AUDIT MARKET CONCENTRATION – EVIDENCE FROM CROATIA

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Abstract

Statutory audit is designated to protect the public interest and has a significant impact on the overall economy. There are concerns that the Big Four audit firms have become too dominant and that the collapse of one of these firms would disrupt the whole financial system. In terms of revenues received, the total market share of the Big Four audit firms for listed companies exceeds 90% in a vast majority of European Union Member States. Prior studies have shown that high audit market concentration limits the choice of auditor for large companies and sets a high barrier of entry for mid-tier audit firms, while the effect on audit quality and audit fees is still unclear. Therefore, the regulators are considering reforms to dilute the Big Four's dominance and improve competition in the audit market. The paper reviews the proposed and implemented measures that are the most common, together with their advantages and drawbacks. In addition, the characteristics of the audit market in Croatia are investigated, with a focus on market concentration measured by standard measures such as the Concentration rate, the Herfindahl-Hirschman Index and the Gini coefficient. According to market shares based on total clients' assets and revenues, the audit market for listed companies is moderately to highly concentrated, with a decrease in the five-year period (2013 compared to 2008).

Keywords: Audit, audit concentration, Big Four audit firms, audit market reforms, audit market in Croatia

1. Introduction

The audit market differs from other markets of goods and services due to its unique set of characteristics. It plays an important role in preserving transparency and improving the functioning of capital markets. An audit has a purpose only if stakeholders have confidence in the service provided and the auditor's opinion.

Moreover, since the statutory audit of financial statements is a legal obligation of certain companies, a significant part of the demand for audit services is mandatory. On the other hand, the supply side of the market is highly concentrated in most of the countries. Given its significant impact on the overall economy, it is understandable that the audit market is under constant monitoring of regulators and professional bodies to ensure that disturbances in this market do not lead to instability of the entire financial system.

Due to the consolidation of large audit firms into even larger firms and the demise of Arthur Andersen, there are now a handful of global audit firms that are able to perform audits of complex institutions. The potential collapse of one of these firms would further limit the choice of auditors for major enterprises, but more importantly it would damage investor trust and could impact the stability of the whole financial system. Therefore, it is necessary to consider ways to mitigate this risk.

This paper gives an overview of the possible factors that led to such a high audit concentration, summarizes prior studies on the level of audit concentration, and analyses its consequences and potential measures suggested by different regulators. Also, an empirical research on audit concentration in Croatia was conducted on a sample of listed companies from the Zagreb Stock Exchange. The aim is to test the hypothesis that the Croatian audit market for listed companies is highly concentrated. The results can be used to evaluate if the regulators' concern is justified and whether it is necessary to consider implementing appropriate measures to reduce the concentration and stimulate competition.

2. Causes of audit market concentration

Measured by revenues or fees received, the Big Four audit firms as a group dominate the audit market for listed companies in the majority of European Union countries, with a market share which exceeds 90% (European Commission, 2010). There appear to be several reasons why auditing has become so concentrated on four global firms. The degree of concentration in the audit market has arisen as a direct result of market forces and, in particular, the demand from investors for audit quality as well as appropriate capability to undertake complex audits across the world (House of Lords, 2011a). Large audit firms can achieve greater economies of scale by spreading certain fixed costs over an expanded client base. Their size enables them "to develop sufficient technical expertise and the ability to conduct work globally to meet the needs of complex multinational audit clients and to do so at lower costs than could be provided by smaller audit firms" (The United States Government Accountability Office, 2008).

Besides global reach, reputation is also an important driver. The Big Four audit firms are perceived as being better at offering value added services on top of the audit and providing insurance against reputational risks. According to the survey conducted by Oxera (2006), less than 10% of the United Kingdom FTSE 350 companies surveyed would consider using a mid-tier firm, which again highlights the importance of perception and reputation in this market.

Since the International financial reporting standards are recognized as being complex, a significant amount of technical expertise is required by the audit firms to adequately advise their clients (Chartered Institute of Management Accountants, 2010). The Big Four firms have more people in their technical departments and their staff have more experience in dealing with similar issues with other multinational businesses. Moreover, it is easier for them to attract and retain high quality experts.

Therefore, the internationalization of business, reputation, complexity of accounting standards, infrastructure investments and economies of scale are all factors that represent a major barrier to market entry for medium-sized audit firms.

3. Prior studies on audit market concentration

The literature review indicates that there are a variety of studies focused on measuring the level of audit concentration and its effect on variables such as the audit quality or audit fees. Some of the studies were conducted at the institutional level, while some of them were carried out by individual researchers.

3.1 Levels of audit concentration

Measuring the levels of audit concentration was the subject of many studies done by regulators and individual researchers. Commonly used measures of concentration are the Concentration ratio, the Herfindahl-Hirschmann Index, the Gini coefficient and the Lorenz curve as a graphic representation of inequality in the distribution. However, the results of different studies are not always comparable because of different methods of calculating the indicators and use of different input data.

Nevertheless, most studies agree that the level of audit concentration in most European countries is very high. The ESCP Europe analysis from 2009 showed that EU Member States can be divided into four groups according to the overall share of the Big Four audit firms, based on the aggregated turnover of companies audited by a certain audit firm. Group 1 represents countries with relatively low overall market concentration with the share of Big Four auditors less than 10%, like the Czech Republic, Estonia, Hungary, Poland and Slovenia. On the other hand, countries with a share of Big Four auditors above 30% belong to Group 4 (i.e. Denmark, Luxembourg, Sweden and the United Kingdom). Concentration levels on listed companies are very different from overall market concentration levels, especially for companies listed on the regulated national stock exchange. For the 21 analyzed Member States, 19 Member States are highly concentrated with a Herfindahl-Hirschmann Index (HH Index) above 2000, while only two states are moderately concentrated with an HH Index between 1000 and 2000 (i.e. France and Greece). The EU average for the HH Index is 3094 (Le Vourc'h, Morand, 2011).

The research published in 2010 by Grant Thornton confirms the dominance of the Big Four firms in the biggest Western economies. It found that the Big Four firms had an 84% share of audits in G8 countries and 70% worldwide. The only big European economy where the mid-tier firms have a sizeable market share of large company audits is France, where joint audits are mandatory. However, in many fast-growing emerging economies, audit markets are more open. For example, in India the Big Four share is only 41% and in China 14%, where the majority of companies are audited by firms other than the Big Four or mid-tier, many of them national firms (Huber, 2011). It should be noted that the Chinese audit market is very young, since the development began in the 1980s, but with a great potential, driven by broader enterprise reforms, the development of capital market and foreign investment (Yang et al., 2003).

When considering the United Kingdom audit market, which is a subject of many studies, in 2010, the Big Four auditors audited 99 of the FTSE 100 leading firms and around 240 of the next-biggest FTSE 250. In some important market segments like banking, the degree of concentration is even greater, since only three of the Big Four auditors audit UK banks (House of Lords, 2011a). In addition, switching rates are low: around 4% on average for all listed companies and 2% on average for FTSE 100 companies (Oxera, 2006). This data shows that the Big Four's domination of the large firm audit market in the UK is almost complete.

Studies in the United States show similar results. According to the Government Accountability Office (2008), 82% of large public companies (i.e. Fortune 1000) saw their choice of auditor as limited to three or fewer audit firms. In 2006 four largest audit firms audited 98% of companies with total revenue above 1 billion USD and 96% companies in the category above 500 million USD company revenue. Although the market is concentrated overall, the degree of market concentration and the extent to which the largest firms dominate declines with the size of public companies.

Due to a number of studies that confirm the domination of a few large audit firms, it is justified that many regulators and interested parties are concerned about the effect of such high market concentration on competitiveness, audit quality and vulnerability of the whole financial system.

3.2 Consequences of high audit market concentration

Studies on the effects of high audit concentration primarily investigated these five segments: 1) barriers to entry for mid-sized audit firms, 2) limited choice of auditors for large companies, 3) the effect on the level of audit fees, 4) the impact on audit quality, and 5) financial system vulnerability.

Significant barriers to entry into the audit market for large companies are the consequence of the high market power of the Big Four audit firms. These main barriers are in particular lack of size or insufficient capacity in terms of number of auditors in mid-tier audit firms, limited geographical reach of mid-tier audit firms, a strong preference among large companies to choose the Big Four auditors because of their reputation, resistance among companies and the absence of incentives to change the audit firm (Le Vourc'h, Morand, 2011). Oxera's analysis of the economics of entry by mid-tier firms into the UK FTSE 100 and FTSE 250 segments indicates that the current market structure is likely to persist. Market entry is not attractive to firms outside the Big Four due the perception bias against mid-tier audit firms, the high costs of entry, a long payback period for any potential investment and significant business risks (Oxera, 2006). Oligopoly market structure with a few strong audit firms and a high barrier of entry seems to be persistent, which is dangerous because it makes it challenging for regulators to take corrective measures to mitigate or eliminate any adverse effects of high concentration.

Limited choice of auditors follows from the high concentration and entry barriers, especially for large companies. The reduction in the number of active audit firms in the market and especially in the number of top tier firms reduces client choice and increases the likelihood of conflicts of interest. Companies may find it increasingly difficult to identify a top tier firm that neither audits nor provides other sensitive services to a major competitor (Beattie et al., 2003). The United States Government Accountability Office found that 82% of the large companies surveyed see their auditor choice as limited to the Big Four because those firms have the technical expertise, capacity and reputation to undertake those audits (Bloom, Schirm, 2008). Moreover, over one-third of the UK FTSE 350 audit committee chairs do not feel that their company has sufficient choice of auditor (Oxera, 2006). Such a market structure where there are only few audit firms on the supply-side and a larger number of clients on the demand-side can lead to disorders such as a rise of audit fees or a reduction of audit quality.

In theory, oligopoly market structure may result in oligopoly firms using their market power to increase the price of their goods or services. The effect of the high audit concentration on audit fees remains unclear because various studies have yielded different results. For example, the Oxera study, based on data for 1995-2004 from the United Kingdom, showed that market concentration and market share of a given auditor in a given sector/year both have a statistically significant and positive impact on audit fees (Oxera, 2006). On the other hand, Eshleman (2013) finds that the effect of audit market concentration on the level of audit fees depends on the size of the audit market. When the audit market contains fewer clients and/or those clients are smaller in size, audit fees are increasing in audit market concentration. In markets where there are a large number of clients and/or the clients are large in size, audit market concentration leads to lower audit fees. In the end, the United States Government Accountability Office analyzed the statistical relationship between audit fees paid by more than 12 000 companies from 2000 through 2006. It has come to the conclusion that public companies operating in industrial sectors with more concentrated audit markets were not paying higher audit fees than companies in sectors with less concentrated audit markets. Although audit fees increased significantly on average for all sizes of firms, the study indicated that factors other than concentration appear to explain audit fees (The United States Government Accountability Office, 2008). Therefore, it is obvious that the results depend on research design and the country in which the research was conducted, which means that a unique conclusion cannot be derived.

A similar situation applies to the effect on audit quality. From the one perspective, higher concentration could be associated with higher audit quality by enabling the auditor to maintain independence. If the auditor depends less on a single client and if there is a reduced probability of the client switching auditors, the auditor is in a better negotiation position to limit client-driven earning manipulations. On the other hand, audit firms with significant market power have the potential to reduce the quality of their services because the lack of competitive alternatives would limit clients' ability to obtain services elsewhere. It is unclear and difficult to empirically test which of these scenarios prevails. Boone et al. (2012) found evidence that auditor concentration manifests itself in increased auditor tolerance for earnings management by clients (Boone et al., 2012). Francis et al. (2013) concluded that the Big Four dominance does not appear to harm audit quality and is in fact associated with higher earnings quality, after controlling for other country characteristics that potentially affect earning quality (Francis et al., 2013). In addition, the US Government Accountability Office and ESCP Europe found no compelling evidence that audit quality was compromised due to market concentration (Bloom, Schirm, 2008; Le Vourc'h, Morand, 2011).

Regardless of the vague effect of high concentration on audit quality, it is clear that such a market structure does not contribute to the stability of the financial system. Audit as a service is meaningful only if the stakeholders have confidence in the auditor's opinion. The potential collapse of one of the major audit firms could disrupt the availability of audited financial information on large companies, damage investor trust and impact the stability of the financial system. Therefore, there are concerns that the Big Four audit firms have become too dominant and that the failure of one of them would cause major disruption to the economy (Huber, 2011). It is understandable that regulators are considering reforms to dilute the Big Four's dominance and improve competition in the audit market.

4. Possible reforms to reduce the audit market concentration

There are many proposals on the reform of the audit market in order to reduce concentration, but few of them have actually been implemented. Institutions like the European Commission, ESCP Europe, the Institute of Chartered Accountants in England and Wales, the United States Government Accountability Office and the Selected Committee of Economic Affairs from the House of Lords have all released reports and studies on this subject. Many of the proposed measures overlap, with the following measures being most frequently mentioned:

a) Mandatory audit firm rotation,

b) Mandatory joint audit,

c) Regular mandatory tendering of audit contracts,

d) Change in ownership arrangements for auditors,

e) Reform of the law of unlimited liability,

f) Elimination of covenants which are restricting the choice of auditors,

g) Establishment of the contingency plans for the potential demise of a Big Four audit firm.

Mandatory audit firm rotation is a measure that would limit the period of years that an audit firm could serve as the auditor for a particular company. It could potentially reduce concentration to the extent that more opportunities are provided for mid-size and smaller firms to compete to provide audit services to public companies (The United States Government Accountability Office, 2008). Moreover, clients and their auditors would have less incentive to build persistent client-auditor ties, which can also have a positive impact on auditor independence (Gerakos, Syverson, 2015). Italy is one of the European Union Member States in which the rotation of audit firms has been mandatory since 1974. The maximum rotation frequency is nine years corresponding to three three-year mandates. In addition, there is also a minimum cooling-off period of three years before the previous auditor can be reappointed. Similar rules exist in Brazil, South Korea, Singapore and India, while Spain, Austria and Canada have abandoned rotation rules (Le Vourc'h, Morand, 2011). Opponents to the rotation often argue that mandatory rotation would not necessarily reduce concentration because large public companies would likely rotate to another one of the largest firms. Rather, costs for both audit firms and their clients would increase (The United States Government Accountability Office, 2008). Hess and Stefani (2012) even predict that such measures would result in auditor changes from smaller to larger audit firms, thereby increasing supplier concentration (Hess, Stefani, 2012). Therefore, it is difficult to reach a consensus. However, the case of Italy does not go in favor of this measure, since the Italian audit market has one of the highest Herfidahl-Hirschman Indexes for listed companies (Le Vourc'h, Morand, 2011).

Joint audits are defined as audits in which two or more auditors simultaneously carry out the audit, which means that they issue a single audit report and share responsibility for the audit (Hess, Stefani, 2012). In order for it to be effective, there should be a ban on the appointment of two Big Four audit firms. This would contribute to the growth of mid-tier firms, enabling them to reach critical size on a national basis. Today France is the only EU Member State requiring by law joint audits for statutory audits of listed companies that publish consolidated accounts. In addition, France has a lower than average concentration level and a mid-tier firm that is present on the main index market segment. There are several benefits of joint audits. It lowers the level of concentration and favors the development of mid-tier and small audit firms. Furthermore, it minimizes the risk of demise of one of the Big Four auditors, since the joint auditor would much more easily take on its counterpart's work than a new entrant. It could potentially improve audit quality by increasing the overall number of cross-checks (Le Vourc'h, Morand, 2011). However, there are costs and risks that come along with this measure. The presence of two auditors increases coordination costs, especially in a consortium of a larger and smaller audit firm. Moreover, audit fees are expected to be higher and the risk of inconsistencies in methodologies is increased (Hess, Stefani, 2012). That is why Denmark dropped mandatory joint audits for listed companies in 2005 (Le Vourc'h, Morand, 2011). Taking into account its benefits and drawbacks, this measure needs to be considered as a serious option for lowering concentration levels.

Another possible measure is mandatory tendering with full transparency as regards the criteria according to which the auditor will be appointed. It could be a useful measure to make the audit market more dynamic, considering the currently low switching rates. Regarding the frequency of tendering, the Institute of Chartered Accountants in England and Wales (2011) recommends that the tendering process should be conducted at least every eight years. On the other hand, the UK Select Committee on Economic Affairs suggested that UK FTSE 350 companies carry out a mandatory tender of their audit contract every five years, adding that the audit committee should be required to include detailed reasons for their choice of auditors in their report to shareholders (House of Lords, 2011b). The main drawbacks identified during the study conducted by the ESCP Europe are related to increasing costs for both companies and audit firms. Moreover, such a measure could lead to a decline of audit quality if it results in price wars. Severe competition between auditors might enable clients to take advantage of the situation to negotiate lower prices. Consequently, audit quality could suffer (Le Vourc'h, Morand, 2011). Despite these drawbacks, mandatory tendering would definitely increase transparency in the audit market.

All European Union Member States require a majority of voting rights in audit firms to be held by qualified auditors, as stipulated in the European Commission Eighth Directive. Some have interpreted these specifications more strictly than others by requiring 75% or more of the owners of audit firms to be qualified auditors (Oxera, 2007). These requirements were intended to preserve audit quality by ensuring auditor independence. However, such a rule might limit the growth opportunities for audit firms, which is one of the barriers to the entry of small and mid-tier audit firms to audit market of larger clients. Allowing parties other than the audit firm's partners to own or invest in audit firms could increase these firms' financial resources and allow them to hire the additional staff needed to serve larger companies. The United States Government Accountability Office (2008) interviewed midsize and smaller audit firms in order to explore the potential effectiveness of this measure. Several of them said that access to capital did not pose a significant barrier to expansion because firms currently raised sufficient capital through traditional channels such as loans. In their experience, shortage of qualified staff in the labor market rather than limited access to capital was their primary impediment to growth. Therefore, it seems that this measure would not contribute much to the reduction of audit concentration and the strengthening of small and midsized companies, but to the contrary could have an adverse effect on the auditors' independence.

It has been argued that auditors' unlimited liability discourages non-Big Four auditors from taking on large listed clients. Placing caps on auditors' potential liability would limit the overall amount that an audit firm would have to pay in connection with a lawsuit involving the work it performed for one of its clients. Even though the basic harmonization regime for statutory audit is unified with the European Directive, the liability part is left to the discretion of each of the Member States. Practices from different countries show that statutory auditors' liability can take different forms. For example, Spain has adopted a proportionate liability regime in 2010, which means that statutory auditors are now only responsible for the amount of damage equal to their share of liability, but not for that of other people if those people cannot pay. On the other hand, the liability of statutory auditors in Germany is limited by a monetary cap set in the German Commercial Code (Dufour et al., 2014).

Another possible measure is to ensure equal competing conditions for all participants in the audit market. It would mean publicly disclosing or even banning all restrictive covenants. Restrictive covenants (i.e. "Big Four-only" clauses) are clauses or requirements in contractual agreements between companies and their banks that state that only a Big Four audit firm can provide audit services to the company (Le Vourc'h, Morand, 2011). No particular measure has been taken to prohibit restrictive covenants in Europe and there is still a lack of data measuring how widespread this practice is. Prohibition on bank covenants is expected to have a positive impact on market competition since they are one of the barriers to the development of the midtier audit firms.

In order to limit the vulnerability of the financial system in case of the collapse of one of the big audit firms, contingency plans and living wills for major audit firms have been suggested. Similar packages have already been discussed and introduced for large financial institutions, due to the experience from the latest global financial crisis. Contingency plan should allow for a rapid resolution in the event of the demise of a major audit firm, avoid disruption in the provision of audit services and prevent further structural accumulation of risk in the market (European Commission, 2010). Living wills would have the same goal, laying out all the information the authorities need to separate the good from the failing parts of an audit firm so disruption to the financial system from a collapse would be minimized (House of Lords, 2011b).

It is evident that there are a number of possible measures. The reason why they are not widely applied probably lies in the fear that their disadvantages overcome possible benefits. Moreover, there is no clear and convincing evidence that a high concentration reduces audit quality and level of competitiveness, which is why regulators are still reluctant to take serious actions. In any case, it is necessary to carry out further research on this issue.

5. *Methods used in the research of audit market concentration in Croatia*

The analysis of audit concentration in Croatia was conducted on a random sample of companies whose securities are listed on the Zagreb Stock Exchange, using standard concentration measures like the Coefficient rate 4, the Herfindahl-Hirschman Index and the Gini coefficient. Measures based on the latest financial data (Financial Agency - Fina), i.e. from 2013, are compared to measures from 2008 to be able to spot trends in the level of concentration. Results are not fully comparable to those analyzed from prior studies due to certain differences in methodology.

Currently, securities of 165 issuers are listed on the Zagreb Stock Exchange. Securities of state and local governments were eliminated for the purpose of the research, which left 156 public companies. Sample size was determined with a 95% confidence level and a confidence interval of 10, giving a sample size of 60 companies. Concentration measures were calculated using the latest annual financial statements and auditor's reports from 2013. In order to be able to spot trends in the audit concentration, measures from 2013 were compared with their levels from 2008. In addition, two companies from each period were eliminated from the sample due to the lack of financial statements, resulting in a final sample size of 58 companies for each year.

5.1 Indicators of market concentration

Three measures have been selected to assess market concentration levels: the Concentration rate 4, the Herfindahl-Hirschman Index and the Gini coefficient. These were also standard measures in previous empirical studies. Concentration rate measures the percentage of the entire reference amount that is allocated to the biggest audit firms. Concentration rate 4 is most commonly reported, calculated as a sum of market shares of four largest audit firms:

$$CR4=s_1+s_2+s_3+s_4 \tag{5.1}$$

According to Velte and Stiglbauer (2012), oligopoly is present if at most three audit companies have a market share above 50% or at least five companies have a market share above 66.6%.

The Herfindahl-Hirschman Index (HH Index) is the sum of squares of the market shares of all audit firms:

$$\text{HH Index}=\sum_{i=1}^{n} s_i \tag{5.2}$$

Owing to squaring market shares, the HH Index is dominated by large audit firms and only insignificantly influenced by small carriers. It rates from 1/n (in case of minimal concentration and equal share of all suppliers) to 10,000 (which indicates a complete concentration). The European legislation uses the HH Index to assess horizontal mergers and thus isolates three ranges of post-merger HH Index levels: 1) non concentrated markets if the HH Index is below 1000, 2) moderately concentrated markets if the HH Index is between 1000 and 2000, and 3) highly concentrated markets if the HH Index is above 2000 (Le Vourc'h, Morand, 2011).

The Gini coefficient summarizes the inequality in the distribution of audit market shares between individual audit firms. It is derived from the Lorenz curve, which plots the cumulative percentage of total market share against the cumulative number of suppliers, starting with the smallest audit firms. If all audit firms are the same size, the Lorenz curve is a straight diagonal line, called the line of equality. If there is any inequality in size, then the Lorenz curve falls below the line of equality. The Gini coefficient measures the area between the Lorenz curve and a hypothetical line of absolute equality, which can be approximated by the following formula (Xycoon):

$$G=\left(\frac{2}{n^2\bar{s}}\right)\cdot\sum_{i=1}^{n}\left(\left(i-\frac{n+1}{2}\right)\cdot s_i\right),\bar{s}=\frac{1}{n}\cdot\sum_{i=1}^{n}s_i \quad (5.3)$$

In case of a complete uniform distribution, the Gini coefficient assumes the value of 0. When there is a perfect competition, the value comes close to 1. If the Gini is above 0.9, a very high concentration exists, while in a situation when the coefficient ranges from 0.6 to 0.9 the market is highly concentrated. Market concentration is moderate if the Gini is between 0.4 and 0.6 (Velte, Stiglbauer, 2012).

For the audit market, market shares can be measured using a variety of metrics, including the number of clients, audit fees and, since audit fees are not publicly disclosed for all audit firms, surrogates for audit fees such as client revenues or total assets (Beattie et al., 2003). All four variables were used and compared in conducting this research. The number of clients indicates the number of audit engagements per audit firm, but is not the best measure of concentration, given that there are large differences in the size of clients. Market share based on audit fees is the most representative. However, most companies do not comply with the provisions on the publication of audit fees paid for the statutory audit in the notes to the financial statements. Therefore, total revenues of the audit firm were used as a proxy.

5.2 Sample characteristics

Measures of descriptive statistics were calculated for the random sample of 58 listed companies from 2008 and 2013 (Table 1). This leads to the conclusion that there are considerable variations in the size of selected companies. For example, total assets vary from 26 million HRK to 104 billion HRK in 2008. In the same year, the minimum total revenue is 119 thousand HRK, while the maximum total revenue is 12 billion HRK. Due to significant differences among companies, it is obvious that the levels of market concentration based on the number of clients and those based on clients' total assets or revenues will also take on different values.

Listed companies from the 2008 sample have been audited by a total of 32 audit firms, which means that each audit firm on average had 1.81 clients (Table 2). The maximum number of clients was 9, referring to one of the Big Four audit firms (i.e. PricewaterhouseCoopers). On the other hand, only 25 audit firms have performed statutory audit for the same sample of public companies in 2013. The average number of clients has increased to 2.32. Two joint audits were performed in that period. For the purpose of the research, in case of joint audits, clients were equally divided among co-auditors, which resulted in a minimum number of clients of 0.5, since one audit firm had no other clients. At the same time, 42.86% of the companies in 2013 changed their auditor in relation to 2008.

As for the revenue level of audit firms included in the sample, the mean rose from 11.4 to 12.2 million HRK, with the coefficient of variation of 188% in 2008 and 163% in 2013. The median is significantly lower, since it is not affected by extreme values of revenues. The maximum level of revenues in both years refers to KPMG.

Table 1 Descriptive statistics of selected variables for listed companies from the sample

Total assets of the listed companies from the sample (in 000 HRK)		
	2008	**2013**
Mean	4,410,484.14	5,221,401.69
Median	586,794.13	619,265.73
Standard Deviation	15,251,299.63	18,715,232.83
Range	104,014,321.13	123,699,259.17
Minimum	26,200.76	24,892.77
Maximum	104,040,521.88	123,724,151.94
Sum	255,808,080.32	302,841,298.30
Count	58	58
Total revenues of the listed companies from the sample (in 000 HRK)		
	2008	**2013**
Mean	1,165,666.40	1,135,886.91
Median	299,591.41	241,427.73
Standard Deviation	2,318,026.93	2,466,321.07
Range	12,003,634.94	14,757,136.89
Minimum	119.06	321.11
Maximum	12,003,754.00	14,757,458.00
Sum	67,608,651.47	65,881,440.73
Count	58	58
Earnings before tax of the listed companies from the sample (in 000 HRK)		
	2008	**2013**
Mean	137,523.20	84,774.00
Median	4,539.91	3,441.72
Standard Deviation	482,146.04	325,844.30
Range	2,985,106.68	1,837,557.85
Minimum	-43,170.00	-208,413.69
Maximum	2,941,936.68	1,629,144.16
Sum	7,976,345.36	4,916,892.19
Count	58	58
Altman Z-Score of listed companies from the sample		
	2008	**2013**
Mean	1.41	1.31
Median	1.40	1.16
Standard Deviation	2.69	1.29
Range	24.55	6.54
Minimum	-14.55	-1.11
Maximum	10.00	5.43
Sum	-	-
Count	54	54

Source: Calculated by the authors

Table 2 Descriptive statistics of selected variables for audit firms from the sample

Number of clients of audit firms from the sample		
	2008	**2013**
Mean	1.81	2.32
Median	1	2
Standard Deviation	1.65	1.91
Range	8	7.5
Minimum	1	0.5
Maximum	9	8
Sum	58	58
Count	32	25
Total revenues of audit firms from the sample (in 000 HRK)		
	2008	**2013**
Mean	11,401.60	12,167.00
Median	2,496.70	3,101.21
Standard Deviation	21,423.79	19,777.01
Range	90,748.22	75,175.31
Minimum	115.83	104.64
Maximum	90,864.05	75,279.95
Sum	364,851.14	304,175.11
Count	32	25

Source: Calculated by the authors

Table 3 Measures of audit concentration for a sample of listed companies in Croatia

	Concentration Rate 4		Herfindahl-Hirschman Index		Gini Coefficient	
	2008	**2013**	**2008**	**2013**	**2008**	**2013**
Based on the number of clients	36.21	40.52	564.80	659.93	0.36	0.40
Based on the audit firm's revenue	69.47	67.18	1381.37	1414.58	0.72	0.69
Based on the total assets of clients	89.18	82.70	3074.24	2636.37	0.86	0.82
Based on the total revenues of clients	75.93	63.62	1662.16	1294.42	0.78	0.71

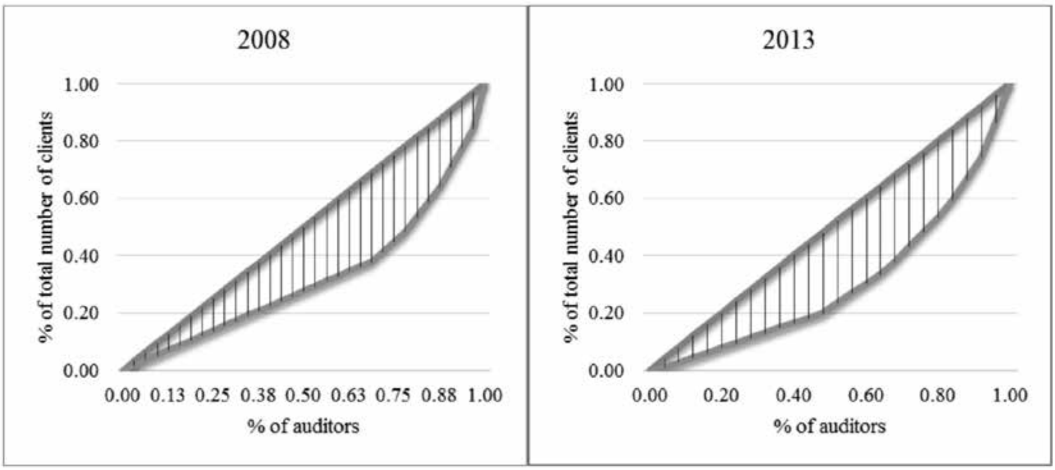
Source: Calculated by the authors

6. Results and discussion of findings

In order to calculate audit concentration measures, market shares were determined based on the number of clients, audit firm revenue, clients' total assets and clients' total revenues. Market shares were used to calculate the Coefficient rate 4, the Hefindahl-Hirschman Index and the Gini coefficient, wherein the level of inequality was also presented on the Lorenz curve. Results are given in Table 3.

The level of concentration is the lowest in a situation where the market shares are determined using *the number of clients*. According to all three measures, the audit concentration has increased in 2013 when compared to 2008. The concentration rate 4 shows that the four audit firms with the biggest market shares audited 36.21% (40.52%) of the total number of clients in the sample in 2008 (2013). Contrary to expectations, only two of them belong to the Big Four. In comparison, total market share of the Big Four audit firms, measured by the number of clients, was 27.59% in 2008 and 34.48% in 2013. The HH Index is below 1000, suggesting that the market is not concentrated. The same conclusion can be derived from the size of the Gini coefficient, which is also evident from the graphical representation in the form of the Lorenz curve (Figure 1).

Figure 1 Lorenz curve – market share based on the number of clients



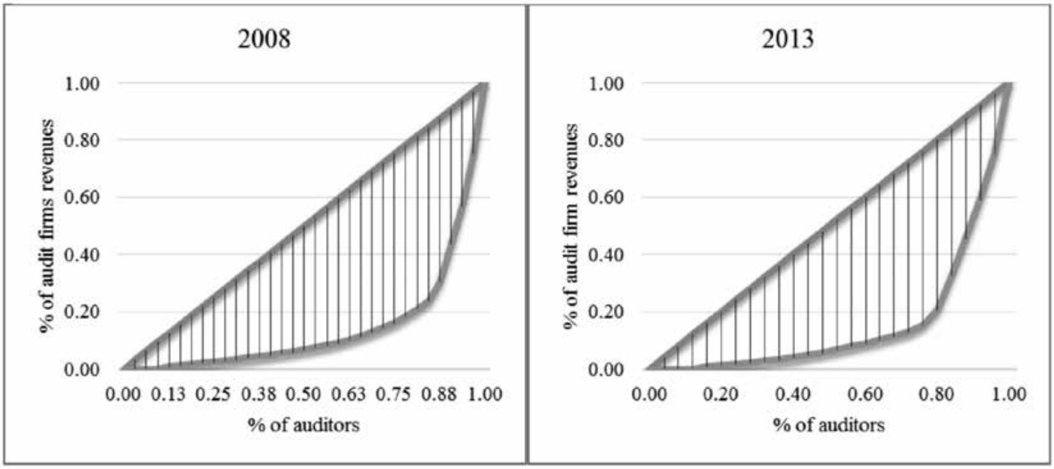
Source: Created by the authors

The level of audit concentration is significantly higher when the measures are based on the *total revenue of audit firms* as a proxy for audit fees. It should be noted that these measures should be taken with caution due to certain inconsistencies in the calculation. More specifically, because of the lack of data on audit fees paid by the companies in the sample, revenues of audit firms were taken as a surrogate. However, these revenues are not only a result of providing services to companies in the sample. Therefore, these values will be used only for comparison and not to form definite conclusions about the level of concentration.

The concentration rate 4 is doubled when the market share is based on the auditor's revenue, which is consistent with the increase of other two measures. According to these indicators, the audit market of listed companies, based on the random sample, is moderately to highly concentrated.

In a situation where the data on audit fees paid is not available, the most representative measures of audit concentration are those based on the size of the clients, since it can be assumed that the larger client requires more audit work and eventually pays a higher fee. According to the *total clients' assets*, market concentration is very high, with the HH Index above 2600 and the Gini coefficient above 0.8. Measures based on the *size of the clients' revenue* are less alarming: the HH Index is in the interval between 1000 and 2000, while the Gini coefficient is above 0.7.

Figure 2 Lorenz curve – market share based on audit firm revenue



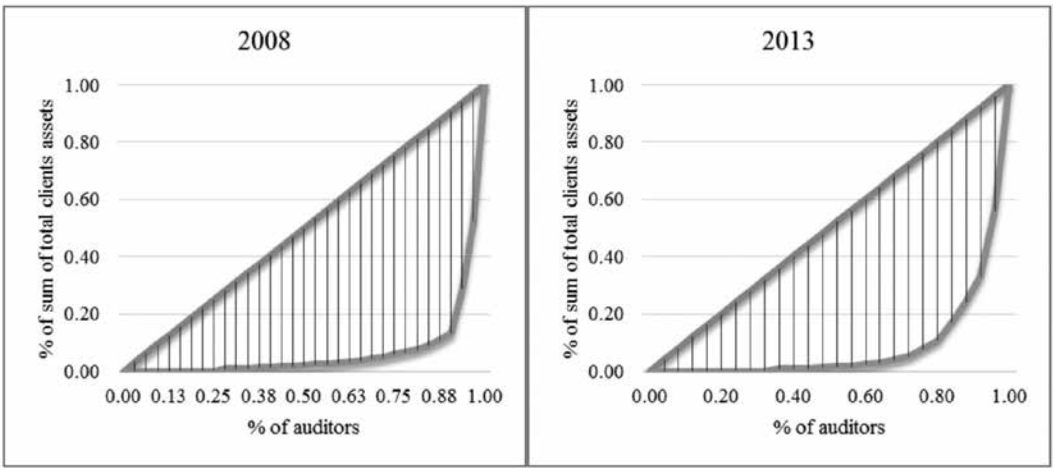
Source: Created by the authors

Moreover, the suggested decrease in the audit concentration in the five-year period is a positive indicator.

In conclusion, the audit market for listed companies in Croatia is moderately to highly concentrated, depending on the measure used. The conclusions drawn from this study are limited by the fact that they are based on a sample of listed companies and not on a whole population.

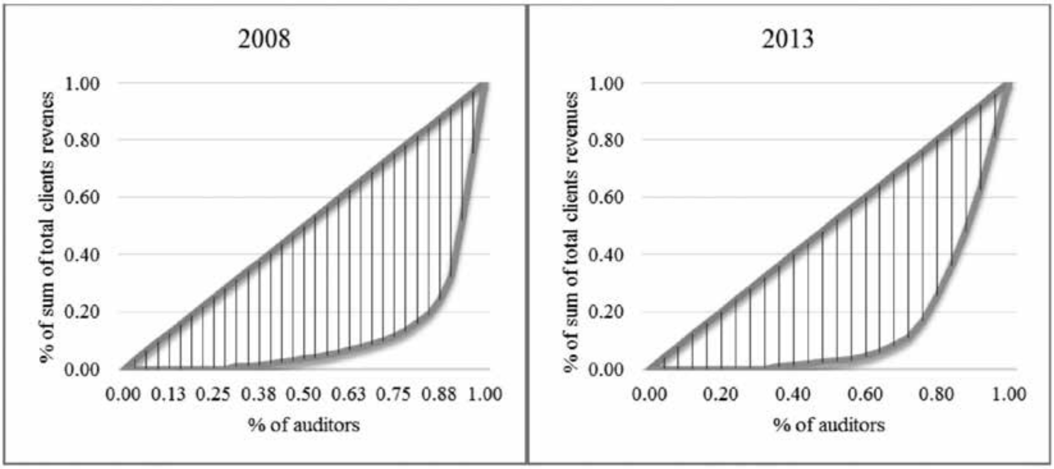
Additionally, a correlation analysis between the size of the client and its auditor has been conducted. The objective is to test if larger public companies hire a larger auditor, that is, one of the auditors from the Big Four. Total revenues were used as a measure of size. Correlation analysis was first conducted separately for each year, and then as a pooled correlation. Results in the form of Pearson and Spearman correlation coefficients are presented in table 4.

Figure 3 Lorenz curve – market share based on clients' total assets



Source: Created by the authors

Figure 4 Lorenz curve – market share based on clients' total revenues



Source: Created by the authors

According to the Pearson correlation coefficient, which evaluates the linear relationship between the variables, the relationship is weak, although technically positive. Moreover, the result for the year 2013 is not significant at $p < 0.05$.

However, the Spearman correlation coefficient indicates a stronger measures is that the Spearman correlation evaluates the monotonic relationship between two variables, where the variables tend to change together, but not necessarily at a constant rate. Therefore, it is based on the ranked values for each variable rather than the raw data. In all three cases, the Spearman coefficient takes on values near or above 0.5. By normal standards, the association between the size of the client and its auditor would be considered statistically significant and positive.

Table 4 Analysis of correlation between the size of the client and its auditor

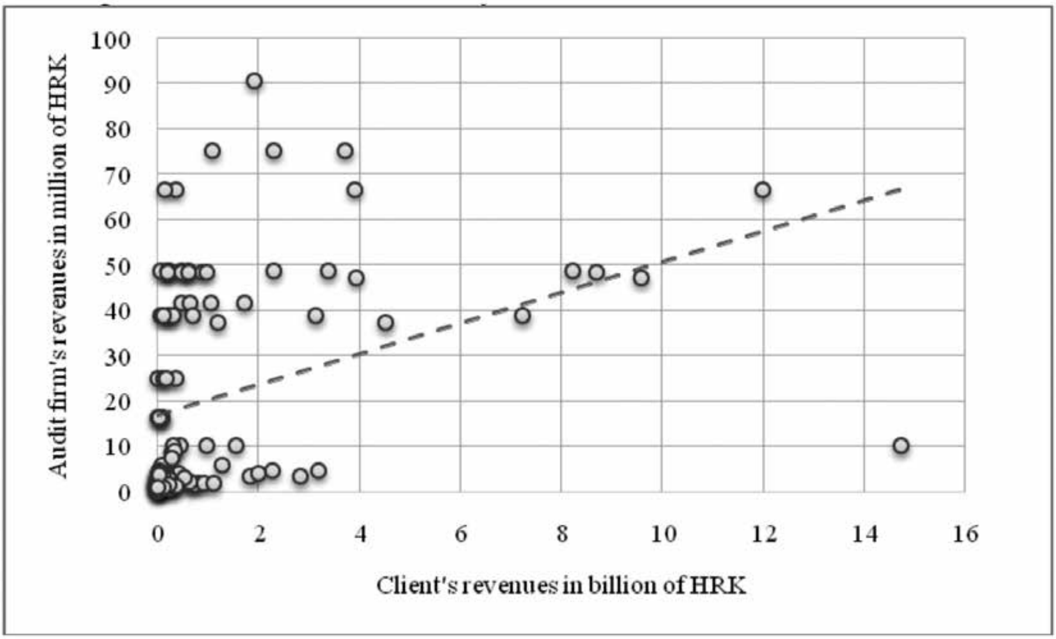
Correlation of client's and auditor's revenues in 2008						
	R	t	p (one-tailed)	p (two-tailed)	n	df
Pearson Correlation	0.4631	3.91	0.000126	0.000251	58	56
Spearman Correlation	0.4651	3.93	0.000118	0.000236	58	56
Correlation of client's and auditor's revenues in 2013						
	R	**t**	**p (one-tailed)**	**p (two-tailed)**	**n**	**df**
Pearson Correlation	0.2328	1.79	0.039352	0.078705	58	56
Spearman Correlation	0.5836	5.38	0.000001	0.000002	58	56
Pooled Correlation of client's and auditor's revenues						
	R	**t**	**p (one-tailed)**	**p (two-tailed)**	**n**	**df**
Pearson Correlation	0.3467	3.95	0.000069	0.000138	116	114
Spearman Correlation	0.5258	6.6	< 0.000001	< 0.000001	116	114

Source: Calculated by the authors

The Pooled correlation presented in the scatter plot (Figure 5) also indicates positive relationship.

Overall results of the empirical research indicate that the Croatian audit market for listed companies is dominated by large audit firms and that larger clients to some extent favor the Big Four audit firms. This does not necessarily mean that such market structure negatively affects audit quality or auditor independence, but serves as a warning that additional analysis should be conducted to investigate potential negative effects.

Figure 5 Scatter plot - Pooled Correlation of client's and auditor's revenues



Source: Created by the authors

7. Conclusion

The requirement to have the annual and consolidated financial statements of certain companies audited by qualified professionals is designed to protect the public interest. Giving its significant impact on the overall economy, it is understandable that the audit market is under constant monitoring of regulators and professional bodies. One of the issues that has received a lot of attention lately is the level of audit concentration. Most studies agree that the level of audit concentration in most European countries is very high, confirming the dominance of the Big Four audit firms.

Some of the factors that led to the increase in the concentration are the internationalization of business, reputation bias, complexity of accounting standards, infrastructure investment and economies of scale. The potential collapse of one of the large firms would damage investors' trust and could impact the stability of the whole financial system. In addition to the financial system vulnerability, negative consequences include limited choice of auditors for large companies and setting significant barriers to entry for mid-sized and small audit firms. The effect of high concentration on audit quality and audit fees is still vague. Therefore, it is necessary to consider ways to mitigate risk. Although there are many proposals on the reform of the audit market in order to reduce concentration, few of them have actually been implemented. Most common measures refer to mandatory audit firm rotation, mandatory joint audit, change in the ownership arrangements for auditors, reform of the law of unlimited liability and the establishment of the contingency plans for potential demise of a Big Four audit firm.

The analysis of audit concentration in Croatia in 2008 and 2013 was conducted on a random sample of companies whose securities are listed on the Zagreb Stock Exchange, using standard concentration measures like the Coefficient rate 4, the Herfindahl-Hirschman Index and the Gini coefficient. The level of concentration was the lowest when market shares of audit firms were determined using the number of clients, indicating that the audit market is not concentrated. However, more representative measures, based on the size of the clients, show different results. According to market shares based on total clients' assets and revenues, the audit market for listed companies is moderately to highly concentrated, with a decrease in the five-year period (i.e. 2013 compared to 2008). Moreover, a correlation analysis between the size of the client and its auditor, using the Spearman correlation coefficient, indicates a statistically significant and positive relationship, which confirms that larger companies tend to choose larger auditors, usually one of the Big Four. Although the research has reached its aims, there were certain limitations. Since the data on audit fees paid was not available, surrogate measures based on clients' size were used to calculate audit market shares, such as total clients' assets and revenues. Moreover, the research was conducted on a sample of listed companies, and not on the entire population.

Future research could be directed towards expanding audit concentration analysis on unlisted companies. It would be interesting to compare audit concentration levels among various sectors and company sizes. Moreover, the existing research could be upgraded by investigating the effect of high audit market concentration on audit quality. The direct approach would imply conducting a survey among internal and external users of statutory audit. On the other hand, it could also be tested indirectly, by exploring the statistical correlation between audit firm's market share and indicator for audit quality, such as level of earnings management detected using accrual-based models.

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Koncentracija na tržištu revizijskih usluga – dokazi iz Republike Hrvatske

Sažetak

Zakonska je revizija u funkciji zaštite javnoga interesa i ima značajan utjecaj na cjelokupno gospodarstvo. Postoji zabrinutost da revizijska poduzeća iz skupine „Velike četvorke“ postaju previše dominantna i da bi slom jednoga od tih poduzeća doveo do poremećaja cijeloga financijskoga sustava. Ako se kao mjera koncentracije uzme udio u prihodima na tržištu revizijskih usluga kotirajućih poduzeća, ukupni tržišni udio revizijskih poduzeća iz skupine „Velike četvorke“ prelazi 90% u većini zemalja članica Europske unije. Prethodna su istraživanja pokazala da visoka koncentracija na tržištu revizijskih usluga velikim poduzećima ograničava izbor revizora te postavlja visoke prepreke ulasku srednjih revizorskih tvrtki na tržište, dok je učinak na revizijsku kvalitetu i iznos revizijskih naknada još uvijek nejasan. Sukladno tome, regulatori razmatraju reforme kojima bi smanjili dominaciju revizorskih poduzeća koja pripadaju „Velikoj četvorci“ i poboljšali konkurenciju na tržištu revizijskih usluga. U radu je dan pregled najučestalijih mjera smanjenja tržišne koncentracije, od kojih su samo neke predložene, a neke i implementirane, pri čemu se analiziraju njihove prednosti i nedostatci. Osim toga, istražene su karakteristike tržišta revizijskih usluga u Republici Hrvatskoj, s naglaskom na tržišnu koncentraciju koja je mjerena uobičajenim mjerama kao što su koncentracijski omjer, Herfindahl-Hirschmanov indeks i Ginijev koeficijent. Ako se tržišni udjeli revizijskih poduzeća mjere na temelju ukupne imovine i ukupnih prihoda klijenata, rezultati pokazuju da je tržište revizijskih usluga za kotirajuća poduzeća umjereno do visoko koncentrirano, pri čemu je primjetan trend smanjenja u promatranom petogodišnjem razdoblju (2013. godine u odnosu na 2008. godinu).

Ključne riječi: revizija, koncentracija na tržištu revizijskih usluga, revizijska poduzeća iz skupine „Velike četvorke“, reforma tržišta revizijskih usluga, tržište revizijskih usluga u Republici Hrvatskoj