

# Concentration of the audit market in the Republic of Croatia

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## CONCENTRATION OF THE AUDIT MARKET IN THE REPUBLIC OF CROATIA

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**Abstract.** The most important commonality of audit markets worldwide is supremacy of the four global market leaders known as the Big Four – Deloitte, Ernst & Young, KPMG and PricewaterhouseCoopers. Situation regarding the audit services market in the Republic of Croatia does not deviate from the global trends and aforementioned companies have founded domestic limited liability companies that form a part of their enormous international audit networks and, thus, have considerable competitive advantage due to a resource disparity in comparison with other companies operating in this market. As in most other activities, increased competition should be desirable from the aspect of maintaining and enhancing auditor's independence and avoidance of potential conflicts of interests. Therefore, the aim of this paper implied providing an overview of different market concentration measures and variables used for their calculation, as well as analysing the values of various measures indicating the level of market concentration to determine how competitive the Croatian audit market in the period from 2016 to 2020 was. Besides analysing the dynamics of concentration in the audit market in Croatia, the authors determine whether there is a leader in the market and its potential impact on market structure. The data required for calculation of market concentration ratios was gathered from financial statements of all audit companies in the Republic of Croatia which have been submitted in an observed business year. The findings reveal that Croatian audit market is characterised with low levels of concentration as found with majority of concentration ratios used and no dominant firm is present.

**Key words:** *audit market, market concentration, Republic of Croatia*

### 1. Introduction

Despite the negative connotation of market concentration for wider public interests, firms have a different point of view and usually strive to increase their market shares because of underlying benefits (Ginevičius and Čirba, 2007). Tendencies of the audit firms do not differ significantly in comparison with companies from other activities, but

the audit markets are scrutinized more than most of the other markets (Oxera, 2007, in Velte and Stiglbauer, 2012) because of potential “monopolistic pricing, a decline in the quality of audits and of the services provided by audit firms, a decrease in the stability of capital markets and in investor confidence, and the impact of another large public accounting firm failure” (Cammack & Caban-Garcia, 2005, p. 3, in Velte and Stiglbauer, 2012, p. 147). These are the reasons why “the audit market is under constant monitoring of regulators and professional bodies” (Sever Mališ and Brozović, 2015, p. 339).

Generally, lower concentration on an audit market is considered desirable because “audit as a service is meaningful only if the stakeholders have confidence in the auditor’s opinion” and “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”, so “regulators are considering reforms to dilute the Big Four’s dominance and improve competition in the audit market” (Sever Mališ and Brozović, 2015, p. 342 and 343). “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” (Sever Mališ and Brozović, p. 339).

On the other side, Francis, Michas and Seavey (2013) have founded that higher market shares of Big Four firms are not necessarily a downside, as regulators usually perceive it, given their potentially beneficial impact on financial reporting quality of clients audited by these firms. More specifically, they have focused on the concentration among the Big Four firms, in which disparities could have detrimental effects on financial reporting quality.

Regulators undertake various activities in an effort to decrease excessive concentration, such as:

- “mandatory audit firm rotation
- mandatory joint audit
- regular mandatory tendering of audit contracts
- change in ownership arrangements for auditors
- reform of the law of unlimited liability
- elimination of covenants which are restricting the choice of auditors
- establishment of the contingency plans for the potential demise of a Big Four audit firm” (Sever Mališ and Brozović, 2015, p. 343).

It is important to mention that measures taken in the audit market could have additional detrimental effects, as Bleibtreu and Stefani (2012, p. 41) showed that “prohibiting non-audit services as a measure intended to improve auditor independence can have counter-productive secondary effects on audit market concentration”.

The level of concentration on an audit market is usually measured using variables as “number of clients, audit fees and (since audit fees are not publicly disclosed in many countries) surrogates for audit fees such as client revenues or total assets” (Beattie, Goodacre and Fearnley, 2003, p. 253).

The main aim of this paper was to provide an overview of different market concentration measures (concentration ratios, Herfindahl-Hirschman index, Gini coefficient and entropy index) and variables used for their calculation, as well as to determine the competitiveness of the Croatian audit market in the period from 2016 to

2020. The paper is structured as follows – firstly, most significant concentration measures are presented. Afterwards, these measures are presented for the audit market in Republic of Croatia and, lastly, conclusions are made based on these results.

## 2. Concentration Measures

The choice of concentration ratios to be used with the aim of measuring the degree of concentration in the particular market depends primarily on the objectives of the research as well as on the characteristics of the market being explored. In order to avoid potential bias in the case of using one indicator, the use of multiple indicators seemed appropriate. Importance is given to both absolute and relative measures since the analysis is oriented towards differences arising from the market share.

Thus, based on the relevant literature dealing with the audit market concentration in this paper concentration ratios, Herfindahl-Hirschman index and Gini coefficient were applied following e.g. Wolk, Michelson & Wootton (2001), McMeeking, Peasnell & Pope (2007), Abidin, Beattie & Goodacre (2008), Bigus & Zimmermann (2008) and Clacher, de Ricquebourg & May (2019). Furthermore, the authors compute entropy index based on Mynhardt, Plastun & Makarenko (2014) and Antoniuk et al. (2020). A more comprehensive review of the concentration measures used in recent literature focusing on audit market is provided in Velte & Stiglbauer (2012).

Concentration ratio (CR) is computed as the sum of the market shares of a number of largest firms operating in the observed market. Depending on the size of the market expressed with the number of firms operating in it, CR can be represented with the percentage of the market controlled by the four, eight, 12 or 20 biggest firms (Hall & Tideman, 1967). The following expression is being used for its calculation:

$$CR_n = \sum_{i=1}^n s_i$$

with  $s_i$  standing for the market share of the  $i$ -th firm of the analysed industry whereas  $n$  represents the number of firms.

CR is a simple indicator of the level of concentration and, thus, it is widely used. Its higher values indicate a lower degree of competitiveness due to the fact that a small number of big firms account for a significant share in total assets/operating revenues.

Shepherd & Shepherd (2004) categorised four main types of market structures which represent the various levels of competition and monopoly power that are summarized in table below.

**Table 1** Type of Market Structures according to Concentration Ratios

Market Characteristics	Market Structure
One firm holds 100% market share	Pure monopoly
Market share of one firm > 40%; no close rivals	Dominant firm
> 60% of the market controlled by four firms	Tight oligopoly
< 40% of the market controlled by four firms	Effective competition (Loose oligopoly, Monopolistic competition, Perfect competition)

Source: Shepherd & Shepherd (2004), p. 13; 71-75

However, one should be aware of its limitations. E.g. Hall & Tideman (1967) suggest that the use of CR might lead to a conclusion that markets with different size distributions could be considered as equally concentrated adding that, possibly, it is not a good measure of monopoly. Furthermore, as suggested by Pasalic & Pavic (2021), when interpreting CR values one should be aware whether the products are sold mostly in the local, national or global market as these enjoy different levels of monopoly powers.

Herfindahl-Hirschmann index (HHI) is also commonly used concentration indicator. The importance given to the HHI also arises from the fact that regulatory bodies dealing with protection of market competition frequently use this indicator. According to the Horizontal Merger Guidelines (2010) provided by the US Department of Justice, markets can be classified into three categories encompassing unconcentrated markets with HHI values below 1500, moderately concentrated markets with HHI ranging from 1500 to 2500, while highly concentrated markets are characterised with HHI values above 2500. Furthermore, European Commission, based on the Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings (2004), uses HHI to detect potential horizontal competition concerns in merger activities.

It is calculated by adding the squares of the individual market shares of all the companies operating in the particular market giving the greater weight to the larger firms' market shares or using the following expression (e.g. Brezina et al. [2016] and Lu, Qiao & Chang [2017]).

$$HHI = \sum_{i=1}^n (s_i)^2$$

where  $s_i$  denotes market share of an individual firm while  $n$  is the total number of firms contained. If the single firm conducts its activities in a particular market controlling the entire supply ( $s_i=100$ ), then the value of HHI equals to 10 000 ( $HHI=(100)^2=10\ 000$ ). Thus, the HHI can range from close to zero reflecting an atomistic market up to 10 000 in the case of a pure monopoly. It is a comprehensive index since it takes into account market shares of all firms that are active in the market, however, as noted by Shepherd & Shepherd (2004), that is also its drawback since it requires more detailed information unlike concentration ratio.

Entropy index (E), introduced by Horowitz and Horowitz (1968), can also be used as a measure of concentration. As it is calculated as:

$$E = - \sum s * \ln(s)$$

with  $s$  is representing the firm's proportional market value within the observed industry. The value of the entropy index ranges from zero to  $\ln(n)$  and is the opposite of the degree of concentration, i.e. the higher the entropy value the higher the level of competitiveness (Nawrocki & Carter, 2010). In case of pure monopoly, it takes value zero whereas its maximum level of  $\ln(n)$  is computed as the logarithmic value of all companies ( $n$ ) operating in the market and is reached when all market participants

have equal market shares and the level of concentration is the lowest. Its main advantage is that it gives weight to firms with smaller market shares (Tipurić, Pejić Bach & Pavić, 2008).

Gini coefficient (G) measures the deviation between distribution of cumulative market shares and a hypothetical uniform distribution with equal market shares measuring the degree of concentration relative to the number of firms on the market (Bigus & Zimmermann, 2008).

Since Gini coefficient stems from the Lorenz curve, if all the firms operating in the market are of equal size, the Lorenz curve is presented with the straight diagonal line of equality. On the contrary, in case of inequality in size of the firms, the Lorenz curve will be positioned below the line of equality. Thus, the Gini coefficient measures the area between the Lorenz curve and a hypothetical line of absolute equality (Mališ & Brozović, 2015).

It ranges between zero, denoting completely uniform distribution, and one, implying perfect inequality.

The formula for calculation of Gini coefficient stands as follows:

$$G = 1 - \frac{1}{n} \sum_{i=1}^n s_i + s_{i-1}$$

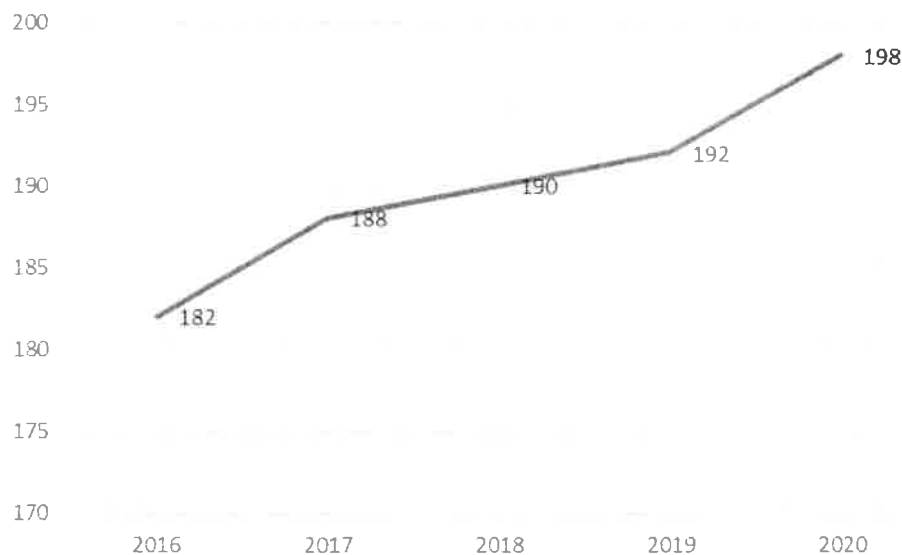
where  $s_i$  is the cumulative share of all individual firms with income less or equal to that of the  $i$ -th individual (Deltas, 2003). If the values of Gini coefficient come close to 1, high level of concentration is present. Specifically, Bigus & Zimmermann (2008) and Velte & Stiglbauer (2012) suggest that values of Gini coefficient below 0.4 indicate low market concentration, its values ranging between 0.4 and 0.6 indicate moderate market concentration while highly concentrated markets are characterised with G values above 0.6.

Market shares necessary for calculation of above mentioned concentration measures in the audit market can be computed on various bases encompassing audit fees, number of clients, total assets, sales revenues, operating revenues etc. (Velte & Stiglbauer, 2012). However, due to the data availability, the authors have opted for the basis including total assets following Bigus & Zimmermann (2008) and Mijić, Jakšić & Vuković (2013).

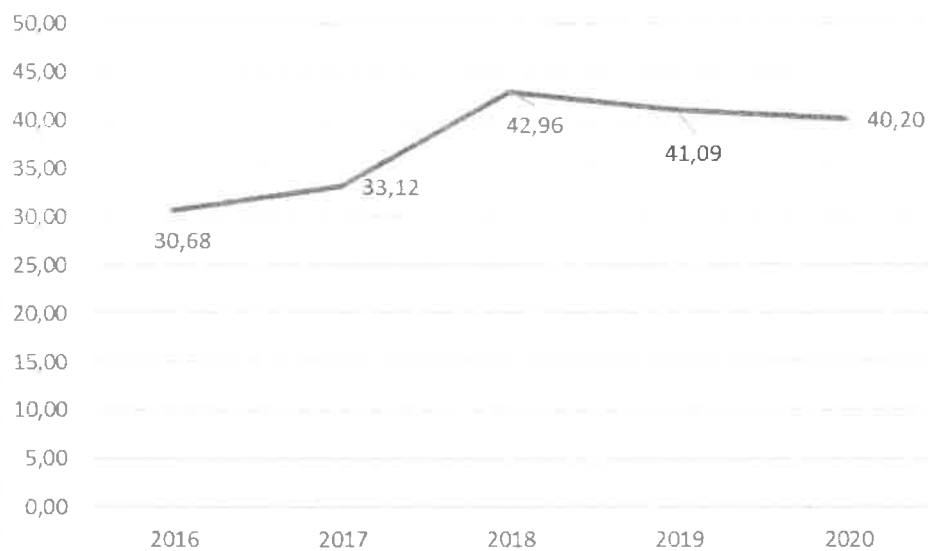
The initial sample employed in the analysis consisted of 200 audit firms listed in the Auditor register (The Ministry of Finance, n.d.). However, since not all of these firms operated in the entire observed period, the sample ranged from 182 to 198 firms in 2016 and 2020, respectively.

### 3. Dynamics of Concentration Indicators in the Croatian Audit Market

The levels of concentration in the Croatian audit market were quite dynamic and varied over time whether it is expressed with CR4, HHI, entropy index or Gini coefficient. The same holds true for the number of audit firms that operated in the observed period that ranges, as presented with Figure 1, from 182 in 2016 to 198 in 2020

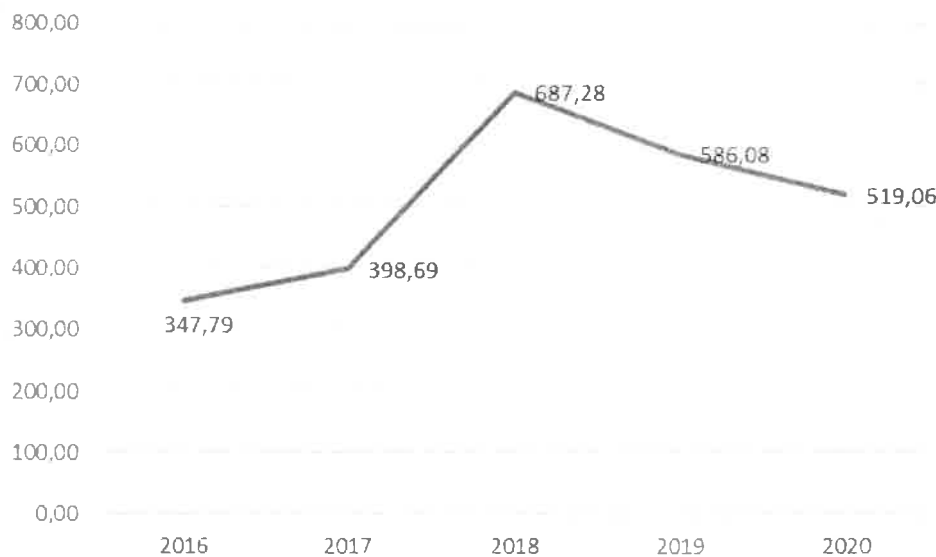


**Figure 1** Number of audit firms in the Croatian market in 2016 - 2020  
Source: authors' calculations



**Figure 2** Dynamics of CR4 in in the Croatian audit market in 2016 - 2020  
Source: authors' calculations

The market shares held by four largest audit firms, i.e. the values of CR4 enabled the authors to determine the market structure as well as the degree of market concentration. As it can be seen from the Figure 1, the values of CR4 varied over time with significantly low values achieved in 2016 and 2017 suggesting the market structure of effective competition. However, in the last three years of the period analysed CR4 registered higher values exceeding the threshold of 40%. It is worth noting, that these four leading audit firms are KPMG, Deloitte, Ernst&Young, and PWC suggesting the dominance of Big Four in the Croatian audit market as well.

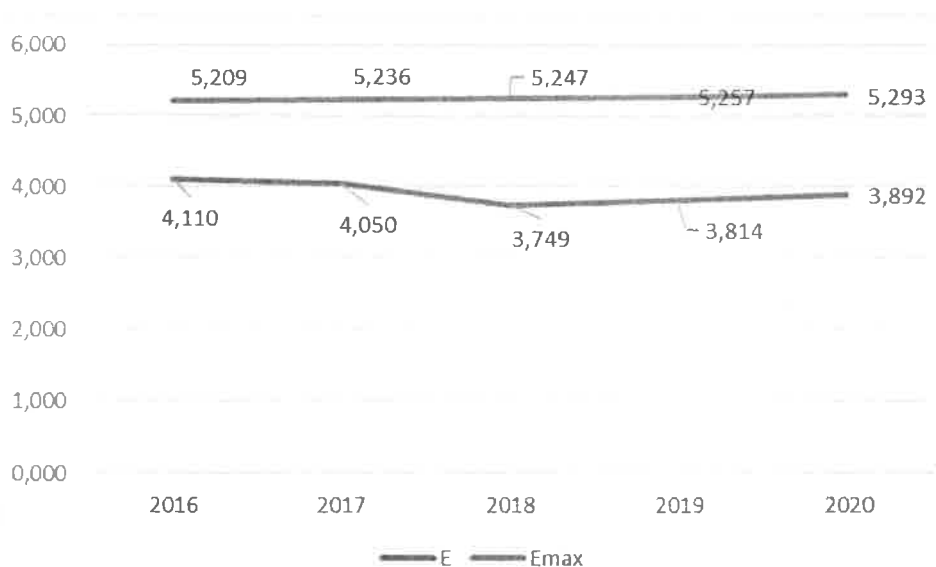


**Figure 3** Dynamics of HHI in in the Croatian audit market in 2016 – 2020

Source: authors' calculations

Similarly to the findings regarding the level of concentration obtained with CR4, HHI values also vary significantly over time. Once again, the lowest levels were achieved in 2016 and 2017 while the highest value is reached in 2018, followed by a slight decline afterwards.

Nevertheless, in the entire observed period the values of HHI are significantly below 1500 suggesting low levels of concentration in Croatian audit market. It is noteworthy that the value of total assets of KPMG, the audit market leader, had more than doubled in 2018 comparing to the financial year 2017, mostly due to the fact that values of trade receivables and receivables from advance profit payments had risen. Also, the value of operating revenues had risen significantly (68,59%).



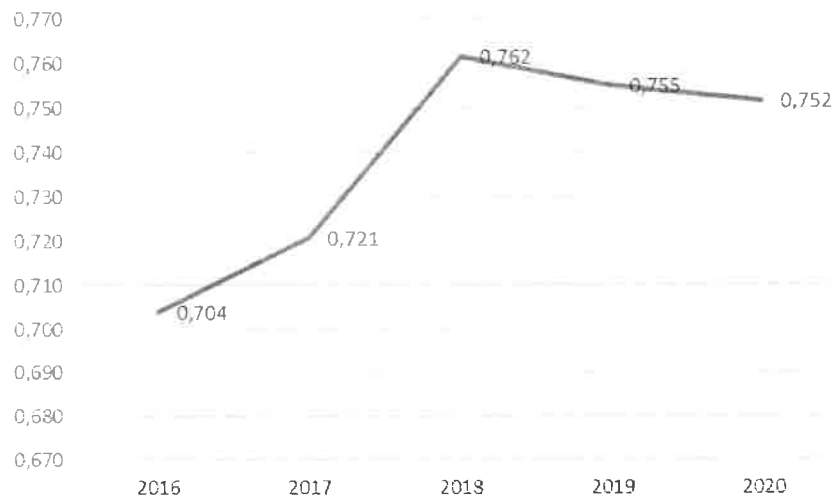
**Figure 4** Dynamics of entropy index in the Croatian audit market in 2016 – 2020

Source: authors' calculations



The entropy index achieves the highest values in 2016 and 2017, approaching the maximum achievable values, whereas it decreases in 2018. In the last two years it moves towards the highest values suggesting an increase in competition.

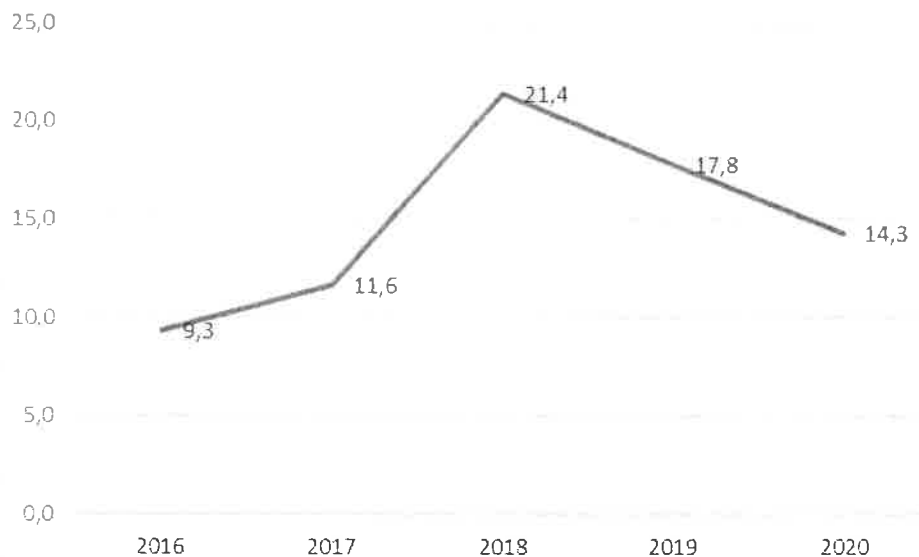
The results regarding level of concentration in the audit market in Croatia are following the same pattern for the first three concentration measures used. This is also true for concentration ratio despite its drawbacks that it does not take into account relative size of the firms concerned nor the total number of firms operating in the market.



**Figure 5** Dynamics of Gini coefficient in the Croatian audit market in 2016 – 2020  
 Source: authors' calculations

The values of Gini coefficient, as shown with Figure 5, also show an increase in the first three years whereas, after reaching the peak in 2018, a decline in concentration is evident. However, its values are constantly in the range between 0.6 and 0.9 suggesting high level of concentration.

The dynamics of concentration measures can be explained with the dynamics of market share held by the market leader KPMG presented with Figure 6. Specifically, the years 2016 and 2017 register its lowest values which slightly increase reaching the maximum in 2018 after which a decline occurs. Moreover, in the all observed period Croatian audit market is not characterised with the dominant firm.



**Figure 6** Market shares of market leader in the Croatian audit market in 2016 – 2020  
Source: authors' calculations

Correspondingly to the findings on concentration levels in the audit markets in other countries, the BIG4 dominance has not avoided Croatia either. Despite the concerns expressed by the regulators arising from the dominance of BIG4 audit firms in terms of increased audit fees and reduced audit quality (Huang, Chang and Chious, 2016), the overall level of audit market concentration in Croatia, as obtained with the majority of concentration measures employed, is rather low indicating that it can be considered as highly competitive one.

#### 4. Conclusion

Similar to all the audit markets in the world, the audit market in the Republic of Croatia is also characterised by the supremacy of the four global market leaders Deloitte, Ernst & Young, KPMG and PricewaterhouseCoopers, known as the Big Four, which have significant competitive advantages in comparison to other audit companies. Because of its important function in the context of economic stability, there are several issues that should be taken into the account when analysing competition in the audit market, such as avoiding the conflict of interests. Despite generally accepted view that high concentration of an audit market is detrimental and various measures undertaken with an aim of its reduction, there is no consensus among experts regarding this issue. According to the main aim of this paper and based on the concentration values calculated using different market concentration measures, it can be concluded that the level of audit market concentration in the period from 2016 to 2020 in the Republic of Croatia obtained with the majority of concentration measures is relatively low and indicates high level of competitiveness. Low levels of concentration are confirmed with CR4 which in the last year of the analysis accounts for 40,20 suggesting the effective competition. This is also confirmed with HHI which is well below 1500 threshold as well as with entropy index which reaches its maximum values that indicate higher competition. This could be perceived as positive regarding the independence of audit companies and, thus, it implies that no additional measures are needed in the Republic

of Croatia in this context. Furthermore, it can be added that Croatian audit market is not characterised with a dominant firm since in the entire observed period market shares of the leading audit firms are well below 40%.

## References

- Abidin, S., Beattie, V. A., & Goodacre, A. (2008). Audit market structure, fees and choice following the Andersen break-up: Evidence from the UK. Fees and Choice following the Andersen Break-up: Evidence from the UK, <http://ssrn.com/abstract=1096464>
- Antoniuk, O., Kuzyk, N., Zhurakovska, I., Sydorenko, R., & Sakhno, L. (2020). The role of «BIG FOUR» auditing firms in the public procurement market in Ukraine. *Independent Journal of Management & Production*, 11(9), 2483-2495.
- Beattie, V., Goodacre, A., & Fearnley, S. (2003). And then there were four: A study of UK audit market concentration-causes, consequences and the scope for market adjustment. *Journal of Financial Regulation and Compliance*, 11(3), 250-265.
- Bigus, J., & Zimmermann, R. C. (2008). Non-audit fees, market leaders and concentration in the German audit market: A descriptive analysis. *International journal of Auditing*, 12(3), 159-179.
- Bleibtreu, C., & Stefani, U. (2012). Auditing, consulting, and audit market concentration. *Zeitschrift für Betriebswirtschaft*, 82(5), 41-70.
- Brezina, I., Pekár, J., Čičková, Z., & Reiff, M. (2016). Herfindahl–Hirschman index level of concentration values modification and analysis of their change. *Central European journal of operations research*, 24(1), 49-72.
- Clacher, I., de Riquebourg, A. D., & May, A. (2019). Who gets all the PIE? Regulation of the statutory audit for private UK companies. *Accounting, Auditing & Accountability Journal*, 32(5), 1297-1324.
- Deltas, G. (2003). The small-sample bias of the Gini coefficient: results and implications for empirical research. *Review of economics and statistics*, 85(1), 226-234.
- Francis, J. R., Michas, P. N., & Seavey, S. E. (2013). Does audit market concentration harm the quality of audited earnings? Evidence from audit markets in 42 countries. *Contemporary Accounting Research*, 30(1), 325-355.
- Ginevičius, R., & Čirba, S. (2007). Determining market concentration. *Journal of Business Economics and Management*, 8(1), 3-10.
- Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings (2004), European Commission, Official Journal C 031, 05/02/2004 P. 0005 – 0018, <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A52004 XC0205%2802%29>
- Hall, M., & Tideman, N. (1967). Measures of concentration. *Journal of the american statistical association*, 62(317), 162-168.
- Horizontal Merger Guidelines (2010). The United States Department of Justice, <https://www.justice.gov/atr/horizontal-merger-guidelines-08192010#5c>
- Horowitz, A., & Horowitz, I. (1968). Entropy, Markov processes and competition in the brewing industry. *The Journal of Industrial Economics*, 196-211.

- Huang, T. C., Chang, H., & Chiou, J. R. (2016). Audit market concentration, audit fees, and audit quality: Evidence from China. *Auditing: A Journal of Practice & Theory*, 35(2), 121-145.
- Lu, C., Qiao, J., & Chang, J. (2017). Herfindahl–Hirschman Index based performance analysis on the convergence development. *Cluster computing*, 20(1), 121-129.
- Mališ, S. S., & Brozović, M. (2015). Audit market concentration–Evidence from Croatia. *Ekonomski vjesnik/Econviews-Review of Contemporary Business, Entrepreneurship and Economic Issues*, 28(2), 339-356.
- McMeeking, K. P., Peasnell, K. V. & Pope, P. F. (2007). The effect of large audit firm mergers on audit pricing in the UK. *Accounting and Business Research*, 37(4), 301-319.
- Mijić, K., Jakšić, D., & Vuković, B. (2013). Concentration of the audit market: Evidence from Serbia. *Economic Themes*, 52(1), 115-126.
- The Ministry of Finance (n.d.). Auditor register, available at: <https://rr.fina.hr/>
- Mynhardt, R. H., Plastun, A., & Makarenko, I. (2014). Competitiveness of the Ukrainian audit market. *Risk governance & control: financial markets & institutions*, 7(2, 1), 177-193.
- Nawrocki, D., & Carter, W. (2010). Industry competitiveness using Herfindahl and entropy concentration indices with firm market capitalization data. *Applied Economics*, 42(22), 2855-2863.
- Pasalic, I. N., & Pavic, I. (2021). Market Concentration in the Personal Computer Industry. *International Journal of Economic Sciences*, 10(1), 84-99.
- Shepherd, W. G., & Shepherd, J. M. (2004). *The economics of industrial organization*. Fifth Edition, Waveland Press.
- Tipurić, D., Pejić Bach, M. & Pavić, T. (2008). Concentration of the insurance industry in selected transition countries of Central and Eastern Europe, 1998–2006. *Post-Communist Economies*, 20(1), 97-118.
- Velte, P., & Stiglbauer, M. (2012). Audit market concentration and its influence on audit quality. *International Business Research*, 5(11), 146-161.
- Wolk, C. M., Michelson, S. E., & Wootton, C. W. (2001). Auditor concentration and market shares in the US: 1988–1999 a descriptive note. *The British Accounting Review*, 33(2), 157-174.