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The Relationship Between Industry Concentration and the Level of Operating Segment Disclosure: The Moderating Effect of Audit Quality

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Abstract

This study aimed to examine the relationship between the degree of industry concentration which the company belongs and the level of operating segment disclosure. The study also aimed to test the impact of audit quality on the previous relationship, using a sample of 40 non-financial companies listed on the Egyptian stock exchange for five-year period 2016-2020.

Using regression analysis, the results of the study showed a low level of operating segment disclosure in Egyptian companies in general. The results of the study also showed that there is a significant negative relationship between the degree of industry concentration and the level of operating segment disclosure. While the results showed an insignificant negative effect of audit quality on the relationship between the degree of industry concentration and the level of disclosure of the operating segments. The previous results were supported by robustness tests conducted by including additional control variables that include the board of directors' characteristics, as well as using an alternative measure to measure the degree of industry concentration.

Keywords: Disclosure of operating segments, Industry concentration, Audit quality

1. Introduction

With the increasing complexity of companies, and performing their operations through many diverse activities, which represent distinct products or market sectors, the need has become urgent to obtain more detailed financial information. As information related to the financial position, performance, and cash flows at the company level as a whole despite its necessity is considered insufficient for users of financial statements, especially investors and creditors, to make sound decisions. This is due to the differences in the operating segments that make up the facility in terms of the profitability it achieves and the risks it is exposed to, which is hidden in the consolidated financial statements at the facility level (Benjamin et al. 2010; Obradovic & Karapavlovic, 2016).

Therefore, without information related to these segments, it will be difficult to analyze the impact of these activities on company performance (Benjamin et al. 2010). This is consistent with what was shown by the survey conducted by Epstein & Palepu (1999) on a sample of 140 financial analysts, that information related to the segment is considered one of the most important information necessary for making investment decisions for most financial analysts. This is because this information provides important additional insights into the past operating performance of the company and its segments, in addition to providing insight into its future performance. This is supported by the findings of several studies (e.g., Blanco et al. 2015; Heo & Doo, 2018; Andre et al. 2019) that disclosure of operating segments leads to increased accuracy of financial analysts' forecasts.

Professional organizations have been interested in the issue of operating segment disclosure for about four decades, which crystallized in the issuance and development of relevant accounting standards. In December 1976, the Financial Accounting Standards Board (FASB) issued the first accounting standard related to segment disclosure, SFAS. 14, which was replaced by SFAS. 131 in June 1997, and became effective after December 15. 1997, in an attempt to address the criticisms directed at the previous standard.

In the same context, in August 1981, the International Accounting Standards Committee (IASC) issued International Accounting Standard No. 14, which was reformulated in 1994. The Committee also issued in August 1997 the revised IAS. 14, which replaced the basic standard, and became effective. For fiscal years beginning in July 1998, or later. This was

followed by the International Accounting Standards Board (IASB) issuing in November 2006 International Financial Reporting Standard No. 8 (IFRS 8), which replaced the revised IAS. 14, and became effective for financial years beginning on or after 1 January 2009, as part of a project Convergence with the Financial Accounting Standards Board, and thus alignment with Financial Accounting Standard No. 131. Egyptian Accounting Standards have kept pace with this interest through the issuance of Egyptian Accounting Standard No. 33 in the year 2006, which is considered merely a translation of the amended International Accounting Standard No. 14, in addition to the issuance of Egyptian Accounting Standard No. 41 entitled Operating Segments in the year 2015, also as a translation of International Financial Reporting Standard No. 8.

Although several studies (e.g., Ettredge et al. 2005; Kang & Gray, 2013; He et al. 2016) have examined whether amending accounting standards related to disclosure of operating segments has led to an improvement in segment disclosure practices or not, they have not agreed in their findings, both in terms of the level of information and the number of segments that were disclosed. In addition, several studies have found a significant reduction in the number of items reported under IFRS. 8, with an increase in the number of segments reported after the standard's adoption (Nichols et al. 2012; Kang & Gray, 2013; Leung & Verriest, 2015). This may be due to this standard being linked to the way companies are managed, and thus the disclosure of segment information depends to a large extent on management estimates (Saidi, 2017).

The above indicates that the decision to disclose or withhold operating segment information may not only depend on what is stipulated in the relevant accounting standards, but also depends on the behavior adopted by the company's management towards disclosure, which subsequently depends on many determinants, including: For example, the nature of the industry in which the company operates, auditing quality, and corporate governance. On the one hand, several studies (e.g., Harris, 1998; Prencipe, 2004; Pisano & Landriani, 2012; Lucchese & Di Carlo, 2016; Souza et al. 2016) have examined the effect of the degree of industry concentration on the level operating segment disclosure. However, the results of these studies did not agree on this effect. On the other hand, some studies (e.g., Westgeest, 2013; Souza et al. 2016; Kobbi-Fakhfakh et al. 2018; Legoria et al. 2018) examined the effect of audit quality on the level of operating segment disclosure, but they did not agree on what It reached its results, and it did not test whether the audit quality affects the relationship between the degree of industry concentration and the level of operating segment disclosure. Hence, the question arises whether there is a relationship between the degree of industry concentration and the level of operating segment disclosure? And whether the audit quality affects the previous relationship, or not?

By using a sample of 200 firm-year observations of non-financial companies listed on the Egyptian Stock Exchange for five-year period 2016-2020, the study provides robust evidence that there is a significant negative relationship between the degree of industry concentration and the level of operating segment disclosure. While there is an insignificant negative effect of audit quality on the previous relationship. This study contributes to the literature by attempting to clarify the relationship between the degree of industry concentration and the

level of operating segment disclosure, to determine whether the difference in the level of disclosure provided by companies is due to the difference in the degree of competition. This comes with the beginning of Egyptian companies implementing the Egyptian Accounting Standards issued in August 2015, thus discovering the extent to which companies listed on the stock exchange comply with the requirements for reporting on operating segments, in addition to understanding what are the factors that affect their level of compliance with the requirements of Egyptian Accounting Standard No. 41, which is compatible with the standard International Financial Reporting No. 8. Also, study derives its importance from the scarcity of studies that have dealt with the degree of industry concentration as a determinant of disclosure of operating segments, in addition to the scarcity of studies that have dealt with the effect of audit quality on the relationship between the degree of industry concentration and the disclosure of operating segments, especially in the Egyptian environment, which is considered a motivation for this study. Finally, this allows professional bodies to determine whether there is a need to impose more mandatory disclosures to avoid information concealment practices, or to strengthen mechanisms that support information transparency.

The rest of it will be organized as follows: Section 2 deals with the theoretical framework and hypotheses development, Section 3 includes the data and research methodology, Section 4 presents the results of the study, their discussion, and robustness tests, and Section 5, the last, presents the conclusion.

2. Literature Review and Hypothesis Development

Operating segment disclosure is defined as the disclosure of information regarding the company's operations in various industries, foreign operations, export sales, and major customers (Epstein & Mirza, 2003). Mantziou (2014) defined it as reporting on the company’s operating segments as an additional disclosure alongside the financial statements, so that the facility is divided into segments, followed by providing financial and non-financial information for each segment. While Odia and Imagbe (2015) defined it as dividing the company into parts, and disclosing financial information for each part.

Disclosure of operating segments arose with the aim of helping to better understand the activities and performance of companies, and thus making rational decisions, by providing information about those segments, which would help users of accounting information to evaluate the main source of past cash flows and the future performance of the company (Mantziou, 2014; Odia & Imagbe, 2015). As well as assessing the risks to which the company is exposed (Mantziou, 2014). In addition, it helps in evaluating opportunities related to the company’s business activities (Odia & Imagbe, 2015; Saidi, 2017).

Studies have provided evidence that supports the importance of operating segment disclosure compared to information collected at the company level as a whole, including, for example, improving investors’ ability to estimate the company’s cash flows (Blanco et al. 2015), increasing the ability to interpret differences in stock prices (Birt et al. 2017), and increase the accuracy of financial analysts’ forecasts (Blanco et al. 2015; Heo & Doo, 2018; Andre et al. 2019). In addition, it reduces the cost of capital (Blanco et al. 2015), reduces the cost of equity capital (Yoo & Semenenko, 2012), as well as reduces the cost of financing by

borrowing through bonds (Franco et al. 2016).

Prencipe (2004) showed that companies bear costs as a result of disclosing segment information, which may be used by competitors and other parties in a way that harms the company making the disclosure, which prompts it to reduce the level of disclosure. The segment disclosure provides details about the profit margin of the company's segments, the return on assets, and the growth rate in its various business lines. This may inform competitors and other parties of the existence of weaknesses or opportunities that can be exploited to achieve their own interests and harm the company. This is consistent with the assumption of proprietary costs theory in explaining company disclosure behavior that in the absence of costs related to disclosure, companies have an incentive to voluntarily disclose relevant information to the capital market in order to reduce information asymmetry (Principe, 2004; Lucchese & Di Carlo, 2016).

In this regard, many studies have examined the effect of industry concentration, which indicates to the most of the industry's sales are made by a few companies on the level of disclosure (Alvarez et al. 2008). On the one hand, some studies find that companies in industries characterized by concentration and thus a low degree of competition tend to provide a lower level of disclosure. Harris (1998) indicated that one of the reasons for managers' objection to segmental disclosure is the claim that such disclosure provides valuable information to competitors that may not be available without it. The study found that the greater the degree of industry concentration, the lower the probability of segment disclosure for the company in order to protect its extraordinary profits, using a sample of 929 American companies during the period 1987-1991.

This is supported by the findings Botosan and Stanford (2005) that companies in industries characterized by a high degree of concentration, and therefore a low level of competition, tend to provide less disclosure about operating segments that achieve high profits. In the same context, using a sample of 124 non-financial companies belonging to 11 stock market sectors in Italy during the years 2008 and 2009, Pisano and Landriani (2012) found that industries characterized by a high degree of competition, and therefore less concentrated, are associated with higher levels of segmental disclosure. In addition, companies operating in industries with a lower degree of competition have reduced the information items provided for each segment under IFRS 8, compared to the level of disclosure in the previous year.

By using a large sample of companies from the European Union, Pardal et al. (2015) found that the number of segments that were disclosed was high. However, the level of disclosure was low in terms of the number of elements that were disclosed. Companies with high performance in their industry, operating in more concentrated industries with a high labor force, are also associated with a lower level of segment disclosure in the pre-IFRS adoption period and the post-adoption period. In contrast, Ali et al. (2014) indicated that management of companies in industries characterized by a high degree of concentration issued earnings forecasts less frequently, and that financial analysts evaluated this disclosure less frequently. In the same context, Konigsruber et al. (2021) found that potential competition is negatively associated with the disclosure of differences in the performance of operating segments for a

sample of USA companies, while existing competition is positively associated with the disclosure of differences in performance between operating segments.

On the other hand, some studies have found an insignificant relationship between the degree of concentration of the industry and the level of disclosure. Souza et al. (2016) found that there is an insignificant relationship between the degree of industry concentration and the level of operating segment disclosure, using a sample of Brazilian companies. In the same context, and using a sample of non-financial Italian companies, Lucchese & Di Carlo (2016) found an insignificant negative relationship between the level of segmental disclosure and the level of competition in the industry. The study by Izzaty and Pujiastuti (2020) found a positive relationship between the level of operating segment disclosure and both company size and financial leverage for a sample of Indonesia industrial companies. While there is an insignificant effect of industrial competition, profitability, and earnings quality on the level of segment disclosure.

In light of the presence of costs related to disclosure, which include: the costs of preparing, disseminating, and reviewing information, in addition to the costs resulting from providing useful information to competitors, which may be used in a way that harms the company, companies have an incentive to provide a low level of disclosure, for fear of losing their advantage. Competitiveness. Based on the description above, the following hypothesis was formulated:

H1: The degree of industry concentration negatively affects the level of operating segment disclosure.

The relationship between the type of audit firm and the quality of services it provides has received great attention, as Berglund et al. (2018), BenYoussef & Drira (2020), and Hammami & Zadeh (2020) show that the type of auditor is a proxy for his reputation and the quality of his performance, and that the Big 4 audit firms with valuable reputations have greater motivation to achieve financial reporting quality and to reduce expected litigation costs. Consistent with this, Comprix & Huang (2015) found that small audit firms are less able to limit earnings management activities. In the Egyptian environment, Khalil and Ozkan (2016) found that the Big 4 audit firms and the Central Auditing Organization provide higher audit quality compared to other audit firms. Continuing the previous research trend, Kurniawati et al. (2020) argue that appointing high-quality audit firms, one of the Big 4, is a mechanism to reduce information asymmetry. In the same context, Souza et al. (2016) indicated that Companies whose financial statements are audited by the Big 4 audit firms also tend to provide better disclosure, because the Big 4 audit firms usually require companies to comply with the disclosure requirements imposed by accounting standards. Therefore, the Big 4 audit firms influence the quality of disclosure and encourage the companies that they audit to disclose more information.

Some studies have examined the impact of audit quality on the level of operating segment disclosure. Westgeest (2013) found that European companies whose financial statements are audited by Big 4 audit firms provide a higher level of geographical segment disclosure than other companies. However, the study did not find support for a higher level of disclosure for

companies whose financial statements are audited by Big 4 audit firms in countries with weaker or more stringent investor protection rights. Souza et al. (2016) found that companies whose financial statements are audited by Big 4 audit firms tend to provide better disclosure, because Big 4 audit firms are usually more demanding regarding the disclosure required by accounting standards. In addition to encouraging better disclosure by their clients, the Big 4 audit firms tend not to engage with clients with low levels of disclosure, and these characteristics can be extended to each segment disclosure.

Kobbi-Fakhfakh et al. (2018) found that there is a wide variation in the quality of segment reporting among European companies, with larger companies, whose financial statements are audited by the Big 4, tending to provide higher quality segment reporting. Legoria et al. (2018) found that companies disclose the identity of their major clients when their financial statements are audited by a specialized audit firm, whose clients largely consist of companies that have large clients. These results were supported by other measures of audit quality, including: Big 4 audit firms, Tier 2 audit firms, and audit firm size. The study also found that small and medium-sized companies are more likely to make voluntary disclosures when they use a higher quality audit firm.

In light of the fact that companies whose financial statements are audited by the Big 4 tend to provide better disclosure, this is because the Big 4 audit firms usually require companies to comply with the disclosure requirements imposed by accounting standards. Therefore, the Big 4 audit firms affect the level of disclosure. Based on the description above, the following hypothesis was formulated:

H2: The relationship between the degree of industry concentration and the level of operating segment disclosure varies depending on the audit quality.

3. Research Methodology

In this section, we will describe in detail how the empirical study was conducted to test the research hypotheses related to the relationship between degree of industry concentration and level of operating segment disclosure, in addition to testing whether this relationship varies depending on the audit quality, using a sample of companies listed on the Egyptian Stock Exchange during the period from 2016 to 2020, through showing the following aspects: the study population and sample, research model, conceptual and operational definitions of variables used in the study.

3.1 Data and Sample

To test the research hypotheses, an empirical study will be conducted using a sample of 40 non-financial companies listed on the Egyptian stock exchange over a period of five years from 2016 to 2020, which is the period that begins with the implementation of Egyptian Accounting Standard 41. Table 1 shows the number and percentage of companies in the study sample, distributed according to the industry.

Table 1. Number and Percentage of Companies Distributed According to Industries

Industry	Number of sample companies	percentage
Basic resources	1	2.5%
Chemicals	3	7.5%
Construction and building materials	9	22.5%
Food and drinks	7	17.5%
Health care and medicine	2	5%
Industrial services, products and cars	5	12.5%
Gas and oil	1	2.5%
Household and personal products	1	2.5%
Real estate	3	7.5
Technology	2	5%
Telecommunications	2	5%
Tourism and entertainment	4	10%
Total number of companies	**40**	**100%**

3.2 Research Model

Multiple linear regression analysis will be used to test the two research hypotheses related to the relationship between the degree of industry concentration and the level of operating segment disclosure, in addition to the moderating effect of audit quality, as follows:

First: Testing the relationship between the degree of industry concentration and the level of operating segment disclosure through the following regression model:

$$SD_{j,t} = \beta_0 + \beta_1 CON_{j,t} + \beta_2 SIZE_{j,t} + \beta_3 LEV_{j,t} + \beta_4 ROA_{j,t} + \beta_5 GROWTH_{j,t} + \beta_6 SGN_{j,t} + \beta_7 LIST_{j,t} + \varepsilon_{j,t} \quad (1)$$

Where: SD: level of operating segment disclosure, CON: industry concentration, SIZE: company size, LEV: financial leverage, ROA return on assets, GROWTH: company growth,

SGN: number of segments that are disclosed in the company, LIST: number of years the company has been registered on the stock exchange, ε is the term of random error.

Second: Testing the effect of audit quality on the relationship between the degree of industry concentration and the level of operating segment disclosure through the following regression model:

$$SD_{j,t} = \beta_0 + \beta_1 CON_{j,t} + \beta_2 AQ_{j,t} + \beta_3 AQ_{j,t}*CON_{j,t} + \beta_4 SIZE_{j,t} + \beta_5 LEV_{j,t} + \beta_6 ROA_{j,t} + \beta_7 GROWTH_{j,t} + \beta_8 SGN_{j,t} + \beta_9 LIST_{j,t} + \varepsilon_{j,t} \quad (2)$$

Where: AQ: audit quality, AQ*CON: the interactive variable for audit quality and degree of industry concentration. The remaining variables are as defined in the previous model No. (1).

3.3 Measuring Study Variables

3.3.1 Dependent Variable: Level of Operating Segment Disclosure

We derived an indicator for disclosure of operating segments to measure the level of disclosure for companies listed on the Egyptian Stock Exchange, which includes 30 elements, based on Egyptian Accounting Standard 41, and studies by Lucchese & Di Carlo (2016), Mateescu (2016), and Souza et al. (2016). The Operating segment disclosure index is shown in Appendix.

3.3.2 Independent Variable: The Degree of Industry Concentration

The degree of industry concentration measured by the most widely used measure in studies, which is the Herfindahl index, based on the value of sales, in agreement with the studies of Pisano & Landriani (2012), Utama (2012), and Wang (2016), as follows:

$$HERF_j = \sum_{i=1}^{n} \left(\frac{sales_{ij}}{sales_j} \right)^2$$

Where: $sales_{ij}$ is company i's sales in industry j, $sales_j$ is the sum of sales for all companies in industry j, n_j is a number of companies in industry j. The higher the value of this indicator, the higher the level of industry concentration.

3.3.3 Moderating Variable: Audit Quality

Audit quality measured through a dummy variable that takes the value (1) if the company is audited by an audit firm partnering with one of the Big 4 audit firms, and takes the value (0) otherwise (Lee & Lee, 2013; Baffa & Yero, 2017; Abubakar et al. 2021).

3.3.4 Control Variables

Several studies (e.g., Ibrahim & Jaafar, 2014; Johari et al. 2016; Tao, 2017) have shown the existence of some factors which may affect the level of operating segment disclosure. Therefore, a set of control variables will be included:

– Company size: measured by the natural logarithm of total assets at the end of the year.

- Leverage: measured by the ratio of total debts to total assets.
- Return on Assets: measured by net profit divided by total assets.
- Growth: measured by the change in the company's sales (= [sales for the current year - sales for the previous year] / sales for the previous year).
- Number of segments that are disclosed: measured by the number of segments that are disclosed as the company's operating segments.
- Number of years the company has been registered on the stock exchange: It is measured by the number of years since the company was registered on the stock exchange until the beginning of the year in question.

4. Results and Discussion

4.1 Descriptive Statistics

The descriptive statistics in Table 2 indicate that the average for both the level of operating segment disclosure and the degree of industry concentration, for the combined study period was 0.2246 and 0.3500, respectively. In addition, the standard deviation of the previous two variables was 0.1390 and 0.2497, respectively, which is less than the same average for these two variables. The number of annual observations audited by the Big 4 audit firms was 143 annual observations, equivalent to 71.5%. On the other hand, the descriptive statistics in Table 2 indicate a low level of operating segment disclosure in the study sample companies, which averaged 0.2246.

Table 2. Descriptive Statistics

Variables	Minimum	Maximum	Mean	Std. Deviation
SD	0.0283	0.6750	0.2246	0.1390
CON	0.0594	0.9698	0.3500	0.2498
AQ*	0	1	0.71	0.453
SIZE	19.0102	25.2970	21.6850	1.3985
LEV	0.0872	0.9194	0.5067	0.2105
ROA	-0.2643	0.3979	0.0733	0.0971
GROWTH	-0.3015	1.9142	0.3002	0.3372
SGN	2	11	3.68	1.840
LIST	1	37	16.02	7.885

* The number of annual observations audited by the Big 4 was 143 annual observations, equivalent to 71.5%.

Where: SD: level of operating segment disclosure, SIZE: company size, LEV: financial leverage, ROA: return on assets, GROWTH: company growth, SGN: number of segments that are disclosed in the company, LIST: number of years the company has been registered on the stock exchange.

4.2 Correlation Between Study Variables

Table 3 shows Pearson correlation coefficients for the relationship between the study variables. There is a significant positive correlation at a significance level of less than 5% between the level of operating segment disclosure and the audit quality, company size, leverage, growth, and the number of segments that are disclosed. The correlation coefficient for these variables was 0.386, 0.312, 0.236, 0.229, and 0.270, respectively. While there is a significant negative correlation at a significance level of less than 5% between the level of operating segment disclosure, as the correlation coefficient for this variable was -0.023.

On the other hand, there is a significant negative correlation at a significance level of less than 5% between the degree of industry concentration and audit quality, as the correlation coefficient for this variable was -0.260. As for the audit quality variable, there is a significant positive correlation between it and both company size and leverage, as the correlation coefficient for these two variables was 0.264 and 0.450, respectively, while there is a significant negative correlation between audit quality and the number of years the company has been registered on the stock exchange, where the correlation coefficient for this variable was -0.269.

Table 3. Pearson Correlation Coefficients

Variables		SD	CON	AQ	SIZE	LEV	ROA	GROWTH	SGN	LIST
SD	Correlation coefficient	1.000								
	Sig. (2-tailed)									
CON	Pearson Correlation	-.203**	1.000							
	Sig. (2-tailed)	.004								
AQ	Pearson Correlation	.386**	-.260**	1.000						
	Sig. (2-tailed)	.000	.000							
SIZE	Pearson Correlation	.312**	.025	.264**	1.000					
	Sig. (2-tailed)	.000	.723	.000						
LEV	Pearson Correlation	.236**	-.042	.450**	.379**	1.000				
	Sig. (2-tailed)	.001	.551	.000	.000					
ROA	Pearson Correlation	.109	.039	.032	-.029	-.322**	1.000			
	Sig. (2-tailed)	.126	.583	.657	.686	.000				
GROWTH	Pearson Correlation	.229**	.117	.063	.137	.183**	.285**	1.000		
	Sig. (2-tailed)	.001	.100	.375	.054	.009	.000			
SGN	Pearson Correlation	.270**	-.049	-.015	.008	-.036	.002	.022	1.000	
	Sig. (2-tailed)	.000	.495	.830	.914	.613	.975	.759		
LIST	Pearson Correlation	-.099	.096	-.269**	-.255**	-.181*	-.175*	-.113	-.023	1.000
	Sig. (2-tailed)	.163	.176	.000	.000	.010	.013	.110	.742	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Where: AQ: audit quality, the remaining variables are as defined in the Table (2).

4.3 Main Result

Results of Testing Research Hypotheses

Table 4 presents the regression estimates of the effects of degree of industry concentration on the level of operating segment disclosure. The table shows that the regression model is significant, as the calculated (F) value was 10.581, there is no linear autocorrelation problem, given that the largest value of the variance inflation factor (VIF) was 1.470, and there is no autocorrelation problem, as the value of the Durbin Watson statistic was 2.023. Table 4 shows that the regression coefficient for the variable degree of industry concentration was -0.122, the t-test value was -3.507. This indicates that there is a significant negative relationship between the degree of industry concentration and the level of operating segment disclosure. Therefore, the first hypothesis of the research is accepted. This is consistent with the findings of studies by Harris (1998), Botosan & Stanford (2005), Pisano & Landriani (2012), and Pardal et al. (2015). While it is not consistent with the findings of the studies of Lucchese & Di Carlo (2016), and Souza et al. (2016) found that there is an insignificant effect of the degree of industry concentration on the level of operating segment disclosure.

Table 4. Multiple regression results for SD and CON

Variables	β	Tolerance	VIF
Intercept	-.456**		
	(-3.112)		
CON	-.122**	0.966	1.035
	(-3.507)		
SIZE	.025**	0.813	1.230
	(3.684)		
LEV	.115*	0.680	1.470
	(2.349)		
ROA	.214*	0.728	1.373
	(2.081)		
GROWTH	.061*	0.819	1.221
	(2.183)		
SGN	.020**	0.993	1.007
	(4.263)		
LIST	.001	0.864	1.157
	(1.008)		

F = 10.581; R^2 = 0.278; Adj. R^2 = 0.252; Durbin-Watson = 2.023

* and ** represent significance at p<0.05 and <0.01, respectively. t-values are reported in the parentheses. See Table (2) for the variable definitions.

On the other hand, there is a significant negative correlation at a significance level of less than 5% between the degree of industry concentration and audit quality, as the correlation coefficient for this variable was -0.260. As for the audit quality variable, there is a significant positive correlation between it and both company size and leverage, as the correlation coefficient for these two variables was 0.264 and 0.450, respectively, while there is a significant negative correlation between audit quality and the number of years the company has been registered on the stock exchange, where the correlation coefficient for this variable was -0.269.

Table 5. Multiple regression results for SD and CON

Variables	β	Tolerance	VIF
Intercept	-.522**		
	(-3.512)		
CON	-.027	.422	2.367
	(-.527)		
AQ	.130**	.272	3.676
	(3.760)		
AQ*CON	-.113	.265	3.769
	(-1.602)		
SIZE	.024**	.785	1.274
	(3.695)		
LEV	.031	.558	1.791
	(.605)		
ROA	.152	.694	1.442
	(1.499)		
GROWTH	.070**	.814	1.229
	(2.602)		
SGN	.021**	.986	1.014
	(4.615		
LIST	.002	.813	1.229
	(1.861)		

F = 10.976; R^2 = 0.342; Adj. R^2 = 0.311; Durbin-Watson = 2.061

* and ** represent significance at p<0.05 and <0.01, respectively. t-values are reported in the parentheses.

Where: AQ*CON the interactive variable for audit quality and degree of industry concentration. The remaining variables are as defined in the Table (2); (3).

Table 5 indicates that there is a significant positive effect of audit quality on the level of operating segment disclosure. The regression coefficient was 0.130, and the t-test value was 3.760. This is consistent with the findings of the studies of Kobbi-Fakhfakh et al. (2018), and

Legoria et al. (2018). As for the moderating effect of audit quality, the results in Table 5 indicate that there is an insignificant negative relationship between the interactive variable of audit quality and the degree of industry concentration and the level of operating segment disclosure. The regression coefficient for the interactive variable was -0.113, and the t-test value was -1.602. This indicates that there is an insignificant effect of audit quality on the relationship between the degree of industry concentration and the level of operating segment disclosure. Therefore, the second hypothesis of the research is not accepted.

4.4 Robustness Tests

4.4.1 Sensitivity of the Results to Changes in Model Specification

In this part of the research, we address re-testing the research hypothesis after including a group of variables related to the characteristics of the board of directors, as the decision to disclose or withhold operating segment information may depend on the behavior adopted by the company's management towards disclosure, which subsequently depends on many determinants, including the characteristics of the board of directors. Although the board of directors is considered one of the most important corporate governance mechanisms which aims to reduce agency problems (Aljifri & Moustafa, 2007), the effectiveness of the board's oversight role depends on its characteristics. Accordingly, the research hypothesis will be retested after including the board of directors' characteristics, which include: size, independence, duality, and diversity of the board of directors.

Table (6/Section A) indicates that the regression coefficient for the variable degree of industry concentration was -0.095, and the t-test value was -2.708. This indicates that there is a significant negative relationship between the degree of industry concentration and the level of operating segment disclosure. Therefore, the first hypothesis of the research is accepted. This result is consistent with the research findings in the primary analysis.

Table (6/Section B) shows that the regression coefficient for the audit quality variable was 0.134, and the t-test value was 3.979. This indicates that there is a significant positive relationship between audit quality and the level of operating segment disclosure. This result supports the findings of the research in the basic analysis. Table No. (6/Section B) also indicates that there is an insignificant negative relationship between the interactive variable of audit quality and the degree of industry concentration and the level of operating segment disclosure. The regression coefficient for the interactive variable was -0.094, and the t-test value was -1.364. This indicates that there is an insignificant effect of audit quality on the relationship between the degree of industry concentration and the level of operating segment disclosure. This result supports the findings of the research in the basic analysis.

4.4.2 Sensitivity of the Results to Changes in Measurement

In this part of the research, we address retesting the two research hypotheses using an alternative measure of the degree of industry concentration, where the Herfindahl index will be used, based on the value of total assets instead of sales (Souza et al. 2016). Table (7/Section A) shows that the regression coefficient for the variable degree of industry concentration was -0.098, and the t-test value was -2.487. This indicates that there is a

significant negative relationship between the degree of industry concentration and the level of operating segment disclosure. Therefore, the first hypothesis of the research is accepted. This result is consistent with the research findings in the primary analysis.

Table 6. Multiple regression results for SD and CON

	Section (A)*	Section (B)**
Variables	**β**	**β**
Intercept	-0.793**	-0.843**
	(-4.900)	(-5.343)
CON	-0.095**	-0.008
	(-2.708)	(-0.166)
AQ		0.134**
		(3.979)
AQ*CON		-0.094
		(-1.364)
SIZE	0.037**	0.035**
	(4.843)	(4.847)
LEV	0.137**	0.025
	(2.781)	(0.477)
ROA	0.420**	0.357**
	(3.993)	(3.509)
GROWTH	0.057*	0.063*
	(2.162)	(2.511)
SGN	0.015**	0.015**
	(3.074)	(3.339)
LIST	0.004**	0.005**
	(3.284)	(4.393)
BSIZE	-0.007*	-0.007*
	(-1.988)	(-2.036)
DUAL	0.005	0.025
	(0.284)	(1.377)
IND	0.304**	0.324**
	(5.180)	(5.795)
DIV	0.084	0.015
	(1.025)	(0.856)

*F = 10.548; R2 = 0.382; Adj. R2 = 0.345; Durbin-Watson = 1.908

**F = 11.760; R2 = 0.451; Adj. R2 = 0.413; Durbin-Watson = 1.890

where, BSIZE board size, IND: independence, DUAL: duality, and DIV: diversity of the board of directors. The remaining variables are as defined in the Table (2); (3).

Table 7. Multiple regression results for SD and CON

	Section (A)*	Section (B)**
Variables	**β**	**β**
Intercept	-0.478**	-0.470**
	(-3.255)	(-3.287)
CON	-0.098*	-0.027
	(-2.487)	(-0.449)
AQ		0.121**
		(3.028)
AQ*CON		-0.071
		(-0.865)
SIZE	0.025**	0.022
	(3.648)	(3.287)
LEV	0.125*	0.032
	(2.554)	(0.629)
ROA	0.259*	0.139
	(2.503)	(1.319)
GROWTH	0.056*	0.069*
	(2.019)	(2.596)
SGN	0.017**	0.019**
	(3.731)	(4.126)
LIST	0.002	0.003*
	(1.543)	(2.244)
*F = 9.266; R2 = 0.253; Adj. R2 = 0.225; Durbin-Watson = 1.947		
**F = 9.979; R2 = 0.321; Adj. R2 = 0.289; Durbin-Watson = 1.819		

Table (7/Section B) indicates that the regression coefficient for the audit quality variable was 0.121, and the t-test value was 3.028. This indicates that there is a significant positive relationship between audit quality and the level of operating segment disclosure. This result supports the findings of the research in the basic analysis. Table No. (7/Section B) also indicates that there is an insignificant negative relationship between the interactive variable of audit quality and the degree of industry concentration and the level of operating segment disclosure. The regression coefficient for the interactive variable was -0.071, and the t-test value was -0.865. This indicates that there is an insignificant effect of audit quality on the relationship between the degree of industry concentration and the level of operating segment disclosure. This result supports the findings of the research in the basic analysis.

5. Conclusion

This research investigated the relationship between the degree of segment concentration and

the level of operating segment disclosure, as well as investigating the effect of audit quality on the previous relationship. This was done using a sample of non-financial companies listed on the Egyptian Stock Exchange for the five-year period 2016-2020.

The findings showed that a low level of disclosure about the operating segment in Egyptian companies in general. The findings also showed that there is a significant negative relationship between the degree of industry concentration and the level of operating segment disclosure. Additionally, there is a significant positive effect of the audit quality on the level of operating segment disclosure, while the findings showed that there is an insignificant effect of the audit quality on the relationship between degree of industry concentration and the level of operating segment disclosure, which indicates that there is no difference in the effect of the degree of industry concentration on the level of operating segment disclosure depending on the audit quality. The results of the additional analysis showed support for the previous findings, both when adding additional control variables to the two regression models that are related to the board of directors' characteristics, as well as support for the previous findings when using an alternative measure to measure the degree of industry concentration.

This study provides insights into the influence both of degree of industry concentration, and audit quality on the level of operating segment disclosure, which draws attention to the need to strengthen the role of regulatory authorities by the Capital Market Authority obligating companies to comply with the requirements for operating segment disclosure, and ensuring that these requirements are implemented by companies. Additionally, strengthening mechanisms to enhance information transparency by strengthening the role of corporate governance in achieving compliance with disclosure requirements for operation segments.

The limitation of the research is to test industry concentration as a determinant of the level of operating segment disclosure. So, it is suggested that future research be conducted to examine other factors that may affect the level of operating segment disclosure such as corporate governance, ownership structure, and company complexity. In addition, researchers can also examine the different effects of the company's operating segment disclosure, such as firm value, stock performance, and cost of equity capital. Finally, because the Egyptian environment may be different, this may limit the generalization of our findings to other countries with different disclosure requirements. Therefore, repeating this study in other capital markets is an extension of this research.

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Appendix. Operating segment disclosure index

1	Chief operating decision maker.
2	The operating results of each segment are reviewed regularly by the chief operating decision maker.
3	Factors used to determine a company's reportable segments (such as products and services or geographic areas)
4	Whether operating segments have been Aggregated.
5	The provisions used in applying the Aggregation standard, along with a summary description of the operating segments that have been grouped.
6	The types of products and services from which each reportable segment derives its revenue.
7	Measuring the profits or losses of each segment that is reported.
8	Measure the total assets of each reportable segment.
9	Measuring the total liabilities for each reportable segment.
10	Revenues from transactions with customers outside the company.
11	Revenues from transactions with other operating segments of the same company.
12	Interest income.
13	Interest expense.
14	Depreciation and amortization expense.
15	Items of income and expenses that are of relative importance.
16	Income tax expense.
17	Amounts of additions to non-current assets, other than financial instruments, and deferred tax assets.
18	The basis of accounting for any reported inter-segment transactions.
19	The nature of any differences between the measures of reportable segment profits or losses and the profits or losses of the company as a whole before income tax expense and discontinued operations.
20	The nature of any differences between the measures of the assets of segments being reported and the assets of the company as a whole.
21	The nature of any differences between the measures of the segment liabilities being

	reported and the liabilities of the company as a whole.
22	The nature of any changes from previous periods in the measurement methods used to determine the profits or losses of the segment being reported, and the impact of those changes on measuring the segment's profits or losses.
23	The nature and effect of any asymmetric allocations to reportable segments. For example, a company allocates depreciation expense to a segment without allocating the related depreciable assets to that segment.
24	The total revenues of the segments being reported compared to the revenues of the entity as a whole.
25	The total profits or losses of measured and reported segments compared to the profits or losses of the entity as a whole before tax expense and discontinued operations.
26	The total assets and liabilities of segments that are reported with the assets and liabilities of the entity as a whole.
27	The total of the reported segment amounts for each other material item with the corresponding amount for the entity as a whole.
28	Revenue from external customers for each product or service or for each group of similar products and services.
29	Revenues from external customers generated in the facility's country of residence, as well as generated from all foreign countries from which the facility derives revenues.
30	Information about the extent of the entity's dependence on its major customers (revenues from transactions with a single external customer amount to 10% or more of the entity's revenues), as well as information about the total amount of revenues from each customer.