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Abstract: This study assesses the effect of the Covid-19 pandemic on corporate risk disclosure (RD) for the listed companies in UAE and its main determinants. Applying a narrative risk technique on 78 listed companies, the paper's findings provide the following evidence. First, RD has increased considerably from 2019 (pre-pandemic year) to 2020 (pandemic year). The highest increase of RD is reported for logistics and transportation sectors, then manufacturing sector then financial sector. The lowest change of RD is observed for the energy sector then for the telecommunication sector. Second, most of the RD changes are observed for pandemic related words, as it increased considerably in 2020. Third, RD increased with the increase of firm profitability. Fourth, aged firms and foreign firms have increased corporate RD during the pandemic. Fifth, audit quality has a positive impact on the increase of RD. Sixth, the decrease of ROA is significantly correlated to the Covid-19 related information disclosure.

Keywords: risk disclosure; Covid-19; UAE; audit quality; foreign ownership.

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1 Introduction

During 2020, the Covid-19 pandemic has disturbed the normal lifestyle of people across the globe. It troubled vital sectors such as healthcare, education, tourism, transportation services, sales, manufacturing, etc. Consequently, a downturn in the overall economy (e.g., higher unemployment, disrupted supply chains, government restrictions, reduced sales in certain industries, etc.).

The Covid-19 pandemic had affected the real operations of many companies either positively or negatively. These businesses, either on their own or as required by the government, reduced (or increased) customer capacity to a significant extent or paused operations altogether. The resulting effect was a severe reduction (or increase) in cash inflows from customers. This level of uncertainty, which never has been seen before, resulted in significant financial reporting implications on companies' annual reports and financial statements (KPMG, 2021).

As now we can see obviously the consequences of Covid-19 pandemic on the global economy, it looks interesting to assess the level of risk disclosure (RD) in the firms' annual reports. Indeed, this would provide useful information to the various stakeholders to understand firms' response to such events; and to regulators to revise risk provisions policies to be better prepared for future similar events. Therefore, this paper extends previous stream of research on RD (Roberts et al., 2022; Guthrie et al., 2020; Heinle and Smith, 2017; Ibrahim and Hussainey, 2019) and investigates two main important issues:

- 1 Whether or not, and to what extent companies disclose information about risks during the Covid-19 time?
- 2 What are the main factors pushing firms to increase (or decrease) the quantity of disclosed risk related information during the Covid-19 pandemic?

By employing a narrative disclosure technique, this study examines RD in the annual reports of UAE listed companies for the period 2018/2019, that immediately precede the pandemic, and the year 2020, the pandemic year.

In this paper, we examine the annual report of 78 listed companies in the Abu Dhabi Stock Exchange (ADX) and Dubai Financial Market (DFM). We are interested to UAE listed companies for mainly three reasons. First, in the recent decade, UAE economy is considered as one of the most fast-developed emerging economy in the MENA region and only few studies are exploring this economy (Schwab, 2018; World Economic Forum, 2022). Second, most of UAE listed companies are either large family business or government owned companies (Grassa and Chakroun, 2016 and Pedersen and Partner, 2014). Third, UAE Accountants and Auditors Association has developed a guideline to addresses the specific areas that have to be taken into consideration as a result of the pandemic effect on the business (Accountants and Auditors Association, 2020). Therefore, we expect that the level of risk disclosure will have some specificities and it will be interesting to discover.

The results are as follows. First, RD has increased considerably from year 2019 (pre-pandemic year) to 2020 (pandemic year). The highest increase of RD has been reported for logistics and transportation sectors, then manufacturing sector followed by financial sector. The lowest change of RD has been observed for the energy sector then for the telecommunication sector. In addition, most of the RD change has been observed for pandemic related words, as it increased considerably. Second, RD increased with the increase of firm profitability. Third, aged firms and foreign firms have increased RD related information during the pandemic. Fourth, there audit quality, as measured by Big 4 audit firms, has a positive effect on the disclosed RD related information. Fifth, the decrease of ROA is significantly correlated to the disclosed Covid-19 related information. It looks that the executives of unprofitable firms tend to disclose more information about the effect of Covid-19 on business operations to justify their bad performance and protect corporate shares from being undervalued.

Our paper offers mainly four important contributions to the corporate disclosure literature. First, to the knowledge of the authors, this is the first paper assessing the effect of Covid-19 on the level of risk disclosure of listed companies in UAE, an important emerging economy in the MENA region. Second, this paper complements previous research on the determinants of corporate risk disclosure and on narrative disclosure (e.g., Barakat and Hussainey, 2013; Elmarzouky et al., 2021; He and Xiao, 2019). Third, this paper produces new risk-related keywords to be used to measure risk disclosure level and is consistent with the proposed definition and the new concepts of risk. Fourth, while there are, few recent studies investigate the determinants of RD during the pandemic; these studies did not compare the effect of the pandemic on the level of RD before and during the crisis time. Our paper fills this gap and compares the level of RD before and during the pandemic, then assesses its determinates

From investor and policy perceptive, our research offer several important implications. First, this paper shield the light on the importance of audit quality to improve firm transparency in emerging market, which would be relevant for investors and regulators. Second, the finding of this paper may be beneficial for the regulatory setters to better understand the determinants of firms providing generic or meaningful Covid-19 information. In addition, the finding of this research would be informative for the International Accounting Standards Board's (IASB) ongoing consideration of risk reporting in the crisis period.

The rest of this paper is as follows. Section 2 gives an overview about Covid-19 financial and accounting implications in UAE. Section 3 presents the theoretical framework of our research; reviews previous researches on risk disclosure and develop our hypotheses. Section 4 describes the methodology used in this paper. Section 5 discusses the main findings. Section 6 concludes the paper.

2 Covid-19 financial and accounting implications in UAE

Accountants and Auditors Association under the support of UAE Ministry of Economy and the Securities and Commodities Authority have set up a task force of regulators, experts and practitioners to study the financial and accounting implications of the pandemic. The output of this taskforce was The “COVID-19 Financial and Accounting implications” guideline (Accountants and Auditors Association, 2020). This document highlights additional key accounting considerations for various important business economic sectors that contribute significantly UAE’s economy including Energy Industry (Oil & Gas, and Utilities), financial institutions, retail business, construction companies, real estate business and manufacturing industry. The document addresses specific areas that have to be taken into consideration as a result of the pandemic effect on the business. The accounting considerations would depend on particular specifics and conditions. In addition, the full requirements of IFRS have to be taken into consideration and not simply the substances discussed in the document. The guidelines requires all companies operating in UAE to disclose significant impacts of pandemic on different risks. As well as, how they managed those risks (Accountants and Auditors Association, 2020).

3 Theoretical framework, literature review and hypothesis development

Previous research has shown that RD is a complex multifaceted concept (Ntim et al., 2013). For that reason, various theories have been used to argument the importance of RD from different perspectives including agency theory, institutional theory, resource dependence theory, legitimacy theory, stakeholder signalling theory, stakeholder theory, proprietary theory, political theory and others. Indeed, each theory argues a particular aspect of RD. We use these theories to argument our hypotheses.

3.1 Covid-19 pandemic and RD

In the light of agency theory, a recent stream of research highlights the importance of corporate risk disclosure to mitigate information asymmetry between investors and management, as information about risk would reduce investors’ uncertainties (Derouiche et al., 2020; Li et al., 2019; Giner et al., 2020; Malafronte et al., 2018). Indeed, RD could be a good indicator for investors to assess the effects of uncertainty on the expected future cash flow, which in turn will affect the firm value (Elshandidy et al., 2013; Jorion, 2002; Lim and Tan, 2007). Therefore, disclosing current and projected risk information would have a direct impact on shareholders’ trust on the company and would increase the transparency on the market (Oliveira et al., 2013).

Important events have urged firms to improve the quality and the quantity of information disclosed about risk. Indeed, the global financial crisis, for example, forced

financial institutions to place greater focus on risk disclosure quality (Asongu, 2013; Grassa et al., 2021). Furthermore, IFRS 7 and Basel II have made substantial contributions to improving the quality of risk disclosure (Hörling and Gründl, 2011).

The recent pandemic has increased the level of uncertainty, resulted in significant financial reporting implications on companies' annual reports and financial statements (KPMG, 2021). Therefore, regulators made clear what level of financial reporting transparency they considered appropriate. In its statement on "Importance of Disclosure about COVID-19" issued in June 2020, the International Organization of Securities Commissions (IOSCO) highlighted the key areas where it is necessary to have a sufficient level of transparency on the effect and uncertainty. Indeed, the pandemic may have significant and diverse consequences on businesses, ranging from short-term direct effects (e.g., short shutdown) to long-term and indirect effects (e.g., a change in business models). Understanding the effects on the business and how they affect the financial data is crucial for the financial statements users'. Disclosures should clarify the material effects on particular assets and liabilities and on the liquidity and going concern assumption. To provide investors enough confidence, the associated uncertainties may impose more exhaustive disclosures of the underlying scenarios and sensitivity data (Deloitte, 2020). Therefore, we expect that the Covid-19 pandemic would have also played an important role to increase financial reporting transparency and we formulate our first hypothesis:

H1: During the pandemic, firms disclose more risk related information

3.2 Determinants of RD:

Previous researches identified the main determinants of RD and show that mainly four firm' attributes influence the quantity and quality of disclosed risk related information, which are:

- i firm size
- ii financial performance
- iii financial leverage
- iv risk.

3.2.1 Firm size and RD

According to agency theory, usually large firms have a complicate organisational architecture and sophisticated business model. This may increase the business risk (Deumes and Knechel, 2008) and increase the information asymmetry among the different stakeholders (Watts and Zimmerman, 1983). Therefore, RD is considered as an important mechanism that help to mitigate agency costs caused by the information asymmetry among firm' stakeholders.

Furthermore, larger firms show higher level of public visibility, which suggests greater inspection amongst stakeholders and amplified inherent risk (Amran et al., 2009; Brammer and Pavelin, 2008). Legitimacy theory argue that disclosing risk-related information can be an effective response to the social and political pressures, as it help to manage the public perceptions and to answer to perceived legitimacy threats. Therefore,

improved RD would improve firms' reputation and satisfy stakeholders' expectation (Oliveira et al., 2011a).

Previous studies shows that larger firms tends to disclose more information about risk as an answer to the social and political pressures. RD will help to ameliorate public perceptions and respond to imposed legitimacy pressures. Thus, RD would help to restore and maintain firms' reputation and to respond to stakeholders' expectations (e.g., Elshandidy et al., 2013; Ntim et al., 2013; Baraket and Hussainey, 2013; Oliveira et al., 2011b; Grassa et al., 2021).

Recent studies show different effects of the firm size on the level of voluntary disclosure during the pandemic. In one side, Bahadar and Zaman (2022) provides evidence that during the pandemic larger firm increased the level of CSR disclosure. Wan and Tian (2022) shows that the effect of the pandemic on information disclosure in China is more pronounced for larger firms. Roberts et al. (2022) argue that larger companies are more likely to disclose the pandemic risk related information. In another side, using a sample of 489 companies from six global regions, Hao and Dong (2021) shows that larger firms disclosed less risk related information compared to smaller counterparts during the pandemic.

Accordingly, we hypothesis that:

H2: The increase (decrease) of the firm size, impacts positively (negatively) the disclosure of risk related information during the pandemic

3.2.2 Firm performance and RD

Previous empirical studies provide evidences on the positive effect of firms' performance on the level of RD (e.g., Elshandidy et al., 2013; Al-Maghzom et al., 2016; Miihkinen, 2012; Deumes and Knechel, 2008; Linsley et al., 2006). According to stakeholder signalling theory, corporate executives in profitable firms, would disclose more risk related information to give a positive signal to the market with regard to their capability in managing risk successfully and accomplishing a higher level of financial performance. Hence, RD would decrease investors' ambiguity about future cash flows and business management, which may reduce the information asymmetry between corporate management and different stakeholders (Khlif and Hussainey, 2016). Contrariwise, executives of unprofitable firms are less likely to disclose voluntary information to hide their bad performance and protect corporate shares from being undervalued (Aljifri et al., 2014; Alsaeed, 2006; Inchausti, 1997).

Besides, Deumes and Knechel (2008) argue that profitable firms are expected to disclose more information about risk as they have the financial resources to implement and effective risk management system and they want to show it to the different stakeholders.

Recent studies tested the effect of the firm performance on the level of voluntary RD during the pandemic. Hao and Dong (2022) and Elmarzouky et al. (2021) shows that RD about the COVID-19 pandemic are not related to the firm' financial performance.

It is very clear that further researches are needed to generalise these findings. Hence, we formulate our third hypothesis:

H3: The increase (decrease) of firm profitability impacts positively (negatively) the disclosure of risk related information during the pandemic.

3.2.3 Financial leverage and RD

According to the agency theory, agency conflicts may rise for high leveraged firms (Elzahar and Hussainey, 2012). Creditors may use their control power over the financial structure of high leveraged firms to impose restrictive debt covenants. Therefore, a high level of RD would play a critical role in mitigating debtholders' concerns about the firm solvency and its capabilities to generate enough cash flows in the future to pay their debts. Recent empirical studies provide evidences that leveraged firms have a tendency to disclose more risk related information as they are more risky and speculative (e.g., Amran et al., 2009; Elshandidy et al., 2013; Khlif and Hussainey, 2016; Oliveira et al., 2011b Deumes and Knechel, 2008; Hassan, 2009; Iatridis, 2008). Moreover, risk factors would influence the quantity and quality of disclosed risk information (e.g., Deumes, 2008, Miihkinen, 2012; Ntim et al., 2013; Elshandidy et al., 2013). According to the agency theory, in order to mitigate risk asymmetry, managers would disclose information about risk. As well as, to distinguish themselves from less efficient counterparts, managers would launch a signal on the market regarding their managerial skills and capacity to identify, assess, and manage risk by disclosing more risk information in the firms' annual reports. Hence, higher risky firms would report more risk information to mitigate uncertainties among investors, suggesting a better evaluation of risk by the market (Hassan, 2009). Increasing the quantity of risk-related information in difficult situation may also reassure stakeholders about a firm's future prospects (Iatridis, 2008).

Recent studies conducted by Hao and Dong (2022) and Zyznarska-Dworczak and Rudzionienė (2022) provide evidences that leverage do not significantly affect COVID-19-related RD in financial reports. It is obvious that further research must be conducted to generalise the effect of financial leverage on corporate RD. Therefore, we formulate our fourth hypothesis:

H4: An increase (decrease) of the financial leverage impacts positively (negatively) the disclosure of risk related information during the pandemic.

4 Methodology

4.1 Samples

Our sample consists of all listed companies in the ADX and in DFM. A main condition must be satisfied for our sample selection is the companies must have published the annual reports for the years 2019 and 2020. Thus, we eliminated the companies who published only the financial statements. On total we collected the annual reports of 42 companies listed in DFM and 36 companies listed in ADX for the year 2019 (pre pandemic year) and 2020 the year of pandemic. Our sample is composed as follow: 51% financial institutions, 20% real state companies, 11% manufacturing companies, 8% logistics and transportation companies, 5% energy companies, 4% telecommunication companies and 1% hospitality companies.

4.2 Regression model

In this research, we will test the effect of the variation of the independent variables on the variation of the dependent variable. We look to the variation because we believe that the

variation of the independent variables must be the direct effect of the variation of the dependent variable. Therefore, to empirically investigate the relationship between the variation of risk disclosure (Covid-19 Disclosure) and the variation of firm characteristics, we employ the following OLS regression.

Model 1:

$$\Delta RD_i = \beta_0 + \beta_1 \Delta FIRM\ SIZE_i + \beta_2 \Delta ROA_i + \beta_3 \Delta ROE_i + \beta_4 \Delta LEVERAGE_i + \beta_5 FIRMAGE_i + \beta_6 BLOCK_i + \beta_7 FOREIGN + \beta_8 BIG4 + \varepsilon_{i,t}$$

Model 2:

$$\Delta COVID-19D = \beta_0 + \beta_1 \Delta FIRM\ SIZE + \beta_2 \Delta ROA + \beta_3 \Delta ROE + \beta_4 \Delta LEVERAGE + \beta_5 FIRMKAGE + \beta_6 BLOCK + \beta_7 FOREIGN + \beta_8 BIG4 + \varepsilon_{i,t}$$

where ΔRD_i : is the variation of RD index for firm i between the years 2019 and 2020; $\Delta COVID-19D$: is the variation of number of sentence with Covid-19 related words disclosed between the years:2019 and 2020. $\Delta FIRM\ SIZE$: is the variation of firm size between 2019 and 2020; ΔROA : is the variation of the return on assets for firm i between 2019 and 2020; ΔROE : is the variation of the return on equity for firm I between 2019 and 2020; $\Delta LEVERAGE$: is the variation of the ratio of long-term debt/total assets for firm i between 2019 and 2020; $BLOCK$: is the number of blockholders for firm i, $FIRMAGE$: is the age of firm i, $FORGN$: 1 if the listed firm is a local firm, 0 otherwise i; $BIG4$: 1 if the auditor is a big 4 firm, 0 otherwise.

Table 1 describes the independent variables used in this study. It also provides the variable definition, measurement and the source of the data.

Table 1 Model specification and variable measurement

<i>Variables</i>	<i>Variable description</i>	<i>Data source</i>	<i>Previous studies</i>
$\Delta FIRM\ SIZE$	The variation of firm size between 2019 and 2020	Annual report: Financial statements	e.g., Elshandidy et al. (2013), Ntim et al. (2013), Baraket and Hussainey (2013), Oliveira et al. (2011b) and Grassa et al. (2021)
ΔROA	The variation of the return on assets for firmi between 2019 and 2020 Return on assets = net income divided by total average assets	Annual report: Financial statements	e.g., Elshandidy et al. (2013), Al-Maghzom et al. (2016), Miihkinen (2012), Deumes and Knechel (2008) and Linsley et al. (2006)
ΔROE	The variation of the return on equity for firm I between 2019 and 2020 Return on equity = net income divided by shareholders' equity	Annual report: Financial statements	
$\Delta LEVERAGE$	The variation of the ratio of long-term debt/total assets for firm I between 2019 and 2020	Annual report: Financial statements	e.g., Amran et al. (2009), Elshandidy et al. (2013), Khlif and Hussainey (2016), Oliveira et al. (2011b) and Deumes and Knechel (2008)

Table 1 Model specification and variable measurement (continued)

<i>Variables</i>	<i>Variable description</i>	<i>Data source</i>	<i>Previous studies</i>
<i>Control variables</i>			
Block	is the number of blockholders for firm <i>i</i>	Annual report/firm website	e.g., Grassa et al. (2021)
FIRMAGE	is the age of firm <i>I</i> by 2020	Annual report/firm website	e.g., Alfraih and Almutawa (2014), Demir and Bahadir (2014) and Grassa et al. (2021)
FORGN	1 if the listed firm is a local firm, 0 otherwise <i>i</i>	Annual report/firm website	e.g., Haniffa and Cooke (2002) and Barako et al. (2006)
BIG4	1 if the auditor is a big 4 firm, 0 otherwise.	Audited financial statements	e.g., Gerry et al. (2018), Oliveira et al. (2011) and Campbell et al. (2014)

4.3 Risk disclosure

Following Ibrahim and Hussainey (2015), we build a comprehensive list of risk keywords. Our objective is to use these keywords to count the number of sentences that includes risk related words. Two main sources has been used to select our list of keywords: the corporate risk disclosure literature (e.g., Ibrahim and Hussainey, 2015; Albitar et al., 2022) and the words associated to risk that have been extensively used in the annual reports constituting our sample. Therefore, 30 annual reports are randomly selected from our sample. Also, one report was selected for each companies, so different reports for different companies would be represented in our subsample. We figure out new words related to the risk especially in the annual reports of 2020. Most of the new worlds found are related to the pandemic.

Table 2 reports the list of keywords used in this research and their frequency. We manually checked all the 156 annual reports in all sections, to count the number of sentences that includes risk related words.

Table 2 Keywords used list

	<i>2019</i>	<i>2020</i>	<i>Difference</i>
Covid-19	24	2111	2087
Pandemic	7	1440	1433
Virus	2	122	120
Corona	0	0	0
Lockdown	11	1003	914
Loss	8169	8908	739
Impairment	3301	3543	242
Exposure	1692	2002	310
Failure	96	172	76
Deficit	121	145	24
Fraud	338	518	180

Table 2 Keywords used list (continued)

	<i>2019</i>	<i>2020</i>	<i>Difference</i>
Adverse	224	345	121
Difficulty	84	97	13
Accident	122	289	167
Emergency	30	48	18
Conflict	93	130	37
Disrupt	38	221	183
Damage	100	242	142
Unable	93	58	−35
Suffer	40	90	50
Breach	123	162	39
Litigation	107	107	0
Hazard	45	108	63
Default	1216	1323	107
Fire	50	86	36
Bad	93	109	16
Severity	38	91	53
Dispute	93	87	−6
Crisis	42	357	315
Emission	290	376	86
Threat	86	135	49
Deterioration	42	94	52
Disaster	59	40	−19
Harm	267	72	−195
Obsolescence	0	2	2
Shortage	17	44	27
Danger	25	47	22
Insufficiency	0	0	0
Non-compliance	106	122	16
Discrimination	58	79	21
Lack	76	86	10
Breakdown	29	52	23
Bankruptcy	51	80	29
Fine	774	796	22
Disappoint	0	288	288
Corruption	142	118	−24
Bribe	39	27	−12
Terrorism	25	73	48
Contingency	45	62	17

Table 2 Keywords used list (continued)

	<i>2019</i>	<i>2020</i>	<i>Difference</i>
Deficiency	20	33	13
Defect	3	4	1
Warn	34	37	3
Flood	22	11	–11
Insolvency	10	27	17
Erosion	4	3	–1
Theft	1	22	21
Prosecute	0	0	0
Crime	3	34	31
Earthquake	2	8	6
Collapse	0	0	0
Illegal	1	3	2
Shock	16	15	–1
Lawsuit	31	40	9
Catastrophe	25	51	26
Hurricane	3	2	–1

5 Results and discussion

5.1 Descriptive statistics

Table 3 reports the descriptive statistics for our main variable RD. On average the RD has increased considerably from 2019 (pre-pandemic year) to 2020 (pandemic year). Our finding is opposite to Carnegie et al.'s (2021) findings who show that the disclosed information with regard to risk associated to pandemic was minimal in a qualitative, neutral and constant format for Australian public universities. Table 3 shows also that the highest RD increase was for logistics and transportation sector, then manufacturing sector then financial sector. The lowest RD change has been observed for the energy sector then for the telecommunication sector. Our findings is consistent to Elmarzouky et al. (2021) who reports that show that the level of COVID-19 disclosure varies from industry to another.

In addition, most of the RD change has been observed for pandemic related words, as it increased considerably (Table 3(B) and Table 2).

Table 4 reports the descriptive statistics for our studied variables. On average, risk disclosure has increased from 2019 to 2020 by 109 sentences (min: 5, max: 552). Parallel, Pandemic risk related disclosure has increased, on average, by 47 sentences (min: 0, max: 172). Our findings is consistent with Roberts, Jang and Mubako (2022) who report that only 15.5% of the 489 observed from six global regions firms did disclose anything about pandemic risk prior to 2020, despite loud warnings from several directions that stressed the inevitable and imminence of a worldwide epidemic. Of these, 71.1% were standardised and basic in nature, providing minimal useful information to stakeholders.

Table 3 Descriptive statistics for RD

		Mean	Median	Standard deviation	Minimum	Maximum	Average change
Financial institutions	2019	302	275	169	44	764	99
	2020	401	395	191	57	858	
Real Estate	2019	225	210	106	106	446	52
	2020	277	266	94	94	451	
Energy	2019	233	269	44	44	275	21
	2020	253	270	40	40	282	
Manufacturing	2019	173	170	89	89	292	172
	2020	345	271	187	187	655	
Logistics and transportation	2019	181	267	183	183	467	271
	2020	451	573	271	271	681	
Hospitality	2019	208	208	–	–	208	54
	2020	262	262	–	–	262	
Telecommunication	2019	290	247	108	210	413	34
	2020	324	266	116	248	458	
Total	2019	233	228	154	44	764	112
	2020	345	300	176	57	858	

Table 3(B) Pandemic related sentences vs. RD sentences

	Total		Difference
	2019	2020	
Pandemic related sentences	44	4676	3640
RD sentences	18,654	22,121	3467
Total RD sentences	18,698	26,797	8099

On average, firm size has increased by 1% from 2019 to 2020 (min: –116%, max: 20%). With regard to the profitability, on average ROA and ROE have increased by 2% and 11% respectively from 2019 to 2020 (min: –30%, max: 75% for ROA and min: –30%; max: 274% for ROE). The average number of blockholders for our sample is 3 (min: 0, max: 8). The average age of our studied firms is 29 years (min: 3, max: 53). On average 15% of the firms constituting our sample are foreigner and 77% of them are audited by a big 4 audit firm.

Table 5 reports the outcomes of the correlation matrix. It is clear that there are no significant correlation coefficients greater than 60%, therefore we believe that we do not face a multicollinearity issue.

Table 4 Descriptive statistics

	<i>Mean</i>	<i>Median</i>	<i>Std. dev</i>	<i>Max</i>	<i>Min</i>
Δ RD	109.31	64.50	121.88	552.00	−5.00
Δ COVID-19 D	46.69	24.50	48.38	172.00	0.00
Δ FIRM SIZE	0.01	0.05	0.31	0.20	−1.16
Δ ROA	0.02	0.01	0.12	0.75	−0.30
Δ ROE	0.11	0.03	0.43	2.74	−0.31
Δ LEVERAGE	0.00	0.03	0.87	0.35	0.03
Block	3.03	3.00	2.07	8.00	0.00
FIRMAGE	29.27	29.00	13.99	53.00	3.00
FORGN	0.15	0.00	0.35	1.00	0.00
BIG4	0.77	1.00	0.43	1.00	0.00

Δ RD: is the variation of RD index for firm *i* between the years 2019 and 2020; Δ COVID-19D: is the variation of number of sentence with Covid-19 related words disclosed between the years:2019 and 2020. Δ FIRM SIZE: is the variation of firm size between 2019 and 2020; Δ ROA: is the variation of the return on assets for firm *i* between 2019 and 2020; Δ ROE: is the variation of the return on equity for firm *I* between 2019 and 2020; Δ LEVERAGE: is the variation of the ratio of long-term debt/total assets for firm *i* between 2019 and 2020; BLOCK: is the number of blockholders for firm *i*, FIRMAGE: is the age of firm *i*, FORGN: 1 if the listed firm is a local firm, 0 otherwise *i*; BIG4: 1 if the auditor is a big 4 firm, 0 otherwise.

Table 5 Correlation matrix

	<i>FIRMAGE</i>	<i>ΔROA</i>	<i>ΔROE</i>	<i>Δ LEVERAGE</i>	<i>ΔFIRM SIZE</i>	<i>BIG4</i>	<i>FORGN</i>	<i>BLOCK</i>
FIRMAGE	1.00							
Δ ROA	0.09 (0.48)	1.00						
Δ ROE	−0.12 (0.37)	0.14 (0.28)	1.00					
Δ LEVERAGE	−0.03 (0.81)	−0.05 (0.67)	0.07 (0.60)	1.00				
Δ FIRM SIZE	−0.04 (0.12)	−0.18 (0.15)	−0.06 (0.62)	−0.20 (0.10)*	1.00			
BIG4	0.18 (0.16)	−0.11 (0.36)	−0.06 (0.64)	0.09 (0.05)**	−0.12 (0.32)	1.00		

Table 5 Correlation matrix (continued)

	<i>FIRMAGE</i>	<i>ΔROA</i>	<i>ΔROE</i>	<i>ΔLEVERAGE</i>	<i>ΔFIRM SIZE</i>	<i>BIG4</i>	<i>FORGN</i>	<i>BLOCK</i>
FORGN	-0.12 (0.33)	-0.10 (0.40)	0.32 (0.01)	0.13 (0.28)	0.07 (0.56)	0.2615 (0.03)	1.00	
BLOCK	0.20 (0.12)	-0.09 (0.50)	-0.24 (0.07)	0.02 (0.12)	-0.03 (0.83)	-0.32 (0.61)	0.03 (0.05)	1.00

*, **, and *** indicate significance at 10%, 5%, and 1% level. P-value between parentheses.

ΔRD : is the variation of RD index for firm *i* between the years 2019 and 2020;
 $\Delta COVID-19D$: is the variation of number of sentence with Covid-19 related words disclosed between the years:2019 and 2020. $\Delta FIRM SIZE$: is the variation of firm size between 2019 and 2020; ΔROA : is the variation of the return on assets for firm *i* between 2019 and 2020; ΔROE : is the variation of the return on equity for firm *I* between 2019 and 2020; $\Delta LEVERAGE$: is the variation of the ratio of long-term debt/total assets for firm *i* between 2019 and 2020; $BLOCK$: is the number of blockholders for firm *i*, $FIRMAGE$: is the age of firm *i*, $FORGN$: 1 if the listed firm is a local firm, 0 otherwise *i*; $BIG4$: 1 if the auditor is a big 4 firm, 0 otherwise.

5.2 Regression results

Table 6 reports the outputs of our main regression models (1) and (2) in which we investigate the main determinants of ΔRD and $\Delta COVID-19D$ in particular some corporate attributes, ownership characteristics, and audit quality for our listed companies in DFM and ADX.

With regards to the outcomes of model (1), only hypotheses 3 is confirmed. The increase of firm profitability has a positive effect on the increase of RD. Our finding is consistent with Elshandidy et al. (2013); Al-Maghzom et al. (2016); Miihkinen (2012) and contradictory to Grassa et al. (2022). It looks that during the pandemic, top management in profitable firms tend to disclose more risk related information to give a positive signal to the market with regard to their capability in managing risk successfully and accomplishing a higher level of financial performance. Hence, risk disclosure would reassure investors about future cash flows and business.

Moreover, aged firms disclose more risk related information during the year 2020 compared to younger firms. Previous researches argue that, over time, aged firms have worked on developing their reporting and enhancing the level of information disclosure (e.g., Alfraih and Almutawa, 2014; Demir and Bahadir, 2014; Grassa et al., 2021). Indeed, while the main priority of younger firms is to improve profitability and increase market share, aged firms might already have developed consistent procedures and management style to deal with the technical aspects of their financial reporting and are more concerned with public image and reputation, improvement of risk management system, and the extent of trust stakeholders. The older a firm has been in operation, the higher its public image is likely to be.

Besides, the regression model reports that foreign companies disclose more RD related information compared to local counterparts. Our findings is consistent with Haniffa and Cooke (2002) and Barako et al. (2006) who reported that foreign ownership increases corporate disclosure.

Table 6 Regression results

	<i>Model (1): ΔRD</i>			<i>Model (2): $\Delta COVID-19 D$</i>		
	<i>coef</i>	<i>t-student</i>	<i>P-value</i>	<i>coef</i>	<i>t-student</i>	<i>P-value</i>
$\Delta FIRM\ SIZE$	-1.58	0.16	0.877	-29.632	2.32	0.025
ΔROA	41.046	1.72**	0.056	-77.91	1.76**	0.041
ΔROE	-1.58	-0.21	0.836	13.503	0.92	0.36
$\Delta LEVERAGE$	-47.16	-1.33	0.189	-59.871	-0.91	0.369
Block	1.08	0.76	0.451	9.432	3.25***	0.002
FIRMAGE	0.507068	2.57***	0.013	-0.971	-2.23**	0.025
FORGN	94.14	2.07**	0.044	98.611	4.76***	0.00
BIG4	17.45	2.91***	0.005	14.233	1.76*	0.072
Adj R-squared	0.7514			0.637		
Number of obs	79			79		

*, **, and *** indicate significance at 10%, 5%, and 1% level. P-value between parentheses.

ΔRD : is the variation of RD index for firm i between the years 2019 and 2020; $\Delta COVID-19 D$: is the variation of number of sentence with Covid-19 related words disclosed between the years:2019 and 2020. $\Delta FIRM\ SIZE$: is the variation of firm size between 2019 and 2020; ΔROA : is the variation of the return on assets for firm i between 2019 and 2020; ΔROE : is the variation of the return on equity for firm i between 2019 and 2020; $\Delta LEVERAGE$: is the variation of the ratio of long-term debt/total assets for firm i between 2019 and 2020; BLOCK: is the number of blockholders for firm i , FIRMAGE: is the age of firm i , FORGN: 1 if the listed firm is a local firm, 0 otherwise i ; BIG4: 1 if the auditor is a big 4 firm, 0 otherwise.

Moreover, we find a complementarity between audit quality, as measured by Big 4 audit firms, and the increase of the disclosed voluntary information. Our finding is consistent with Gerry et al. (2018), Oliveira et al. (2011) and Campbell et al. (2014) who argue that companies audited by a Big 4 audit firm tend to disclose more risk information. Indeed, audit quality control in Big 4 firms is more effective than in other local or regional audit firms (Bedard et al., 2008). Big 4 audit firms have effective quality control, less variability in audit quality, hence, auditors would play an important role in improving the quality of business risk disclosure (Fraser et al., 2010; Fraser and Pierpoint, 2011; Abraham and Cox, 2007).

With regard to the model (2), the regression reports almost the same findings and only Hypothesis 2 is confirmed. However, the variation of ROA is negatively correlated to the Covid-19 related information. It looks that the executives of unprofitable firms tend to disclose more information about the effect of Covid-19 on business operations to justify their bad performance and protect corporate shares from being undervalued.

5.3 Robustness test

As robustness test, we test the effect of independents variables on the dependent variables without taken into consideration the variation effect. Our OLS equations will be:

Model 3:

$$RD_i = \beta_0 + \beta_1 \text{FIRM SIZE}_i + \beta_2 \text{ROA}_i + \beta_3 \text{ROE}_i + \beta_4 \text{LEVERAGE}_i \\ + \beta_5 \text{FIRMAGE}_i + \beta_6 \text{BLOK}_i + \beta_7 \text{FOREIGN} + \beta_8 \text{BIG4} + \varepsilon_{i,t}$$

Model 4:

$$\text{COVID-19D} = \beta_0 + \beta_1 \text{FIRM SIZE} + \beta_2 \text{ROA} + \beta_3 \text{ROE} + \beta_4 \text{LEVERAGE} \\ + \beta_5 \text{FIRMAGE} + \beta_6 \text{BLOK} + \beta_7 \text{FOREIGN} + \beta_8 \text{BIG4} + \varepsilon_{i,t}$$

where RD is the RD index for firm i for year t; COVID-19D is the number of sentence with Covid-19 related words disclosed, FIRM SIZE is the ln of total assets; ROA is the return on assets; ROE is return on equity; LEVERAGE is the ratio of long-term debt/total assets; BLOCK is the number of blockholders for firm i, FIRMAGE is the age of firm i, FORGN 1 if the listed firm is a local firm, 0 otherwise; BIG4: 1 if the auditor is a big 4 firm, 0 otherwise.

Overall, our regression findings reported in Table 7 confirm and reinforce our main findings reported in Table 6.

Table 7 Robustness Test

	<i>Model (3): RD</i>				<i>Model (4): COVID-19 D</i>			
	<i>2019</i>		<i>2020</i>		<i>2019</i>		<i>2020</i>	
	<i>coef</i>	<i>t-student</i>	<i>coef</i>	<i>t-student</i>	<i>coef</i>	<i>t-student</i>	<i>coef</i>	<i>t-student</i>
COVID-19 D	2.54	1.12	16.6	3.11***				
FIRM SIZE	2.18	0.25	-1.16	-0.27	0.064	2.69**	2.14	1.81*
ROA	7.37	1.72*	-0.96	-0.52	2.682	1.03	-9.77	1.87*
ROE	3.1	2.34**	0.303	0.05	-1.56	-1.86*	-2.25	-1.35
LEVERAGE	1.71	2.08**	2.51	2.51**	-0.47	-0.84	-7.97	-0.27
Block	1.16	1.12	13.14	1.09	-0.0874	-1.24	5.73	1.68*
FIRMAGE	-0.23	-0.17	-0.96	0.6	-0.04	-0.46	-0.353	-0.76
FORGN	8.287	1.15	21.12	2.43**	-0.004	-0.46	7.99	3.6***
BIG4	1.55	3.07***	18.93	3.23***	-0.56	-1.7*	1.178	1.7*
Adj R-squared	0.7765		0.8683		0.2585		0.6483	
Number of obs	79		79		79		79	

*, **, and *** indicate significance at 10%, 5%, and 1% level. P-value between parentheses.

Where RD is the RD index for firm i for year t; COVID-19D is the number of sentences with Covid-19 related words disclosed, FIRM SIZE is the ln of total assets; ROA is the return on assets; ROE is return on equity; LEVERAGE is the ratio of long-term debt/total assets; BLOCK is the number of blockholders for firm i, FIRMAGE is the age of firm i, FORGN 1 if the listed firm is a local firm, 0 otherwise; BIG4: 1 if the auditor is a big 4 firm, 0 otherwise.

6 Conclusion

The Covid-19 pandemic has increased the level of uncertainty in many business sectors, which in turn increased the stakeholders' demand for transparency and information with regard to risk management. This paper assesses the extent of RD during the Covid-19 pandemic and the main factors pushing firms to increase (or decrease) the quantity of disclosed risk related information during the epidemic.

We employed a narrative disclosure technique on the annual reports of 78 UAE listed companies for the period 2018/2019 that immediately preceded the occurrence of the pandemic and the year 2020, the pandemic year. Our paper's findings provide the following evidence. First, RD has increased considerably from year 2019 (pre-pandemic year) to 2020 (pandemic year). The highest increase of RD has been reported for logistics and transportation sector, then manufacturing sector then financial sector. The lowest change of RD has been observed for the energy sector then for the telecommunication sector. Second, most of the RD change has been observed for pandemic related words, as it increased considerably. Third, the findings report that RD increased with the increase of firm profitability. Fourth, aged firms and foreign firms have increased RD related information during the pandemic. Fifth, research findings show a complementarity between audit quality, as measured by Big 4 audit firms, and the increase of the disclosed RD related information. Sixth, the decrease of ROA is significantly correlated to the Covid-19 related information disclosure. It looks that the executives of unprofitable firms tend to disclose more information about the effect of covid-19 on business operations to justify their bad performance and protect corporate shares from being undervalued.

The paper's findings would be relevant for regulators, supervisory authority and shareholders.. First, this paper sheds light on the importance of audit quality to improve firm transparency in emerging market, which would be relevant for investors and regulators. Second, the finding of this paper may be beneficial for the regulatory setters to better understand the determinants of firms providing generic or meaningful Covid-19 information. The finding of this research would be informative for the International Accounting Standards Board's (IASB) ongoing consideration of risk reporting in the crisis period.

Although this research is one of the pioneering studies that investigate the effect of Covid-19 pandemic on the RD of UAE listed companies, it still suffers from some caveats. First, we scored the annual reports (subjectively) manually. Second, our study focused only on UAE context, so we cannot generalise the findings. Third, our sample is limited to 78 firms, due to unavailability of some annual reports. Future research may replicate our study in other contexts and compare the findings. In addition, future research may assess the level of corporate RD before, during and after the pandemic and identify the main determinants. We believe also, that increasing the sample size and inter country comparison will help to generalise the findings.

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