

## Empirical Paper

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# Concentration on the market of audit services provided to publicly listed companies: Evidence from Poland

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**Abstract: Paper's objectives:** The main purpose of the article was to identify the level of concentration on the market of audit services provided to public companies listed on the Warsaw Stock Exchange. The additional aim of the article was to identify the level of rotation among companies providing audit services to public companies listed on the Warsaw Stock Exchange.

**Methods applied:** The research conclusions were formulated based on the analysis of 3,960 annual reports prepared in the years between 2011 and 2019 by companies listed on the Warsaw Stock Exchange.

**Findings:** The study found that over the years from 2011 to 2016 the concentration (measured by BIG4, CR<sub>4</sub>, CR<sub>8</sub>, and 10KAP indicators) on the market of auditing services provided to public companies increased. However, as of 2017, this concentration began to decline. This demonstrates the effectiveness of the new regulations on the audit market. In the analyzed period, eight audit firms, referred to in the article as “leading”, provided their services to an average of >62% of public companies. Their share in the market of auditing services varied from sector to sector. At the turn of 2016 and of 2017, a significant increase in the level of rotation on the market of audit services provided to public companies was observed. This level varied from sector to sector.

**Originality/value:** The literature on the subject has not yet presented a comprehensive analysis of the impact of EU directives on the structure of the Polish market of audit services provided to public companies. This issue is a research gap, which has been filled in this article.

**Keywords:** BIG4, financial audit, legislative changes, public companies

**JEL Classification:** M42, M48, G34

## 1 Introduction

The key task of a financial audit is to verify – on behalf of shareholders and other stakeholders – the credibility of financial statements, which, in the conditions of information asymmetry occurring on capital markets, constitute the primary source of information on the financial situation and achievements of the entity. As Lee [2006] points out, financial auditing is a direct measure to protect shareholders from inappropriate management behavior.

In an international study conducted by the International Federation of Accountants (IFAC) [2011], users of financial reports indicated that legislative actions to increase the usefulness of financial data presented by enterprises should consist, inter alia, in reducing the market dominance of companies from

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the “Big Four” (BIG4). In recent years, the structure of the audit services market has become the subject of legislative activities of the European Union. The aim of the adopted EU directives was, *inter alia*, to reduce concentration on the market of auditing services. As noted in the report of the European Commission [2017] on the audit services market, a competitive market for services provided to public interest entities enables the efficient operation of financial markets. The solutions implemented in the legal orders of EU countries became an inspiration to analyze the market of auditing companies providing services to public companies listed on the Warsaw Stock Exchange.

The main purpose of the article was to identify the level of concentration on the market of auditing services provided to public companies listed on the Warsaw Stock Exchange. The additional aim of the article was to identify the level of rotation among companies providing audit services to public companies listed on the Warsaw Stock Exchange.

The content of the article was developed with the use of literature studies and the analysis of legal acts. The conclusions presented in the last, empirical part were formulated based on an analysis of 3,960 reports of public companies listed on the Warsaw Stock Exchange, prepared between 2011 and 2019. The reports came from the websites of the surveyed companies. Data were collected manually.

The first part of the article presents the results of literature studies on the problem of concentration on the audit services market. The second part of the article reviews the methods of measuring concentration on the audit services market. The third part reviews the research on the concentration on the markets of audit services in the European countries. The fourth part presents the key legislative changes concerning the audit market in Poland. The fifth section presents key information on the organization of the study. The results of empirical research are presented in the subsequent part of the article. The last part of the article presents a discussion of the obtained results of empirical research.

The obtained research results provide new knowledge on the functioning of the market of auditing services provided to public companies. The research results show that the legislative changes introduced in 2017 had a significant impact on the market of auditing services provided to public companies listed on the Warsaw Stock Exchange. The results supplement theoretical research on the audit market in Poland [Sawicki, 2009; Kutera, 2009; Dobija, 2011; Dobija and Cieślak, 2012] or empirical research on the relationship between the statutory auditor and the audit committee [Dobija, 2010, 2015]. The presented research results complement other empirical studies whose substantive scope or research period included in the analysis were smaller compared to the studies presented in this article [Gad, 2018; Indyk, 2019].

## 2 The problem of concentration on the market of auditing services – literature studies

Statutory auditors are perceived as informal guardians of the credibility of enterprises [Marcinkowska, 2014], acting on behalf of owners and providing objective and independent opinion on the quality of financial statements. The results of the research presented in the literature allow us to conclude that the quality of the audit depends, among others, on concentration on the audit services market, although it is not clear whether this relationship is positive or negative.

The literature indicates that concentration on the audit services market, which translates into limited choice of an audit firm, strengthens the market position of the largest audit firms and reduces the incentive to improve the quality of audit [GAO, 2008]. The high concentration on the auditing market is related to the high barriers to entering this market by new entities. This applies to small audit firms that are unable to fulfill orders usually undertaken by large audit firms and lack reputation that the companies in the BIG4 have. The lack of experience of auditors in a given sector and the lack of specialist knowledge in some areas, e.g., in the field of IT or actuarial matters [Le Vourc’h and Morand, 2011] may also pose a problem.

Concentration on the market of auditing services increases audit fees [GAO, 2008]. Caban-Garcia and Cammack [2009] argue that the market power of the largest market “players” may cause monopolization of prices and a reduction in audit quality, which may lead to a reduction in the stability of capital markets and lower investor confidence.

At the same time, a different view is presented in the literature, according to which the concentration on the market of audit services may lead to economies of scale and intense competition among other providers of audit services, which results in a reduction of audit fees [Pearson and Trompeter, 1994; Eshleman and Lawson, 2017]. In addition, increasing concentration on the audit services market may reduce auditors' fears of losing customers and allows auditors to focus on improving the quality of the audit process [Newton et al., 2013]. A similar opinion was presented by Boone et al. [2012], who claim that concentration on the audit services market may increase, not decrease, the quality of the audit, as it may reduce the need for auditors to “win over” clients and strengthens their professional position.

In the European Union countries, the markets of audit services provided to public companies are mostly dominated by companies from the BIG4 [European Commission, 2017, 2021]. Empirical research conducted, among others, in EU countries indicate that audits carried out by companies from the BIG4 and by companies not from the BIG4 are of higher quality in countries where the BIG4 companies have a greater share. This indicates the market demand for high-quality audits, and thus the need to eliminate auditors who provide low-quality services from the market [Francis et al., 2013]. Research conducted among audit firms providing audit services on the Polish capital market confirms that audit firms from the BIG4 are less willing than other firms to issue opinions without reservations [Gruszczyński, 2003].

Companies that choose one of the auditing companies from the BIG4 do not focus on costs, but on the quality of audit services, auditors' competences, or international reputation [Mijic et al., 2014].

It is noted in the literature that one of the factors that cause changes in the level of concentration on the audit services market is the rotation of audit firms, which strengthens the independence of auditors [Mijic et al., 2014].

A different view is presented by Narayanaswamy and Raghunandan [2019], who found that the mandatory rotation of audit firms is associated with a higher level of concentration on the audit services market. The literature also indicates that the mandatory rotation of audit firms increases the probability of making “a first-time audit” errors. These errors result from the fact that the auditing company has limited knowledge about the audited entity [Jong et al., 2020].

### 3 Methods of measuring concentration on the market of audit services

Concentration on the audit services market may be understood as the consolidated share of revenues from audit services of selected audit firms in the total revenues from audit services or as a consolidated share of the number of entities audited by selected audit firms in the total number of entities subject to an audit. Importantly, this concentration can be measured using various indices, such as, for example, Concentration Index ( $CR_k$ ), Hirschman–Herfindahl Index (HHI), Hannah-Kay (HK) index, Comprehensive Concentration Index (CCI), and Linda (L) index [Le Vourc'h and Morand, 2011]. Concentration on the market of auditing services can also be measured by the market share of the BIG4 companies, i.e., PricewaterhouseCoopers, Deloitte, KPMG, and Ernst & Young [Financial Reporting Council, 2010; Indyk, 2019] and using the “10KAP” ratio, which means the share of the ten key audit companies in the audit market, i.e., Baker Tilly; BDO; Ernst & Young; Deloitte; Grant Thornton; KPMG; Mazars; Moore Stephens; Nexia; and PricewaterhouseCoopers [European Commission, 2017]. In the study prepared by the OECD [1993], it is recommended to use two indices to study the concentration on the audit services market, i.e.,  $CR_k$  and HHI, of which the  $CR_k$  index is most often used in the literature [Mijic et al., 2014; Paunescu, 2015; Malis and Brozovic, 2015; Groff and Salihovic, 2016; European Commission, 2017, 2021]. The  $CR_k$  ratio means the consolidated market share of the  $k$  largest audit firms. The  $CR_k$  indicator may apply to, for example, four ( $CR_4$ ) or eight largest audit firms ( $CR_8$ ).

The literature indicates how to understand the individual levels of the  $CR_4$  indicator. This ratio may range from 0% to 100%, where [Le Vourc'h and Morand, 2011; European Commission, 2017]:

- $CR_4 = 0\%$  means perfect competition,
- $0\% < CR_4 < 50\%$  is the range from perfect competition to oligopoly,

- $50\% < CR_4 < 80\%$  means oligopoly,
- $80\% < CR_4 < 100\%$  is the range from concentrated oligopoly to monopoly, and
- $CR_4 = 100\%$  means a high level of oligopoly concentration or even a monopoly (if  $CR_1 = 100\%$ ).

The level of concentration on the market of auditing services provided to public companies varies in different countries of the European Union.

## 4 Concentration on the markets of auditing services in the European countries – An overview of the research

Research conducted in Great Britain shows that, in 2009, companies from the BIG4 conducted audits in as many as 99% of companies from the FTSE 100 index and in 94% of companies from the FTSE 250 index [Financial Reporting Council, 2010]. In the same year in Lithuania, companies from the BIG4 provided auditing services for 84% of public interest entities [Steponaviciute et al., 2010]. In turn, in Romania in 2013, ~40% of financial statements of public companies were audited by companies from the BIG4. The  $CR_4$  ratio on the Romanian audit market in 2013 was 28% [Paunescu, 2015].

In 2016, in Lithuania, companies from the BIG4 group provided audit services to 63.64% of public interest entities and to 33.33% of public companies [Rozgina, 2018].

In 2017, the financial statements of almost 100% of public companies with the highest capitalization listed on the capital markets in the United Kingdom, Germany, Italy, Spain, and the Netherlands were audited by audit companies from the BIG4 group [Rozgina, 2018].

The results of research conducted on regional markets indicate that the level of concentration on selected national markets of audit services was increasing. In Slovenia, the  $CR_4$  ratio (for audits carried out among public companies) in the years 2008, 2009, 2010, and 2011 was 67.3%, 74.5%, 69.6% and 69.5%, respectively. On the other hand, the  $CR_{10}$  ratio (for audits carried out among public companies) in 2008, 2009, 2010, and 2011 was 90.9%, 90.9%, 89.3%, and 91.5%, respectively [Groff and Salihovic, 2016]. In Croatia, in 2008 the  $CR_4$  ratio was 36.21%, while in 2013 this ratio was 40.52% [Malis and Brozovic, 2015]. The share of the BIG4 companies on the Croatian market increased between 2008 and 2013 from 27.59% to 34.48% [Malis and Brozovic, 2015].

The results of research conducted among EU countries indicate that in the years from 2004 to 2009 the level of concentration on the market of auditing services provided to public companies increased in 9 out of the 22 surveyed EU countries. In 2009, the concentration level measured by the  $CR_4$  index was higher than 70% in 14 out of the 22 surveyed EU countries [Le Vourc'h and Morand, 2011]. It should be emphasized that this study did not take into account all public companies listed in a given country. For example, in 2009 in Poland, 373 companies had the status of a public company, while only 138 were included in the study.

Changes in the EU market of audit services provided to public interest entities are monitored by EU institutions. The reports published by the European Commission include, inter alia, the problem of concentration on the audit services market [European Commission, 2017]. These reports present three concentration ratios, i.e., the 10KAP ratio, the BIG4 ratio, and the  $CR_4$  ratio. Research carried out using data from 2015 and 2018 shows that the average share of auditing companies from the BIG4 group in the market of services provided to public interest entities in EU countries was ~70%. The research results indicate a considerable variation in the level of concentration on the market of audit services in the EU countries. In 2015, the highest level of concentration ( $\geq 90\%$ ) measured by the  $CR_4$  ratio was observed in Ireland, Spain, and Denmark. In 2018, the group of countries with the highest  $CR_4$  ( $\geq 90\%$ ) included Estonia, Denmark, Sweden, Lithuania, Luxembourg, Finland, and Spain. The lowest concentration level ( $< 40\%$ ), measured by the  $CR_4$  ratio, was recorded in 2015 in Bulgaria, Slovakia, and Hungary. In 2018, this indicator was  $< 40\%$  in Bulgaria, Romania, and Poland [European Commission, 2017, 2021].

Audit companies from the BIG4 had the largest share ( $\geq 90\%$ ) in the market of auditing services provided to public companies in Ireland, Spain, and Denmark in 2015. In 2018, the highest value of the BIG4 index ( $\geq 90\%$ ) was recorded in Estonia, Denmark, Lithuania, Sweden, and Luxembourg. In 2015, the smallest share ( $< 40\%$ ) in the audit market had companies from the BIG4 in Bulgaria, Slovakia, Greece, and

Hungary, while in 2018, the smallest share had Bulgaria, Greece, Romania, Poland, and Portugal [European Commission, 2017, 2021].

Both in 2015 and 2018, in the great majority of EU countries, the BIG4 index was equal to the  $CR_4$  index, which means that in these countries the four audit firms with the highest market share belonged to the BIG4.

## 5 Legislative changes concerning the market of auditing services in Poland

New regulations on the audit market were introduced in the EU, and thus in Poland, due to Directive 2013/34/EU, Directive 2014/56/EU, and Regulation (EU) No 537/2014. The new EU regulations take into account a number of shortcomings observed on the audit market, which concern, inter alia [European Commission, 2016]:

- (1) investors' doubts as to the credibility and reliability of the audited financial statements of banks, other financial institutions, and listed companies – the above doubts seriously damaged investors' confidence in the auditors' reports;
- (2) the problem of an excessive familiarity between the management of the company and its audit firm, which poses a threat to the independence of statutory auditors;
- (3) the inability to choose audit firms in practice, resulting from the high level of concentration on the highest level of the audit market; and
- (4) systemic risk related to the dominance of entities from the BIG4 group on the audit market.

The reform of the auditing market in the European Union was primarily aimed at improving the quality of audit and restoring investor confidence in financial information through [European Commission, 2016]:

- (1) ensuring transparency of companies' financial information;
- (2) providing auditors with a strong mandate to be independent and display professional skepticism;
- (3) contributing to a more dynamic EU audit market; and
- (4) improving the supervision of statutory auditors and coordination of audit supervision by competent authorities in the EU.

The regulations implemented in Poland mainly concerned:

- (1) mandatory rotation of audit firms,
- (2) new rules for setting up an audit committee,
- (3) stricter requirements for the independence and competence of audit committee members,
- (4) increasing the role of the audit committee in the financial audit process, including the obligation to prepare an additional audit report for the audit committee,
- (5) new tasks of the audit committee, and
- (6) administrative penalties imposed on the members of the management board and the supervisory board for non-compliance with the tasks assigned to them.

From the point of view of the structure of the audit services market, legislative changes regarding mandatory rotation of audit firms and new duties of audit committees related to the selection of an audit firm are of particular importance.

The solutions adopted in 2017 in Poland are aimed at limiting the competitive advantage of large audit firms and enabling other entities to enter the market, which is to result in the market decentralization of audit services provided to public interest entities [Ministry of Finance, 2017]. Pursuant to the provisions of the Polish Act on Statutory Auditors, Audit Firms and Public Oversight, the maximum uninterrupted duration of statutory audit engagements carried out by the same audit firm may not exceed 5 years. This period also applies to the key statutory auditor conducting an audit in a public interest entity. The first contract for the audit of financial statements is concluded with an auditing company for a period of not less than 2 years, with the possibility of extension for further periods of at least 2 years. The role of the



audit committee in the financial audit process has been significantly strengthened. The audit committee is obliged, *inter alia*, to develop a policy and procedure for selecting an audit firm by a public interest entity. If the audit firm is selected by the supervisory board, the audit committee presents its recommendation to the board, which, *inter alia*, indicates the audit company to which it proposes to entrust the audit. The recommendation should include at least two audit firms to choose from. In addition, it should be prepared following a procedure that, *inter alia*, does not exclude from participation in the selection procedure companies that received <15% of their total remuneration for auditing from public interest entities in a given EU country in the previous calendar year [Act on Statutory Auditors, Audit Firms and Public Oversight; Act on Accounting].

## 6 Organization of the study

The empirical study was aimed at acquiring new knowledge about the market of auditing services provided to public companies listed on the WSE, which seems to be particularly valuable in the context of the legislative changes introduced in Poland in 2017 resulting from EU Directives.

The empirical study was conducted in two stages. In the first stage, changes related to the concentration of audit services provided to public companies on the market were identified. In this article, concentration was measured as the consolidated share of the number of audits performed by given audit firms in the total number of audits performed for public companies. In the second stage of the study, the level of rotation among audit firms providing services to public companies listed on the Warsaw Stock Exchange was determined.

The data were obtained from 3,960 annual reports prepared by public companies listed on the WSE during the entire research period, *i.e.*, between 2011 and 2019 and in shorter periods within the same time span. The reports came from the websites of the surveyed companies. Data were collected manually.

One of the tools used in the empirical study was the analysis of the structure. Due to the fact that the assumption about the normality of variable distributions was not met, the non-parametric Kruskal–Wallis test was used for data analysis. The study also used Pearson’s chi-squared independence test and Cramér’s V. The non-parametric Kruskal–Wallis test was used to determine whether there were statistically significant differences between companies representing different sectors with regard to different measures of concentration on the audit market and to the levels of rotation on the audit market. Pearson’s chi-square independence test was used to estimate the existence of a statistically significant relationship between the sector and the various measures of concentration on the audit market. The power of the relationship was measured using Cramér’s V. The concentration on the audit market was measured using the concentration measures used by the European Commission [2017, 2021]. The calculation was made in the IBM SPSS Statistics.

The following research questions were formulated:

- (1) Which audit companies between 2011 and 2019 provided audit services to the largest number of public companies?
- (2) What was the level of concentration of auditing services provided to public companies on the market between 2011 and 2019?
- (3) What was the market share of companies that provided audit services to only one public company between 2011 and 2019?
- (4) What was the share of public companies in the total number of companies listed on the Warsaw Stock Exchange between 2011 and 2019, in which the audit firm was changed?

The study included a sectoral analysis of public companies for which audit services were provided. The sectoral breakdown comes from the website of the Warsaw Stock Exchange.

The problem of sectoral specialization of auditors was undertaken in many studies concerning, *inter alia*, the impact of sector specialization of auditors on the quality of the audit, precision in identifying errors, or the remuneration of auditors [Solomon *et al.*, 1999; Taylor, 2000; Owosho *et al.*, 2002; Balsam *et al.*, 2003; Low, 2004; Cahan *et al.*, 2011; Minutti-Meza, 2013].

The companies from the sectors of industrial production and construction and assembly, finance, consumer goods, and trade and services had the largest share in the surveyed population (Table 1).

**Table 1.** Sectoral structure of the surveyed companies (%)

Sector name	2011	2012	2013	2014	2015	2016	2017	2018	2019
Finance	22.43	22.84	23.30	22.68	22.27	22.25	22.46	22.91	22.78
Fuel and energy	3.58	3.96	4.07	4.54	4.37	4.10	4.49	4.77	5.06
Chemicals and raw materials	9.55	10.26	9.73	9.98	9.61	9.50	9.46	9.55	8.86
Industrial and construction-assembly production	25.78	25.17	25.11	25.40	26.64	25.70	25.77	25.06	25.57
Consumer goods	14.56	13.99	13.80	13.83	13.54	13.61	13.24	12.89	12.66
Trade and services	10.50	10.49	10.63	10.66	10.26	10.80	10.87	11.22	11.39
Health care	4.06	3.96	4.07	3.63	4.15	5.18	5.20	5.25	5.57
Technologies	9.55	9.32	9.28	9.30	9.17	8.86	8.51	8.35	8.10

Source: Own compilation.

## 7 Results

### 7.1 Concentration on the market of auditing services provided to public companies

Between 2011 and 2019, auditing services for public companies were provided by 141 audit companies. Eight audit firms were identified, which in at least 1 year included in the analysis had a market share of audit services provided to public companies at a level exceeding 5%. This article defines them as “leading” audit firms ( $CR_8$ ). Ernst & Young and Deloitte had the largest share in this market. Concentration on the market of audit services provided to public companies seems to be noticeable. The total share of eight “leading” audit firms ( $CR_8$ ) in the market of auditing services provided to public companies listed on the WSE between 2011 and 2019 on average exceeded 62%. Importantly, the share of “leading” audit firms ( $CR_8$ ) in the market of audit services provided to public companies increased over the analyzed years (from 58.23% in 2011 to 62.03% in 2019) (Table 2).

**Table 2.** The structure of the market of auditing services provided to public companies (%)

No.	Audit company	2011	2012	2013	2014	2015	2016	2017	2018	2019
1.	Ernst & Young	10.50	10.26	9.05	9.30	10.48	11.23	14.66	13.13	12.15
2.	Deloitte	9.79	10.26	11.76	12.47	12.66	13.61	12.29	8.59	6.08
3.	BDO Polska	9.79	8.16	6.79	5.90	6.55	7.34	7.57	7.88	6.84
4.	KPMG	8.35	7.93	8.82	10.20	9.17	8.42	6.38	6.92	6.33
5.	PKF Polska	6.21	7.23	8.14	8.16	7.42	6.91	5.91	4.53	5.32
6.	PricewaterhouseCoopers	4.53	6.29	6.56	7.26	8.08	8.21	6.38	7.88	8.10
7.	ECA Seredyński i Wspólnicy	4.06	3.96	4.30	5.22	4.15	4.10	5.67	6.44	7.85
8.	Grant Thornton Frąckowiak	5.01	4.20	3.85	4.08	4.37	4.97	5.91	7.16	9.37
	Other audit firms	41.77	41.72	40.72	37.41	37.12	35.21	35.22	37.47	37.97

Source: Own compilation.

The research results indicate that the share of “leading” audit firms ( $CR_8$ ) in the audit services market has increased over the years in most sectors. In the sectors of finance, fuel and energy, and technologies, this share slightly decreased. At the same time, it should be noted that in the fuel and energy sector, the share of “leading” auditing companies ( $CR_8$ ) in the audit services market was >84% in all years (Table 3). This sector includes companies with the highest market capitalization and book value. The total value of the market capitalization of companies from the fuel and energy sector in 2016 was 38.21% of the total market value of all companies listed on the WSE, while the total book value of these companies was 51.96% of the total book value of all companies listed on the WSE.

The results of the non-parametric Kruskal–Wallis test show that only in 2015 there were statistically significant differences in the share of “leading” audit firms in the total number of audits carried out by audit firms in individual sectors, i.e., in at least one sector this share was statistically significantly different from the shares occurring in other sectors.

In turn, the results of the Pearson’s chi-square independence test allow us to conclude that in 2015 there was a statistically significant, relatively weak relationship between the sector and the audit of financial statements by an audit company from the  $CR_8$  group (Table 3).

**Table 3.** The share of “leading” auditing companies in the market of auditing services provided to public companies (by sectors, %)

No.	Sector	2011	2012	2013	2014	2015	2016	2017	2018	2019
1.	Finance	65.96	60.20	63.11	66.00	66.67	66.02	63.16	62.50	60.00
2.	Fuel and energy	93.33	94.12	94.44	85.00	90.00	84.21	89.47	85.00	85.00
3.	Chemicals and raw materials	70.00	59.09	62.79	70.45	75.00	79.55	75.00	72.50	71.43
4.	Industrial and construction-assembly production	54.63	57.41	57.66	56.25	57.38	63.87	63.30	58.10	56.44
5.	Consumer goods	49.18	50.00	49.18	62.30	56.45	60.32	58.93	61.11	60.00
6.	Trade and services	56.91	71.11	74.47	70.21	74.47	64.00	63.04	59.57	62.22
7.	Health care	47.06	58.82	55.56	62.50	68.42	70.83	72.23	72.23	77.27
8.	Technologies	57.50	62.50	51.22	53.66	52.38	53.66	55.56	51.43	53.13
Kruskal–Wallis test ( <i>P</i> -value)		0.122	0.178	0.060	0.091	<b>0.046*</b>	0.142	0.212	0.175	0.059
Pearson’s chi-square test of independence ( <i>P</i> -value)		0.121	0.177	0.059	0.090	<b>0.045*</b>	0.142	0.211	0.174	0.058
Cramér’s <i>V</i>		0.147	0.139	0.161	0.153	0.165	0.144	0.144	0.148	0.171

\*  $p < 0.05$

\*\*  $p < 0.01$

Source: Own compilation.

Over the analyzed years, in most sectors, the share of the number of audits carried out by audit companies from the BIG4 group in the total number of audits carried out by audit companies decreased. Only in the consumer goods and health care sectors, this share slightly increased over the analyzed years.

The largest share of the number of audits carried out by companies from the BIG4 group in the total number of audits occurred in all analyzed years in the fuel and energy sector.

The results of the non-parametric Kruskal–Wallis test indicate that in all the years studied, there were statistically significant differences between the sectors regarding the share of the number of audits carried out by the BIG4 in the total number of audits (Table 4).



**Table 4.** The share of auditing companies from the BIG4 group in the market of auditing services provided to public companies (by sectors, %)

No.	Sector	2011	2012	2013	2014	2015	2016	2017	2018	2019
1.	Finance	36.17	37.76	38.83	45.00	45.10	45.63	40.00	38.54	32.22
2.	Fuel and energy	80.00	82.35	77.78	70.00	80.00	78.95	84.21	75.00	70.00
3.	Chemicals and raw materials	47.50	38.64	44.19	50.00	52.27	56.82	57.50	47.50	45.71
4.	Industrial and construction-assembly production	25.93	29.63	30.63	33.04	34.43	34.45	31.19	28.57	23.76
5.	Consumer goods	26.23	25.00	29.51	32.79	29.03	33.33	35.71	31.48	28.00
6.	Trade and services	31.82	35.56	38.30	38.30	46.81	44.00	34.78	34.04	31.11
7.	Health care	35.29	41.18	38.89	43.75	42.11	45.83	40.91	36.36	36.36
8.	Technologies	32.50	35.00	31.71	31.71	33.33	31.71	33.33	31.43	31.25
Kruskal–Wallis test (P-value)		<b>0.022*</b>	<b>0.009**</b>	<b>0.020*</b>	<b>0.013*</b>	<b>0.002**</b>	<b>0.005**</b>	<b>0.003**</b>	<b>0.012*</b>	<b>0.006**</b>
Pearson's chi-square test of independence (P-value)		<b>0.022*</b>	<b>0.009**</b>	<b>0.020*</b>	<b>0.013*</b>	<b>0.002**</b>	<b>0.005**</b>	<b>0.003**</b>	<b>0.012*</b>	<b>0.006**</b>
Cramér's V		0.176	0.188	0.178	0.184	0.209	0.197	0.214	0.197	0.207

\* p &lt; 0.05

\*\* p &lt; 0.01

Source: Own compilation.

The results of the Pearson's chi-square test of independence allow us to conclude that in all analyzed years there was a statistically significant, relatively weak relationship between the sector and the audit of financial statements by the auditing company from the BIG4 group (Table 4).

Between 2011 and 2019, audit services were most often provided by companies from the BIG4 group in the sectors of finance, fuel and energy, trade and services, and chemicals and raw materials (Table 5). The results of the research indicate that some kind of specialization of audit firms can be identified. In the analyzed period, in the technologies sector, these services were provided mainly by Ernst and Young. In the chemicals and raw materials, industrial production, and consumer goods sectors, audit services were most often provided by Deloitte. On the other hand, in the healthcare sector, audit services were most often provided by BDO, which is not in the BIG4 group.

In the analyzed period, the share of audit firms providing audit services to only one public company decreased by half. In 2011, it was 10.79%, while in 2019 it was only 5.06% (Table 6). Therefore, it seems that audit firms that provided services to public companies incidentally were forced out of the market of auditing services provided to public companies.

Until 2016, the level of concentration on the market of auditing services provided to public companies listed on the Warsaw Stock Exchange was systematically increasing. This applies to all concentration indicators. As of 2017, the concentration on the market of auditing services provided to public companies began to decline. The level of the BIG4 and CR<sub>4</sub> indicators in 2019 was lower than their level in 2011 (Table 7).

Thus, the results of the research indicate that the legislative changes introduced in Poland in 2017 were effective and contributed to the reduction of the level of concentration on the audit services market. The values of the CR<sub>4</sub> concentration ratio confirm that the market of auditing services provided to public companies in Poland does not take the form of an oligopoly.

**Table 5.** An audit company that most often provided auditing services to public companies (by sectors, %)

No.	Sector	2011	2012	2013	2014	2015	2016	2017	2018	2019
1.	Finance	EY	EY	EY	Deloitte	Deloitte	Deloitte	Deloitte	KPMG	KPMG
2.	Fuel and energy	EY	EY	KPMG	KPMG	KPMG	KPMG	EY	EY	Deloitte
3.	Chemicals and raw materials	Deloitte	KPMG	Deloitte	KPMG	Deloitte	Deloitte	Deloitte	EY	EY
4.	Industrial and construction-assembly production	BDO	Deloitte	Deloitte	Deloitte	Deloitte	Deloitte	EY	EY	EY
5.	Consumer goods	Deloitte	PwC	Baker Tilly	KPMG	Deloitte	Deloitte	Deloitte	Deloitte	PwC
6.	Trade and services	PwC	BDO	PwC	PwC	PwC	Deloitte	Deloitte	KPMG	KPMG
7.	Health care	EY	EY	Deloitte	Deloitte	BDO	BDO	BDO	BDO	BDO
8.	Technologies	EY	EY	EY	PKF	EY	PKF	EY	EY	EY

Source: Own compilation.

**Table 6.** Share of audit firms providing audit services to only one public company in the market of audit services (%)

2011	2012	2013	2014	2015	2016	2017	2018	2019
10.74	9.56	6.56	7.71	5.90	5.83	6.38	6.68	5.06

Source: Own compilation.

**Table 7.** Selected concentration indicators on the market of auditing services provided to public companies (%)

Concentration indicators	2011	2012	2013	2014	2015	2016	2017	2018	2019
BIG4	33.89	35.43	36.88	39.91	41.05	41.68	39.72	36.52	32.66
CR <sub>4</sub>	38.66	37.06	38.24	40.59	41.05	41.68	40.90	37.47	37.47
CR <sub>8</sub>	59.19	59.44	59.95	63.49	63.97	65.66	64.78	62.53	62.03
10KAP	52.03	51.98	52.04	52.83	55.24	56.59	55.79	54.65	50.89

Source: Own compilation.

## 7.2 Rotation on the market of auditing services provided to public companies

Between 2011 and 2016, ~20% of public companies listed on the WSE changed their auditing company. The rotation of audit firms increased significantly at the turn of 2016 and at the turn of 2017. At the turn of 2018, the rotation was again ~20% (Table 8).

At the turn of 2016 or and of 2017, the rotation of audit companies increased in all analyzed sectors. The highest level of rotation occurred at the turn of 2016 in the fuel and energy sector, and it was almost 29%. Until 2016, the lowest level of rotation was in the fuel and energy sector, and the highest in the health care sector (Table 9).

The results of the non-parametric Kruskal–Wallis test show that only at the turn of 2014 there were statistically significant differences between sectors regarding the rotation of audit firms.

**Table 8.** Share of public companies where the audit firm changed in the total number of public companies (%)

2011/2012	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
19.18	19.53	20.79	20.24	21.41	28.80	31.31	21.52

Source: Own compilation.

**Table 9.** Share of public companies from a given sector in which the audit firm changed in the total number of companies from a given sector (%)

No.	Sector	2011/ 2012	2012/ 2013	2013/ 2014	2014/ 2015	2015/ 2016	2016/ 2017	2017/ 2018	2018/ 2019
1.	Finance	18.09	24.49	22.68	21.05	16.49	24.24	35.87	27.78
2.	Fuel and energy	13.33	11.76	5.56	20.00	15.79	38.89	26.32	20.00
3.	Chemicals and raw materials	22.50	20.93	21.43	13.95	27.91	32.50	30.00	14.29
4.	Industrial and construction- assembly production	20.37	19.81	22.02	20.18	23.08	32.74	29.52	14.85
5.	Consumer goods	20.00	16.95	24.14	18.97	20.69	28.33	35.19	22.00
6.	Trade and services	20.45	17.78	21.28	16.28	25.58	19.15	30.43	28.89
7.	Health care	23.53	11.76	12.50	37.50	26.32	31.82	13.64	18.18
8.	Technologies	12.82	17.50	17.07	25.00	17.95	28.95	35.29	25.00
Kruskal–Wallis test ( <i>P</i> -value)		0.482	0.748	0.305	<b>0.034*</b>	0.205	0.923	0.073	0.084

\*  $p < 0.05$ \*\*  $p < 0.01$ 

Source: Own compilation.

## 8 Conclusions

In the light of the research carried out by the EU in 2015, Poland was ranked 22nd (out of 28 EU countries) in terms of concentration on the market of audit services provided to public interest entities. In 2018, Poland ranked 26th (out of 29 EU countries) in the above ranking. The average share of companies from the BIG4 in the audit markets of EU countries, both in 2015 and 2018, amounted to almost 70% of the total number of audits provided to public interest entities. In Poland, in 2015, this share was ~47%, while in 2018 it was ~35% [European Commission, 2017, 2021]. Thus, in Poland, the level of concentration on the market of audit services provided to public interest entities is much lower than the EU average.

The results of the research conducted by the author allow us to conclude that the level of concentration on the market of audit services provided to public companies listed on the Warsaw Stock Exchange was increasing until 2016 and then began to decline. In the case of the Polish capital market, eight “leading” audit firms ( $CR_8$ ) can be identified, including Ernst & Young, Deloitte, BDO Polska, KPMG, PKF Polska, PricewaterhouseCoopers, ECA Seredyński i Wspólnicy, and Grant Thornton Frąckowiak. These are companies with a market share >5% in at least one year of the survey. Between 2011 and 2019, “leading” auditing companies had on average >62% of the market share of auditing services provided to public companies.

Between 2011 and 2016, the concentration (measured by BIG4,  $CR_4$ ,  $CR_8$ , and 10KAP indicators) on the market of auditing services provided to public companies was growing. Starting from 2017, this concentration (measured by the BIG4,  $CR_4$ ,  $CR_8$ , and 10KAP indicators) started to decrease significantly. It seems that the changes on the market of audit services provided to public companies in the area of concentration are consistent with the intention of the Polish legislator as well as with that of the EU. In the years from 2011 to 2019, the share of audit companies providing their services to only one public company decreased systematically.

The research results indicate that there were statistically significant differences regarding the share of BIG4 in the market of auditing services provided to public companies listed on the Warsaw Stock Exchange in various sectors. In all analyzed years, auditing companies from the BIG4 group provided auditing services to the majority of public companies in the fuel and energy sector. This sector is distinguished by the fact that its companies have high book value and market capitalization. The results of the research allow us to conclude that the audit companies from the BIG4 group had in their portfolios the largest public companies, in which their accounting systems seem to be the most extensive. The literature on the subject presents a

theoretical explanation of this phenomenon. According to Craswell et al. [1995], larger companies usually struggle with more complex agency problems, and therefore they are more likely to use the services of the largest, recognized audit firms employing specialists from particular sectors. Mayhew and Wilkins [2003] noted that audit firms with a large market share differ from other audit firms, due to the fact that they have the largest share of large companies in their portfolios. As indicated in the literature, hiring large audit firms is associated with the desire to signal high-quality financial reporting [Brown et al., 2011]. A large, recognized audit firm is a kind of credibility guarantee, which will be difficult to achieve in the case of a small audit firm.

The research results presented in this article show that there is a kind of specialization on the Polish market of auditing services provided to public companies. A similar situation occurs in developed capital markets [Taylor, 2000; Balsam et al., 2003; Hay and Jeter, 2011]. The research results presented in the literature indicate that the sector specialization of auditors leads to a higher quality of audit compared to the audit performed by auditors without sector specialization [Booner and Lewis, 1990; Ashton, 1991; O’Keele et al., 1994; Balsam et al., 2003; Kwon et al., 2007]. Sector specialization can contribute to achieving economies of scale and improve audit efficiency, which can lead to a reduction in audit costs [Hay and Jeter, 2011]. Importantly, companies with an audit committee are more likely to entrust the audit to an auditor specializing in a given sector [Chen et al., 2005].

The research results indicate that the level of rotation of audit firms providing services to public companies listed on the Warsaw Stock Exchange between 2011 and 2016 was at a similar level and amounted to ~20%. A significant change took place at the turn of 2016 and again at the turn of 2017. During these periods, the level of rotation increased significantly. This may result from changes in regulations that were supposed to, inter alia, increase the rotation of audit firms. In turn, at the turn of 2018, the turnover level was again ~20%. Audit firms appear reluctant to change audited companies. The literature indicates that the first-time audit of a company is more expensive than the second-time audit. This is due to the initial investment necessary to become familiar with the customer’s accounting system [Chan, 1999].

To sum up, it seems that the legislative changes introduced in 2017 influenced the structure of the market for services provided to public companies listed on the Warsaw Stock Exchange.

The research results presented in the article can be used for subsequent analysis of the functioning of the market of auditing services provided to public companies.

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