

Erasmus University Rotterdam

Erasmus School of Economics

Master Thesis Accounting, Auditing & Control (Audit track)

The Impact of the COVID-19 Pandemic on the Issuance of Going Concern Audit Opinion in the Manufacturing Industry: An Empirical Analysis

A B S T R A C T

This paper investigates the impact of the COVID-19 crisis that occurred in 2020-2021 on the propensity to issue a going concern audit opinion, with a focus on companies operating in the manufacturing industry. Going concern opinion is defined as a proxy for auditor conservatism. To address this research question, logistic regression models are developed using data from a sample of SEC-registered firms for the period of 2019-2021.

I find strong evidence that there is an increase in the likelihood of issuing going concern audit opinion during the COVID-19 crisis. The results indicate that Big 4 audit firms do not apply more audit conservatism as they are less likely to issue a going concern opinion during the pandemic crisis compared to non-Big 4 audit firms. I also find that manufacturing companies are slightly more likely to receive a going concern audit opinion during the COVID-19 pandemic compared to firms operating in other sectors; in line with my expectations.

Keywords: COVID-19; GCO; manufacturing; auditor; crisis

AUTHOR: Dora Faskerti

STUDENT ID: 615492

SUPERVISOR: C. Antoons

SECOND ASSESSOR: N. Lehmann

SUBMISSION DATE: 23rd October 2023

The content of this thesis is the sole responsibility of the author and does not reflect the view of either the supervisor, second assessor, Erasmus School of Economics or Erasmus University.

TABLE OF CONTENTS

- 1. INTRODUCTION..... 3
- 2. LITERATURE REVIEW..... 5
 - 2.1 The complexity of going concern opinion..... 5
 - 2.2 Auditor conservatism..... 7
 - 2.2.1 COVID-19 pandemic and GCO..... 8
 - 2.2.2 COVID-19 as a financial crisis 9
 - 2.2.3 Developing Hypothesis H1 10
 - 2.3 Auditor firm size..... 11
 - 2.3.1 Developing Hypothesis H2 11
 - 2.4. Focus on the Manufacturing Industry..... 12
 - 2.4.1 Developing Hypothesis H3 12
- 3. RESEARCH DESIGN 13
 - 3.1 Data and sample selection 13
 - 3.2 Principal Component Analysis (“PCA”) on financial performance measures 13
 - 3.2.1 Results..... 14
 - 3.3 Logistic Regression Models 15
 - 3.3.1 Testing Hypothesis 1: Auditor conservatism..... 15
 - 3.3.2 Testing Hypothesis 2: Audit firm size 17
 - 3.3.3 Testing Hypothesis 3: Manufacturing industry..... 18
- 4. ANALYSIS & RESULTS..... 19
 - 4.1 Descriptive statistics 19
 - 4.2 Results from the Regression Model 1 (Hypothesis 1)..... 21
 - 4.3 Results from the Regression Model 2 (Hypothesis 2)..... 23
 - 4.4 Results from the Regression Model 3 (Hypothesis 3)..... 25
- 5. CONCLUSION..... 27
- 6. APPENDIX 29
- 7. REFERENCES..... 38

1. INTRODUCTION

The emergence of the COVID-19 pandemic in 2020 brought forth unprecedented challenges and caused disruptions in the world. The widespread lockdowns resulted in disrupted supply chains, falling revenues, and financial distress all over the world. As businesses grapple with the far-reaching consequences of the pandemic, auditors and investors are compelled to assess the financial viability and sustainability of corporates. In times of uncertainty and economic volatility, the going concern opinion (“GCO”) issued by auditors has gained significant prominence (Arnold, 2020). Assessing the going concern of a company is “often complex analyses that frequently involve significant judgments related to future cash flows” (Arnold, 2020).

The going concern assumption has been one of the key principles of the Conceptual Framework for Financial Reporting issued by the IASB (2018)¹. The financial statements are normally prepared on the assumption that an entity is a going concern and will continue in existence for the foreseeable future – usually at least 12 months after the end of the reporting period (Conceptual Framework para 3.9, ISA 570 Para. 2²). If a company is “unable to continue as a going concern” (ISA 570.2), it may have to file for bankruptcy or undergo a restructuring process, which can have significant implications for stakeholders.

Therefore, an auditor must “obtain sufficient appropriate audit evidence regarding the appropriateness of management’s use of the going concern basis of accounting in the preparation of the financial statements, and to conclude [...] whether a material uncertainty exists about the entity’s ability to continue as a going concern.” (ISA 570 Para. 6). Consequently, if the auditor concludes that the entity is unlikely to continue operating in the foreseeable future, a going concern audit opinion is to be issued.

This paper makes an attempt to investigate whether the COVID-19 pandemic has had an effect on the frequency of going concern audit opinion, with a special focus on companies operating in the manufacturing industry. Therefore, I will examine the following research question:

RQ: Did the propensity of going concern audit opinion increase in the manufacturing industry due to the COVID-19 pandemic?

¹ International Accounting Standards Board

² International Standard on Auditing 570 (Revised): Going Concern

To answer the above research question, three hypothesis tests are formulated, using a sample of 8,882 audit reports from 3,516 SEC-registered companies.

First, I examine whether the pandemic crisis resulted in increased auditor conservatism, meaning that more GCOs are likely to be issued during the COVID-19 period than before.

Second, I test whether the size of the audit firm – being a Big 4 or a non-Big 4 firm – has a positive effect on the likelihood of a going concern opinion issuance during the pandemic crisis.

Finally, I investigate the manufacturing industry in comparison to other sectors, in terms of the likelihood of receiving a GCO in 2020-2021.

Accordingly, this paper is structured as follows: In Section 2, I present an academic background on the going concern opinion during the period of interest – namely before and during the COVID-19 pandemic. Then I review prior literature on auditor conservatism and GCO and develop my underlying hypotheses. Section 3 describes the methodology of my research. Section 4 presents and explains the results for the three hypotheses; followed by Section 5 which includes a conclusion, suggestions for future research and some limitations of this paper.

2. LITERATURE REVIEW

The primary objective of an auditor is to provide an opinion on the fairness and reliability of an entity's financial statements and express going concern issues (ISA 200³ Para. A1) if there are doubts regarding the company's ability to continue in the foreseeable future (Averio, 2021).

In accordance with ISA 570 on Going Concern, auditors are required to conclude whether – based on the auditor's judgement and obtained sufficient appropriate evidence – “a material uncertainty exists related to events or conditions that, individually or collectively, may cast significant doubt on the entity's ability to continue as a going concern” (ISA 570 Para. 9b). In this section, I summarise the literature on the concept of going concern assessment, its relation to COVID-19 and auditor conservatism.

2.1 The complexity of going concern opinion

Determining whether a company is a going concern is considered one of the most intricate decisions encountered by audit firms (Louwers, 1998). The GCO enhances financial transparency by providing crucial information about a company's financial position and its ability to meet its obligations. A GCO is crucial for shareholders, as it is considered a “red flag” and it can draw public attention, regardless of the type of audit opinion (Averio, 2021). Shareholders rely on GCOs in assessing the risks pertaining to a company's capacity to generate future cash flows.

GCOs are powerful: Carson et al. (2013) find that there is no significant market reaction to qualified audit opinions unless the audit report includes going concern uncertainties. Moreover, Asare and Williams (2015) note that stakeholders tend to place more significance and importance on GCOs than it is intended by the auditors.

According to Asare (1992), the GCO assessment is a two-stage process: the first stage is related to the auditor's judgement “about the client's financial distress or stability” (Geiger et al., 2014). The second stage is the decision of how to formulate this opinion when the auditor determines the nature of the audit opinion regarding the going concern.

Earlier international research clearly distinguished between the presence or absence of a GCO using a binary distinction (Geiger et al., 2019). The auditor should either express an unmodified audit opinion with an Emphasis of Matter (“EOM”) paragraph on going-concern uncertainty

³ International Standard on Auditing 200: Overall Objectives of The Independent Auditor and The Conduct of an Audit In Accordance With International Standards on Auditing

(ISA 570, ISA 701⁴, ISA 706 (Revised)⁵); otherwise, the auditor shall issue a qualified or even an adverse opinion, in accordance with ISA 570.

However, in September 2019, the IAASB⁶ introduced the concept of *material uncertainty* related to a going concern which gives auditors the opportunity to highlight "*non-material*" going concern uncertainties with a modified phrasing as a relevant Key Audit Matter (KAM) (ISA 701 Para. A6), or in an Emphasis of Matter paragraph, or in a voluntary explanatory paragraph to the auditor's opinion, called Other Matter paragraph (ISA 706 Para. 10-11).

The determination of whether a going concern is material or non-material depends on the auditor's judgement and the magnitude of audit evidence collected. A non-material going concern uncertainty is a situation where there is a potential risk regarding the ability of an entity to continue operating in the foreseeable future, but the impact of that uncertainty is considered insignificant in the context of the financial statements according to the auditor. Before the 2019 modification, this type of going concern uncertainty was only included in the Emphasis of Matter paragraph. Geiger et al. (2019) add that such disclosures on non-material going concern uncertainty were fairly uncommon (before 2019) because the users of financial statements have difficulty in properly understanding these disclosures.

This obviously raises the question of the whole concept (of non-material going concern) introduced in September 2019 whether being disclosed as KAM or in an explanatory paragraph contains any valuable information for investors and other financial statement users or they will get confused about how to interpret types of disclosures. Geiger et al. (2019) underline that auditors should consider that a company's non-material going concern uncertainty could lead to a potential bankruptcy rather than the actual issuance of a GCO 'as such'.

On the other hand, Carson et al. (2019) note that negative abnormal stock returns associated with GCOs are notably mitigated if the GCO is preceded by an "early warning" report that includes an "Emphasis of Matter paragraph related going concern uncertainties" (ISA 706 Para. A6, 9). This suggests a gradual effect: an Emphasis of Matter paragraph included in the audit report triggers a negative stock market reaction; however, the magnitude of such reaction is lower compared to a qualified GCO.

As discussed above, the significance of a going concern matter can be described on a wide range in the audit report; and this versatility is reflected in the academic research methodology

⁴ International Standards on Auditing 701: Communicating Key Audit Matters in the Independent Auditor's Report

⁵ International Standards on Auditing 706 (Revised): Emphasis of Matter Paragraphs and Other Matter Paragraphs in the Independent Auditor's Report

⁶ International Auditing and Assurance Standards Board

as well. Carson et al. (2016) review the different types of audit reports with regard to GCO and conclude that more “unmodified EOM” reports for GCOs have been issued in Australia since 2007-08. This is in contrast to prior research – Koh and Tong, 2013; Bruynseels and Cardinaels, 2014; Burke, Convery, and Skaife, 2015 – but these prior papers only consider the material GCO reports but leave out the non-material ones such as KAMs.

Furthermore, Carson et al. (2019) apply a logistic regression model using GCO as a dependent, single binary variable, which includes any type of audit opinion which has a reference to going concern uncertainty. This is the research approach I take in this paper as well.

The new audit reporting formats of GCO introduced in September 2019 is a potential future research field as highlighted by Geiger et al. (2021, p. 147). It could be examined whether the new reporting formats have had an effect on the prevalence of issuing a GCO by the auditors.

2.2 Auditor conservatism

The concept of accounting and auditor conservatism are two sides of the same coin.

Basu (1997) interprets accounting conservatism as “capturing accountants' tendency to require a higher degree of verification for recognizing good news than bad news in financial statements”. In other words, accounting conservatism prioritises the recognition of loss over gain in financial reporting. Prior literature propose that accounting conservatism produces favourable information effects as it serves to hinder managers' inclinations to manipulate accounting information (D’Augusta and DeAngelis, 2020) and addresses challenges related to information asymmetry (LaFond and Watts, 2008).

The weaker the accounting conservatism is, and the more assertive the management’s approach is in manipulating information in financial statements, the more conservative approach auditors need to take.

Auditor conservatism is defined as “...the attestation of an auditor who, when in doubt, disapproves a favourable client report” (Lu and Sapra, 2009). Auditors prioritise the prevention of potential errors or misstatements, which prompts them to exercise greater levels of professional scepticism and apply more rigorous criteria in their evaluations; as a result, it helps to reduce moral hazard. Moreover, auditors adopt conservative procedures to ensure the accuracy and reliability of accounting information, particularly, when there are indications of potential financial distress. Auditor conservatism manifests itself as a protective stance, as

auditors are more likely to express doubts and issue a GCO to avoid the risk of not adequately warning stakeholders about potential financial distress.

During a period of increased economic and financial uncertainty, the role of auditor conservatism becomes more significant (Cui et al., 2021). There is evidence to suggest an increase in the issuance of GCOs after the global financial crisis of 2007-2008 ("GFC") (Carson et al., 2019).

In general, increased auditor conservatism is a natural progress in a high regulatory and inspection risk environment (Carson et al., 2019). The propensity to issue GCOs can serve also as a protection against litigation risk (Xu et al., 2013).

Nevertheless, this trend can indicate a possible cost to the value of audit opinions, as intense public attention may have influenced auditors to adopt a more conservative approach. Carson et al. (2019) conclude that such an increase in the issuance of GCOs is the result of auditor conservatism in response to increased regulatory scrutiny. Carson et al. (2019) raise concerns about the potential decline in the "accuracy" of audit reporting in terms of effectively signalling the financial struggles of companies that do not ultimately fail. In other words, the increased prevalence of GCOs suggests that a high level of auditor conservatism may potentially result in an overstatement of going concern uncertainty (Carson et al., 2019).

In the next section (2.2), I explore the link between auditor conservatism and the COVID-19 pandemic. Moreover, I show that the pandemic caused a financial crisis similar to the GFC in 2007-2008.

2.2.1 COVID-19 pandemic and GCO

The World Health Organization ("WHO", 2020) confirmed the COVID-19 pandemic as a global pandemic on 11th March 2020. Business closures and a cessation of in-person trade made the economic effects of the ensuing shutdowns instantly clear. Entire industries were struggling financially.

As the pandemic is a relatively recent phenomenon, there has not been extensive, in-depth academic research on the effects of COVID-19 on audit opinions. Albitar et al. (2020) were the first to examine the theoretical impact of COVID-19 on five attributes of audit quality – one of them is the GCO. They concluded that the pandemic has a significant impact on going concern assessment and it is likely that audit quality does not remain unchanged.

Heltzer and Mindak (2021) conducted the first extensive study examining the effects of COVID-19 on the various aspects of the accounting and audit profession and concluded that auditors found it particularly difficult to assess – both in the short- and long-term – the going concern of their clients due to the COVID-19 pandemic. Auditors admitted that COVID-19 caused exceptional challenges to determine a client's long-term viability as a going concern due to the pandemic's uncertainty and disruptions. However, that paper is based on survey research which can result in response bias and social desirability bias.

2.2.2 COVID-19 as a financial crisis

It is useful to compare the COVID-19 pandemic with the global financial crisis from a financial perspective. Although there are a lot of differences in the underlying causes, the magnitude of recovery and duration, both these events caused significant disruptions in financial markets and investor confidence and led to global recession.

The pandemic was the worst economic shock since the global financial crisis (Gopinath, 2020). The Dow Jones and FTSE indexes both saw their worst quarterly declines in the first three months in 2020 since 1987, signalling a significant decline in stock markets (Jones et al., 2021). Equity markets were significantly impacted, which caused a liquidity crisis for numerous companies. This crisis has resulted in a decline in cash flows and an increase in default risk (Acharya and Steffen, 2020). Cui et al. (2021) highlight that companies that suffered from significant declines in sales faced considerable uncertainty regarding the scale and duration of the economic consequences stemming from the pandemic.

Cui et al. (2021) add that the quality of accounting information became more important for capital markets, investors, and financial statement users during the COVID-19 pandemic period than before. The pandemic created a sense of uncertainty among investors, leading them to raise doubts about the accuracy and credibility of financial information (D'Augusta and Grossetti, 2022).

In fact, the responsibility of auditors in going concern assessment becomes even more challenging during periods of economic shocks, because companies are already more likely to be in increased financial distress (Geiger et al., 2014). Typically, circumstances or events that prompt uncertainties about a client's continuity involve negative trends such as persistent operating losses, unfavourable working capital, negative cash flow from operating activities,

and a downturn in financial ratios (Asare and Williams, 2015) – paralleling the difficulties experienced by businesses during the COVID-19 pandemic.

In the context of a financial crisis, one observes greater regulatory scrutiny, an elevated risk of audit failure and reputational damage, and an increased likelihood of litigation risk (Xu et al., 2013). Therefore, to maintain an acceptable level of audit risk, it is reasonable that auditors are likely to be more conservative and issue more GCO reports. However, there is contradictory literature regarding the effect on the issuance of the GCOs in times of financial crisis.

On one hand, Geiger et al. (2014) find that audit firms issued more GCOs during the GFC. They add that the reason for that was increased auditor conservatism during the GFC: auditors issued more conservative audit reports than in the pre-GFC period.

Xu et al. (2011) also document a significant rise in the issuance of GCO during the financial crisis. The frequency increased from an average of 12% in the pre-GFC period to approximately 18-22% in 2008-2009. They emphasize that during a financial crisis, auditors face increased challenges in obtaining sufficient appropriate audit evidence to mitigate audit risk to an acceptable level. (It is worth noting here that during the COVID-19 pandemic, in periods of complete lockdowns and due to the lack of personal contacts, it was even harder to obtain audit evidence.)

Carson et al. (2019) conclude that – in order to maintain an acceptable level of audit risk- auditors opt to be more conservative and issue more GCO reports. Beams and Yan (2015) also confirm that the financial crisis affected auditor conservatism in the form of increased GCOs.

On the other hand, research by Mareque et al. (2017) suggests that the percentage of reports with going concern qualifications remained unchanged both before and amid the financial crisis.

2.2.3 Developing Hypothesis H1

Given the contradictory literature on the effects of a financial crisis on going concern audit opinions, I formulate the first directional hypothesis regarding the main dependent variable, going concern opinion. I anticipate that following a significant economic event – such as the pandemic – auditors issue more GCOs as a result of their increased conservatism. Here I consider GCO as an indicator of auditor conservatism.

Hypothesis 1: COVID-19 resulted in stronger auditor conservatism, meaning that the likelihood of the issuance of GCOs increased during the COVID-19 period.

2.3 Auditor firm size

There are contradictory theories as to whether Big 4 audit firms opt for a more conservative approach or non-Big 4 firms do so.

Big 4 firms have higher reputational costs, higher litigation risk (Geiger and Rama, 2006) and ‘deeper pockets’ (DeAngelo, 1981), so they have certainly more to lose if an audit fails. This means Big 4 firms are likely to be more conservative than non-Big 4 firms (Xu et al., 2013). Moreover, Big 4 firms have a tendency to respond differently to systematic economic events than non-Big 4 auditors. In response to the GFC in Australia, the Big 4 audit firms demonstrated a faster reaction by issuing a higher number of GCOs compared to non-Big audit 4 firms after the beginning of the GFC (Geiger et al., 2014).

However, Xu et al. (2013) argue that non-Big 4 audit firms may opt for a qualified GCO report as means of compensating for their perceived lower competence in a risky environment to mitigate the potential client risk in uncertain circumstances. This is also confirmed by Kaplan and Williams (2012), while Carson et al. (2016) found that non-Big 4 firms appear to give more GCOs.

On the other hand, Beams and Yan (2015) found that both Big 4 firms and non-Big 4 firms became more conservative during the financial crisis by issuing more GCOs. Moreover, Foster and Shastri (2016) conclude that there is no difference between Big 4 and non-Big 4 audit firms in the number GCOs being issued, suggesting that auditor size does not make a difference in audit quality – measured by the issuance of GCOs.

2.3.1 Developing Hypothesis H2

Accordingly, there are contradictory findings regarding the issuance of GCOs by Big 4 versus non-Big 4 audit firms. My assumption in this paper is that Big 4 audit firms have better technology and more human and financial resources to detect and properly evaluate going concern issues, therefore the auditor size does play a role in the number of issued GCOs. Therefore, I formulate the second directional hypothesis as follows:

Hypothesis 2: Big 4 auditors are generally more likely to issue a GCO than non-Big 4 auditors during COVID-19.

2.4. Focus on the Manufacturing Industry

Prior literature reveals that the pandemic heavily impacted the manufacturing industry (e.g., Kapoor et al., 2021; Ardolino et al., 2022). Both PwC (2020) and KPMG (2020) highlight that the manufacturing industry faced multiple complexities in 2020 from supply chain problems to constrained access to base raw materials. In a survey conducted in the US by the NAM⁷ in 2021, 78 % of respondents reported a financial impact due to COVID-19.

NAM reports that the pandemic has led to reduced demand for goods and services, which negatively impacted the whole manufacturing industry. On the supply side, many manufacturing companies faced shortages of critical materials and components, and some had to temporarily halt production due to supply chain disruptions (Harapko, 2023). As a consequence, according to the U.S. Census Bureau data, the manufacturing industry (NAICS 311-319) experienced a 10% decline in revenue from 2019 to 2020. Within the US manufacturing industry, Transportation Equipment Manufacturing (NAICS 336) (with -14.6%), Apparel Manufacturing (NAICS 315) (with -14.5%), and Leather and Allied Product Manufacturing (NAICS 316) (with -14.3%) were the most negatively impacted sub-industry sectors in terms of total revenue decline in 2020. According to Coffin et al. (2022), the US automotive industry faced a significant downturn in 2020, witnessing a decline of over 15% in sales of new vehicles compared to 2019 —marking the steepest annual decline since 1980.

Production side difficulties and falling demand led to declining revenues, financial distress, and an increased likelihood of going concern opinions being issued. As a consequence, in the first 7 months of 2020, half of the issued going concern qualifications occurred in the manufacturing industry (Audit Analytics, 2020).

Therefore, I believe that the manufacturing industry is the right sector to further explore the impact of the COVID-19 pandemic on GCO audit reports.

2.4.1 Developing Hypothesis H3

The final hypothesis of my research aims to investigate whether GCOs were issued more frequently for companies operating in the manufacturing industry compared to other sectors, during the COVID-19 period:

Hypothesis 3: Manufacturing companies are more likely to receive a GCO during the COVID-19 pandemic compared to companies operating in other industries

⁷ National Association of Manufacturers

3. RESEARCH DESIGN

3.1 Data and sample selection

I obtain the data for my research from two sources. Audit opinion data is extracted from the Audit Analytics database. Annual financial data, financial ratios based on annual financial data and company listing data are sourced from the Compustat database. My primary focus is on both public and private companies that are registered with the U.S. Securities and Exchange Commission (SEC). SEC registrants are obliged to provide audited annual reports (including financial statements) as part of their regulatory compliance; therefore, this register provides a bigger sample than publicly listed companies only.

The sample covers the period of 2019–2021 where the year 2019 is defined as pre COVID-19 period and the years 2020-2021 are defined as the COVID-19 period.

I initially collect 35,300 audit reports of the research period for companies registered with the SEC. Similar to other research papers in the literature (Geiger et al., 2014) I exclude companies which operate in financial services, due to their different financial reporting requirements.

After that non-randomly missing⁸ values are excluded, resulting in the final sample size of 8,882 firm-year observations (2,870 in 2019, 3,042 in 2020 and 2,970 in 2021) from 3,516 SEC-registered companies, in the merged database consisting of Compustat and Audit Analytics data. Randomly missing values are handled with mean imputation. Finally, all continuous variables are rounded to three decimal points and winsorized on the top and bottom 1%, to mitigate outliers.

3.2 Principal Component Analysis (“PCA”) on financial performance measures

Several studies have examined the impact of the GFC or the COVID-19 crisis on financial performance (Madaleno and Barbuta-Misu, 2019; Devi et al., 2020; Jabeur et al., 2020; Cui et al., 2021; Ahmad et al., 2023). They all conclude that several financial performance measures are impacted during a financial crisis. Furthermore, as highlighted by Periokaite and Dobrovolskiene (2021), the financial performance of a company is influenced by the COVID-19.

⁸ I define non-randomly missing values when financial reporting data is not available for a company. This may be due to missing reporting or certain regulatory reporting requirements that is industry specific.

As a useful analogy, Larcker et al. (2007) conducted an exploratory principal component analysis on corporate governance measures to investigate the correlation between corporate governance and audit quality. As a result of their PCA, the number of dimensions of corporate governance indices is reduced by identifying patterns among the original variables. This is a useful approach for this paper as well, in order to avoid selection bias and address multicollinearity.

In this paper, I conduct a PCA with a sample period of 2020-2021 in order to incorporate a wide range of financial performance measures which are likely to have an effect on the likelihood of a GCO. I aim to encompass a comprehensive set of dominant financial performance indicators, albeit with reduced dimensions, to precisely capture firm performance.

The resulting Principal Components (“PC”) are then included as control variables in my logistic regression models in order to eliminate their impact and reduce the variances in the model.

Following the approach of Larcker et al. (2007), I extracted 23 financial statement ratios directly from the Compustat database and created two more ratios – cash ratio and gross profit to total assets ratio – from financial statement data available from Compustat. Appendix 1 summarises these 25 financial indicators used in the PCA, and Appendix 2 shows their descriptive statistics.

3.2.1 Results

In the PCA I identify the underlying structure of financial performance and determine which measures are associated (and summarised in) with each PC. The objective is to see whether the selected measures exhibit strong predictive power.

First, I retain and filter all factors with an eigenvalue greater than 1.00. As a result, eight factors remain, representing 73.6% of the total variance in the original dataset. The factors are further reduced to four to enhance the interpretability of the PCA solution, in accordance with the suggestions of Gan (2023) (see Appendix 3). Appendix 4 summarises the correlation among the original variables.

In PC1, cash ratio, net profit margin and cash-to-debt ratio have the largest contributing factors. These indicators mainly reflect the company's liquidity. Moreover, according to Desai et al., (2020) and Geiger et al., (2019), 81% of clients which received a going concern opinion have difficulty in generating sufficient profits and 56% of the cases include liquidity concerns. The common element is the presence of cash, which contributes to both short-term liquidity and long-term solvency. I named this principal component as “Viability”.

PC2 contains three indicators – debt to asset ratio, capitalisation ratio and current debt ratio, and it reflects the importance of leverage and capital structure. In previous literature, Geiger et al. (2021) confirm that leverage is positively associated with a higher propensity to receive a GCO. This factor is therefore named as “Leverage”.

Asset turnover, sales to invested capital and R&D expense to revenue have the largest contributing factors in dimension 3. PC3 reflects patterns of capital utilisation and operational efficiency. The key element is the effective utilisation of invested capital, which contributes to revenue generation, therefore, PC3 is named ”Operational efficiency”.

Finally, the last dimension includes debt to EBITDA, ROE and Enterprise Value Multiple. The common element is the form of earnings – which contributes to the company's overall financial stability; therefore PC 4 is named “Profitability”.

Table 4: Financial performance indices – Principal component construction

Dimension	Name	Composition
PC1	Viability	= Cash ratio + Cash to debt ratio + Net profit margin
PC2	Leverage	= Debt to Asset ratio + Current Debt ratio + Capitalisation ratio
PC3	Operational efficiency	= Asset turnover + R&D Expense ratio + Sales to Invested capital
PC4	Profitability	= Debt to EBITDA + Return on Equity + Enterprise Value

3.3 Logistic Regression Models

3.3.1 Testing Hypothesis 1: Auditor conservatism

Based on prior research on GCO (Geiger et al., 2005; Fargher and Jiang, 2008; Feldmann and Read, 2010) I use the following logistic regression model to test H1 in the period 2019-2021. I expect β_1 to be positive:

$$\begin{aligned}
 GCO = & \beta_0 + \beta_1 * COVID19 + \beta_2 * PC1 + \beta_3 * PC2 + \beta_4 * PC3 + \beta_5 * PC4 + \beta_6 \\
 & * AUDLAG + \beta_7 * SIZE + \beta_8 * INV + \beta_9 * ZSCORE + \beta_{10} * REV \\
 & + \beta_{11} * LLOSS + \beta_{12} * DEBTORS + \varepsilon
 \end{aligned}
 \tag{1}$$

In this model, I included an industry fixed effect estimator to ensure that companies in the sample are comparable across different industry sectors, thereby alleviating estimation bias from omitted variables (Xu et al., 2013).

Dependent variable

- GCO = indicator variable, taking the value of 1 if the current year's audit report includes a going concern opinion (encompassing a going concern qualification, modification, mention of going concern as a Key Audit Matter (KAM), or an Emphasis of Matter related to a going concern issue), and 0 otherwise.

Independent variables

- COVID19 = indicator variable, 0 for 2019 and 1 for observations in 2020-2021

Control variables

- PC1 = Viability = $\text{cash_ratio} + \text{npm} + \text{cash_lt}$
- PC2 = Leverage = $\text{debt_at} + \text{capital_ratio} + \text{curr_debt}$
- PC3 = Operational efficiency = $\text{at_turn} + \text{rd_sale} + \text{sale_invcap}$
- PC4 = Profitability = $\text{debt_ebitda} + \text{evm} + \text{roe}$
- SIZE = client size, natural logarithm of total assets (in millions of dollars);
- AUDLAG = audit lag, square root of the number of days from fiscal year-end to audit report filing date;
- ZSCORE = an indicator of the probability of bankruptcy, determined by Altman's Z-Score;⁹(Geiger et al., 2021)
- INV = inventory divided by total assets (Xu et al., 2013);
- DEBTORS = total receivables divided by total assets (Xu et al., 2013);
- LLOSS = indicator variable, with a value of 1 if the client reports a loss in any of the years 2019-21, and 0 otherwise (Carson et al., 2019);
- REV = natural logarithm of total sales (in millions of dollars) (Rickling et al., 2020);

⁹ $A*3.3 + B*0.99 + C*0.6 + D*1.2 + E*1.4$, where A=EBIT/Total Assets; B=Net Sales /Total Assets; C=Market Value of Equity / Total Debt; D=Working Capital/Total Assets; E=Retained Earnings /Total Assets. The higher the Z-Score, the less likely clients will go bankrupt (Altman, 1968).

3.3.2 Testing Hypothesis 2: Audit firm size

For Model 2, I adopt the going concern model used by Berglund et al. (2018) with a slight modification regarding the used control variables. To specifically assess the impact of auditor firm size, I narrow down my sample to the Covid-19 period (2020-2021), reducing the observations from 8,882 to 6,012. My objective is to investigate whether BIG 4 audit firms exhibit a higher likelihood of issuing a going concern opinion during the pandemic period. To test H2, the following logistic regression model is applied:

$$\begin{aligned} GCO = & \beta_0 + \beta_1 * BIG4 + \beta_2 * AUDLAG + \beta_3 * SIZE + \beta_4 * INV + \beta_5 * ZSCORE \\ & + \beta_6 * REV + \beta_7 * LLOSS + \beta_8 * DEBTORS + \beta_9 * PC1 + \beta_{10} * PC2 \\ & + \beta_{11} * PC3 + \beta_{12} * PC4 + \varepsilon \end{aligned} \quad (2)$$

In examining whether the Big 4 auditors are inclined to give a going concern opinion, it is important to consider the financial state of their clients (the companies). In Model 2, the principal components factors are added to the control variables (Berglund et al., 2018) again. I assume that when comparing clients with similar financial conditions, Big 4 auditors are more likely to issue a GCO, exercising stronger auditor conservatism.

Dependent variable

- GCO = indicator variable, taking the value of 1 if the current year's audit report includes a going concern opinion (encompassing a going concern qualification, modification, mention of going concern as a Key Audit Matter (KAM), or an Emphasis of Matter related to a going concern issue), and 0 otherwise.

Independent variables

- BIG4 = indicator variable, 1 if the auditor is KPMG, EY, Deloitte, or PricewaterhouseCoopers, and 0 otherwise (Data Source: Audit Analytics);

Control variables

- SIZE = client size, natural logarithm of total assets (in millions of dollars);
- AUDLAG = audit lag, square root of the number of days from fiscal year-end to audit report filing date;
- ZSCORE = an indicator of the probability of bankruptcy, determined by Altman's Z-Score;
- PC1 = Viability = cash_ratio + npm + cash_lt

- PC2 = Leverage = debt_at + capital_ratio + curr_debt
- PC3 = Operational efficiency = at_turn + rd_sale + sale_invcap
- PC4 = Profitability = debt_ebitda + evm + roe
- INV = inventory divided by total assets;
- DEBTORS = total receivables divided by total assets;
- LLOSS = indicator variable, with a value of 1 if the client reports a loss in any of the years 2019-21, and 0 otherwise (Carson et al., 2019);
- REV = natural logarithm of total sales (in millions of dollars);

3.3.3 Testing Hypothesis 3: Manufacturing industry

Xu et al. (2013) use an indicator variable for mining and IT sectors in their main going concern model. Similarly, I use an independent variable to indicate the manufacturing sector in this logistic regression model. Like in Model 2, the sample size is reduced also here (from 8,882 to 6,012), and the period of interest is the years 2020-2021, the pandemic period.

In my hypothesis, I expect the coefficient β_1 to be significant and positive.

$$\begin{aligned}
 GCO = & \beta_0 + \beta_1 * IND + \beta_2 * AUDLAG + \beta_2 * SIZE + \beta_4 * INV + \beta_5 * ZSCORE \\
 & + \beta_6 * REV + \beta_7 * LLOSS + \beta_8 * DEBTORS + \beta_9 * PC1 + \beta_{10} * PC2 \\
 & + \beta_{11} * PC3 + \beta_{12} * PC4 + \varepsilon
 \end{aligned}
 \tag{3}$$

Dependent variable

- GCO = indicator variable, taking the value of 1 if the current year's audit report includes a going concern opinion (encompassing a going concern qualification, modification, mention of going concern as a Key Audit Matter (KAM), or an Emphasis of Matter related to a going concern issue), and 0 otherwise.

Independent variables

- IND = indicator variable, it is 1 if the client is in the manufacturing industry, 0 otherwise;¹⁰

Control variables

- SIZE = client size, natural logarithm of total assets (in millions of dollars);

¹⁰ This is based on the NAICS industry code: a company operates in the manufacturing industry if the NAICS code number starts in between 31-33. See Appendix 8 for subsectors included in the manufacturing industry.

- AUDLAG = audit lag, square root of the number of days from fiscal year-end to audit report filing date;
- ZSCORE = an indicator of the probability of bankruptcy, determined by Altman's Z-Score;
- PC1 = Viability = $\text{cash_ratio} + \text{npm} + \text{cash_lt}$
- PC2 = Leverage = $\text{debt_at} + \text{capital_ratio} + \text{curr_debt}$
- PC3 = Operational efficiency = $\text{at_turn} + \text{rd_sale} + \text{sale_invcap}$
- PC4 = Profitability = $\text{debt_ebitda} + \text{evm} + \text{roe}$
- INV = inventory divided by total assets;
- DEBTORS = total receivables divided by total assets;
- LLOSS = indicator variable, with a value of 1 if the client reports a loss in any of the years 2019-21, and 0 otherwise (Carson et al., 2019);
- REV = natural logarithm of total sales (in millions of dollars);

4. ANALYSIS & RESULTS

4.1 Descriptive statistics

Descriptive statistics for the full sample are presented in Table 5. The full sample contains 8,882 firm-year observations for the period 2019-2021. 64.7% of the annual reports in the sample are audited by a Big 4 audit firm. 43.6 % of the observations report a negative net income, 58 % of annual reports received a going concern opinion during the sample period, and 45.9 % of the observations came from the manufacturing industry.

Table 5: Descriptive Statistics

Variable	Mean	St. Dev.	Median	Min	Max
PC1	0.000	2.433	0.621	-14.446	5.419
PC2	0.000	1.581	0.0672	-10.448	5.791
PC3	0.000	1.476	-0.156	-4.042	7.522
PC4	0.000	1.297	0.054	-6.744	6.378
GCO	0.580	0.494	1	0	1
AUDLAG	7.940	0.970	7.681	5.831	11.358
IND	0.459	0.498	0	0	1
SIZE	6.934	2.292	7.029	2.083	12.379
INV	0.069	0.109	0.011	0.000	0.571
LLOSS	0.435	0.496	0	0	1
DEBTORS	0.161	0.201	0.092	0.000	0.815
REV	6.085	2.500	6.102	-1.377	11.349
ZSCORE	4.061	10.144	2.144	-23.194	59.094
COVID19	0.677	0.468	1	0	1
BIG4	0.647	0.478	1	0	1

4.2 Results from the Regression Model 1 (Hypothesis 1)

I examine whether auditors have a higher propensity to issue a GCO during the pandemic period. The results from the logistic regression Model 1 regarding H1 are shown in Table 6.

Table 6: Logistic regression results for H1

Dependent variable: GCO

	Coeff.	Std. error	t-value	p-value
Constant	0.746**	(0.329)	t = 2.265	p = 0.024
COVID19	0.728***	(0.049)	t = 14.958	p = 0.000
AUDLAG	-0.161***	(0.032)	t = -5.056	p = 0.000
SIZE	0.015	(0.023)	t = 0.650	p = 0.516
INV	-0.269	(0.248)	t = -1.085	p = 0.279
ZSCORE	-0.025***	(0.003)	t = -8.703	p = 0.000
REV	-0.114***	(0.020)	t = -5.820	p = 0.000
LLOSS	0.270***	(0.059)	t = 4.546	p = 0.000
DEBTORS	-1.093***	(0.136)	t = -8.050	p = 0.000
PC1	-0.013	(0.013)	t = -1.009	p = 0.314
PC2	0.096***	(0.019)	t = 5.162	p = 0.000
PC3	-0.024	(0.019)	t = -1.297	p = 0.195
PC4	-0.105***	(0.019)	t = -5.531	p = 0.000
Industry fixed effects	Included			
Observations	8,882			
Log Likelihood	-5,569.891			
Nagelkerke R2	0.243			

*Note: *, **, *** specifies the significance at the 10 percent, 5 percent, and 1 percent levels, respectively (one-tailed tests) for the logistic regression specifications.*

In Model 1, the coefficient of the indicator variable, COVID19 which is positive and significant at the 1% level. This means that auditors exercised stronger conservatism as the likelihood of issuing a going concern opinion has significantly increased in 2020 and 2021 compared to 2019 (pre-COVID-19 period).

Let us take a look at our principal component factor control variables. Only Leverage (PC2) and Profitability (PC4) are statistically significant at a 1% percent level. The odds ratio related to leverage is 1.100 which indicates that for a one-unit increase in leverage, the likelihood of company receiving a GCO increases by approximately 10%. The odds ratio for the profitability coefficient is 0.818 which indicates that the likelihood of firms with a higher profitability to receive a GCO is lower compared to firms with lower profitability. Viability and Operational efficiency are not statistically significant.

Concerning the remaining control variables, all coefficients demonstrate the expected directions based on findings from previous research, with the exception of INV (Xu et al., 2013; Geiger et al., 2014; Rickling et al., 2015, Foster and Shastri, 2016; Carson et al., 2019).

In summary, the findings from Model 1 support Hypothesis 1: indicating that auditors demonstrate an increased level of conservatism in issuing Going Concern opinions during the COVID-19 pandemic compared to the pre-pandemic era.

4.3 Results from the Regression Model 2 (Hypothesis 2)

Table 7 shows whether BIG 4 audit firms are more likely to issue going concern opinion during the pandemic period (2020-2021) compared to non-BIG 4 audit firms.

Table 7: Logistic regression results for H2

Dependent variable: GCO

	Coeff.	Std. error	t-value	p-value
Constant	2.874***	(0.427)	t = 6.736	p = 0.000
BIG4	-0.875***	(0.078)	t = -11.184	p = 0.000
AUDLAG	-0.241***	(0.042)	t = -5.806	p = 0.000
SIZE	0.008	(0.028)	t = 0.278	p = 0.781
ZSCORE	-0.022***	(0.003)	t = -6.734	p = 0.000
INV	-0.214	(0.312)	t = -0.685	p = 0.494
REV	-0.080***	(0.023)	t = -3.422	p = 0.001
DEBTORS	-1.168***	(0.176)	t = -6.647	p = 0.000
LLOSS	0.164***	(0.073)	t = 2.248	p = 0.025
PC1	-0.052***	(0.016)	t = -3.341	p = 0.001
PC2	0.099***	(0.022)	t = 4.511	p = 0.000
PC3	-0.032	(0.023)	t = -1.396	p = 0.163
PC4	-0.057***	(0.022)	t = -2.624	p = 0.009
Industry fixed effects	Included			
Observations	6,012			
Log Likelihood	-3,751.575			
Nagelkerke R2	0.093			
Model Chi-Square	12.687			

*Note: *, **, *** specifies the significance at the 10 percent, 5 percent, and 1 percent levels, respectively (one-tailed tests) for the logistic regression specifications.*

The coefficient of variable BIG4 is negative and statistically significant at a 1% level, suggesting a significant association between the audit firm size and the likelihood of issuing a GCO in the COVID-19 period. The odds ratio is 0.417 which indicates that Big 4 auditors are

less conservative in issuing a going concern opinion during the pandemic crisis than non-Big 4 audit firms. Contrary to my expectations, Hypothesis 2 is not supported.

A straightforward explanation could be that Big 4 audit firms generally have larger and more financially stable clients, with greater financial resources and stronger market positions which help them survive the pandemic period in a better shape. However, by adding to Model 2 the principal components factors as control variables, this factor is eliminated, and my model compares clients with similar financial conditions.

A more plausible explanation is that Big 4 firms have a thorough client acceptance process that is designed to filter out “problematic” or “risky” clients even before accepting the engagement. Accordingly, within the accepted client base of Big 4 firms, the likelihood of issuing a GOC is mitigated compared to less standardised non-Big 4 firms. In other words, the auditor conservatism of Big 4 firms is reflected in their client acceptance process, and not only in their issuance of GCOs. This reasoning is also mentioned in Kaplan and Williams (2012) paper.

Regarding the control variables, it is worth highlighting the coefficient of AUDLAG which is negative and statistically significant (p -value < 0.01). The negative sign implies that a longer period between the fiscal year-end and the audit report issue date is associated with a lower likelihood of receiving a GCO. At first sight, this seems unusual as a long delay usually covers problems or controversies regarding the financial reports, between the client and the auditor. However, a possible explanation could be that a longer audit lag may reflect more time to properly prepare the financial statements, and thoroughly audit them. During the pandemic, in closedown periods, it is logical that auditors needed additional time to collect evidence, verify information, and assess audit risk.

4.4 Results from the Regression Model 3 (Hypothesis 3)

Table 8 presents the results of the last logistic regression Model 3. Here IND stands as the independent variable for the manufacturing industry sector. On the other hand, the industry effects are obviously not excluded.

Table 8: Logistic regression results for H3

Dependent variable: GCO

	Coeff.	Std. error	t-value	p-value
Constant	1.873***	(0.422)	t = 4.435	p = 0.000
IND	0.122*	(0.066)	t = 1.858	p = 0.064
AUDLAG	-0.126***	(0.040)	t = -3.153	p = 0.002
SIZE	-0.047*	(0.028)	t = -1.674	p = 0.095
ZSCORE	-0.021***	(0.003)	t = -6.611	p = 0.000
LLOSS	0.275***	(0.071)	t = 3.856	p = 0.000
INV	-0.201	(0.320)	t = -0.628	p = 0.531
DEBTORS	-0.605***	(0.170)	t = -3.567	p = 0.000
REV	-0.046**	(0.023)	t = -1.995	p = 0.047
PC1	-0.066***	(0.016)	t = -4.110	p = 0.000
PC2	0.086***	(0.022)	t = 3.964	p = 0.000
PC3	-0.053**	(0.022)	t = -2.379	p = 0.018
PC4	-0.068***	(0.021)	t = -3.191	p = 0.002
Observations	6,012			
Log Likelihood	-3,814.667			
Nagelkerke R2	0.308			
Model Chi-Square	186.208			

*Note: *, **, *** specifies the significance at the 10 percent, 5 percent, and 1 percent levels, respectively (one-tailed tests) for the logistic regression specifications.*

The coefficient of IND is 0.122, and statistically moderately significant (at (10% level) which means that there is moderate evidence to conclude that the coefficient of IND is significantly different from zero. In other words, there is some statistical evidence to claim that companies

operating in the manufacturing industry have a higher likelihood of receiving a GCO during the pandemic crisis compared to companies operating in other sectors. Overall, this indicates that Hypothesis 3 is supported.

The resulted low coefficient can be explained by a detailed analysis of statistical data. According to the statistics published by the U.S. Bureau of Economic Analysis, the decline in gross output for the whole manufacturing sector was 7.1% in 2020 (compared to 2019), being significantly higher than the negative 3.6% of “All industries” (see Appendix 9). However, it is notable that the finance sector was fairly resilient to the COVID-19 pandemic: “Finance and Insurance” showed even an increase of 2.7% in gross output. Consequently, the non-financial industries must have a higher decline in 2020, exceeding the overall figure of -3.6%.

As previously mentioned, in my research, banks and other financial service companies are excluded, therefore the sample is constructed as follows:

$$\textit{Full sample} = \textit{Manufacturing industry} + (\textit{General economy} - \textit{Banks and financial services} - \textit{Manufacturing industry})$$

It means that the overall effect of COVID-19 was stronger in the sample than in the general economy. Therefore, it well may be that the difference between the severity of the pandemic crisis in the manufacturing sector and in the other (i.e., non-manufacturing and non-finance) sectors in the sample was not so substantial. That can explain the moderate increase in the likelihood of receiving GCO in the manufacturing sector compared to other industries during 2020-2021.

5. CONCLUSION

The aim of this paper is to examine whether the issuance of going concern audit opinion increased during the pandemic crisis, with a special focus on companies which operate in the manufacturing industry. Before constructing the regression models based to test my three hypotheses, I first run a principal component analysis to identify patterns among 25 selected financial performance indices based on annual financial statements prepared during the pandemic period, to avoid selection bias and reduce multicollinearity. As a result, four principal component factors are formulated: Viability, Leverage, Operational efficiency, and Profitability. First, I hypothesise that during the COVID-19 period, auditor conservatism has increased, meaning that the propensity to issue GCOs increased. Using a large data sample from 3,516 SEC-registered companies, I find that – in accordance with my expectations – auditors are more conservative and are more likely to issue going concern opinion during the pandemic crisis compared to the pre-pandemic period of 2019. Therefore, Hypothesis 1 is supported. The findings are consistent with prior research on the effects of a financial crisis as well. Xu et al. (2013) highlight that auditors tend to adopt a conservative approach to safeguard themselves from elevated risk exposure during a crisis.

The existing literature offers conflicting findings on whether Big 4 or non-Big 4 audit firms demonstrate greater conservatism in issuing audit reports with going concern modifications. Contrary to my expectations, the findings for H2 indicate that Big 4 auditors are generally less likely to issue a GCO in the COVID-19 period than non-Big 4 auditors. This could be due to that Big 4 audit firms have a thorough client acceptance process, which effectively exercises part of their auditor conservatism, even before starting the audit engagement, and therefore the need for issuing a going concern opinion is less likely to occur for these audit firms.

Finally, the findings for H3 show that there is weak statistical evidence to suggest that manufacturing companies have a significantly different likelihood of receiving a GCO during the COVID-19 period compared to companies in other industries. This can be due to that in my sample (that excluded financial companies) the difference between the negative impact of the pandemic crisis on the manufacturing sector and the other (i.e., non-manufacturing and non-finance) sectors is fairly moderate.

It is important to note that my findings shall be interpreted with respect to certain limitations, which of course, gives an opportunity for further research. First of all, the sample excludes

banks and companies that operate in the financial services sector. This is consistent with similar prior research studies. Exclusion of banks and the financial service sector may have an effect on the result of H3 as explained in Section 4.4.

Moreover, there is a potential risk of observations lost due to missing data or companies who did not receive an audit opinion in the examined sample period.

The sample period is rather limited – covers only three consecutive years. Once data is fully available for 2022 and 2023, it would be a potential research opportunity to extend the sample period and design a difference in difference model to investigate the post-COVID-19 effects and compare it with the pre-COVID-19 and the COVID-19 period.

The final research opportunity aligns with previous research (Carson et al., 2019; Geiger et al., 2019) to evaluate the accuracy of GCOs. It involves exploring whether the pandemic crisis has had an effect on the likelihood of issuing going concern audit opinions, specifically examining companies that ultimately survive (Type I misclassifications) or file for bankruptcy in the subsequent year (Type II misclassifications) (Carson et al., 2013).

The topic of going concern continues to be of significant interest to academics in the field of accounting and audit research. The findings in this paper can be of interest to auditors, regulators, shareholders, and financial information users. Auditors may use this study as an evaluation of current regulations regarding going concern assessment. In particular, whether auditors continue to exercise an elevated level of professional scepticism regarding important topics, such as going concern assumptions and the associated audit processes.

6. APPENDIX

Appendix 1: PCA – Variable definitions

Table 1: PCA variable information

Variable name	Description
Enterprise value multiple (evm)	Enterprise value/EBITDA
Gross profit margin (gpm)	Gross profit/Total revenue
Net profit margin (npm)	Net profit/Total revenue
Price to sales (ps)	Stock price/Total revenue
Return on asset (roa)	Net income/Total asset
Return on equity (roe)	Net income/Shareholder's equity
Gross profit to asset (gp_at)	Gross profit/Total asset
Capitalisation ratio (capital_ratio)	Total debt/Total debt + Total equity
Cash to debt (cash_lt)	Cash/Total debt
Inventory to current asset (invt_act)	Inventory/Current asset
Debt to asset (debt_at)	Total debt/Total asset
Debt to EBITDA (debt_ebitda)	Total debt/EBITDA
Current debt ratio (curr_debt)	Current debt/Total debt
Debt to Equity (de_ratio)	Total debt/Total equity
Cash ratio (cash_ratio)	Cash/Total current debt
Current ratio (curr_ratio)	Total current asset/Total current debt
Cash conversation (cash_conversion)	Cash flow/Net profit
Inventory turnover (inv_turn)	Cost of goods sold/Average inventory value
Asset turnover (at_turn)	Net revenue/Average total asset
Receivables turnover (rect_turn)	Net revenue/Average total receivable
Payables turnover (pay_turn)	Net revenue/Average total payable
Sales to invested capital (sale_invcap)	Total revenue /Invested capital
R&D expense to sales (rd_sale)	R&D expense/Total revenue
Advertising expense to sales (adv_sale)	Advertising expense/Total revenue

Appendix 2: PCA – Descriptive statistics

Table 2: Descriptive Statistics for PCA

Full sample (N = 8,882)

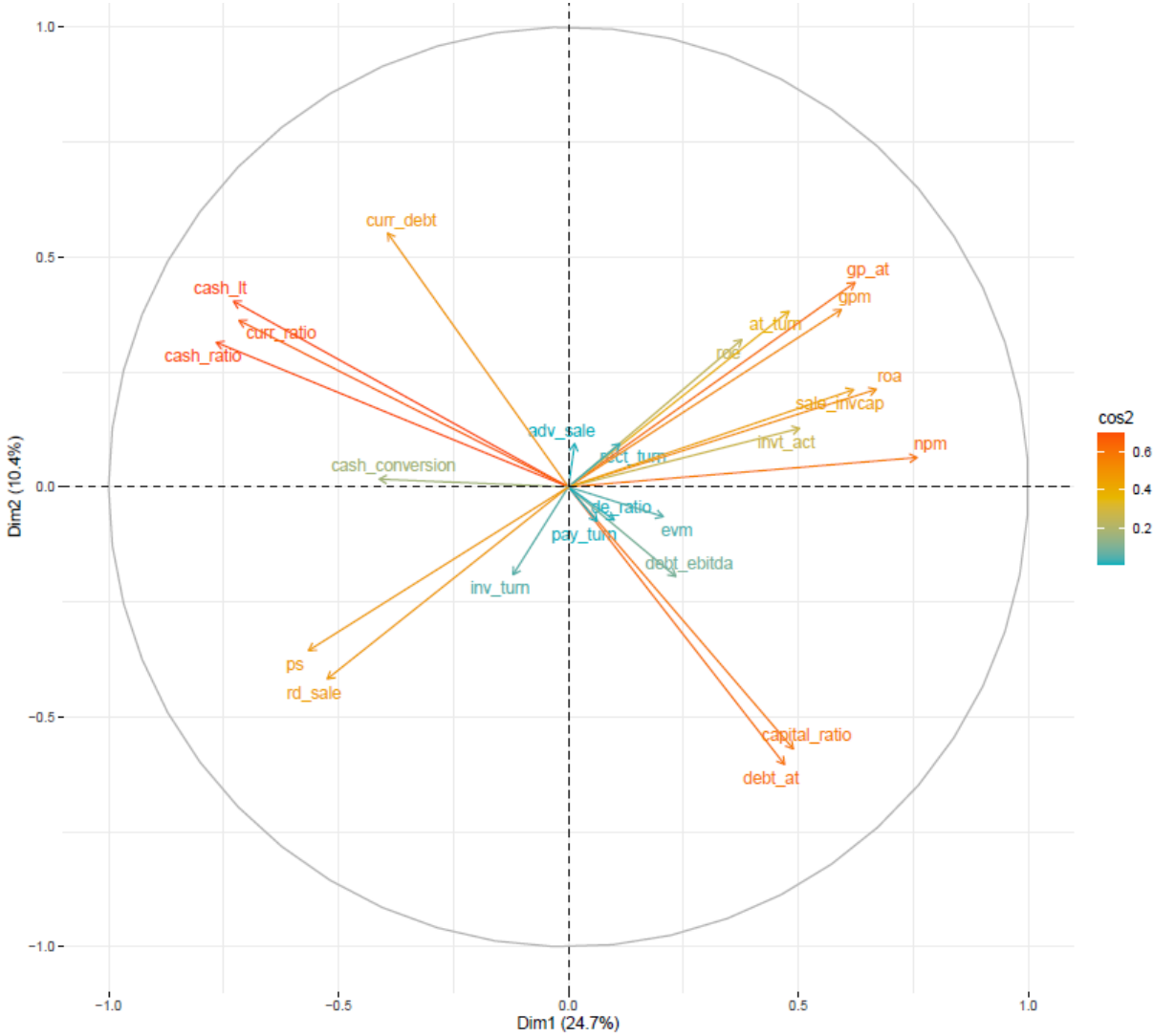
Variable	Mean	St. Dev.	Median	Min	Max
evm	5.653	46.953	8.935	-249.489	220.851
ps	20.408	84.312	2.611	0.096	706.016
npm	-9.064	27.822	0.021	-136.340	0.540
gpm	-1.121	6.916	0.349	-56.760	0.977
roa	-0.061	0.351	0.047	-1.794	0.397
roe	-0.224	0.842	0.027	-5.130	1.287
gp_at	0.186	0.283	0.174	-0.855	1.029
capital_ratio	0.354	0.337	0.295	0.000	1.787
cash_lt	1.405	3.296	0.228	0.003	20.815
inv_t_act	0.163	0.178	0.157	0.000	0.741
debt_at	0.263	0.238	0.214	0.000	1.126
debt_ebitda	2.203	6.729	1.502	-26.820	35.567
curr_debt	0.475	0.241	0.475	0.072	1.000
de_ratio	2.249	4.996	1.178	-18.351	27.624
cash_ratio	2.874	4.598	1.250	0.013	28.087
curr_ratio	4.240	4.634	2.654	0.372	28.813
cash_conversion	1,365.523	1,858.575	129.334	1.978	4,139.106
inv_turn	25.011	38.597	12.318	0.082	285.977
at_turn	0.669	0.594	0.572	0.004	3.000
rect_turn	11.853	20.716	6.377	0.052	147.790
pay_turn	12.104	16.389	7.512	-0.008	106.150
sale_invcap	0.949	1.269	0.673	-1.078	6.857
rd_sale	1.126	5.813	0.000	0.000	47.238
adv_sale	0.015	0.035	0.000	0.000	0.229

Appendix 3: PCA – Retaining principal components

	eigenvalue	Variance percent	Cumulative variance percent
Dim.1	5.921	24.669	24.669
Dim.2	2.499	10.413	35.082
Dim.3	2.177	9.071	44.154
Dim.4	1.683	7.013	51.167
Dim.5	1.581	6.589	57.756
Dim.6	1.378	5.741	63.496
Dim.7	1.308	5.451	68.948
Dim.8	1.118	4.658	73.605

The third column denotes the proportion of variation explained by each dimension. An eigenvalue exceeding 1.000 signals that the component factors elucidate more variance than any single original variable.

Appendix 4: PCA – Biplot of variables of Dim 1 and 2 (Graph 1)



This biplot shows how strongly the characteristics influence a principal component. The angle between the vectors shows how the characteristics correlate with each other. When two vectors form a small angle, it indicates a positive correlation between the variables. If the angle measures exactly 90° between two characteristics, it signifies no correlation between them. Finally, an angle between 90° and 180° suggests a negative correlation between the variables.

Appendix 5: PCA – Odds ratios H1

Table 9: Logistic regression results for H1

Coefficient	Odds Ratio
Constant	2.107
COVID19	2.420
AUDLAG	0.853
SIZE	1.060
INV	0.705
ZSCORE	0.977
REV	0.892
DEBTORS	0.350
LLOSS	1.310
PC1	0.987
PC2	1.100
PC3	0.949
PC4	0.818

Appendix 6: PCA – Odds ratios H2

Table 10: Logistic regression results for H2

Coefficient	Odds Ratio
Constant	17.705
BIG4	0.417
AUDLAG	0.785
SIZE	1.008
ZSCORE	0.979
INV	0.808
REV	0.923
DEBTORS	0.311
LLOSS	1.178
PC1	0.950
PC2	1.104
PC3	0.969
PC4	0.944

Appendix 7: PCA – Odds ratios H3

Coefficient	Odds Ratio
Constant	6.519
IND	1.130
AUDLAG	0.881
SIZE	0.954
ZSCORE	0.979
LLOSS	1.317
INV	0.818
DEBTORS	0.546
REV	0.955
PC1	0.936
PC2	1.090
PC3	0.948
PC4	0.934

Appendix 8: Manufacturing industry subsectors (NAICS 31-33)

Table 12: Manufacturing industry subsectors

NAICS CODE	SUBSECTOR
311	Food manufacturing
312	Beverage and tobacco product manufacturing
313	Textile mills
314	Textile product mills
315	Apparel manufacturing
316	Leather and allied product manufacturing
321	Wood product manufacturing
322	Paper manufacturing
323	Printing and related support activities
324	Petroleum and coal product manufacturing
325	Chemical manufacturing
326	Plastics and rubber products manufacturing
327	Non-metallic mineral product manufacturing
331	Primary metal manufacturing
332	Fabricated metal product manufacturing
333	Machinery manufacturing
334	Computer and electronic product manufacturing
335	Electrical equipment, appliance, and component manufacturing
336	Transportation equipment manufacturing
337	Furniture and related product manufacturing
339	Miscellaneous Manufacturing

Source: U.S. Bureau of Labor Statistics, "Industries at a Glance: NAICS Code Index"

Appendix 9: Percent Changes in Quantity Indexes for Gross Output by Industry
2019-2021

Table 13: Percent Changes in Quantity Indexes for Gross Output by Industry			
	2019	2020	2021
All industries	1.9	-3.6	6.2
Agriculture, forestry, fishing, and hunting	-2.4	4.5	-2.7
Mining	4.9	-14.5	-2.3
Utilities	-0.9	-2.7	2.2
Construction	1.0	1.8	1.0
Manufacturing	-0.3	-7.1	2.0
Wholesale trade	-1.1	-4.1	11.2
Retail trade	0.9	1.1	6.5
Transportation, and warehousing	1.0	-13.1	14.4
Air transportation	4.3	-50.2	63.3
Rail transportation	-3.2	-13.1	8.0
Water transportation	-0.5	-30.6	4.4
Truck transportation	-0.4	-1.3	7.7
Information	4.0	1.6	13.4
Finance and insurance	0.9	2.7	4.7
Funds, trusts, and other financial vehicles	-14.7	25.6	11.9
Professional and business services	5.0	-0.3	11.3
Educational services, health care, and social assistance	2.6	-4.8	4.7
Arts, entertainment, recreation, accommodation, and food services	2.0	-27.3	31.9
Arts, entertainment, and recreation	2.3	-38.1	35.5
Accommodation and food services	1.9	-23.9	31.0
Government	2.5	-0.3	1.6

Source: U.S. Bureau of Economic Analysis, "Percent Changes in Chain-Type Quantity Indexes for Gross Output by Industry".

7. REFERENCES

- Acharya, V. V., & Steffen, S. (2020). The risk of being a fallen angel and the corporate dash for cash amid Covid. *The Review of Corporate Finance Studies*, 9(3), 430–471. <https://doi.org/10.1093/rcfs/cfaa013>
- Ahmad, N., Mobarek, A., Moodhi, R., (2023). Impact of global financial crisis on firm performance in UK: Moderating role of ESG, corporate governance and firm size. *Cogent Business & Management*, 10:1, <https://doi.org/10.1080/23311975.2023.2167548>
- Albitar, K., Gerged, A. M., Kikhia, H. Y., & Hussainey, K. (2020). Auditing in times of social distancing: the effect of COVID-19 on auditing quality. *International Journal of Accounting and Information Management*, 29(1), 169–178. <https://doi.org/10.1108/ijaim-08-2020-0128>
- Altman, E. I., (1968), Financial ratios, discriminant analysis and the prediction of corporate bankruptcy, *The Journal of Finance* 23, 589–609.
- Ardolino, M., Bacchetti, A., & Ivanov, D. (2022). Analysis of the COVID-19 pandemic's impacts on manufacturing: a systematic literature review and future research agenda. *Operations Management Research*, 15(1–2), 551–566. <https://doi.org/10.1007/s12063-021-00225-9>
- Arnold, C. (2020, June 3). Summary of COVID-19 audit considerations. IFAC. <https://www.ifac.org/knowledge-gateway/supporting-international-standards/discussion/summary-covid-19-audit-considerations>
- Asare, S. K. (1992). The auditor's going-concern decision: interaction of task variables and the sequential processing of evidence. *Accounting Review* 67(2): 379–93.
- Asare, S.K. and Williams, D.J. (2015). Auditors' Role in Reporting on a Company's Going Concern Status. In *Wiley Encyclopedia of Management Vol. 1 Accounting* (eds C.L. Cooper, C. Clubb and S. Imam). <https://doi.org/10.1002/9781118785317.weom010020>
- Averio, T. (2021). The analysis of influencing factors on the going concern audit opinion – a study in manufacturing firms in Indonesia. *AJAR (Asian Journal of Accounting Research)*, 6(2), 152–164. <https://doi.org/10.1108/ajar-09-2020-0078>
- Basu, S. (1997). The conservatism principle and the asymmetric timeliness of earnings¹. *Journal of accounting and economics*, 24(1), 3-37.

- Beams, J. D., & Yan, Y. (2015). The effect of financial crisis on auditor conservatism: US evidence. *Accounting Research Journal*, 28(2), 160–171. <https://doi.org/10.1108/arj-06-2013-0033>
- Berglund, N. R., Eshleman, J. D., & Guo, P. (2018). Auditor Size and Going Concern Reporting. *Auditing: A Journal of Practice & Theory*, 37(2), 1–25. <https://doi.org/10.2308/ajpt-51786>
- Blay, A. D., & Geiger, M. A. (2013). Auditor Fees and Auditor Independence: Evidence from Going Concern Reporting Decisions*. *Contemporary Accounting Research*, 30(2), 579–606. <https://doi.org/10.1111/j.1911-3846.2012.01166.x>
- Bruynseels, L., and E. Cardinaels. (2014). The audit committee: Management watchdog or personal friend of the CEO? *The Accounting Review* 89 (1): 113-45.
- Burke, Q. L., A. M. Convery, and H. A. Skaife. (2015). Government contracting and the continuation as a going concern. Working paper, Miami University.
- Carson, E., N. Fargher, M. Geiger, C. Lennox, K. Raghunandan, and M. Willekens. (2013). Auditor reporting on going-concern uncertainty: A research synthesis. *Auditing: A Journal of Practice & Theory* 32 (1): 353-384.
- Carson, E., N. Fargher, and Y. Zhang. (2016). Trends in auditor reporting in Australia: A synthesis and opportunities for research. *Australian Accounting Review* 26(3): 226-242.
- Carson, E., Fargher, N., & Zhang, Y. (2019). Explaining auditors' propensity to issue going-concern opinions in Australia after the global financial crisis. *Accounting and Finance*, 59(4), 2415–2453. <https://doi.org/10.1111/acfi.12313>
- Chen, K. J., & Church, B. K. (1996). Going Concern Opinions and the Market's Reaction to Bankruptcy Filings. *The Accounting Review*, 71(1), 117. <http://repository.ust.hk/ir/Record/1783.1-31832>
- Coffin, D., Downing, D., Horowitz, J., & LaRocca, G. (2022). The Roadblocks of the COVID-19 Pandemic in the U.S. Automotive Industry. *Office of Industries Working Paper ID-091*. <https://doi.org/10.2139/ssrn.4143474>
- Cui, L., Kent, P., Kim, S. W., & Li, S. (2021b). Accounting conservatism and firm performance during the COVID-19 pandemic. *Accounting and Finance*, 61(4), 5543–5579. <https://doi.org/10.1111/acfi.12767>
- DeAngelo, L. E., (1981). Auditor size and audit quality, *Journal of Accounting and Economics* 3, 183–199.

- D'Augusta, C., & DeAngelis, M. D. (2020). Does accounting conservatism discipline qualitative disclosure? Evidence from tone management in the MD&A. *Contemporary Accounting Research*, 37(4), 2287-2318.
- D'Augusta, C., & Grossetti, F. (2022b). How did Covid-19 affect investors' interpretation of earnings news? The role of accounting conservatism. *Finance Research Letters*, 52, 103504. <https://doi.org/10.1016/j.frl.2022.103504>
- Deloitte. (2020). What is the impact of COVID-19 on your going concern assessment? In Deloitte US. <https://www2.deloitte.com/content/dam/Deloitte/au/Documents/audit/deloitte-au-audit-what-impact-covid19-going-concern-assessment-210720.pdf>
- Desai, V., Desai, R., Kim, J. W., & Raghunandan, K. (2020). Are going-concern issues disclosed in audit reports associated with subsequent bankruptcy? evidence from the United States. *International Journal of Auditing*, 24(1), 131-144. doi:10.1111/ijau.12183
- Devi, S., Warasniasih, N. M. S., & Masdiantini, P. R. (2020). The Impact of COVID-19 Pandemic on the Financial Performance of Firms on the Indonesia Stock Exchange. *Journal of Economics, Business, and Accountancy / Ventura*, 23(2). <https://doi.org/10.14414/jebav.v23i2.2313>
- Dube, K., Nhamo, G., & Chikodzi, D. (2021b). COVID-19 pandemic and prospects for recovery of the global aviation industry. *Journal of Air Transport Management*, 92, 102022. <https://doi.org/10.1016/j.jairtraman.2021.102022>
- Fidiana F., Yani P., Suryaningrum, D. H. (2022), Corporate Going Concern in Pandemic Situation: Evidence from Indonesia. *Working Paper*. Available at SSRN: <https://ssrn.com/abstract=4071633> or <http://dx.doi.org/10.2139/ssrn.4071633>
- Foster, B. P., & Shastri, T. (2016). Determinants of going concern opinions and audit fees for development stage enterprises. *Advances in Accounting, Incorporating Advances in International Accounting*, 33, 68– 84. doi.org/ 10.1016/ j.adiac.2016.05.001
- Frick, W. (2022, June 21). How to Survive a Recession and Thrive Afterward. *Harvard Business Review*. <https://hbr.org/2019/05/how-to-survive-a-recession-and-thrive-afterward>
- Gan, Y. (2023) Principal Component Analysis (PCA) [Lecture slides]. Data Analytics. Erasmus University Rotterdam, Erasmus School of Economics.
- Geiger, M. A., & Rama, D. V. (2006). Audit firm size and going-concern reporting accuracy. *Accounting Horizons*, 20(1), 1–17. <https://doi.org/10.2308/acch.2006.20.1.1>

Geiger, M. A., Raghunandan, K., & Riccardi, W. (2014). The global financial crisis: U.S. bankruptcies and going-concern audit opinions. *Accounting Horizons*, 28(1), 59-75. doi:10.2308/acch-50659

Geiger, M. A., Gold, A., & Wallage, P. (2019). A synthesis of research on auditor reporting on going-concern uncertainty: An update and extension. Foundation for Auditing Research.

Geiger, M. A., Gold, A., & Wallage, P. (2021). Auditor going concern reporting: A review of global research and future research opportunities.

Gong, S., Ho, N., Jin, J. Y., & Kanagaretnam, K. (2022). Audit quality and covid-19 restrictions. *Managerial Auditing Journal*, 37(8), 1017–1037. <https://doi.org/10.1108/maj-11-2021-3383>

Gopinath, G. (2020, April 14). The Great Lockdown: Worst Economic Downturn Since the Great Depression. IMF. <https://www.imf.org/en/Blogs/Articles/2020/04/14/blog-weo-the-great-lockdown-worst-economic-downturn-since-the-great-depression>

Harapko, S. (2023, January 6). How COVID-19 impacted supply chains and what comes next. EY – Netherlands. https://www.ey.com/en_nl/supply-chain/how-covid-19-impacted-supply-chains-and-what-comes-next

Hategan, C., Pitorac, R., & Crucean, A. C. (2022). Impact of COVID-19 pandemic on auditors' responsibility: Evidence from European listed companies on key audit matters. *Managerial Auditing Journal*, 37(7), 886-907. doi:10.1108/MAJ-07-2021-3261

Heltzer, W., & Mindak, M. (2021). COVID-19 and the accounting profession. *Journal of Accounting, Ethics and Public Policy*, 22(2), 151-205.

International Accounting Standards Board. (2018). *Conceptual Framework for Financial Reporting*. In ifrs.org. IFRS Foundation. <https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/conceptual-framework-for-financial-reporting.pdf>

International Auditing and Assurance Standards Board. (2009). ISA 200: Overall Objectives of The Independent Auditor and The Conduct of an Audit In Accordance With International Standards on Auditing. IAASB. <https://www.ifac.org/flysystem/azure-private/publications/files/A009%202012%20IAASB%20Handbook%20ISA%20200.pdf>

International Auditing and Assurance Standards Board. (2016). ISA 570 (Revised): Going Concern. IAASB. [https://www.ifac.org/flysystem/azure-private/publications/files/ISA-570-\(Revised\).pdf](https://www.ifac.org/flysystem/azure-private/publications/files/ISA-570-(Revised).pdf)

International Auditing and Assurance Standards Board. (2016). ISA 701: Communicating Key Audit Matters in the Independent Auditor's Report. IAASB. <https://www.iaasb.org/publications/international-standard-auditing-isa-701-new-communicating-key-audit-matters-independent-auditors>

International Auditing and Assurance Standards Board. (2016). ISA 706 (Revised): Emphasis of Matter Paragraphs and Other Matter Paragraphs in the Independent Auditor's Report. IAASB. https://www.ifac.org/flysystem/azure-private/publications/files/ISA-706-Revised_0.pdf

Jabeur, S. B., Hassine, R. B. H., & Mefteh-Wali, S. (2020). Firm financial performance during the financial crisis: A French case study. *International Journal of Finance & Economics*, 26(2), 2800–2812. <https://doi.org/10.1002/ijfe.1935>

Jones, L., Palumbo, D., & Brown, D. (2021, January 24). Coronavirus: How the pandemic has changed the world economy. BBC News. <https://www.bbc.com/news/business-51706225>

Kaplan, S. A., & Williams, D. R. (2012). The changing relationship between audit firm size and going concern reporting. *Accounting Organizations and Society*, 37(5), 322–341. <https://doi.org/10.1016/j.aos.2012.05.002>

Koh, K, and Y. H. Tong. (2013). The effects of clients' controversial activities on audit pricing. *Auditing: A Journal of Practice & Theory* 32 (2): 67-96.

KPMG. (2020). "COVID-19: Potential impact on financial reporting". <https://home.kpmg/xx/en/home/insights/2020/03/covid-19-financial-reporting-resource-centre.html>

LaFond, R., & Watts, R. L. (2008). The information role of conservatism. *The accounting review*, 83(2), 447-478.

Louwers, T. J. (1998). The Relation between Going-Concern Opinions and the Auditor's Loss Function. *Journal of Accounting Research*, 36(1), 143. <https://doi.org/10.2307/2491325>

Lu, T., & Sapa, H. (2009). Auditor conservatism and investment efficiency. *The Accounting Review*, 84(6), 1933–1958. <https://doi.org/10.2308/accr.2009.84.6.1933>

- Mareque, M., López-Corrales, F., & Pedrosa, A. (2017). Audit reporting for going concern in Spain during the global financial crisis. *Ekonomiska Istrazivanja-economic Research*, 30(1), 154–183. <https://doi.org/10.1080/1331677x.2017.1305787>
- Menon, K., & Williams, D. D. (2010). Investor reaction to going concern audit reports. *The Accounting Review*, 85(6), 2075-2105. doi:10.2308/accr.2010.85.6.2075
- Mutchler, J. F. (1985). A multivariate analysis of the auditor's going-concern opinion decision. *Journal of Accounting Research*, 23(2), 668-682. doi:10.2307/2490832
- Myers, L. A., Schmidt, J. J., & Wilkins, M. J. (2014). An investigation of recent changes in going concern reporting decisions among Big N and non-Big N auditors. *Review of Quantitative Finance and Accounting*, 43(1), 155–172. <https://doi.org/10.1007/s11156-013-0368-6>
- National Association of Manufacturers [NAM]. (2021). NAM MANUFACTURERS' OUTLOOK SURVEY: FIRST QUARTER 2021. <https://www.nam.org/wp-content/uploads/2021/03/NAM-Outlook-Survey-Q1-2021.pdf>
- Periokaitė, P., & Dobrovolskienė, N. (2021). The impact of COVID-19 on the financial performance: a case study of the Lithuanian transport sector. *Insights into Regional Development*, 3(4), 34-50.
- Rickling, M. F., Bitter, M. E., & West, J. (2020). Going-Concern Decisions and the Global Financial Crisis. *International Journal of Business*, 25(1), 21-44.
- Sundgren, S., & Svanström, T. (2014). Auditor-in-charge characteristics and going-concern reporting. *Contemporary Accounting Research*, 31(2), 531-550. doi:10.1111/1911-3846.12035
- WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020. (2020, March 11). <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>
- Xu, Y., Jiang, A., Fargher, N., & Carson, E. (2011). Audit Reports in Australia during the Global Financial Crisis. *Australian Accounting Review*, 21(1), 22–31. <https://doi.org/10.1111/j.1835-2561.2010.00118.x>
- Xu, Y., Carson, E., Fargher, N., & Jiang, L. (2013). Responses by Australian auditors to the global financial crisis. *Accounting and Finance*, 53(1), 301–338. <https://doi.org/10.1111/j.1467-629x.2011.00459.x>

Zdolšek, D., Jagrič, T., & Kolar, I. (2022). Auditor's going-concern opinion prediction: The case of Slovenia. *Economic Research – Ekonomska Istraživanja*, 35(1), 106-121. doi:10.1080/1331677X.2021.1888766