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Determinants of voluntary COVID-19 disclosure post-pandemic: Evidence from Jordan

Rawan Atwa[1]
Hadeel Yaseen[2]
Suzan Abed[3+]

[1]*Faculty of Business, Yarmouk University, Irbid, Jordan.*
Email: rawan@yu.edu.jo
[2]*Business School, AL-Ahliyya Amman University, Amman, Jordan.*
Email: h.yaseen@ammanu.edu.jo
[3]*School of Business and Public Administration, University of the District of Columbia, Washington, DC, USA.*
Email: suzan.abed@udc.edu

(+ Corresponding author)

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ABSTRACT

This paper examines the relationship between the extent of COVID-19 disclosure and various firm characteristics within annual reports of industrial companies listed on the Amman Stock Exchange in Jordan. The authors employed a disclosure index to assess corporate COVID-19 disclosures within the narrative sections of annual reports. Ordinary least squares (OLS) regression was employed to investigate the factors influencing the voluntary COVID-19 disclosure among industrial companies. Regression analysis results show a positive relationship between COVID-19 disclosure and factors such as leverage, firm performance and firm age. The significance of uncertainty related to COVID-19 disclosure in annual reports is expected to persist in the coming years. Policymakers should encourage voluntary disclosure as a tool to improve corporate transparency, investor trust, and crisis awareness. The findings provide valuable guidance for firm management on the importance of maintaining transparency in disclosures among significant challenges and uncertainty. These findings are relevant for governments, shareholders, policymakers, suppliers, and creditors. The findings provide constructive insights for corporate managers and the ASE in enhancing corporate disclosure and transparency during future financial crises.

Contribution/Originality: This paper contributes to the literature by addressing voluntary disclosure practices in developing countries, which vary from those in developed countries. In developed countries, transparency is driven by regulatory standards and corporate governance norms while developing countries, disclosures are often strategic and selective aimed at government incentives.

1. INTRODUCTION

The COVID-19 outbreak has introduced significant uncertainty across society and the capital markets. Global stock markets have experienced sharp declines within a short period driven by widespread fear over the pandemic's potential damage and uncertainty about the future. The scale of this unprecedented event and numerous unknowns surrounding the disease continue to challenge the medical community while the likely economic impacts remain equally perplexing for businesses. The precise impact and duration of the pandemic's effects remain unpredictable from disrupted supply chains to potential long-term changes in consumer behavior, and from ensuring safe work environments for manufacturing firms to accommodating remote work. Rahman, Meero, Darwish, and Hamdan (2024) indicated that the coronavirus pandemic significantly impacted most accounting policies and procedures. The study recommended learning from the lessons of the crisis and developing adaptable accounting policies and procedures to better manage potential future crises. Halteh, AlKhoury, Ziadat, Gepp, and Kumar (2024) highlighted the debt ratio and return on invested capital as the primary indicators of financial distress in the global aviation industry during the COVID-19 pandemic.

The measures implemented in response to the COVID-19 pandemic led to major disruptions in business operations and a sharp rise in economic uncertainty. These unprecedented events and conditions introduced a high level of ambiguity and risk which had never been faced by companies before resulting in business challenges for those preparing financial statements (Echchabi, Grassa, & Khlif, 2023). The COVID-19 pandemic is not like the traditional global financial crisis (GFC) which stemmed from financial negligence within institutions rather, it is a natural disaster that punched the economy with remarkable speed (Harvey, 2020). For example, Loughran and McDonald (2023) identified varying impacts of COVID-19 across industries, the most severe adverse effects in the pandemic with sectors such as restaurants, hotels and motels, food, and candy and soda. Similarly, Dutta, Kumar, Pant, Walsh, and Dutta (2023) identified several sectors significantly affected by COVID-19. Airlines, clothing, consumer durables, vehicle and electronics manufacturing, hotels, and financial services were notably impacted by COVID-19. Consequently, companies have employed different disclosure practices based on their operational practices, leading to significant differences in disclosure levels across firms and within the same industry. However, variation in disclosure results in reducing comparability and relevance across firms, promoting our interest in how the COVID-19 pandemic might increase disclosure in annual reports and reduce the level of uncertainty. According to signaling theory, disclosing more information can reduce information asymmetry (Connelly, Certo, Ireland, & Reutzel, 2011). However, if investors interpret this information as a signal of firm weakness, it could also heighten market uncertainty. Thus, while greater COVID-19 disclosure may lower information asymmetry, it might simultaneously increase uncertainty. Elmarzouky, Albitar, and Hussainey (2021) observed substantial differences in COVID-19 disclosure across industries in the UK. Research on corporate disclosures has a long history with extensive focus on factors that shape the nature and scope of disclosures—both broadly and specifically concerning the pandemic (e.g., (Albitar, Al-Shaer, & Elmarzouky, 2021; Albitar, Elmarzouky, & Hussainey, 2022; Ben-Amar, Bujaki, McConomy, & McIlkenny, 2021; Dutta et al., 2023; Elmarzouky et al., 2021; Fassas, Bellos, & Kladakis, 2021; Loughran & McDonald, 2023)).

Voluntary COVID-19 disclosure in developing countries post-pandemic is an important area of focus. These disclosures have distinct implications for transparency, investor confidence, and economic recovery. Unlike in developed economies where regulatory standards for disclosure are generally well-defined, developing countries often experience challenges that affect voluntary disclosure practices. Regulatory frameworks in many developing countries may be less stringent or inconsistent resulting in varying levels of transparency. Companies may disclose COVID-19 impacts voluntarily to inform stakeholders about operational adjustments, financial stability, and risk management efforts. However, in the absence of standardized guidelines, these voluntary disclosures are often inconsistent resulting in limited comparability between firms.

Jordan, as a developing country in the Middle East acknowledged for its stability and economic resilience has a growing and diversified economy that includes different industries, such as tourism, service, finance, and manufacturing. The Amman Stock Exchange (ASE) was established in 1999 as part of the country's commitment to modernizing its financial sector and attracting national and international investors. The ASE operates with high standards of transparency and efficiency governed by the Jordan Securities Commission. The exchange lists companies from various sectors, which are crucial contributors to Jordan's economy. The ASE plays a vital role in providing capital for businesses and opportunities for investors, with regulations pointed at ensuring fair practices and enhancing the country's economic competitiveness.

As previously discussed, voluntary disclosure practices vary significantly between developed and developing countries due to differences in regulatory environments, stakeholder prospects, economic stability, and the structure of corporate governance. In developed countries, transparency is driven by regulatory standards, investor expectations, and corporate governance norms. In developing countries, disclosures are often strategic and selective aimed at securing foreign investment or government incentives rather than providing complete transparency. Therefore, we can argue that what drives disclosure to change in developing countries may differ from that in developed countries. Therefore, this study explores the extent of voluntary disclosure of COVID-19 information and identifies the factors influencing the level of COVID-19 information in industrial companies in Jordan.

The rest of this paper is structured as follows: Section 2 reviews the literature and formulates the study hypotheses. Section 3 discusses the research method and the sample selection criteria and presents the main model of the study. Section 4 displays the main results of the study. The last section concludes the main results and suggests future studies.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Voluntary disclosure often hinges on resource availability for companies in developing countries, particularly smaller firms. Unlike larger firms, smaller businesses may lack the capacity or financial incentive to provide extensive disclosures, especially if these reveal challenges that could discourage creditors or suppliers. In contrast, firms with more capital access may view voluntary disclosure as a strategic tool to secure or attract funding. Additionally, signaling theory suggests that companies sharing information on COVID-19 impacts project resilience and a commitment to transparency. However, if stakeholders interpret these disclosures as signs of ongoing risk or instability, they could inadvertently increase uncertainty. Therefore, the key is to strike a balance in disclosures that demonstrate transparency without raising investor concerns.

Developing countries frequently play essential roles in global supply chains. COVID-19-related disruptions have had widespread effects. Companies that voluntarily disclose their strategies for addressing supply chain challenges may enhance their reputation with global partners, strengthening their stability and long-term viability. This transparency can make them more appealing to international investors and stakeholders who highly value reliable, candid communication in times of uncertainty.

Financial reporting is not only about presenting historical financial statements and related notes but also providing insights into the company's performance and prospects through narrative sections (Beattie, 2000). Narrative disclosures include both mandatory sections, such as directors' reports and corporate governance statements, and voluntary information, such as management analysis, operating and financial review (OFR), business review, operational review, objectives and strategy, and descriptions of the business (Beattie, McInnes, & Fearnley, 2004). Corporate voluntary disclosure has garnered significant attention during the COVID-19 pandemic (Albitar et al., 2021; Elmarzouky et al., 2021). We propose that narrative sections of annual reports, such as chairmen's statements and planned response strategies may serve as an effective communication channel for companies to convey the impact of the COVID-19 pandemic on their current and future performance given the high demand for voluntary disclosure among users.

Voluntary disclosure has attracted considerable attention during the COVID-19 pandemic (Elmarzouky et al., 2021). For instance, a report issued by the financial reporting council highlights the significance of the disclosure of COVID-19 information in the narratives during the crisis. Elmarzouky et al. (2021) explored the relationship between performance and disclosure of COVID-19 information within the annual reports' narrative. Tibiletti, Marchini, Gamba, and Todaro (2021) highlighted that negative judgments often arise concerning future performance.

However, no critical going concern issues were identified among Italian companies. Most previous studies have focused on the disclosure of COVID-19-related information during the pandemic. However, the current study examines the extent of COVID-19 information disclosed in the post-pandemic period, analyzing how various firm characteristics may affect the level of voluntary disclosure. Thus, this section sets up the research hypotheses and provides rationale for each hypothesis.

2.1. Leverage

Companies with a high debt burden in their capital structure are more inclined to disclose more to mitigate agency costs (Jensen & Meckling, 1976). Disclosures of additional information ensure companies' abilities to meet their obligations on time. Foster (1986) argued that companies with high debt in their capital structure are more likely to disclose more to show that they have not violated their covenant. Shareholders view high-debt companies as riskier leading to greater potential wealth transfers from fixed claimants to residual claimants (Myers, 1977). Therefore, voluntary disclosure may minimize information asymmetry, lowering the borrower's default risk (Baiman & Verrecchia, 1996). Ahmed and Nicholls (1994) concluded that when firms are financed by financial institutions, they are more likely to provide additional information compared to companies with a small amount of debt in their capital structure. High-leverage firms are often under pressure to provide more detailed disclosures to reassure creditors and investors of their stability, especially during times of crisis.

The COVID-19 pandemic has emphasized the importance of transparent corporate disclosure, particularly as firms navigate the financial and operational risks introduced by the crisis. One key factor influencing COVID-19 disclosure is financial leverage, which reflects a firm's use of debt in its capital structure. Previous research has extensively utilized leverage to analyze the factors influencing corporate voluntary disclosure. During the COVID-19 pandemic, firms with higher leverage may disclose more information about the COVID-19 pandemic to convince creditors and stakeholders demanding transparency regarding the company's ability to meet their debt and mitigate risks (Morris, Phalippou, & Wu, 2022). The positive relationship is supported by agency and signaling theories, which suggest that high-levered firms face greater scrutiny and thus disclose additional information to manage stakeholder expectations. In contrast, low-levered companies, facing less pressure from creditors may not disclose as extensively. Understanding this relationship is essential for policymakers, investors, and creditors aiming to evaluate firms' responses to the COVID-19 pandemic. In the context of the disclosure, Alshababi, Pria, and Hussainey (2021) found no relation between COVID-19 information and leverage. Based on the previous discussion, it can be hypothesized that

H_1: There is a positive relationship between the level of COVID-19 information and leverage.

2.2. Audit Firm Size

The COVID-19 pandemic has highlighted the need for comprehensive and reliable corporate disclosure as stakeholders increasingly demand transparency on how companies are managing pandemic-related risks. Audit firms play a crucial role in ensuring the quality and comprehensiveness of these disclosures. Among the factors affecting COVID-19 disclosure, audit firm size has emerged as a significant determinant, influencing both the quality and extent of disclosures. This literature review examines the relationship between COVID-19 disclosure and audit firm size, exploring how the resources, reputation, and expertise associated with larger audit firms' impact their clients' disclosure practices.

DeAngelo (1981) documented that big audit companies may add more pressure on management to disclose additional information. Similarly, Krishnan and Schauer (2000) highlighted that the credibility of financial statements is linked to the quality of auditors with larger audit firms typically seen as holding more experience. As a result, 4 big audit companies are more likely to work with clients who provide more information. O'Sullivan, Percy, and Stewart (2008) found a positive relationship between audit firm size and the disclosure of forward-looking information. In contrast, Aljifri and Hussainey (2007) found no relationship between forward-looking information and audit firm size. During the COVID-19 pandemic, large audit firms have been instrumental in advising clients on best practices for providing COVID-19 information, particularly on complex issues such as financial risk, supply chain interruptions, and operational flexibility (Abdo & Edgar, 2021). In contrast, smaller audit firms may lack the resources and specialized knowledge necessary to guide clients through intricate COVID-19 disclosures. Previous studies showed that smaller audit firms may face constraints related to proficiency and quality control, which can impact their ability to enforce adequate disclosures (Palmrose, 1988). As a result, companies audited by small audit firms may disclose less COVID-19-related information or produce lower-quality disclosures, leading to variability in transparency levels across firms with different audit providers. Studies by Abdo and Edgar (2021) and Xu, Chen, Zhang, and Zhao (2021) indicated that large audit firms provided guidance on COVID-19 disclosures related to financial stability, liquidity risks, and going concern assumptions, ensuring a higher level of transparency in corporate reporting. Based on this, it can be hypothesized that

H_2: There is a positive relationship between the disclosure of COVID-19 information and audit firm size.

2.3. Firm Age

The COVID-19 pandemic has reinforced the need for transparency among companies with stakeholders increasingly expecting firms to disclose information on their response to the unexpected worldwide crisis. One factor that may influence the extent of COVID-19 disclosure is firm age. Older firm gains experience build a reputation, and accumulate resources — all of which significantly influence their reporting practices.

Glaum and Street (2003) argued that younger firms prioritize product and market development over accounting when establishing their businesses. Their study found that firm age significantly influences corporate social disclosure. However, Mahammed, Al-Mutairi, and Al-Duwaila (2015) demonstrated that firm age does not have a significant impact on the social responsibility disclosures of industrial and service firms listed on the Kuwait Stock Exchange. On the other hand, Khaldoon (2015) indicated that firm age significantly affects voluntary corporate social disclosure. Haladu and Salim (2016) found a significant relationship between firm age and environmental reporting. Similarly, Thi Hoang and Nguyen (2023) found a positive relationship between firm age and the level of COVID-19-related disclosures.

Firm age is frequently linked to disclosure quality with older firms often disclosing more comprehensive information than younger ones. Older firms generally have well-established disclosure practices due to their history of regulatory compliance, long-standing stakeholder relationships, and a greater need to maintain reputational capital (Botosan, 1997). This literature review examines how firm age relates to COVID-19 disclosure practices, analyzing why older firms may provide more comprehensive information while younger firms might have different incentives and constraints. During the COVID-19 pandemic, these firms were expected to disclose more about their financial stability, risk management strategies, and operational adjustments. Older firms having faced previous economic disruptions are likely to be more transparent about their resilience and crisis management strategies, ensuring stakeholders receive consistent, reliable information (Boubaker, Cellier, Manita, & Saeed, 2020). Based on the previous discussion, it can be hypothesized

H_3: There is a positive relationship between the disclosure of COVID-19 information and firm age.

2.4. Firm Size

Size is the most commonly used variable in the literature to explain variations in voluntary disclosure. Most prior studies have found that corporate size is positively related to voluntary disclosure (Cook, 1991; Cooke, 1989; Wallace, 1988). The demand for external funds exerts pressure on companies especially large companies to disclose more information based on the capital market theory (Jensen & Meckling, 1976). Leftwich, Watts, and Zimmerman (1981) highlighted that large companies depend on external funds to raise their capital. Thus, they need to disclose more to secure such funds for the supplier. Additionally, Chow and Wong-Boren (1987) stated that larger companies have a higher level of information asymmetry between the manager and the shareholders which increases agency costs. Watts and Zimmerman (1986) argued that agency costs are high for larger companies because shareholders are widespread. Hence, additional disclosure may reduce these costs. Thi Hoang and Nguyen (2023) found that firm size is positively associated with the extent of COVID-19-related disclosure. However, Wang and Xing (2020) and Elmarzouky et al. (2021) found no relationship between the extent of COVID-19 and firm size.

Signaling theory provides insight into how firm size affects COVID-19 disclosure. According to signaling theory, companies communicate information to reduce information asymmetry and enhance market perceptions (Spence, 1973). Large firms are more likely to disclose comprehensive information about COVID-19 impacts to signal their resilience, stability, and commitment to transparency. Studies have shown that larger firms due to their size and visibility feel compelled to provide more detailed COVID-19 disclosures to reassure investors and sustain market confidence (Elmarzouky et al., 2021). However, smaller firms may avoid extensive disclosures, especially if they perceive that such information could reveal vulnerabilities and lead to negative stakeholder reactions. Based on the previous discussion, it can be hypothesized that

H_4: There is a positive relationship between the disclosure of COVID-19 information and firm size.

2.5. Firm Performance

According to Trueman's theory, investors evaluate a firm's worth based on how well the management appears to be able to adjust to its operating environment (Trueman, 1986). Hence, talent managers are most likely fascinated to manifest their skills and abilities by increasing the level of voluntary disclosure (Trueman, 1986; Yu & Wang, 2018). Additionally, this theory suggests that talented managers may seek to demonstrate their competence by making voluntary disclosures, thereby increasing the level of performance information related to the COVID-19 pandemic. The aim of disclosing such performance information is to provide stakeholders with an assessment of management's capabilities and to predict potential changes in the economic environment, such as the COVID-19 crisis, in which the company operates. This information could also help in selecting appropriate mitigation strategies (Elmarzouky et al., 2021). Conversely, linking COVID-19 disclosures with performance data could give investors a clearer understanding of the firm's current and future performance by illustrating how managers are managing the crisis and reducing risks (Broadstock, Chan, Cheng, & Wang, 2021). Managers are likely motivated to provide accurate information regarding the impact of COVID-19 on performance (Elmarzouky et al., 2021). If this is the case, then disclosure will diminish information asymmetry between insiders (i.e., management) and outsiders (i.e., stakeholders) to capture performance during the crisis period. Hossain, Alam, and Mazumder (2023) discovered that companies primarily employed assertive and performance-focused strategies to impress their stakeholders while defensive strategies were used in only a few instances.

Several studies have been conducted in different contexts concerning the relationship between COVID-19 disclosure and firm performance, and different results have been reported. For example, Nguyen, Nguyen, Nguyen, Do, and Ngo (2022) concluded that the financial performance of 114 logistics firms listed on the Vietnam Stock Exchange remained unchanged. However, it also reported a decline in business performance indicators, such as ROA. Rababah, Al-Haddad, Sial, Chunmei, and Cherian (2020) investigated the effect of COVID-19 on performance for Chinese companies. The results showed that there is a sharp decline in the financial performance of small and medium firms because of the COVID-19 pandemic. Moreover, Boshnak (2022) found a decline in performance as an effect of the pandemic in the context of Saudi Arabia. Elmarzouky et al. (2021) demonstrated a significant and positive relationship between the COVID-19 disclosure and the firm performance in the context of the UK.

The impact of COVID-19 disclosure on performance may vary across industries. For instance, industries directly affected by the pandemic, such as hospitality and travel, faced greater scrutiny and pressure to disclose their disaster responses. Alsamhi et al. (2022) pointed out that there is a significant difference in total income in the construction sector in India before and after COVID-19. Nguyen et al. (2022) indicated that companies in these sectors that engaged in robust disclosure practices were better positioned to recover financially compared to their less transparent counterparts. Conversely, the technology industry is less impacted by the pandemic and may not have seen the same level of correlation between disclosure and performance due to different market dynamics.

Wang and Xing (2020) found no relationship between the extent of COVID-19 and firm performance. On the other hand, ElGammal, El-Kassar, and Canaan Messarra (2018) indicated that company size had a positive and significant effect at the 10% significance level on the disclosure of good news, suggesting that larger companies disclosed more positive news during the pandemic. Based on the previous discussion, it can be hypothesized that

H_5: There is a positive relationship between the disclosure of COVID-19 information and firm performance.

3. RESEARCH METHODOLOGY

3.1. Study Sample

All the industrial companies listed on the Amman Stock Exchange were selected to examine the extent of COVID-19 disclosure in annual reports' narratives. The initial list of companies consists of all 63 industrial companies listed on the Amman Stock Exchange in 2023. However, the final sample consists of 60 industrial companies after excluding 3 firms due to the unavailability of annual reports.

3.2. Dependent Variable -Disclosure Index

The disclosure index is a widely recognized tool frequently employed in research as a proxy for measuring the extent of corporate disclosure practices. Marston and Shrives (1991) conducted a review of the use of disclosure indices in the literature to assess corporate disclosure quality. A key step in constructing a disclosure index is identifying the preidentified items expected to appear in annual reports. Since no standardized theory dictates the number or choice of items, past studies have used lists ranging from as few as 17 items (Barrett, 1975) to as many as 250 (Curuk, 1999). The selection of disclosure items is informed by a review of the literature and a detailed examination of sample annual reports. Several steps are followed to construct the disclosure index. First, a detailed review of prior studies on COVID-19 disclosure to develop a comprehensive disclosure list and minimize bias from potentially excluded items (Albitar et al., 2021; Elmarzouky et al., 2021; Wang & Xing, 2020) was conducted. Many of these studies utilized automated content analysis based on word counts from a predefined list of keywords. Drawing from this review, an initial list of disclosure items was assembled. Second, the narrative sections of the annual reports were reviewed to ensure that no relevant items were overlooked in the initial list. Highly standardized sections, such as the director's report and corporate governance reports were excluded from this review. Based on this examination, the initial list was refined to create a preliminary COVID-19 disclosure list consisting of 33 items. Third, prior studies have used two independent coders to analyze a sample of reports, resolving any discrepancies through discussion to minimize potential bias and subjectivity in interpreting the narratives of annual reports. Following this approach, a pilot test was conducted in this study using a sample of five randomly selected industrial companies listed on the Amman Stock Exchange in 2023. This pilot test aimed to establish consistent criteria for identifying the presence or absence of specific disclosure items. Minor adjustments were made to some items, such as modifying word combinations to ensure that all relevant items were included and irrelevant or ambiguous items were excluded. This detailed review of pilot-tested annual reports refined the list, helping to improve the index and address any challenges in applying certain items across companies in different sectors. Fourth, a key consideration when using a disclosure index is determining whether specific items apply to each company. Cooke (1989) recommended reviewing the entire annual report to assess the relevance of individual items. Alternatively, limiting the index to items that all sample firms could disclose as suggested by Botosan (1997) helps avoid this issue. Buzby (1972) argued that omitting significant items from the index may reduce its effectiveness in differentiating companies. Following these guidelines, the final disclosure index list includes 30 COVID-19 items.

The next step in constructing a disclosure index involves assigning weights to each item. Two main approaches are commonly used: weighted and unweighted indices. The unweighted index treats all disclosure items as equally important using a dichotomous scoring method where an item receives a score of 1 if disclosed in the annual report and 0 if not. Kamran Ahmed and Courtis (1999) argued that unweighted indices help reduce subjectivity in disclosure measurement. Conversely, the weighted index, used in some prior studies to assess disclosure extent, assigns different weights to items based on their perceived importance. For example, Buzby (1974) developed a weighting system by surveying financial analysts to gauge the relative significance of each item, with the mean score reflecting each item's importance. However, critics argue that using weights may introduce variability since the importance of each item can change depending on the context, such as the event, company, user, industry, and timing of the study (Cooke & Wallace, 1989). Previous studies have suggested that there may be little to no difference between weighted and unweighted disclosure indices (Chow & Wong-Boren, 1987; Firth, 1980). Marston and Shrives (1991) recommended using an unweighted disclosure index even if a weighted one is available to assess whether the weighting influences company rankings.

A disclosure index was applied to industrial Jordanian companies listed on the Amman Stock Exchange (ASE) for 2023 to assess the level of voluntary COVID-19 disclosure. Each company's voluntary disclosure was measured using a scoring sheet of 30 items. A dichotomous scoring method was employed. A score of 1 was given if a company disclosed a specific item in its annual report and 0 if not. For each annual report reviewed, the "Actual Disclosed Voluntary Items" (ADVI) were recorded. A "Disclosure Score Ratio" (DSR) was calculated for each company by dividing the total ADVI by the total number of disclosure items (30) to quantify disclosure. Thus, each company's DSR ranged from 0% (no items disclosed) to 100% (all items disclosed).

$$ADVI = \sum_{i=1}^{n} di$$

d = Scored 1 if the item di disclosed, and 0 if the item di is not disclosed.

n = The total number of items (30).

$$DSR = \frac{ADVI}{30}$$

3.3. Regression Model

This section presents the regression model used to test the study hypotheses.

The extent of COVID-19 information = £ (firm characteristics).

The extent of COVID-19 information is measured by the disclosure index.

The pooled OLS regression model is as follows:

The regression equation is

$$DSR\_COVID-19 = \beta 0 + \beta 1\, leverage + \beta 2\, audit\ firm\ size + \beta 3\, firm\ age + \beta 4\, firm\ size + \beta 5\, performance + e$$

Where

DSR_COVID-19	= The extent of disclosure of COVID-19 information.
β1-5	= The regression coefficient, i = 0, 1,…, 5.
Leverage	= Leverage measured by total debt divided by total assets.
Audit Firm Size	= Measured by a dichotomous variable equal to 1 for companies audited by the Big 4 companies and 0 otherwise.
Firm age	= Calculated as the number of years from the company's establishment to 2023.
Firm Size	= Measured by the natural logarithm of market capitalization.
performance	= Measured by Tobin's Q.
E	= Error term.

4. RESULTS OF THE STUDY

This section presents the main results of the study. Table 1 displays the descriptive analysis of the variables.

4.1. Descriptive Results

Table 1 presents the results of the descriptive analysis for dependent and independent variables.

Table 1. Descriptive statistics

Variables	Min.	Max.	Mean	Std. dev.
Disclosure of COVID-19 information	0.11	0.82	0.32	0.18
Leverage	0.02	1.35	0.39	0.30
Audit firm size	0	1	0.37	0.468
Firm age	11	64	33.47	14.60
Firm size	6.50	9.12	7.42	0.53
Performance	0.18	2.05	0.78	0.51

Table 1 provides the descriptive analysis results for the dependent and independent variables. On average, industrial Jordanian companies disclosed 32% of COVID-19 information with a minimum disclosure level of 11% and a maximum of 82%, indicating generally low disclosure levels across the companies post the pandemic. This result is consistent with Thi Hoang and Nguyen (2023) who revealed that the extent of COVID-19-related disclosure in Vietnam is relatively low. This finding aligns with Dahiyat (2020) who reported an average voluntary disclosure quality of 49% for industrial Jordanian companies with a standard deviation of 18%. This result is inconsistent with Karim, Reza, and Shetu (2024). They documented a significant shift in corporate disclosures due to the COVID-19 pandemic, highlighting a notable increase in disclosure levels in Vietnam from 2019 to 2020.

The analysis of the disclosure index showed that approximately 83% of the sampled companies disclosed information on "the effect of COVID-19 on the company's performance" and "the impact of the COVID-19 pandemic on company operations." However, the results also revealed that no company reported information on "expenditures on automation initiatives" or "compensation for contract breaches caused by COVID-19."

Moreover, Table 1 presents the descriptive statistics for the independent variables used in the model to evaluate their impact on COVID-19 disclosure levels. The mean leverage is 39% with a range from a minimum of 2% to a maximum of 1.35. 37% of the companies are audited by one of the Big 4 firms for audit firm size. The average firm age is 33 years with a range between 11 and 64 years. Additionally, the average natural logarithm of firm size is 7.42 with a maximum of 9.12, a minimum of 6.5, and a standard deviation of 53%. The average company performance is 78% with a standard deviation of 51%.

4.2. Correlation Matrix

Table 2 presents the Pearson correlation coefficients for the variables in this study. A correlation above 0.80 may indicate a potential collinearity issue following Gujarati's (1995) guideline. A high correlation (41% significant at 1%) exists between audit firm size and firm age. The correlation matrix suggests no multicollinearity concerns among these variables.

Table 2. Correlation matrix

Variables	Leverage	Audit firm size	Firm age	Firm size	Performance
Leverage	1				
Audit firm size	0.119 0.364	1			
Firm age	-0.155 0.238	0.410 0.001**	1		
Firm size	-0.004 0.977	0.239 0.065*	0.066 0.617	1	
Performance	-0.386 0.002**	0.239 0.066*	0.056 0.671	0.229 0.078*	1

Note: **Correlation is significant at the 0.01 level.
*Correlation is significant at the 0.05 level.

4.3. Hypotheses Testing

The OLS regression results presented in Table 3 demonstrate that the combination of independent variables is statistically significant, reflected in both the individual significance of the variables and the adjusted R^2 value.

Table 3. Multiple regression results: The extent of COVID-19 information

Variables	Coefficients	T
Constant	-0.144	-0.522
Leverage	0.129	1.787*
Audit firm size	-0.072	-1.532
Firm age	0.004	2.545**
Firm size	0.037	0.993
Performance	0.096	2.237**
Adjusted R^2	10.6%	
F model	2.400**	

Note: ** Significant at the 5% level.
* Significant at the 10% level.

The OLS regression results in Table 3 show that the model is highly significant (F = 2.4**), with an adjusted R^2 of 10.6%. This indicates that combining independent variables collectively explains 10.6% of the variation in COVID-19 voluntary disclosure across companies. Firm age and performance are both significant at the 5% level, while leverage is significant at the 10% level.

Table 3 presents the OLS regression analysis results on factors influencing COVID-19 voluntary disclosure. As expected, leverage shows a positive and significant relationship with disclosure, supporting H1. This finding aligns with theories suggesting that growth firms face higher information asymmetry and agency costs (Gaver & Gaver, 1993; Smith Jr & Watts, 1992). This result is consistent with Morris et al. (2022) who found a positive relationship between leverage and COVID-19 information. The literature also indicates a positive relationship between leverage and COVID-19 disclosure with highly leveraged firms providing more extensive information to reassure creditors and other stakeholders. This relationship is supported by agency and signaling theories which propose that high-leverage firms are under greater scrutiny prompting them to disclose more to meet stakeholder expectations. This insight is valuable for policymakers, investors, and creditors aiming to evaluate firm transparency and financial resilience amid the COVID-19 pandemic. However, this result is inconsistent with Alshabibi et al. (2021) who found no relationship between COVID-19 information and leverage.

Concerning the audit firm size, inconsistent with H2, no relationship between disclosures of COVID-19 information and audit firm size is found to be inconsistent with agency theory which predicts that the existence of a big audit firm reduces agency costs. This result contrasts with findings by Abdo and Edgar (2021) and Xu et al. (2021) which indicated that large audit firms offered guidance on COVID-19 disclosures concerning financial stability, liquidity risks, and going concern assumptions, promoting greater transparency in corporate reporting.

A positive and significant relationship between COVID-19 information and firm age was found, aligning with economic theory and H3. The literature reveals a positive relationship between firm age and the extent of COVID-19 disclosure with older firms generally providing more comprehensive and transparent disclosures than younger firms. This relationship is shaped by many factors, such as reputation, experience, resource availability, and stakeholder expectations. Older firms, aiming to protect their established reputations and maintain trust with stakeholders, disclose COVID-19 information often constrained by resources and lacking professional experience to deal with the crisis, while younger firms tend to focus on minimum disclosures. Understanding the role of firm age in shaping COVID-19 disclosure practices offers valuable insights for policymakers, investors, and stakeholders seeking to assess the reliability and transparency of pandemic-related disclosures. This result is consistent with Boubaker et al. (2020) who confirmed that older firms, having experienced different crises are more likely to be transparent about their resilience and crisis management strategies.

However, inconsistent with the prediction of H4, firm size is uncorrelated with the disclosure of COVID-19 information. This result is consistent with Wang and Xing (2020) and Elmarzouky et al. (2021) who found no relationship between the extent of COVID-19 information and firm size. This result contrasts with the finding of Thi Hoang and Nguyen (2023) which indicated that firm size is positively associated with the extent of COVID-19-related disclosure.

Firm performance (t = 2.237) is positive and significant consistent with Elmarzouky et al. (2021) who found a strong positive relationship between performance and the extent of COVID-19 information. A possible explanation for this is that companies whether dealing with bad or good news may seek to disclose information sooner to mitigate the impact of litigation costs. This result aligns with Elmarzouky et al. (2021) who found a positive relationship between the COVID-19 disclosure and the firm performance disclosure in the annual reports in the context of the UK. This result contrasts Wang and Xing (2020) and found no relationship between the extent of COVID-19 and firm performance.

5. CONCLUSION, IMPLICATIONS, AND FUTURE STUDIES

The voluntary disclosure of COVID-19 information in developing countries introduces opportunities and challenges. While it can perform as a powerful tool to rebuild trust and attract investors, achieving adequate disclosures is crucial. Developing consistent guidelines and fostering a culture of transparency could enhance the long-term benefits of voluntary disclosure, helping firms and economies alike to navigate the post-pandemic landscape effectively. Yaseen, Ayoub, Hattar, Al-Adwan, and Alsoud (2025) emphasized the need for a strategic focus on competitor analysis, consumer-centered approaches, technology implementation, and strategic partnerships to enhance market competitiveness and overall performance.

This study highlights the impact of the extent of COVID-19 information on the corporate characteristics of a sample of industrial companies listed on the Amman Stock Exchange in 2023. It is crucial to categorize the companies by their respective sectors to draw more specific conclusions. The number of companies listed in AMS is small, so the statistical analysis is invalid. The industrial sector comprises 60% of the companies listed on the Amman Stock Exchange. This study contributes to the disclosure studies by adding to the literature on the relationship between the disclosure of COVID-19 information and firms' characteristics (Elmarzouky et al., 2021) (Albitar et al., 2021; Elmarzouky et al., 2021) by providing empirical evidence in developing countries, such as Jordan which is consistent with information asymmetry theories. The result shows that the extent of COVID-19 information is low among industrial companies post- pandemic. The results of OLS regression show that leverage, firm age, and performance have positive and significant relationships with the level of disclosure of COVID-19 information measured by the disclosure index consisting of 30 items.

This study has several limitations. First, it evaluates the extent of voluntary COVID-19-related disclosures using a predefined disclosure index which assumes that additional voluntary disclosures may be present in the narrative sections but are not captured by the index. Second, the study focuses on the voluntary disclosure of COVID-19 information within annual report narratives as annual reports are considered the most effective communication medium. However, annual reports face limitations related to timing as many value-relevant events are reflected in stock prices immediately after the information becomes available while their impact on reported earnings often occurs with a delay. Future research employing the same methodology could be conducted for other forms of communication, such as press releases, conference calls, corporate websites, interim reports, or social media after identifying a new list of COVID-19 information that is more relevant and prompt to information disclosed in such media forms.

Future research should explore the longitudinal impacts of COVID-19 disclosures on firm performance as the pandemic continues to evolve. Additionally, examining how different types of disclosures (e.g., financial vs. operational) influence stakeholder reactions could provide deeper insights into effective communication strategies in times of crisis. Policymakers should leverage voluntary disclosure as a tool to improve corporate transparency, stakeholder trust, and crisis preparedness. By setting clear guidelines, providing incentives, and fostering collaboration, they can enhance the effectiveness of voluntary disclosure during public health emergencies like COVID-19.

Future studies should examine the impact of internal corporate governance and audit quality on the level of COVID-19 disclosure. The study should reconsider the empirical model by incorporating a time variable to capture changes in disclosure behavior over different periods or a country indicator to account for variations in disclosure practices across different regulatory and economic environments. This adjustment would enhance the model's robustness and improve the accuracy of its findings. Understanding these dynamics will be crucial for firms to navigate future uncertainties successfully.

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