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Accounting, Auditing and Control
Master thesis

Going Concern Opinion and Audit Market Concentration

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The effect of audit market concentration on the issuance of going concern opinions

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Abstract: Audit regulators have expressed concern about audit market concentration on audit quality. Prior literature shows mixed results regarding this debate. In this paper, I examine whether audit market concentration at the local (i.e., metropolitan statistical area) level leads to the issuance of more going concern opinions (GCOs). Using a sample of listed financially distressed firms in the United States between 2012-2019, I find limited evidence that audit market concentration leads to the issuance of more GCOs. These results hold when accounting for the effects of concentration on audit fees and using a different measure of financially distressed firms. A separate analysis shows that there is no effect of audit market concentration on the Type 1 error rate – modified opinion to clients that are viable - and the Type 2 error rate – unmodified opinion to clients that do subsequently fail. Overall, there is limited evidence of the relation between audit market concentration and the issuance of GCOs, and no relation between audit market concentration and the accuracy of GCOs.

Keywords: Audit market concentration, audit quality, going concern opinions

Contents

1. Introduction 3

2. Theoretical Background and Hypothesis Development 6

2.1 Audit Market Concentration 6

2.2 Going Concern Opinions 8

2.3 Hypotheses Development 9

2.3.1 Hypothesis 1 9

2.3.2 Hypothesis 2 10

3. Sample Selection and Research 11

3.1 Sample Selection 11

3.2 Research Design 13

3.2.1 Going Concern Model 13

3.2.2 Accuracy Models 15

4. Results 15

4.1 Descriptive Statistics 15

4.2 Hypothesis 1 Analysis 17

4.3 Hypothesis 2 Analysis 17

4.4 Robustness Test 18

4.4.1 Different measure of audit market concentration 18

4.4.2 Different measure of financially distressed companies 19

4.5 Additional Tests 20

5. Conclusion 22

References 25

Appendix A: Variable Definitions 27

Appendix B: Bankruptcy datasets comparison 29

1. Introduction

This study investigates the relation between audit market concentration on the issuance and accuracy of going concern opinions (GCOs). Audit market concentration has been a topic of considerable controversy within the academic, business, and regulatory communities. Due to mergers between big audit firms and the demise of Arthur Anderson in 2002, the amount of big audit firms decreased from the Big 8 audit firms in 1989, to the current Big 4 audit firms.[1] Due to this decrease, policy makers have expressed concerns regarding audit market concentration on audit quality (US Treasury, 2008; Government Accountability Office [GAO], 2003, 2008). The Sarbanes-Oxley Act (SOX) of 2002 mandated the GAO to study the effects of consolidation on audit quality. However, they find inconclusive results and conclude that there is no link between audit quality and consolidation (GAO, 2003). In the follow-up study in 2008, the GAO places caution on this notion. Increased concentration could lead to an increase or decrease in audit quality (GAO, 2008). The concern is that audit market concentration reduces client's choice of auditor which could increase complacency, resulting in a lower audit quality.

The empirical evidence on the association between audit market concentration and audit quality is mixed. Some studies document a negative relation between audit market concentration and audit quality (Boone, Khurana & Raman, 2012;[2] Huang, Chang & Chiou, 2016;[3] Gunn, Kawada & Michas, 2019[4]). They argue that auditor complacency increases due to which auditors become more lenient and less sceptical. However, some studies document a positive relation of concentration on audit quality, meaning audit market concentration increases audit quality (Kallapur, Sankaraguruswamy & Zang, 2010;[5] Francis, Michas & Seavey, 2013;[6] Newton, Wang & Wilkins, 2013[7]). Basically, higher concentration could increase audit quality by the reduced fear that clients switch to a more compliant auditor ("opinion shopping") which could strengthen the auditor's professional values (Boone et al.

[1] The current Big 4 audit firms are Deloitte, PricewaterhouseCoopers (PwC), Ernst & Young (EY) and Klynveld Peat Marwick Goerdeler (KPMG).
[2] Boone et al. (2012) find that auditors are more tolerant towards discretionary accruals to meet the consensus earnings forecast when audit market concentration is higher.
[3] Huang et al. (2016) show that there is a negative direct effect of audit market concentration on audit quality, as measured by the absolute value of abnormal accruals.
[4] Gunn et al. (2019) show that within Big 4 audit firms, the audit fees are rising for complex clients, but these firms receive lower audit quality. Audit quality is measured using discretionary accruals, income-increasing accruals and firms that report a net profit.
[5] Kallapur et al. (2010) find a positive association between audit market concentration and audit quality, measured as discretionary accruals.
[6] Francis et al. (2013) find that the audit quality, measured as total accruals, abnormal accruals, the likelihood of reporting a loss, and timely loss recognition, is higher when Big 4 auditors have a higher market share.
[7] Newton et al. (2013) show that increased auditor competition leads to more restatements.

2012). So, there is mixed evidence whether audit market concentration increases or decreases audit quality.

Besides earnings and restatements, the issuance and accuracy of GCOs is also seen as a proxy of audit quality (Geiger & Rama, 2006). An external auditor is required to express an opinion on whether there is substantial doubt that a client can continue as a going concern for a considerable amount of time (up to 12 months) (Public Company Accounting Oversight Board [PCAOB], 2002). It is stated that the issuance of more GCOs in relation to a lower error rate is related to higher audit quality, auditors look in depth to the going concern ability of clients (Geiger & Raghunandan, 2002). When an auditor provides a GCO, the auditor must weigh the consequences of issuing a GCO to a client that does not subsequently fail (Type 1 error) and the consequences of not issuing a GCO to a client that does subsequently fail (Type 2 error). The auditor's cost of providing more GCOs is the dismissal risk for providing a false-positive GCO (Carcello & Neal, 2003). The auditor's cost of providing fewer GCOs is the litigation risk and reputation risk for failing to warn investors of an impending bankruptcy (Carcello & Palmrose, 1994).

Audit market concentration has garnered attention from regulatory bodies in many jurisdictions. For example, in the Netherlands, the Autoriteit Financiële Markten (AFM) wants to reduce the amount of a small audit firms, because according to the AFM they make more mistakes (Pols, 2021). However, when there are fewer audit firms, the concentration in the audit market increases, and it is still unclear whether this leads to an increase in audit quality. This paper provides extra evidence regarding the relation between audit market concentration and audit quality. As far as I am aware, prior literature uses mostly earnings and restatements as a proxy of audit quality and not the issuance and accuracy of GCOs. The findings of this paper will shed a new light on the discussion. It could provide evidence in line with concerns of policy makers that audit market concentration lowers audit quality. However, it could also be in line with evidence of certain papers, indicating that audit market concentration increases audit quality.

Due to conflicting results in prior literature, I do not predict the sign of the effect of audit market concentration on the issuance of GCOs. Concentration could increase the frequency of issued GCOs because the dismissal rate is lower. Though, higher concentration could increase auditor complacency, indicating that auditors spent less time and effort on determining the going concern ability of clients. This leads to fewer GCOs being issued.

As stated before, there are two types of errors related to the issuance of GCOs and I cannot predict whether audit market concentration leads to a lower Type 1 and Type 2 error

rate. Regarding Type 1 errors, higher audit market concentration indicates that clients cannot easily switch to another auditor, so the risk of dismissal is lower and more GCOs are issued. This could lead to the issuance of GCOs to companies that do not go bankrupt, which results in a higher Type 1 error rate. However, the Type 1 error rate could also be lower, because auditors decide to look more in depth into companies and provide more accurate GCOs. So, audit market concentration could increase or decrease the Type 1 error rate.

Regarding the Type 2 error rate, higher audit market concentration could lead to an increase or decrease in the Type 2 error rate. On the one hand, when more GCOs are issued, the chance is higher that companies that went bankrupt, also received a GCO. On the other hand, when auditors look more in depth in companies, they provide fewer GCOs but to the right companies. However, when auditors put less effort in the audit, they do not provide GCOs to companies that went bankrupt, resulting in a higher Type 2 error rate.

To examine these effects, I focus on the local audit markets in the United States (US). My primary measure of audit market concentration is the Herfindahl index for each year based on audit fees in the local market. To examine the robustness of the findings, I also compute the Herfindahl index based on client size (total assets of clients) and use a different determination of financially distressed companies. Furthermore, I also conduct the same auditor concentration as the aggregate market share of the Big 4 as a group and the concentration within the Big 4 audit market.

The sample spans the 2012-2019 period to avoid the potentially confounding effects of various events (i.e., Financial Crisis and Corona pandemic). The sample contains 3,917 client-year observations. The main test of Hypothesis 1 does not show a relation between audit market concentration and the chance a GCO is issued. These findings hold across a different measure of financially distressed companies, when the Herfindahl index is based on Big 4 auditors only, and for the Big 4 market share. However, I do find a significant negative effect when the Herfindahl index is calculated using total assets, indicating that higher concentration is associated with a lower chance a GCO is issued.

I am also unable to detect a relation between audit market concentration and the Type 1 and Type 2 error rate. These findings hold across a different measure of the Herfindahl index based on total assets, Big 4 auditors only and the Big 4 market share.

Overall, these findings add to current work by examining the effect of audit market concentration on audit quality. Boone et al. (2012) find that higher concentration is associated with more discretionary accruals. However, Kallapur et al. (2010) find that higher concentration is associated with higher accruals quality. My results suggest that there is no effect of audit

market concentration on the chance a GCO is issued and the accuracy of the issued GCOs. However, it does depend on how you operationalize the Herfindahl index. The Herfindahl index operationalized with total assets does show that higher concentration is associated with a lower chance a GCO is issued.

This study has several implications for policy makers. Policy makers are concerned with the concentration in the audit market and the effect on audit quality. GAO (2003, 2008) did not find a relation between audit quality and consolidation but are concerned with the effects of increased concentration on audit quality. My study shows that audit market concentration has no impact on the issuance of GCOs. Furthermore, it does show that higher concentration in the Big 4 audit market leads to higher audit quality, by the means of a lower Type 2 error rate. So, this shows that a reduction in the amount of audit firms (as suggested by the AFM in the Netherlands) and the possibility of increased audit market concentration has no negative effect on audit quality.

The findings in this paper contribute to the auditing literature in several ways. First, prior literature shows contradicting evidence whether audit market concentration leads to higher audit quality. This study shows that there is no relation between audit market concentration and audit quality, when operationalized with the issuance of GCOs. This is a measure of audit quality that is not often used. Furthermore, these findings show that results depend on how audit market concentration is operationalized. The study does show significant results when the Herfindahl index is calculated using total assets, but same tests are insignificant when operationalized with audit fees.

The rest of this paper proceeds as follows. Section 2 describes and develops the hypotheses. Section 3 discusses the sample selection procedure and research design. The empirical findings are included in Section 4, and Section 5 provides a conclusion.

2. Theoretical Background and Hypothesis Development

2.1 Audit Market Concentration

Audit market concentration indicates how many audit firms are active in a specific market/region and how concentrated this region is. This paper uses metropolitan statistical areas (MSAs) in the US to measure audit market concentration in local regions. Higher audit market concentration indicates that the market share is unequally split between local audit firms (Boone et al., 2012). Appendix A shows three definitions of audit market concentration that are used. There is contradictory evidence whether audit market concentration leads to higher audit quality. These opposing views are discussed below.

Auditor concentration could increase audit quality due to a reduced opportunity of clients to switch auditors. This could allow auditors to commit to the independent watchdog function and "push-back" harder against wishes of clients and reduce the bias in reported financial statements (Boone et al., 2012). This is also shown in the research of Newton, Persellin, Wang and Wilkins (2016). They reveal that internal control opinion shopping is present in more competitive audit markets. So, if the audit market concentration is higher and there is less competition,[8] the chance of internal control opinion shopping is lower. Because auditors do not have to be afraid of opinion shopping of clients, they can perform audits of higher quality. Newton et al. (2013) show that more competition is related to more accounting restatements. So, higher audit market concentration (lower competition) is related to fewer accounting restatements. Some other studies use earnings as a measure of audit quality. Kallapur et al. (2010) study the relation between audit quality, proxied by absolute discretionary accruals, and audit market concentration. They show that higher audit market concentration leads to higher audit quality. Francis et al. (2013) study this in an international setting. It is assumed that earnings are of higher quality when accruals are smaller, when there is a greater likelihood of reporting a loss and when a firm exhibits more timely loss recognition. They show that audit quality is higher when Big 4 auditors have a greater market share in a country. Furthermore, Huang et al. (2016) present a positive indirect effect between earnings quality (as measured by the absolute value of abnormal accruals) and audit market concentration. They argue that due to higher audit fees, auditors devote more resources to audit tasks, which results in higher earnings quality. So, these papers show that there is a positive link between audit market concentration and audit quality.

Alternatively, it can also be assumed that higher concentration is associated with lower audit quality. The client's choice of auditor is limited, which could make the incumbent auditor more complacent. In turn, this could lead to self-satisfaction and fewer rigorous audit procedures (GAO, 2008). Boone et al. (2012) show a negative relation between audit quality and audit market concentration. They find that concentration is associated with a higher chance that clients have enough discretionary accruals to meet the consensus earnings forecast. This holds for indexes based on all auditors or Big 4 auditors only. Furthermore, Francis et al. (2013) show that increased concentration within the Big 4 audit firms is negatively associated with the quality of the audit. Gunn et al. (2019) also show that within Big 4 market concentration is

[8] Here I assumed that higher concentration is related to lower competition in the audit market. This is also done by Newton et al. (2013). However, Willekens, Dekeyser, Bruynseels and Numan (2020) this does not have to be the same. Even in a small market, there could be high competition when there is a threat of entry of new rivals.

associated with lower audit quality. However, they base their results mostly on the complexity of clients and they show that this relation holds for clients that are larger, exhibit international operations, and use the International Financial Reporting Standards (IFRS). Furthermore, Huang et al. (2016) show that the direct effect between concentration and audit quality is negative. This indicates that higher concentration leads to lower quality, because it reduces client's choice of auditor, and it increases auditor complacency. So, within the Big 4 audit market, higher concentration leads to lower audit quality and higher concentration leads to more discretionary accruals needed to meet the analyst forecast.

In summary, this subsection shows that there is conflicting evidence about the relation between audit market concentration and audit quality. Newton et al. (2013) provide evidence that higher competition leads to more restatements, so higher concentration, and lower competition lead to fewer restatements. Furthermore, Kallapur et al. (2010) show that higher concentration leads to higher audit quality, measured by negative absolute discretionary accruals. However, Boone et al. (2012) show that higher concentration is associated with enough positive discretionary accruals to meet the analyst forecast. Besides, Francis et al. (2013) show that audit quality is higher when the Big 4 market share is higher, but audit quality is lower when concentration in the Big 4 audit market is higher. Finally, Huang et al. (2016) show a direct negative effect of concentration on audit quality. However, they also show an indirect positive effect, because clients pay higher fees that auditors use to devote more time and money on a good audit. Overall, there is still an inconclusive effect of audit market concentration on audit quality.

2.2 Going Concern Opinions

GCOs are issued when an auditor has substantial doubt that a client can remain viable one year from the financial statement date. If there is substantial doubt, the auditor must include an explanatory paragraph in which they question the going concern ability of the client (PCAOB, 2002). Sometimes auditors make inaccurate decisions about providing a GCO. An inaccurate audit opinion occurs when a GCO is provided to a company remains viable (Type 1 error; false-positive GCO) or when an auditor provides a clear audit opinion to a client that subsequently fails (Type 2 error; false-negative GCO) (Berglund, Eshleman & Guo, 2018).

The Type 1 error rate is higher when an auditor reports more conservative. Fargher and Jiang (2008) show that after 2000-2002 (the high-profile collapses) auditors report more conservative due to a higher litigation risk. This leads to the issuance of more GCOs to financially distressed clients immediately after this period. So, fewer clients went bankrupt

without receiving a GCO, but more companies received a GCO that remained viable (a higher Type 1 error rate). The associated risk is the risk of dismissal. Chow and Rice (1982) show that firms are more likely to switch auditors after they receive a GCO. Carcello and Neal (2003) find that this effect is more pronounced when the audit committee is less independent. So, a Type 1 error occurs when an auditor provides a GCO to a company that remains viable.

Fargher and Jiang (2008) also show that in the period following 2000-2002, fewer companies that subsequently fail did not receive a GCO, a Type 2 error. If auditors report more conservative due to increased litigation against auditors, they provide more GCOs, and the risk of a Type 2 error is lower. The related risks to a false-negative GCO are the risk of litigation and reputational damage because the auditor fails to inform investors of an impending bankruptcy (Carcello & Palmrose, 1994; Berglund et al., 2018). So, a Type 2 error occurs when an auditor fails to provide a GCO to a company that does subsequently fail.

In summary, GCOs are issued by an auditor when there is substantial doubt that a client can continue as a going concern in the following twelve months. A false-positive GCO occurs when a company received a GCO but does not subsequently fail. The related risk is the risk of dismissal. A false-negative GCO arises when a company did not receive a GCO but does subsequently fail. The related risks are reputational damage and litigation risk.

2.3 Hypotheses Development

2.3.1 Hypothesis 1

In this paper, I examine the relation between audit market concentration and the issuance of GCOs. There are opposing views on the relation between audit market concentration and audit quality. Kallapur et al. (2010) show that audit market concentration is associated with higher audit quality, because the risk of replacement is lower so auditors can report more truthfully. However, Gunn et al. (2019) and Boone et al. (2012) show that audit market concentration leads to lower audit quality. Auditors are less sceptical and more lenient, so higher auditor complacency and reduced audit work.

Audit quality is often operationalized using earnings or restatements, but audit market concentration is not studied in relation to the issuance of GCOs. As stated by Geiger and Rama (2006), the issuance of GCOs is an operationalization of audit quality. Based on prior literature it is not clear whether audit market concentration leads to higher audit quality. So, the relation between audit market concentration and the issuance of GCOs is unclear.

Higher audit market concentration could lead to the issuance of more GCOs. Oligopolistic dominance can increase complacency among auditors and lead to less sceptical

approach to audits and lower audit quality. Besides, the litigation risk and risk of reputational damage is most pronounced when they do not issue a GCO to a company that subsequently fails. Auditors want to avoid this, and issue more often a GCO. However, it is also possible that auditors issue fewer GCOs because they do not provide a thoughtful analysis and they cannot identify financially distressed companies. This leads to the issuance of fewer GCOs. So, the relation between lower audit quality and the amount of issued GCOs is unclear.

Audit market concentration could also lead to a reduction in the fear of being replaced by a more compliant auditor. This could strengthen the traditional commitment to the independent watchdog function. Auditors put more effort in the audit and provide a more thoughtful analysis of the viability of clients. They can better identify clients and do not have to be afraid that clients switch after receiving a GCO, so they can issue GCOs that they would not have issued when the concentration was lower. However, it is possible that fewer companies should receive a GCO, so fewer GCOs are provided. So, higher audit quality could be associated with an increase or decrease in the amount of issued GCOs. Whether audit market concentration leads to the issuance of more GCOs is an empirical question, so the first hypothesis is stated as a null hypothesis:

> ***H1:*** *Audit market concentration is not related to the issuance of going-concern opinions.*

With this hypothesis, I add extra evidence to the debate about whether audit market concentration increases audit quality or not. As stated before, audit quality is often operationalized using earnings, but not operationalized with the issuance of GCOs.

2.3.2 Hypothesis 2

The outcome of Hypothesis 1 is unclear, and it is important to look at the chance of a Type 1 and Type 2 error in relation to audit market concentration. Geiger and Rama (2006) mention that lower reporting error rates could be associated with higher audit quality. A lower Type 1 and Type 2 error rate is associated with higher audit quality. However, it is unclear what the relation is between audit market concentration and the Type 1 and Type 2 error rate.

As stated previously, it is possible that auditors provide more GCOs because they do not have to be concerned that clients switch auditors if they disagree with the issuance of a GCO. This increases the chance of a Type 1 error, because they provide a GCO when there is small chance that the client cannot stay in business, rather than performing more extensive tests to come up with a more thoughtful analysis. On the other hand, even though there are more GCOs issued, they are issued to clients that struggle to stay in business. In this situation the

chance of a Type 1 error is lower. So, when Hypothesis 1 shows that there are more GCOs issued, this does not automatically decrease the Type 1 error rate.

It is also possible that auditors issue fewer GCOs. This could indicate a lower Type 1 error rate, because fewer companies receive a GCO. However, the Type 1 error rate could be higher if auditors did not perform a thoughtful analysis on clients that did receive a GCO. They issue GCOs to vital clients. The relation between fewer GCOs and the Type 1 error rate is two-sided. Given the empirical nature of the question, the following hypothesis is stated in the null-form:

H2a: *Audit market concentration is not related to the Type 1 reporting error rate.*

Furthermore, it is also uncertain whether there is a positive or negative relation between audit market concentration and the Type 2 error rate. If there are more GCOs issued, there is a higher chance that these GCOs are issued to companies that do subsequently fail. In this situation, the Type 2 error rate will be lower. However, auditors could provide GCOs to vital clients which could increase the Type 2 error rate. This shows again that the relation between the issuance of more GCOs and the Type 2 error rate is two-folded.

When there are fewer GCOs issued, it is possible that the Type 2 error rate is higher. Fewer clients receive a GCO so more clients that go bankrupt did not receive a GCO. Though, it is also possible that the auditor paid more attention to the viability of clients and only issued GCOs to clients that subsequently fail. This indicates a lower Type 2 error rate. Overall, it is unclear what the effect is of audit market concentration on the Type 2 error rate. So, given the empirical nature of the question, the following hypothesis is stated in the null-form:

H2b: *Audit market concentration is not related to the Type 2 reporting error rate.*

Overall, it is important to examine the outcome of Hypothesis 1, Hypothesis 2a and Hypothesis 2b to determine whether higher audit market concentration increases audit quality. The issuance of more GCOs in relation to a higher Type 1 and Type 2 error rate indicates lower audit quality, while the issuance of more GCOs in relation to a lower Type 1 and Type 2 error rate indicates a higher audit quality. The same holds for the issuance of fewer GCOs. So, the combination of these three hypotheses is needed to answer the research question. This is not done in prior literature.

3. Sample Selection and Research

3.1 Sample Selection

I gather data from listed US companies between 2012-2019 to avoid the potentially confounding effects of various events, e.g., the Corona Pandemic and the Financial Crisis from

2008 till 2011. It does not consider possible issued GCOs due these crises. It is a period of an economic boom, so GCOs are issued due to the performance of companies and not due to the overall economic performance in the US.

Table 1 outlines the sample selection procedure for all three hypotheses. Panel A includes the sample selection of Hypothesis 1. There were 32,042 client-year observations available on COMPUSTAT and AUDIT ANALYTICS for non-financial companies. Financial companies (SIC codes 6000-6999) are excluded due to the specific accounting standards of these companies. Besides, all companies active in a MSA with less than 10 client-year observations are deleted. These companies are deleted to make a better estimation of the concentration. Furthermore, 24,452 non-distressed clients are deleted. It is important to keep only financially distressed clients because these companies are reasonably expected to receive a GCO. These are clients that have a negative net income and negative operating cash flows (Callaghan, Parkash & Singhal, 2009; Berglund et al., 2018; Blay and Geiger, 2013). After that, 3,673 observations with missing values are deleted.[9] The final sample of Hypothesis 1 contains of 3,917 client-year observations from 2012-2019 and these client-year observations are audited by local offices in 78 different MSAs.

Table 1, Panel B shows the sample selection procedure of Hypothesis 2a. This is the sample selection of the Type 1 error analysis. Again, I start with the same 32,042 client-year observations. I restrict the sample to companies that received a GCO. Furthermore, all observations with missing values are deleted. The main sample of Hypothesis 2a consists of 3,380 client year observations audited by local offices in 79 different MSAs.

Table 1, Panel C includes the sample selection procedure for the Type 2 error analysis (Hypothesis 2b). This includes only companies that filed for bankruptcies within one year following the financial statement date. This sample includes companies filed for bankruptcy in 2020, because those companies should have received a GCO in fiscal year 2019. Only 214 companies are included. These companies are collected from the AUDIT ANALYTICS database combined with the UCLA-LoPocki Bankruptcy database. These two databases contain different companies. The differences between the two databases are described in Appendix B. After deleting companies with missing values, 156 client-year observations are left for Hypothesis 2b. These observations are audited by local offices in 39 different MSAs.

[Insert Table 1 here]

[9] Some observations had missing values that were easy to extract from annual reports, so this information is gathered manually.

Table 2 shows the yearly distribution of the observations used for the different hypotheses. Panel A includes the yearly distribution of the Hypothesis 1 dataset. It shows that the dataset contains more observations for the later years. Furthermore, Column 3 shows that the amount of issued GCOs increases over time. The last column shows that over time more companies received a GCO. In 2012 only 16.49 percent of all the companies included in the dataset received a GCO. In 2019, this percentage increased to over 30 percent. This shows that auditors gave more GCOs in the later years. In total, the dataset includes 3,917 client-year observations of which 881 received a GCO. This is a total of 22.49 percent.

Table 2, Panel B shows the distribution of the Type 1 error dataset. This dataset only includes companies that received a GCO. Contrary to Panel A, this panel shows that over time fewer GCOs are issued. A possible explanation for this difference is that the dataset of Hypothesis 1 only contains companies with negative net income and negative operating cash flows. The dataset of Hypothesis 2a contains companies that received a GCO, but this dataset also contains companies that are not financially distressed according to the classification that I follow (both negative net income and negative operating cash flows). Looking at Column 4, there is not much of a percentage difference over time. In 2019 4.20 percent of all companies that received a GCO, also went bankrupt. Overall, the dataset contains 3,380 client-year observations that received a GCO between 2012-2019 and out of these observations, 94 companies went bankrupt. This is a total of 2.78 percent.

Table 2, Panel C includes the yearly distribution regarding the Hypothesis 2b dataset. It contains the years 2013-2020. There are no bankruptcies recorded in 2012, because they are often associated with the potentially issued GCO in the fiscal year 2011, which are not included in the dataset. It shows that out of 13 companies that filed for bankruptcy in 2013, 10 received a GCO. This is a 76.92 percent. This percentage decreased over time with an outlier of 75.00 percent in 2017. In total, 156 companies filed for bankruptcy and 94 of these companies received a GCO. This is 60.26 percent.

[Insert Table 2 here]

3.2 Research Design

3.2.1 Going Concern Model

To investigate whether audit market concentration has an impact on the issuance of GCOs, I use the following probit model adapted from Berglund et al. (2018):

$$\Pr(GCO_{it} = 1) = \beta_0 + \beta_1 HERF_{it} + \beta_2 LOGTA_{it} + \beta_3 ATURN_{it} + \beta_4 CURR_{it} + \beta_5 LEV_{it} + \beta_6 ROA_{it} + \beta_7 SG_{it} + \beta_8 MB_{it} + \beta_9 ZSCORE_{it} + \beta_{10} CASH_{it} + \beta_{11} OCF_{it} + \beta_{12} LAGLOSS_{it} + \beta_{13} AGE_{it} + \beta_{14} RETURN_{it} + \beta_{15} BETA_{it} + \beta_{16} VOL_{it} + \beta_{17} DELAY_{it} + \beta_{18} WEAK_{it} + \beta_{19} NEWEQUITY_{it} + \beta_{20} NEWDEBT_{it} + \beta_{21} TENURE_{it} + \beta_{22} FIRSTYEAR_{it} + \beta_{23} BIG4_{it} + \beta_{24} LITG_{it} + Industry\ Fixed\ Effects + Year\ Fixed\ Effects + \varepsilon_{it} \quad (1)$$

In this model, the dependent variable is *GCO*. This equals 1 if a company received a GCO, and 0 otherwise. The variable of interest is *HERF*. This is a measure of audit market concentration, based on the Herfindahl index. This is an internationally used index that calculates the concentration in a specific market, for example the audit market (Centraal Bureau voor de Statistiek [CBS], n.d.). In line with Kallapur et al. (2010) and Boone et al. (2012), I calculate *HERF* for every MSA and year, using the following formula:

$$HERF = \sum_{i=1}^{N} [s_i / S]^2 \quad (2)$$

where N is the total number of audit firms in the MSA, s_i is the size of the audit firm and *S* is the size of the total audit market for a MSA in a certain year. It is a value between 0.01 and 1. A low value of *HERF* indicates that the audit firms in the MSA are of equal size and audit market concentration is low. Audit market concentration is higher when *HERF* is higher (Boone et al., 2012). In my research, I use two different measures of *HERF*. In the main analyses, audit fees earned is used as an indicator of the size of the audit firm. This is referred to as *HERF1*. However, some research examine that audit fees increase (or decrease) when audit market concentration increases (Huang et al., 2016; Gunn et al., 2019). To make sure that this relation does not manipulate my results, I will also calculate the *HERF* with total assets, referred to as *HERF2*.[10] This is done as a robustness test. Higher audit market concentration could indicate that the chance a GCO is issued increases, so a positive coefficient of *HERF1* or *HERF2* means the issuance of more GCOs. Control variables are explained in Appendix A.[11]

[10] This is also done by Gunn et al. (2019).
[11] Control variables are mostly derived using Equation 2 from Berglund et al. (2018).

3.2.2 Accuracy Models

To test Hypotheses 2a and 2b, I need two other probit models. These two models are adopted from Equation (4) and Equation (5) of Berglund et al. (2018):

$$\Pr(BANKRUPT_{it+1} = 1 | GCO_{it} = 1) = \alpha_0 + \alpha_1 HERF_{it} + \alpha_2 ZSCORE_{it} + \alpha_3 LOGSALE_{it} + \alpha_4 NYSE_{it} + \alpha_5 BIG4_{it} + Industry\ Fixed\ Effects + Year\ Fixed\ Effects + \varepsilon_{it} \quad (3)$$

$$\Pr(GCO_{it} = 1 | BANKRUPT_{it+1} = 1) = \delta_0 + \delta_1 HERF_{it} + \delta_2 ZSCORE_{it} + \delta_3 LOGSALE_{it} + \delta_4 NYSE_{it} + \delta_5 BANKLAG_{it} + \delta_6 REPORTLAG + \delta_7 BIG4_{it} + Industry\ Fixed\ Effects + Year\ Fixed\ Effects + \varepsilon_{it} \quad (4)$$

Equation (3) tests whether audit firms active in MSAs with higher audit market concentration are less likely to commit Type 1 errors. So, the model only includes companies that received a GCO. The dependent variable *BANKRUPT* equals 1 if a company went bankrupt within 12 months after the balance sheet date, and 0 otherwise. A higher coefficient of *HERF* indicates a lower chance of a Type 1 error. Equation (4) tests whether audit firms active in MSAs with higher audit market concentration are less likely to commit Type 2 errors. It is tested on a dataset with only companies that filed for bankruptcy. A higher coefficient of *HERF* means a higher probability that such a company received a GCO, so a lower Type 2 error rate. Again, in the main analyses of Equation (3) and Equation (4) I calculate the *HERF* using audit fees, referred to as *HERF1,* and in the robustness test I use total assets to calculate the *HERF*, referred to as *HERF2*. The control variables are included in Appendix A.

4. Results

4.1 Descriptive Statistics

Table 3 shows the descriptive statistics of the dependent variable and explanatory variable of the different equations.[12] Table 3, Panel A and Panel B report the descriptive statistics for test variables *HERF1* and *HERF2* in the Hypothesis 1 dataset. Panel A includes *HERF1,* and Panel B includes the descriptive statistics for variable *HERF2*. These panels show how concentrated the market is.

[12] All variables are winsorized at the 5 percent and 95 percent level.

In 2010, the Department of Justice (DOJ) published formal guidelines regarding the market concentration in terms of the Herfindahl-Hirschman Index or *HHI*. The range of the *HHI* is 100 to 10,000, whereas the Herfindahl index (*HERF*) used in my study, is from 0.01 to 1. So, the *HERF* metric is simply the *HHI* divided by 10,000. According to the DOJ guidelines, an *HHI* under 1,500 (or a *HERF* below 0.15) indicates an unconcentrated market, an *HHI* between 1,500 and 2,500 (a *HERF* between 0.15 and 0.25) indicates a moderately concentrated market, while an *HHI* above 2,500 (or a *HERF* above 0.25) indicates high concentration (DOJ, 2010). The aggregate mean of *HERF1* is 0.281 and of *HERF2* is 0.389, indicating that in both instances, the audit market is highly concentrated. Furthermore, even the lowest mean *HERF* (irrespective whether *HERF1* or *HERF2*) reported in Table 3, Panel A and Panel B (mean of 0.254 in Panel A with all four Big 4 audit firms present), represents a highly concentrated market. Overall, this indicates that the audit market in the United States between 2012-2019 is highly concentrated.

Table 3, Panel C till E present the descriptive statistics of the datasets of the three hypotheses. I really on *HERF1* in these descriptive statistics. There is a distinction made between the moderately concentrated markets (*HERF1* between 0.15 and 0.25) and highly concentrated markets (*HERF1* above 0.25). Table 3, Panel C presents preliminary results of Hypothesis 1. The data indicates that there is no significant difference between the going concern opinion rate of clients audited by audit firms active in moderately concentrated markets and clients audited by audit firms active in highly concentrated audit markets. So, there is no effect of audit market concentration on the frequency of issued GCOs.

Table 3, Panel D summarizes the results of the Hypothesis 2a sample (Type 1 error rate). It shows that clients audited by local offices in moderately concentrated markets have a slightly higher rate of ex post bankruptcy than clients audited by audit firms active in highly concentrated audit markets (3.60 percent compared to 2.00 percent). This effect is significant at a 1 percent level. This univariate result shows that highly concentrated markets are more prone to Type 1 errors than moderately concentrated markets.

Furthermore, Table 3, Panel E shows univariate results regarding the Hypothesis 2b sample. Of the companies that file for bankruptcy, there is no significant difference between the rate of GCOs for clients of audit firms active in highly concentrated audit market or clients of audit firms active in moderately concentrated markets. Thus, there is no significant difference between the Type 2 error rate for moderately concentrated markets and highly concentrated markets.

[Insert Table 3 here]

Table 4 reports the correlation matrix between the variables included in the Hypothesis 1 analysis. It shows that there is a high positive and significant correlation between *HERF1* and *HERF2* (0.72), indicating that a higher *HERF1* is related to a higher *HERF2*. It shows that their correlation between *HERF1* and *HERF2* and the control variables is low, so the risk of collinearity for interpreting the regression results is low. It also shows that there is a low and statistically insignificant correlation between the issued GCOs and the value of *HERF1* and *HERF2,* indicating that there is no correlation between the audit market concentration and issued GCOs.

[Insert Table 4 here]

4.2 Hypothesis 1 Analysis

Table 5 reports the regression results of the relation between audit market concentration and issued GCOs (Equation (1)). Panel A includes two regressions; first, a regression in which audit market concentration is calculated with audit fees, *HERF1*; and second, a regression in which audit market concentration is calculated with total assets, *HERF2*. Both regressions include only companies that have both negative net income and negative net operating cash flows. Panel B includes the same regressions with a different measure of financially distressed companies. Table 5, Panel A, the right regression and Table 5, Panel B are discussed in Section 4.4 Robustness Test. The control variables in Table 5, Panel A, left-hand side are generally significant with the expected signs. More importantly, the regression shows that test variable *HERF1* has a negative but insignificant coefficient (p-value of 0.604) indicating that there is no relation between audit market concentration and the chance a GCO is issued. However, this effect would have been economically significant because the baseline probability of receiving a GCO is 22.49 percent. So, there is no evidence contradicting Hypothesis 1, audit market concentration has no impact on the chance a GCO is issued.

[Insert Table 5 here]

4.3 Hypothesis 2 Analysis

Table 6, Panel A provides the probit regression results from estimating the Type 1 error rate (Equation (3)). The left-hand side shows the results of the main Hypothesis 2a test, with

HERF1. The right-hand side regression is explained in Section 4.4. The dataset only contains clients that did receive a GCO. The marginal effect of *HERF1* is -0.747 percent but it is not statistically significant at conventional levels. Most control variables are significant in the predicted direction. This indicates that there is no evidence that an increase in audit market concentration has an impact on the Type 1 error rate. Thus, these results are in line with Hypothesis 2a.

Table 6, Panel B shows the probit regression results of Equation (4), the Type 2 error model. The left-hand side shows the results when using the sample of 156 clients that file for bankruptcy between 2013-2020 and using *HERF1* as variable of interest. The right-hand regression is again explained in Section 4.4. The coefficient is positive (1.408) with a corresponding marginal effect of 36.971 percent. However, this result is not statistically significant (p-value of 0.183), indicating that there is no effect of audit market concentration on the Type 2 error rate. Half of the control variables are statistically significant, but they are not all in line with the predicted direction. Taken together, I report support for Hypothesis 2b indicating that there is no effect of audit market concentration on the Type 2 error rate.

[Insert Table 6 here]

4.4 Robustness Test

4.4.1 Different measure of audit market concentration

So far, I used *HERF1*, *HERF* calculated using audit fees, in my analyses. Though, prior literature shows that there could be a relation between audit market concentration and audit fees. Huang et al. (2016) mention that audit market concentration led to higher audit fees. Furthermore, Gunn et al. (2019) show that there is a positive association between Big 4 market concentration and audit fees for complex clients (larger clients that exhibit international operations and apply IFRS). However, the GAO (2003) shows that an increase in audit fees is often due to new accounting and auditing requirements and not due to higher audit market concentration. Further, Numan and Willekens (2012) show that audit market concentration per se does not increase (rather decrease) audit fees, because increased concentration leads to increased price competition (Willekens and Achmadi, 2003). Due to these opposing results, I also conduct the above analyses using total assets of clients to calculate the audit market concentration, referred to as *HERF2*.[13]

[13] Kallapur et al. (2010) and Boone et al. (2012) also calculate the audit market concentration with the sum of total assets of clients.

Table 5, Panel A, right-hand regression reports the results regarding Hypothesis 1. It shows that there is a negative coefficient of *HERF2*. This effect is more pronounced in this regression compared to the main test of Hypothesis 1. (-9.035 compared to -4.371 percent). The main test did not provide statistically significant results, but this test does show a statistically significant result at the 10 percent level (p-value of 0.066). This indicates that an increase in audit market concentration by 1 percent reduces the chance a GCO is issued by 9.035 percent. Most of the control variables are significant and consistent with the predicted directions. Taken together, these results do not support Hypothesis 1, indicating that audit market concentration reduces the chance a GCO is issued.

Table 6, Panel A, Columns 6, 7 and 8 show results of the Type 1 error rate with *HERF2* as variable of interest. The coefficient and marginal effect are almost the same as the ones in the main test. The p-value is still high (0.708) indicating that the effect is not statistically significant. Half of the control variables are statistically significant and in line with the predicted signs. Thus, these results are in line with Hypothesis 2a, there is no effect of audit market concentration on the Type 1 error rate.

Table, 6, Panel B, right-hand side regression provides the robustness test regarding the Type 2 error rate (Hypothesis 2b). The coefficient *HERF2* is positive but insignificant (p-value of 0.182), indicating that a higher audit market concentration has no impact on the chance that a Type 2 error occurs. Half of the control variables are significant but are not all in line with the predicted sign. Thus, these results are in line with Hypothesis 2b because a higher audit market concentration has no impact on the Type 2 error rate.

4.4.2 Different measure of financially distressed companies

So far, Hypothesis 1 included only companies when they have both a negative net income and negative operating cash flows. However, there are other methods to determine whether companies are financially distressed. Therefore, it is interesting to see the effect of a different measure of financially distressed companies on the results of Hypothesis 1. Another measure of financially distressed companies are companies that have negative net income or negative operating cash flows.

Table 5, Panel B includes these regression results. The left-hand side shows the results with *HERF1* as independent variable. The marginal effect is 1.257 percent, but it is still statistically insignificant at the conventional levels. The right-hand side of Table 5, Panel B includes the results of the regression with *HERF2* as independent variable. The marginal effect of *HERF2* is -4.170 percent and not statistically significant at the traditional levels. The control

variables are generally significant with the expected signs. Taken together, the evidence of Table 5, Panel B supports Hypothesis 1. There is no effect of audit market concentration on the chance a GCO is issued.

4.5 Additional Tests

Francis et al. (2013) find that audit quality, measured by earnings, is higher when the Big 4 auditors have a higher market share in the overall audit market. Besides, Francis et al. (2013) and Gunn et al. (2019) show that audit quality is lower when the concentration in the Big 4 audit market is higher. It is interesting to also study this for the issuance and accuracy of GCOs. Big 4 audit share in the overall audit market is operationalized with *BIG4SHARE*, calculated as the sum of total audit fees or total assets of clients audited by Big 4 audit firms, divided by the overall audit fees or total assets in the MSA. Like *HERF*, I calculate the *BIG4SHARE* using both audit fees and total assets, leading to two different variables of interest. *BIG4SHARE1* is the variable of interest in which Big 4 market share is calculated using audit fees and *BIG4SHARE2* is the variable when Big 4 market share is calculated using total assets. The concentration within the Big 4 audit market is operationalized with *BIG4_HERF*, calculated as the Herfindahl index in the Big 4 audit market. Just as explained for *BIG4SHARE*, *BIG4_HERF*, also operationalized using audit fees and total assets, leading to *BIG4_HERF1* and *BIG4_HERF2*, respectively.

Untabulated correlation between *HERF1* and *BIG4_HERF1* and *HERF2* and *BIG4_HERF2* is 0.93 and 0.95, respectively. The correlation between *HERF1* and *BIG4SHARE1*, and *HERF2* and *BIG4SHARE2* is much smaller, namely 0.17 and 0.11, respectively. It shows that there is a high correlation between both measures of *HERF* and *BIG4_HERF*, indicating that MSAs with a high *HERF* often also show a high *BIG4_HERF*.

Table 7, Panel B shows the results of Equation (1) with *BIG4SHARE* instead of *HERF* as independent variable. The first probit regression (Columns 3 till 5) are again *BIG4SHARE1* and the second regression (Columns 6 till 8) use *BIG4SHARE2*. Both, *BIG4SHARE1* and *BIG4SHARE2* are negative, but statistically insignificant (p-values of 0.762 and 0.988) indicating that there is no relation between Big 4 audit market share and the chance a GCO is issued. This effect of *BIG4SHARE1 would* have been economically significant because the baseline probability is equal to 22.49 percent. Most control variables are statistically significant and are in line with the predicted sign. Thus, these results are in line with Hypothesis 1, higher Big 4 audit market share has no impact on the issuance of more GCOs.

Table 7, Panel C provides the last two regressions regarding Hypothesis 1. In these two regressions, *BIG4_HERF* replaces *HERF* in Equation (1). The left regression has a negative insignificant coefficient for *BIG4_HERF1* (-0.182). This effect would be economically significant, but the effect is not statistically significant. The same holds for the right regression with *BIG4_HERF2*. The negative marginal effect of 6.848 percent is economically significant, but not statistically significant. Most of the control variables are statistically significant and in line with the predicted sign. Taken together, these results support Hypothesis 1. There is no effect of the concentration in the Big 4 audit market on the chance a GCO is issued.

[Insert Table 7 here]

BIG4SHARE and *BIG4_HERF* also replace *HERF* in Equation (3) and Equation (4). Table 8, Panel A and B indicate the effect of the Big 4 market share on the Type 1 and Type 2 error rate. Panel A shows two regressions with *BIG4SHARE1* and *BIG4SHARE2*. Both regressions show a positive but statistically insignificant coefficient for *BIG4SHARE*. The marginal effects are equal to 0.937 percent and 4.449 percent for the left and right regression, respectively. Part of the control variables are significant and in line with the predicted sign. However, because the effect is not statistically significant, the results are in line with Hypothesis 2a, higher Big 4 audit market share does not have an impact on the Type 1 error rate.

Table 8, Panel B shows the results of the Type 2 error rate with *BIG4SHARE1* and *BIG4SHARE2* as independent variables. Half of the control variables are statistically significant. *BIG4SHARE1* and *BIG4SHARE2* have a positive but statistically insignificant coefficient, indicating that there is no evidence contradicting Hypothesis 2b. A higher big 4 market share does not have an impact on the Type 2 error rate.

Table 8, Panel C shows the results of the Type 1 error rate for audit market concentration within the Big 4 audit market. *BIG4_HERF1* and *BIG4_HERF2* in both regressions are negative and statistically insignificant. The marginal effect is small, namely -0.813 percent for *BIG4_HERF1*, and -1.262 percent for *BIG4_HERF2*. The economically significance is rather low, due to the low marginal effects. Part of the control variables are statistically significant and in line with the predicted direction. So, there is no evidence contradicting Hypothesis 2a, higher concentration within the Big 4 audit market does not influence the Type 1 error rate.

Table 8, Panel D shows the last two regressions conducted in this study. These are the regressions for the Type 2 error rate in which *HERF1* and *HERF2* are replaced by, respectively, *BIG4_HERF1* and *BIG4_HERF2* in Equation (4). The left regression (*BIG4_HERF1*) indicates

a positive but statistically insignificant coefficient (p-value of 0.190). The same holds for the right regression (*BIG4_HERF2*) (p-value of 0.210). This indicates that there is no evidence contradicting Hypothesis 2b. There is no impact of Big 4 audit market concentration on the Type 2 error rate.

[Insert Table 8 here]

5. Conclusion

In this study, I try to come up with an answer what the effect of audit market concentration is on audit quality. This remains an important question in the public debate (GAO, 2003, 2008). Prior literature shows contradicting evidence of the effect of audit market concentration on audit quality. Often, audit quality is operationalized using earnings and earnings management. However, another measure of audit quality are the issued GCOs. Auditors could issue more GCOs because client cannot switch to a more compliant auditor. On the other hand, auditor complacency could increase which could lead to the issuance of fewer GCOs. Hence, the relation between audit market concentration and audit quality, and specifically the issuance of GCOs, remains an empirical question.

Using a sample of listed US companies between 2012 and 2019, I find little evidence of the impact of audit market concentration on the issuance of GCOs. The main test does not show an impact of audit market concentration on the issuance of GCOs. These findings are robust when financially distressed companies are defined as companies that have negative net income or negative operating cash flows. Though, when audit market concentration is calculated with total assets, there is evidence that higher audit market concentration lowers the chance a GCO is issued.

Furthermore, I also investigate the relation between audit market concentration and the accuracy of issued GCOs. I do not find a significant relation between audit market concentration and the Type 1 and Type 2 error rate. These results hold across a different measure of the Herfindahl index (measured with total assets).

In separate analyses, I also examined the effect of the Big 4 audit market share and the audit market concentration in the Big 4 audit market on the issuance and accuracy of issued GCOs. Once again, these results are not statistically significant. There is no effect of the Big 4 market share and Big 4 audit market concentration on the issuance and accuracy of issued GCOs.

So, only one of the tests on the Hypothesis 1 dataset shows a significant and negative result. The other regressions show insignificant results. Furthermore, there are no significant results on the Type 1 and Type 2 error datasets. This indicates that there is overall no impact of audit market concentration on audit quality. However, it does depend on how audit market concentration is operationalized. These findings are important for several reasons. It indicates that higher audit market concentration does not have a negative effect on audit quality. So, the concerns of policy makers can be relaxed. Furthermore, it contributes to existing academic literature by showing another view on the debate whether audit market concentration increases or decreases audit quality. It also contributes to the debate whether higher concentration within the Big 4 audit market leads to higher audit quality or not. Prior literature indicates that higher Big 4 audit market concentration has a negative impact on audit quality. However, my results are not significant indicating that Big 4 audit market concentration has no impact on audit quality. These results indicate that there is still a lot to discover in the relation between audit market concentration and audit quality.

The study has some caveats. Firstly, the study of Berglund et al. (2018) included the default of companies as a control variable. Default is about whether a company was in payment or technical default. I did not include this due to difficulty of gathering this data. Second, I include all firms in the sample even firms that already received GCOs in prior years. Prior literature, e.g., Berglund et al. (2018), does exclude all companies that did receive a GCO in the prior year. Excluding these companies could partly influence the results.

Furthermore, this paper shows that the results differ whether audit market concentration is operationalized with audit fees or total assets of clients. This indicates that the differences between papers could be due to the way audit market concentration is calculated. Due to which the comparability between different papers is more difficult. The same holds for the way financially distressed companies are selected. There are different ways to determine whether a company is financially distressed. In this paper, I used the selection procedure that companies should have had both a negative net income and negative operating cash flows. The additional analyses use the selection that one of these two measures should be negative. There are even more different ways to determine whether a company is financially distressed. So, comparability with different studies is difficult. The impact of the differences between the two measures could be studied in future research.

Besides, audit market concentration is not the same as competition in the audit market. Willekens et al. (2020) show that even in small concentrated markets, the concentration could be high due to a threat of new rivals. It is possible that the issuance and accuracy of GCOs is

not due to high concentration in the market, but due to competition. High competition could indicate that auditors provide better quality because the audit firms compete on the quality. This is not considered, so the effect of concentration on quality could be different then the effect of competition on quality. Future research could investigate whether there is significant difference between the two measures. In this way, researchers can investigate the effect of competition and whether there is a difference between competition and concentration on the issuance and accuracy of GCOs.

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Appendix A: Variable Definitions

Variable	Definition
Variables included in Going Concern Analyses	
Dependent variable	
GCO	Indicator variable equals one if a company receives a going concern opinion, 0 otherwise (Data Source: Audit Analytics).
Test variable	
HERF1	The Herfindahl index for a metropolitan statistical area (MSA) of the audit firms local practice office. This is calculated by summing the squared market share of each audit firm. The market share is calculated as the total audit fees paid by clients to each audit firm. The higher the metric, the higher the audit market concentration.
HERF2	The Herfindahl index for a metropolitan statistical area (MSA) of the audit firms local practice office. This is calculated by summing the squared market share of each audit firm. The market share is calculated as the total assets of clients audited by each audit firm. The higher the metric, the higher the audit market concentration.
BIG4SHARE1	The Herfindahl index for a metropolitan statistical area (MSA) of the audit firms local practice office. The Big 4 share in the overall market. This is calculated by dividing the total audit fees of clients paid to Big 4 firms by the total audit fees paid by the clients to all the audit firms. The higher the metric, the higher the Big 4 market share.
BIG4SHARE2	The Herfindahl index for a metropolitan statistical area (MSA) of the audit firms local practice office. The Big 4 share in the overall market. This is calculated by dividing the total assets of clients audited by Big 4 firms by the total assets of clients audited by all the audit firms active in a MSA. The higher the metric, the higher the Big 4 market share.
BIG4_HERF1	The Herfindahl index for a metropolitan statistical area (MSA) of the audit firms local practice office. This is calculated by summing the squared market share of all Big 4 audit firms. The market share is calculated as the total audit fees paid by clients to each Big 4 audit firm. The higher the metric, the higher the concentration of the Big 4 audit market.
BIG4_HERF2	The Herfindahl index for a metropolitan statistical area (MSA) of the audit firms local practice office. This is calculated by summing the squared market share of all Big 4 audit firms. The market share is calculated as the total assets of clients audited by each Big 4 audit firm. The higher the metric, the higher the concentration of the Big 4 audit market.
Control variables	
LOGTA	Natural logarithm of total assets (AT). Indicator variable for the size of a firm.
ATURN	Asset turnover calculated as sales (SALE) divided by lagged assets (AT). Indicator variable for the financial health of a firm.
CURR	Current ratio calculated as current assets (ACT) divided by current liabilities (LCT). Indicator variable for the financial health of a firm.
LEV	Leverage calculated as long-term debt (DLTT) plus debt in current liabilities (DLC), scaled by total assets (AT). Indicator variable for the financial health of a firm.
ROA	Return on assets calculated as income before extraordinary items (IB) divided by lagged assets (AT). Indicator variable for the profitability of a firm.
SG	Sales growth, defined as the percentage change in sales (SALE). Indicator variable for the growth of a firm.
MB	Market-to-book ratio, market value of equity (PRCC_F*CSHO) scaled by book value of equity (CEQ). Indicator variable for the growth of a firm.

ZSCORE	Altman's (1968) bankruptcy score adjusted by Altman et al. (2013), calculated as $1000e^X/(1+e^X)$, in which X is calculated as X = -4.34 – 0.08*(WCAP/AT) + 0.04*(RE/AT) – 0.10*[(PI+XINT-IDIT)/AT] – 0.22*[(PRCC_F*CSHO)/LT] + 0.06*(SALES/AT).
CASH	Cash and cash equivalents (CHE) divided by total assets (AT).
OCF	Operating cash flows divided (OANCF) by lagged assets (AT).
LAGLOSS	Indicator variable that equals 1 if the client reported negative net income (NI) in the prior year, 0 otherwise.
AGE	Natural logarithm of the years that data of the company is available of Compustat.
RETURN	The client's 12-month stock return during its fiscal year (RET) (Date Source: CRSP).
BETA	The market beta calculated using the covariance/variance method for daily returns during the fiscal year of the firm (Data Source: CRSP).
VOL	Stock return volatility, estimated as the standard deviation of the client's daily stock return during the fiscal year (Data Source: CRSP).
DELAY	The number of days between the fiscal year-end and the 10-K filing date (Data Source: Audit Analytics).
WEAK	Indicator variable that equals 1 if the client discloses a material weakness, and 0 otherwise (Data source: Audit Analytics).
NEWEQUITY	Indicator variable that equals 1 if the firm issues new equity during the year (SSTK > 0), 0 otherwise.
NEWDEBT	Indicator variable that equals 1 if the client issues new debt during the year (DLTIS > 0), 0 otherwise.
TENURE	The number of years the client has engaged the same audit firm.
FIRSTYEAR	Indicator variable that equals 1 if the client has a new audit firm, and 0 otherwise (Data Source: Audit Analytics).
BIG4	Indicator variable that equals 1 if the client is audited by one of the Big 4 audit firms, and 0 otherwise. The Big 4 audit firms are PwC, KPMG, EY and Deloitte (Data Source: Audit Analytics).
LITG	Indicator variable that equals 1 if the firm operates in a high litigious industry, and zero otherwise. The high litigious industries are industries with SIC codes of 2833-2836. 3570-3577, 3600-3674, 5200-5961. 7371-7379. These are defined in Francis, Philbrick, and Schipper (1994).
Variables included in Going Concern Analyses excluding those defined above)	
BANKRUPT	Indicator variable that equals 1 if a company went bankrupt within one year after the fiscal year end, 0 otherwise (Data Source: Audit Analytics and UCLA-LoPucki Bankruptcy Research Database).
LOGSALE	The natural logarithm of the sales of the client (SALE).
NYSE	Indicator variable that equals 1 if a company is listed on the New York Stock Exchange, and 0 otherwise (Data Source: CRSP).
BANKLAG	The number of days between the end of the fiscal year of the client and the bankruptcy filing date (Data Source: Audit Analytics and UCLA-LoPucki Bankruptcy Research Database).
REPORTLAG	The number of days between the end of the fiscal year of the client and the auditor signature date (Data Source: Audit Analytics).
BIG4	Indicator variable that equals 1 if the client is audited by one of the Big 4 audit firms, and 0 otherwise. The Big 4 audit firms are PwC, KPMG, EY and Deloitte (Data Source: Audit Analytics).

Within this table, the variables are collected from the Compustat database. The Compustat name is included within parenthesis. This is except for the variables for which the data source is explicitly mentioned.

Appendix B: Bankruptcy datasets comparison

The analyses of Hypothesis 2a and Hypothesis 2b use two different bankruptcy datasets. One dataset is from Audit Analytics and the other bankruptcy dataset is from the University of California – Los Angeles (UCLA) School of Law, UCLA-LoPucki Bankruptcy Research Database.[14] Papers often use them both because there are some important differences between the two datasets. This Appendix provides a description of some of the similarities and differences.

Two differences are regarding the time frame. The first difference is that the UCLA datasets is updated monthly, and the Audit Analytics dataset is updated quarterly (Audit Analytics, 2021; UCLA-LoPucki, 2021). The second difference is that the UCLA dataset has filed bankruptcy cases from October 1, 1979, and onwards, while the Audit Analytics dataset has filed bankruptcies from June 20, 1988, and onwards (Audit Analytics, 2021; UCLA-LoPucki, 2021).

Both datasets include data for public companies. The Audit Analytics dataset includes companies that have a Securities and Exchange Commission (SEC) filings of bankruptcy declarations (Audit Analytics, n.d.a). On the other hand, the UCLA dataset includes bankruptcies filed in the United States Bankruptcy Courts (LoPucki, n.d.). Because the different datasets look at different filings, it is possible that the same company has two different filing dates or that one company has already a filing in SEC, but not yet in court or the other way. In this situation, the company is could be included in only one of the two datasets.

One of the most important differences is that Audit Analytics dataset includes all public companies, while the UCLA dataset only includes large public companies. Concerning the UCLA dataset, this means that there are only companies included that have assets worth at least $ 100 million or more, measured in 1980 dollars[15] (LoPucki, n.d.). So, there are fewer companies included in the UCLA dataset compared to the Audit Analytics dataset. Looking at the time frame that I use, most of the bankruptcy cases included in the UCLA dataset are also included in the Audit Analytics dataset, but not the other way around.

The UCLA dataset includes Chapter 7 and Chapter 11 bankruptcies, while the Audit Analytics dataset also includes Chapter 15 bankruptcies (UCLA-LoPucki, 2021; Audit Analytics, n.d.b). A Chapter 7 bankruptcy is the bankruptcy code for "liquidation". In this situation, the bankruptcy trustee gathers and sells the non-exempt assets of debtors and uses this to pay creditors (United States Courts, n.d.a). A Chapter 11 code provides for

[14] I refer to the UCLA-LoPocki Bankruptcy Research Database with UCLA database.
[15] This equals to $ 287 million in current dollars.

“reorganization”. Debtors usually stay in business and pay creditors over time. They often may, with approval of court, borrow new money. They provide a plan for reorganization, creditors that are affected by the plan may vote and court may approve the plan if there are enough votes and satisfy certain legal requirements. So, in this case, the company often remains open and operating (United States Courts, n.d.b). A Chapter 15 bankruptcy is added to the Bankruptcy Code in 2005. This bankruptcy allows foreign companies to file for bankruptcy in the US if they have assets, property, or business in multiple countries. One of these countries must be the US (United States courts, n.d.c).

So, the biggest differences between the two databases are that the UCLA database only includes companies that have assets worth of at least $ 287 million or more and the Audit Analytics database includes all listed US companies. Furthermore, the Audit Analytics database includes Chapter 7, 11 and 15 bankruptcies, while the UCLA database only includes Chapter 7 and 11 bankruptcies. The last two differences are that the Audit Analytics database is updated quarterly and the UCLA database monthly and the UCLA database has companies that filed for bankruptcy from 1979 and onwards and the Audit Analytics database has companies from 1988 and onwards included in the database.

Table 1

Sample Selection

Panel A: Sample Selection for Hypothesis 1 Analysis	
All non-financial COMPUSTAT companies that have data available on AUDIT ANALYTICS between 2012-2019	32,042
Less:	
Non distressed Clients	(24,452)
Companies with missing data necessary to estimate Equation (1)	(3,673)
Main Sample for Hypothesis 1 Analysis	**3,917**
Panel B: Sample Selection for Hypothesis 2a Analysis	
All non-financial COMPUSTAT companies that have data available on AUDIT ANALYTICS between 2012-2019	32,042
Less:	
Clients without GCO_{it} = 1	(26,935)
Companies with missing data necessary to estimate Equation (2)	(1,727)
Main Sample for Hypothesis 2a Analysis	**3,380**
Panel C: Sample Selection for Hypothesis 2b Analysis	
All non-financial companies that filed for bankruptcy between 2012-2019, so BANKRUPT = 1	214
Less:	
Companies with missing data necessary to estimate Equation (3)	(58)
Main Sample for Hypothesis 2b Analysis	**156**

Financial clients are all clients that have a SIC code between 6000-6999. Bankruptcies are identified using the Audit Analytics dataset combined with the UCLA-LoPucki Bankruptcy database. Non-distressed clients are clients that have both a negative net income and negative operating cash flows. The 3,917 client-year observations of Hypothesis 1 are audited by local audit offices in a total of 78 different metropolitan statistical areas (MSA). For Hypothesis 2a, the 3,380 client-year observations are audited by local audit offices in a total of 79 different MSA's and the sample of Hypothesis 2b is audited in 39 different MSA's.

Table 2

Yearly distribution of observations

Panel A: Yearly distribution of Hypothesis 1 dataset

Year	N	GCO	%
2012	376	62	16.49
2013	375	51	13.60
2014	463	69	14.90
2015	504	104	20.63
2016	521	125	23.99
2017	539	130	24.12
2018	560	155	27.68
2019	579	185	31.95
Total	**3,917**	**881**	**22.49**

Panel B: Yearly distribution of Hypothesis 2a dataset

Year	N	Bankrupt	%
2012	464	10	2.16
2013	445	8	1.80
2014	433	15	3.46
2015	447	14	3.13
2016	416	9	2.16
2017	398	9	2.26
2018	396	13	3.28
2019	381	16	4.20
Total	**3,380**	**94**	**2.78**

Panel C: Yearly distribution of Hypothesis 2b dataset

Year	N	GCO	%
2013	13	10	76.92
2014	13	8	61.54
2015	22	15	68.18
2016	25	14	56.00
2017	17	9	52.94
2018	12	9	75.00
2019	20	13	65.00
2020	34	16	47.06
Total	**156**	**94**	**60.26**

This table shows that yearly distribution of the observations, with percentages of the amount of issued GCOs and bankruptcies. Panel A includes the yearly distribution of the issued GCOs in the Hypothesis 1 dataset. Panel B includes the yearly distribution of the number of bankruptcies in each year for companies that received a GCO (Hypothesis 2a). Panel C includes the yearly distribution of the companies that went bankrupt between 2013-2020 and the companies that received a corresponding GCO between 2012-2019.

Table 3

Descriptive statistics

Panel A: Descriptive Statistics for test variable *HERF1* calculated with audit fees main Sample Hypothesis 1

Big 4 firms in MSA	Number of MSA's	Number of Client-Years	Min	25th	Median	Mean	75th	Max	Std. Dev.
0	13	55	0.209	0.218	0.311	0.314	0.3664	0.565	0.098
1	21	136	0.220	0.317	0.368	0.399	0.430	0.838	0.128
2	18	361	0.220	0.335	0.402	0.417	0.483	0.802	0.125
3	12	483	0.178	0.232	0.281	0.303	0.356	0.594	0.098
4	14	2882	0.809	0.236	0.250	0.254	0.264	0.438	0.033
Total	**78**	**3,917**							

Panel B: Descriptive Statistics for test variable *HERF2* calculated with total assets main Sample Hypothesis 1

Big 4 firms in MSA	Number of MSA's	Number of Client-Years	Min	25th	Median	Mean	75th	Max	Std. Dev.
0	13	55	0.235	0.287	0.377	0.451	0.565	0.899	0.200
1	21	136	0.199	0.330	0.420	0.522	0.683	0.992	0.248
2	18	361	0.215	0.449	0.529	0.553	0.645	0.973	0.166
3	12	483	0.231	0.282	0.364	0.446	0.571	0.945	0.204
4	14	2882	0.226	0.270	0.321	0.351	0.447	0.542	0.096
Total	**78**	**3,917**							

Panel C: Descriptive Statistics for Hypothesis 1 Main Sample

	0.15 < *HERF1* < 0.25 (n = 1,631)			***HERF1* > 0.25 (n = 2,286)**			**t-test Diff. p-value**
Variable	**Mean**	**Median**	**Std. Dev.**	**Mean**	**Median**	**Std. Dev.**	
GCO	0.235	0.000	0.424	0.218	0.000	0.413	0.212
LOGTA	4.469	4.455	1.479	4.243	4.119	1.515	0.000***
ATURN	0.518	0.211	0.724	0.577	0.337	0.710	0.011**
CURR	5.278	3.348	5.976	4.947	3.023	6.137	0.090*
LEV	0.228	0.085	0.467	0.214	0.071	0.386	0.298
ROA	-0.801	-0.376	7.851	345.129	63.250	3.376	0.631
SG	10.380	0.000	318.161	6.080	0.000	148.662	0.612
MB	3.823	2.538	57.997	50.870	2.590	2377.407	0.344
ZSCORE	0.415	0.477	24.882	-0.948	0.180	21.698	0.075*
CASH	0.509	0.519	0.332	0.490	0.491	0.316	0.076*
OCF	-0.457	-0.204	2.486	-0.431	-0.200	1.448	0.713
LAGLOSS	0.925	1.000	0.264	0.902	1.000	0.298	0.011**
AGE	2.385	2.303	0.746	2.421	2.398	0.741	0.136
RETURN	-0.002	-0.225	1.040	0.027	-0.212	1.763	0.517
BETA	1.204	1.188	0.892	1.145	1.112	0.900	0.045**
VOL	0.049	0.044	0.028	0.050	0.44	0.031	0.641
DELAY	74.010	72.000	26.779	76.040	73.000	25.786	0.018**
WEAK	0.141	0.000	0.348	0.150	0.000	0.357	0.429
NEWEQUITY	0.860	1.000	0.347	0.865	1.000	0.342	0.651
NEWDEBT	0.338	0.000	0.473	0.325	0.000	0.468	0.386
TENURE	7.468	5.000	98.216	8.409	5.000	38.620	0.259
FIRSTYEAR	0.106	0.000	0.308	0.110	0.000	0.313	0.711
BIG4	0.519	1.000	0.500	0.484	0.000	0.500	0.029**
LITG	0.001	0.000	0.025	0.000	0.000	0.021	0.816

Table 3
Continued

Panel D: Descriptive Statistics for Hypothesis 2a Main Sample

Variable	0.15 < *HERF1* < 0.25 (n = 1,564)			*HERF1* > 0.25 (n = 1.816)			t-test Diff. p-value
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	
BANKRUPT	0.036	0.000	0.187	0.020	0.000	0.141	0.006***
ZSCORE	-34.619	-11.803	316.230	-44.317	-14.977	107.951	0.248
LOGSALE	0.431	0.000	2.297	0.439	0.000	2.201	0.914
NYSE	0.018	0.000	0.133	0.015	0.000	0.121	0.490
BIG4	0.130	0.000	0.337	0.113	0.000	0.317	0.133

Panel E: Descriptive Statistics for Hypothesis 2b Main Sample

Variable	0.15 < *HERF1* < 0.25 (n = 99)			*HERF1* > 0.25 (n = 57)			t-test Diff. p-value
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	
GCO	0.576	1.000	0.497	0.649	1.000	0.481	0.367
ZSCORE	-5.113	-0.417	18.926	-21.624	-1.380	73.867	0.103
LOGSALE	5.095	5.665	2.290	4.130	4.569	2.673	0.024**
NYSE	0.333	0.000	0.474	0.281	0.000	0.453	0.494
BANKLAG	211.600	212.000	89.020	217.300	234.000	92.300	0.708
REPORTLAG	88.050	77.000	38.166	93.440	82.000	56.068	0.521
BIG4	0.535	1.000	0.501	0.509	1.000	0.504	0.751

*, **, *** Denote statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.
This table reports the descriptive statistics of this paper. The first two panels include descriptive statistics of the variable of interest *HERF*. Panel A summarizes the descriptive statistics of *HERF1*, and Panel B provides the descriptive statistics of *HERF2.* Both panel's report the minimum, first quartile, mean, median, third quartile, maximum and standard deviation. The other three panels show the descriptive statistics of Hypothesis 1 (Panel C), Hypothesis 2a (Panel D), and Hypothesis 2b (Panel E). It includes the mean, median and standard deviation of all the variables included in the analyses. There is a distinction made between moderately concentrated MSAs (0.15 < *HERF1* < 0.25) and highly concentrated MSAs (*HERF1* > 0.25). Furthermore, it shows the p-value for the difference between the means of moderately concentrated and highly concentrated markets. See Appendix A for variable definitions.

Table 4

Correlation matrix

Variables		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
GCO	(1)									
HERF1	(2)	-0.01								
HERF2	(3)	-0.04	**0.72**							
LOGTA	(4)	**-0.39**	**-0.05**	-0.02						
ATURN	(5)	**-0.06**	0.04	0.02	0.01					
CURR	(6)	**-0.23**	-0.02	0.01	**0.08**	**-0.022**				
LEV	(7)	**0.16**	-0.01	0.00	0.04	**0.08**	**-0.20**			
ROA	(8)	-0.04	0.01	0.01	0.02	**0.04**	-0.01	0.00		
SG	(9)	-0.01	-0.01	-0.02	0.02	-0.01	0.01	0.01	0.00	
MB	(10)	0.03	0.00	0.01	-0.01	-0.01	-0.01	0.01	0.00	0.00
ZSCORE	(11)	**-0.33**	0.00	-0.01	**0.38**	**-0.08**	**0.48**	**-0.26**	0.02	0.00
CASH	(12)	**-0.10**	**-0.08**	0.02	**-0.11**	**-0.52**	**0.51**	**-0.18**	-0.04	0.00
OCF	(13)	**-0.09**	0.01	0.01	**0.10**	**0.08**	-0.01	0.00	0.91	-0.01
LAGLOSS	(14)	**0.08**	-0.03	0.00	**-0.09**	**-0.17**	0.04	0.04	-0.03	0.01
AGE	(15)	**-0.11**	**0.08**	0.01	**0.09**	**0.30**	**-0.16**	0.04	**0.05**	-0.05
RETURN	(16)	**-0.13**	0.00	0.01	**0.07**	**-0.06**	**0.15**	-0.04	0.00	0.00
BETA	(17)	**-0.07**	-0.04	-0.03	**0.28**	**-0.14**	**0.06**	**0.05**	0.02	0.00
VOL	(18)	**0.25**	0.00	0.00	**-0.27**	**-0.11**	0.00	0.04	-0.01	0.00
DELAY	(19)	**0.24**	**0.05**	0.01	**-0.29**	**0.13**	**-0.13**	**0.05**	0.00	0.00
WEAK	(20)	**0.18**	0.04	0.01	**-0.11**	**0.08**	**-0.14**	**0.07**	-0.03	0.04
NEWEQUITY	(21)	0.00	-0.02	**0.07**	0.01	**-0.31**	**0.11**	**-0.08**	-0.03	0.01
NEWDEBT	(22)	0.00	0.04	0.02	**0.22**	**0.14**	**-0.20**	**0.33**	0.01	0.04
TENURE	(23)	-0.04	0.02	0.03	**0.12**	0.04	-0.02	0.03	0.01	0.00
FIRSTYEAR	(24)	**0.07**	0.01	0.01	**-0.11**	0.03	-0.03	-0.02	0.03	0.03
BIG4	(25)	**-0.18**	**-0.04**	-0.01	**0.51**	**-0.12**	**0.10**	0.02	0.01	0.01
LITG	(26)	0.01	-0.01	-0.01	0.00	0.03	0.00	0.00	0.00	0.00

		(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
ZSCORE	(11)	-0.01								
CASH	(12)	-0.01	**0.17**							
OCF	(13)	0.00	**0.05**	**-0.08**						
LAGLOSS	(14)	0.01	**-0.04**	**0.14**	**-0.15**					
AGE	(15)	0.02	**-0.14**	**-0.30**	**0.09**	**-0.14**				
RETURN	(16)	0.02	**0.21**	**0.10**	0.00	0.02	0.00			
BETA	(17)	0.02	**0.08**	**0.13**	**0.03**	**0.06**	**-0.07**	**0.11**		
VOL	(18)	0.01	**-0.09**	**0.05**	**-0.04**	**0.11**	**-0.16**	**0.06**	**0.11**	
DELAY	(19)	0.00	**-0.16**	**-0.21**	-0.02	-0.04	-0.02	**-0.07**	**-0.11**	**0.13**
WEAK	(20)	0.04	**-0.06**	**-0.25**	-0.04	**-0.06**	**-0.06**	**-0.05**	**-0.09**	**0.10**
NEWEQUITY	(21)	0.01	0.07	**0.31**	**-0.05**	**0.09**	-0.24	0.06	**0.14**	0.04
NEWDEBT	(22)	-0.01	-0.07	**-0.32**	0.03	-0.03	0.02	-0.02	0.02	-0.01
TENURE	(23)	0.00	0.00	-0.03	0.02	**-0.07**	**0.10**	-0.01	0.03	-0.03
FIRSTYEAR	(24)	-0.02	-0.03	**-0.07**	0.00	-0.01	**-0.06**	-0.02	**-0.08**	**0.06**
BIG4	(25)	-0.02	**0.14**	**0.23**	0.03	0.02	**-0.09**	**0.05**	**0.22**	**-0.15**
LITG	(26)	0.00	0.01	-0.02	0.00	-0.03	-0.03	0.00	0.00	0.00

		(19)	(20)	(21)	(22)	(23)	(24)	(25)
WEAK	(20)	**0.33**						
NEWEQUITY	(21)	**-0.15**	**-0.09**					
NEWDEBT	(22)	**0.06**	**0.10**	**-0.06**				
TENURE	(23)	**-0.04**	**-0.04**	-0.01	0.00			
FIRSTYEAR	(24)	**0.13**	**0.16**	-0.03	0.02	**-0.08**		
BIG4	(25)	**-0.26**	**-0.20**	**0.12**	0.01	**0.11**	**-0.15**	
LITG	(26)	0.01	0.02	-0.02	0.03	-0.01	-0.01	-0.02

This table shows the correlation matrix between the variables included in the Hypothesis 1 dataset. It includes the dependent variable, *GCO*, the two independent variables *HERF1* and *HERF2*, and the control variables. Correlation coefficients statistically significant at $p < 0.01$ are in bold. See Appendix A for variable definitions.

Table 5

Regression of audit market concentration on propensity to issue a Going Concern Opinion

Panel A: Hypothesis 1 test (Dependent variable = *GCO*)

		HERF1			*HERF2*		
Variable	**Predicted Sign**	**Coef.**	**Marginal Effect**	**p-value**	**Coef.**	**Marginal Effect**	**p-value**
HERF1	?	-0.227	-4.371%	0.604			
HERF2	?				-0.471	-9.035%	0.066*
LOGTA	-	-0.406	-7.811%	0.000***	-0.405	-7.769%	0.000***
ATURN	-	-0.289	-5.556%	0.000***	-0.285	-5.462%	0.001***
CURR	-	-0.107	-2.063%	0.000***	-0.107	-2.057%	0.000***
LEV	+	0.378	-7.258%	0.005***	0.382	7.331%	0.005***
ROA	-	0.014	0.263%	0.371	0.014	0.259%	0.378
SG	+	-0.001	-0.016%	0.101	-0.001	-0.017%	0.096*
MB	+	0.000	0.000%	0.002***	0.000	0.000%	0.003**
ZSCORE	-	-0.007	-0.136%	0.276	-0.007	-0.139%	0.266
CASH	-	-0.509	-9.787%	0.008***	-0.493	-9.460%	0.010**
OCF	-	-0.066	-1.264%	0.224	-0.065	-1.245%	0.231
LAGLOSS	+	0.209	4.025%	0.103	0.210	4.019%	0.105
AGE	-	-0.227	-4.368%	0.000***	-0.226	-4.329%	0.000***
RETURN	-	-0.323	-6.206%	0.000***	-0.321	-6.162%	0.000***
BETA	+	0.005	0.103%	0.882	0.003	0.064%	0.926
VOL	+	4.326	83.180%	0.001***	4.339	83.235%	0.002***
DELAY	+	0.004	0.086%	0.040**	0.004	0.086%	0.039**
WEAK	+	0.230	4.428%	0.022**	0.234	4.488%	0.20**
NEWEQUITY	-	0.025	0.477%	0.818	0.038	0.735%	0.722
NEWDEBT	?	-0.070	-1.340%	0.333	-0.066	-1.269%	0.357
TENURE	-	0.001	0.013%	0.151	0.001	0.014%	0.128
FIRSTYEAR	?	0.076	1.458%	0.434	0.075	1.434%	0.440
BIG4	+	0.214	4.111%	0.032**	0.206	3.957%	0.038**
LITG	-	1.263	24.282%	0.036**	1.236	23.719%	0.040**
Industry Fixed Effects		Included			Included		
Year Fixed Effects		Included			Included		
n		3,917			3,917		
n *GCO*		881			881		
Pseudo R^2		0.485			0.486		

Table 5
Continued

Panel B: Robustness test of Hypothesis 1 with bigger dataset (Dependent variable = *GCO*)

		HERF1			*HERF2*		
Variable	**Predicted Sign**	**Coef.**	**Marginal Effect**	**p-value**	**Coef.**	**Marginal Effect**	**p-value**
HERF1	?	-0.092	-1.257%	0.819			
HERF2	?				-0.306	-4.170%	0.197
LOGTA	-	-0.365	-4.986%	0.000***	-0.366	-4.986%	0.000***
ATURN	-	-0.329	-4.485%	0.000***	-0.327	-4.454%	0.000***
CURR	-	-0.117	-1.595%	0.000***	-0.117	-1.596%	0.000***
LEV	+	0.386	5.263%	0.020**	0.389	5.300%	0.020**
ROA	-	0.044	0.601%	0.209	0.044	0.604%	0.213
SG	+	-0.001	-0.001%	0.069*	-0.001	-0.009%	0.088*
MB	+	0.000	0.000%	0.000***	0.000	0.000%	0.000***
ZSCORE	-	-0.005	-0.070%	0.307	-0.005	-0.070%	0.295
CASH	-	-0.282	-3.850%	0.128	-0.272	-3.715%	0.143
OCF	-	-0.134	-1.835%	0.143	-0.135	-1.843%	0.154
LAGLOSS	+	0.336	4.592%	0.000***	0.337	4.594%	0.000***
AGE	-	-0.197	-2.686%	0.001***	-0.195	-2.657%	0.001***
RETURN	-	-0.409	-5.589%	0.000***	-0.408	-5.571%	0.000***
BETA	+	-0.012	-1.712%	0.712	-0.014	-0.192%	0.680
VOL	+	5.714	77.998%	0.000***	5.719	78.018%	0.000***
DELAY	+	0.003	0.046%	0.000***	0.003	0.045%	0.00***
WEAK	+	0.219	2.988%	0.010**	0.220	3.001%	0.010**
NEWEQUITY	-	0.007	0.100%	0.934	0.016	0.217%	0.856
NEWDEBT	?	-0.052	-0.707%	0.432	-0.049	-0.668%	0.456
TENURE	-	-0.000	-0.003%	0.779	-0.000	-0.002%	0.829
FIRSTYEAR	?	0.046	0.624%	0.583	0.045	0.619%	0.585
BIG4	+	0.173	2.366%	0.044**	0.170	2.314%	0.048**
LITG	-	0.763	10.413%	0.147	0.763	10.412%	0.144
Industry Fixed Effects		Included			Included		
Year Fixed Effects		Included			Included		
n		6,823			6,823		
n *GCO*		967			957		
Pseudo R^2		0.499			0.499		

*, **, *** Denote statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.
This table reports the regression results of audit market concentration on the chance a GCO is issued (Equation (1)). The table includes Panels. Panel A reports two tests of Hypothesis 1 in which financially distressed companies are defined as companies that have both negative net income and negative operating cash flows. The left regression (Columns 3, 4 and 5) reports the main test of Hypothesis 1, with *HERF1* as variable of interest. The right regression (Columns 6, 7 and 8) provides the robustness test in which *HERF2* is the variable of interest. Panel B includes the same two tests but with a bigger sample in which financially distressed companies are defined as companies that have negative net income or negative operating cash flows. The regressions include the coefficient of the variables, the marginal effect of the coefficients, and the corresponding p-value. All regressions include industry and year fixed effects. The p-values are calculated using standard errors clustered by clients. See Appendix A for variable definitions.

Table 6

Regression of audit market concentration on accuracy of issued Going Concern Opinions

Panel A: Type I errors (Dependent Variable = *BANKRUPT*)

		HERF1			*HERF2*		
Variable	**Predicted Sign**	**Coef.**	**Marginal Effect**	**p-value**	**Coef.**	**Marginal Effect**	**p-value**
HERF1	?	-0.161	-0.747%	0.821			
HERF2	?				-0.162	-0.754%	0.708
ZSCORE	-	-0.001	-0.002%	0.193	-0.001	-0.002%	0.194
LOGSALE	+	0.284	1.323%	0.000***	0.284	1.321%	0.000***
NYSE	+	0.495	2.304%	0.036**	0.494	2.296%	0.037**
BIG4	+	0.106	0.494%	0.514	0.105	0.487%	0.521
Industry Fixed Effects		Included			Included		
Year Fixed Effects		Included			Included		
n		3,380			3,380		
n *BANKRUPT*		94			94		
Pseudo R^2		0.313			0.314		

Panel B: Type II errors (Dependent Variable = *GCO*)

		HERF1			*HERF2*		
Variable	**Predicted Sign**	**Coef.**	**Marginal Effect**	**p-value**	**Coef.**	**Marginal Effect**	**p-value**
HERF1	?	1.408	36.971%	0.183			
HERF2	?				1.073	28.158%	0.182
ZSCORE	-	-0.009	-0.225%	0.410	-0.008	-0.209%	0.348
LOGSALE	+	-0.143	-3.754%	0.035**	-0.135	-3.552%	0.041**
NYSE	+	-0.648	-17.019%	0.036**	-0.649	-17.036%	0.036**
BANKLAG	-	-0.008	-0.222%	0.000***	-0.008	-0.220%	0.000***
REPORTLAG	+	0.006	0.168%	0.310	0.007	0.174%	0.295
BIG4	+	-0.180	-17.019%	0.488	-0.179	-17.036%	0.508
Industry Fixed Effects		Included			Included		
Year Fixed Effects		Included			Included		
n		156			156		
n *BANKRUPT*		94			94		
Pseudo R^2		0.457			0.459		

*, **, *** Denote statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

This table reports the regression results of audit market concentration on the accuracy of issued GCO's. Panel A tests the chance that when a company received a GCO, they also went bankrupt (Equation (3)). Panel B tests whether companies that went bankrupt, also received a GCO (Equation (4)). Both panels include two probit regressions. One is with *HERF1* as independent variable (Columns 3, 4 and 5) and Columns 6, 7 and 8 is the probit regression for *HERF2*. Each regression includes the coefficient, marginal effect, and the corresponding p-value. All regressions include industry and year fixed effects. The p-values are calculated using standard errors clustered by clients. See Appendix A for variable definitions.

Table 7

Additional test regarding regression of audit market concentration on issuance of Going Concern Opinions

Panel A: Alternative test with *BIG4SHARE* (Dependent variable = *GCO*)

		BIG4SHARE1			*BIG4SHARE2*		
Variable	**Predicted Sign**	**Coef.**	**Marginal Effect**	**p-value**	**Coef.**	**Marginal Effect**	**p-value**
BIG4SHARE1	?	-0.213	-4.089%	0.762			
BIG4SHARE2	?				-0.007	-0.127%	0.988
LOGTA	-	-0.405	-7.795%	0.000***	-0.405	-7.765%	0.000***
ATURN	-	-0.287	-5.525%	0.000***	-0.288	-5.536%	0.000***
CURR	-	-0.107	-2.063%	0.000***	-0.107	-2.064%	0.000***
LEV	+	0.378	7.262%	0.005***	0.378	7.262%	0.005***
ROA	-	0.014	0.261%	0.375	0.014	0.263%	0.371
SG	+	-0.001	-0.015%	0.101	-0.001	-0.015%	0.101
MB	+	0.000	0.000%	0.003***	0.000	0.000%	0.003***
ZSCORE	-	-0.007	-0.136%	0.272	-0.007	-0.136%	0.274
CASH	-	-0.504	-9.688%	0.008***	-0.505	-9.708%	0.008***
OCF	-	-0.065	-1.259%	0.227	-0.066	-1.266%	0.224
LAGLOSS	+	0.211	4.046%	0.099*	0.210	4.039%	0.101
AGE	-	-0.230	-4.413%	0.000***	-0.230	-4.414%	0.000***
RETURN	-	-0.324	-6.228%	0.000***	-0.324	-6.232%	0.000***
BETA	+	0.007	0.109%	0.875	0.005	0.101%	0.884
VOL	+	4.310	82.864%	0.001***	4.321	83.087%	0.001***
DELAY	+	0.004	0.086%	0.039**	0.004	0.086%	0.039**
WEAK	+	0.229	4.403%	0.023**	0.230	4.417%	0.022**
NEWEQUITY	-	0.024	0.464%	0.823	0.024	0.460%	0.825
NEWDEBT	?	-0.073	-1.407%	0.310	-0.072	-1.378%	0.319
TENURE	-	0.001	0.013%	0.156	0.001	0.013%	0.159
FIRSTYEAR	?	0.076	1.453%	0.435	0.076	1.640%	0.432
BIG4	+	0.216	4.144%	0.031**	0.214	4.117%	0.032**
LITG	-	1.269	24.407%	0.035**	1.270	24.415%	0.034**
Industry Fixed Effects		Included			Included		
Year Fixed Effects		Included			Included		
n		3,917			3,917		
n *GCO*		881			881		
Pseudo R^2		0.485			0.485		

Table 7
Continued

Panel B: Alternative test with *BIG4_HERF* (Dependent variable = *GCO*)

		BIG4_HERF1			*BIG4_HERF2*		
Variable	**Predicted Sign**	**Coef.**	**Marginal Effect**	**p-value**	**Coef.**	**Marginal Effect**	**p-value**
BIG4_HERF1	?	-0.182	-3.502%	0.608			
BIG4_HERF2	?				-0.357	-6.848%	0.133
LOGTA	-	-0.406	-7.810%	0.000***	-0.405	-7.779%	0.000***
ATURN	-	-0.290	-5.567%	0.000***	-0.288	-5.530%	0.000***
CURR	-	-0.107	-2.063%	0.000***	-0.107	-2.059%	0.000***
LEV	+	0.377	7.257%	0.005***	0.381	7.316%	0.005***
ROA	-	0.014	0.264%	0.369	0.014	0.263%	0.372
SG	+	-0.001	-0.016%	0.101	-0.001	-0.017%	0.096*
MB	+	0.000	0.000%	0.003***	0.000	0.000%	0.002***
ZSCORE	-	-0.007	-0.136%	0.276	-0.007	-0.139%	0.270
CASH	-	-0.510	-9.806%	0.008***	-0.502	-9.629%	0.009***
OCF	-	-0.066	-1.268%	0.222	-0.066	-1.262%	0.226
LAGLOSS	+	0.209	4.022%	0.103	0.209	4.002%	0.107
AGE	-	-0.227	-4.370%	0.000***	-0.226	-4.344%	0.000***
RETURN	-	-0.323	-6.208%	0.000***	-0.322	-6.174%	0.000***
BETA	+	0.005	0.098%	0.887	0.003	0.056%	0.935
VOL	+	4.334	83.334%	0.001***	4.347	83.456%	0.002***
DELAY	+	0.004	0.086%	0.040**	0.004	0.086%	0.038**
WEAK	+	0.321	4.432%	0.022**	0.232	4.452%	0.021**
NEWEQUITY	-	0.025	4.743%	0.819	0.033	0.630%	0.760
NEWDEBT	?	-0.069	-1.325%	0.340	-0.067	-1.282%	0.352
TENURE	-	0.001	0.013%	0.154	0.001	0.014%	0.137
FIRSTYEAR	?	0.076	1.467%	0.431	0.076	1.452%	0.434
BIG4	+	0.213	4.098%	0.032**	0.208	3.995%	0.036**
LITG	-	1.264	24.296%	0.35**	1.239	23.784%	0.040**
Industry Fixed Effects		Included			Included		
Year Fixed Effects		Included			Included		
n		3,917			3,917		
n *GCO*		881			881		
Pseudo R^2		0.485			0.486		

*, **, *** Denote statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.
This table provides 4 additional probit regressions regarding Hypothesis 1. Panel A presents two probit regressions in which *HERF1* and *HERF2* in Equation (1) are substituted with *BIG4SHARE1* and *BIG4SHARE2*, the operationalization of the Big 4 market share in the overall audit market. Panel B presents two probit regressions in which *HERF1* and *HERF2* in Equation (1) are substituted by *BIG4_HERF1* and *BIG4_HERF2*. *BIG4_HERF* calculates the concentration in the Big 4 audit market. Each regression includes the coefficient, marginal effect, and the corresponding p-value. All regressions include industry and year fixed effects. The p-values are calculated using standard errors clustered by clients. See Appendix A for variable definitions.

Table 8

Additional test regarding regression of audit market concentration on accuracy of issued Going Concern Opinions

Panel A: Type I errors with BIG4SHARE (Dependent Variable = *BANKRUPT*)

		BIG4SHARE1			*BIG4SHARE2*		
Variable	**Predicted Sign**	**Coef.**	**Marginal Effect**	**p-value**	**Coef.**	**Marginal Effect**	**p-value**
BIG4SHARE1	?	0.202	0.937%	0.776			
BIG4SHARE2	?				0.959	4.449%	0.129
ZSCORE	-	-0.001	-0.002%	0.192	-0.001	-0.002%	0.194
LOGSALE	+	0.285	1.323%	0.000***	0.285	1.321%	0.000***
NYSE	+	0.493	2.291%	0.038**	0.493	2.289%	0.038**
BIG4	+	0.101	0.472%	0.533	0.094	0.434%	0.565
Industry Fixed Effects		Included			Included		
Year Fixed Effects		Included			Included		
n		3,380			3,380		
n *BANKRUPT*		94			84		
Pseudo R^2		0.313			0.315		

Panel B: Type II errors with BIG4SHARE (Dependent Variable = *BANKRUPT*)

		BIG4SHARE1			*BIG4SHARE2*		
Variable	**Predicted Sign**	**Coef.**	**Marginal Effect**	**p-value**	**Coef.**	**Marginal Effect**	**p-value**
BIG4SHARE1	?	1.067	28.137%	0.516			
BIG4SHARE2	?				0.690	18.226%	0.616
ZSCORE	-	-0.010	-0.270%	0.375	-0.010	-0.270%	0.374
LOGSALE	+	-0.145	-3.823%	0.032**	-0.143	-3.787%	0.035**
NYSE	+	-0.580	-15.288%	0.064*	-0.580	-15.302%	0.062*
BANKLAG	-	-0.008	-0.219%	0.000***	-0.008	-0.218%	0.000***
REPORTLAG	+	0.006	0.165%	0.320	0.006	0.165%	0.318
BIG4	+	-0.184	-4.864%	0.511	-0.174	-4.585%	0.536
Industry Fixed Effects		Included			Included		
Year Fixed Effects		Included			Included		
n		156			156		
n *GCO*		94			94		
Pseudo R^2		0.453			0.452		

Table 8
Continued

Panel C: Type I errors with BIG4_HERF (Dependent Variable = *BANKRUPT*)

		BIG4_HERF1			*BIG4_HERF2*		
Variable	**Predicted Sign**	**Coef.**	**Marginal Effect**	**p-value**	**Coef.**	**Marginal Effect**	**p-value**
BIG4_HERF1	?	-0.175	-0.813	0.749			
BIG4_HERF2	?				-0.271	-1.262%	0.502
ZSCORE	-	-0.001	-0.002	0.194	-0.000	-0.002%	0.198
LOGSALE	+	0.284	1.324	0.000***	0.283	1.320%	0.000***
NYSE	+	0.496	2.311	0.036**	0.495	23.030%	0.036**
BIG4	+	0.104	0.483	0.526	0.102	0.476%	0.531
Industry Fixed Effects		Included			Included		0.020**
Year Fixed Effects		Included			Included		
n		3,374			3,374		
n *BANKRUPT*		94			94		
Pseudo R^2		0.313			0.314		

Panel D: Type II errors BIG4_HERF (Dependent Variable = *GCO*)

		BIG4_HERF1			*BIG4_HERF2*		
Variable	**Predicted Sign**	**Coef.**	**Marginal Effect**	**p-value**	**Coef.**	**Marginal Effect**	**p-value**
BIG4_HERF1	?	1.273	33.448%	0.190			
BIG4_HERF2					1.015	26.651%	0.210
ZSCORE	-	-0.008	-0.221%	0.412	-0.008	-0.208%	0.346
LOGSALE	+	-0.143	-3.747%	0.037**	-0.136	-3.578%	0.041**
NYSE	+	-0.654	-17.198%	0.036**	-0.656	-17.242%	0.035**
BANKLAG	-	-0.008	-0.222%	0.000***	-0.008	-0.222%	0.000***
REPORTLAG	+	0.006	0.170%	0.301	0.007	0.177%	0.286
BIG4	+	-0.174	-4.585%	0.521	-0.170	-4.454%	0.530
Industry Fixed Effects		Included			Included		
Year Fixed Effects		Included			Included		
n		156			156		
n *GCO*		94			94		
Pseudo R^2		0.457			0.459		

*, **, *** Denote statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.
This table shows 8 additional probit regressions regarding Hypothesis 2a (Panel A and C) and Hypothesis 2b (Panel B and D). Panel A and B include *BIG4SHARE1* and *BIG4SHARE2* as operationalization for audit market concentration and Panel C and D include *BIG4_HERF1* and *BIG4_HERF2* as operationalization. *BIG4SHARE* takes the Big 4 audit firms together and the other audit firms together and test whether higher Big 4 market share in the overall market leads to the issuance of more GCO's. *BIG4_HERF* calculates the audit market concentration within the Big 4 audit market. Each regression includes the coefficient, marginal effect, and the corresponding p-value. All regressions include industry and year fixed effects. The p-values are calculated using standard errors clustered by clients. See Appendix A for variable definitions.