0.005	0.874
ROA	0.055	0.652	0.033	0.788
GROWTH	-0.028	0.021 * *	-0.028	0.021 * *
MBV	0.008	0.131	0.009	0.144
LEV	-0.220	0.000 * **	-0.255	0.000 * **
RISK	-0.421	0.000 * **	-0.410	0.000 * **
SIZE	0.008	0.323	0.007	0.346
AGE	-0.034	0.028 * *	-0.038	0.014 * *
Year dummies	Yes		Yes	
Industry dummies	Yes		Yes	
McFadden Adj-R^2	11.2%		12.4%	
Wald chi2	192.68 * **		202.76	

Notes: symbols * , * *, * ** indicate statistical significance at the 10%, 5%, 1% levels, respectively. Table 3 provides a description of variables used in the study.

Table 8
Robustness test using the dynamic panel system GMM methodology.

	Dependent variable: *dividend/assets*			
	Model (1)		Model (2)	
Variable	Coefficient	p-value	Coefficient	p-value
DPL_{t-1}	0.142	0.001 * **	0.139	0.000 * **
Independent and moderating variable				
SPREAD	-0.002	0.027 * *	-0.001	0.013 * *
CGQ			0.037	0.082 *
SPREAD × CGQ			0.006	0.003 * *
Control variables				
TANG	-0.013	0.498	-0.011	0.791
ROA	0.050	0.031 * *	0.042	0.026 * *
GROWTH	-0.064	0.002 * **	-0.060	0.000 * **
MBV	-0.002	0.000 * **	-0.002	0.000 * **
LEV	-0.031	0.043 * *	-0.033	0.041 * *
RISK	-0.100	0.052 *	-0.106	0.048 * *
SIZE	0.004	0.069 *	0.005	0.081 *
AGE	-0.002	0.398	-0.002	0.395
Intercept	0.341	0.793	0.661	0.622
Year dummies	Yes		Yes	
Industry dummies	Yes		Yes	
Wald test	25.9 * *		26.88 * *	
AR (1)	-1.018 * **		-1.020 * **	
AR (2)	-1.036		-1.038	
Hansen test	44.01		43.63	

Notes: symbols * , * *, * ** indicate statistical significance at the 10%, 5%, 1% levels, respectively. Table 3 provides a description of variables used in the study.

of family control in the UAE, among others. These unique features significantly impact a country's corporate governance, which is thereby likely to influence their operations and major decisions with regard to dividend policies.

The sample consists of 59 UAE firms that were listed between 2009 and 2021. Consistent with most prior studies (e.g., Basiddiq and Hussainey, 2012; Li and Zhao, 2008; Lin et al., 2017), we discover, after controlling for firm-related attributes, that information asymmetry is negatively linked to a firm's dividend payments. The negative sign of this linkage suggests that firms with higher degrees of informational gap distribute lower dividends. One interpretation for this result is that managers tend to over-retain free cash flows for personal interests by refraining from distributing dividends, consistent with agency theory. Another interpretation for this result is in line with the pecking order hypothesis which suggests that firms with high levels of debt have tendencies to keep retained earnings inside the firms and thereby underpay dividends. Indeed, our result conflicts with the prediction provided signaling theory that managers convey relevant information about the firm's underlying economics to market participants through dividends. The reason for this may be attributed to the presence of highly concentrated ownership and family-controlled businesses in UAE capital markets. Thus, managers have fewer incentives to use dividends as a signaling device to stockholders.

We also investigate whether the quality of corporate governance weakens the negative linkage between information asymmetry and dividend policy. Our investigation is motivated by at least two factors. First, given the inconsistent results from prior studies with mixed theoretical and practical implications on the connection between information asymmetry and corporate dividend payouts, it is important to consider moderating or mediating factors to clarify the nature of the association. Second, despite considerable differences in corporate governance practices between the UAE and other nations, there is scant research to investigate the consequences of such differences. Third, the impact of CGQ on the information asymmetry–dividend policy relationship has given very limited attention in the UAE. Our findings support the premise that effective corporate governance weakens the negative connection between the information gap and corporate dividend payouts. Specifically, the finding suggests that firms with good corporate governance mechanisms are linked with lower stock market asymmetry problems and thus pay larger dividends.

The present study offers important implications to managers, shareholders, and policymakers. Firms should provide reliable and transparent information to the equity market in order to mitigate financial constraints arising from information asymmetry problems. This can assist firms in obtaining external funds at a lower cost and hence motivate managers to distribute higher dividends, resulting in improvements in their reputation in the eyes of outside shareholders. We also encourage stockholders to consider the quality of corporate governance when making their investment decisions because well-governed firms are associated with better information environments and higher dividend payments. Finally, policymakers should be interested in our results as good corporate governance enhances information transparency and hence forces managers to pay out more dividends.

Before concluding, it is useful to highlight the caveats of the paper. First, our corporate governance index may not sufficiently capture the underlying construct. As suggested by Larcker et al. (2007), there is no well-developed theory in the literature for selecting the appropriate governance items and their relative weights to include when constructing the governance index. Thus, future studies are encouraged to develop better measures of CGQ. Second, due to data limitations, we do not consider other proxies for information asymmetry problems such as the number of analysts following. Finally, our analyses are restricted to non-financial firms operating in UAE stock exchanges. Thus, it would be interesting to extend this paper by considering financial institutions. In spite of these caveats, this paper improves our understanding of the dividend puzzle by showing that CGQ moderates the information asymmetry–dividend policy relationship, a hitherto unexplored issue in the corporate finance literature.

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Ahmad Al-Hiyari: Conceptualization, Writing – original draft preparation, Supervision. **Mohamed Chakib kolsi**: Data curation, Methodology, Formal analysis. **Abdalwali Lutfi:** Writing – reviewing & editing. **Amer Saadi Kallel Shakkour**: Review & editing: **Ahmad Ibrahim Aljumah:** Review and Investigation.

Declaration of Competing Interest

The authors certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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