COMPETITIVENESS OF THE UKRAINIAN AUDIT MARKET

Ronald H Mynhardt*, Alex Plastun**, Inna Makarenko**

* Southern Business School, South Africa
** Sumy State University, Ukraine

OPEN ACCESS

How to cite this paper:
Mynhardt, RH., Plastun, A. and Makarenko, I. (2017). Competitiveness Of The Ukrainian Audit Market. *Risk governance & control: financial markets & institutions, 7(2, 1),* 177-193.
http://dx.doi.org/10.22495/rgcv7i2c1p6

ISSN Online: 2077-4303
ISSN Print: 2077-429X

Received: 22.12.2016
Accepted: 18.04.2017

JEL Classification: M4, M40, M41, M42, M49
DOI: 10.22495/rgcv7i2c1p6

Abstract

Ukrainian association with EU forces the implementation of some EU Directives and Regulation acts in Ukrainian audit market. One of the key issues for compliance with the EU principles is the presence of competition in the market. This paper provides new empirical evidence on the concentration in Ukrainian audit market. The use of different methods to measure market competitiveness: (i) traditional measurements of market competition (Hirschman Index, Lerner Index, Comprehensive concentration index, Entropy Index etc.) to examine market concentration; (ii) a multivariate regression analysis with dummy variables and Kruskal-Wallis test to confirm the hypothesis about market heterogeneity; allows to show that Ukrainian audit market has quasi-competitive character and is characterized by a high level of regional market concentration. To stimulate competition some policy implications are proposed in this paper. Among them are: cancellation of restrictive covenants for some market participants, promotion of integrity tendering practices in attracting auditors to perform tasks on the principles of transparency and openness; increasing the effectiveness of the Antimonopoly Committee of Ukraine regulatory activities in audit sphere; development of local audit practice.

Keywords: Audit Market, Competition, Concentration, Restrictive Covenants

1. INTRODUCTION

Ukrainian audit market has been under reform since 1993. Important steps have been taken since then. International standards of audit have been adopted as national and system of quality control have been designed. But the question of free competition in the market remains relevant.

With implementation to the 2017 rules of Directive 2006/43/EU, Directive 2014/56/EU, Regulation (4/16/2014) and EU Association Agreement the question of competitive audit market in Ukraine is actualized. Competitive audit market reduces audit fees, improves quality standards as well as transparency of corporate reporting.

The presence of competition in the Ukrainian audit market as a necessary feature for compliance with the EU rules is a subject for discussion. It relates to the only segment of the market – domestic audit companies. Ukrainian audit market demonstrates high concentration in the most profitable segment and free competition in the cheaper segments by the size of services provided on regional level. Thus, the market can be considered as quasi-competitive.

Moreover, to improve the quality of audit in the state companies, Ukrainian government had adopted the Resolution of the Cabinet of Ministers №390 «On some issues of the financial statements audit of state-owned companies». This resolution has discriminatory influence on the resident audit companies. It introduces artificial restrictive covenants for resident companies in favor of major market players, including 4 biggest audit companies in the world (well known as Big 4) and other international networks.

However, authoritative studies, including the study of Association of Chartered Certified Accountants (ACCA, 2011)[12], confirm that abolition of discriminatory covenants is the basis of the development of competitive audit market.

Despite a wide range of papers devoted to audit market competition analysis, Ukrainian audit market still faces the lack of academic activity especially in the context of the implementation of the EU audit regulation.

The aim of this study is to show the quasi-competitive character of the Ukrainian audit market

[12] ACCA (2011) Audit under fire: a review of the post-financial crisis inquiries. Available at: http://www.accaglobal.com/content/dam/acca/global/PDF-technical/audit-publications/pol-af-auf.pdf

and to provide policy changes to increase the competitiveness of this market. This is quite important for Ukraine nowadays as it moves in the EU direction. This study tries to fill these gaps and provides a statistical analysis of the Ukrainian audit market concentration for the 2007-2014 in the regional level. Also it expands the market concentration methodology by using multivariate regression analysis with dummy variables and Kruskal-Wallis test to confirm the hypothesis about market heterogeneity along with the standard approaches like Hirschman Index, Lerner Index, Comprehensive concentration index, Entropy Index etc.

The remainder of the paper is structured as follows: Section 2 briefly reviews the literature on the audit market concentration. Section 3 outlines data and empirical methodology. Section 4 presents the empirical results. Section 5 offers some policy implication concerning competition in Ukrainian audit market. Finally, Section 6 presents concluding remarks.

2. LITERATURE REVIEW

Competition in audit market is object of attention of regulators around the world because of the undeniable importance of audit quality for the companies and financial institutions. The role of audit companies in maintaining transparency and stability of the economies in the post-crisis period are the focus areas for audit regulators.

In European Commission Green Paper, 2010[13] the question of «systemic risk» associated with the audit market concentration in the segment of Big 4 and the possible conversion of Big 4 to Big 3 is quite important. In 2014 the issue of audit market competition in EU received legislative confirmation in the provisions of Directive 2014/56/EU[14] and Regulation (4/16/2014), which complement the requirements of Directive 2006/43 / EU.

Competition Commission, UK, 2013[15], exploring the experience of audit companies listed in FTSE 100 and FTSE 250, said that 31% of FTSE 100 companies and 20% FTSE 250 companies had the same auditor from the Big 4, BDO, Grant Thornton for more than 20 years and 67% of FTSE 100 companies and 52% of FTSE 250 companies for over ten years. In this regard, requirements for auditor rotation to ensure market competition are vital. Though, the discriminatory covenants in favor of the Big 4, including the loan or investment agreements are not insuperable for Mid Tier companies, these criteria should be banned.

Oxera, 2006[16] provides evidence that the increase in the audit market concentration can raise audit fees for provided services. However, the fact that audit committees are focused primarily on the quality and reputation of audit firms, rather than on price parameters, is also proved. In addition, it is difficult to distinguish between the impact on audit fees of market concentration and other regulatory requirements.

Requests to the Office of Fair Trading about the audit market competition and the dominance of Big 4 were made by the House of Lords Economic Affairs Committee UK. The final report (House of Lords, 2010[17]) did not confirm a direct correlation between lower audit quality and increased concentration of audit firms. At the same time the largest audit companies' activity in high concentrated financial services segment during the last financial crisis was criticized.

Such initiatives also emerged in the US. Public Company Accounting Oversight Board and the US senate are working to review the existing models of professional auditing activities regulation.

Implementation of mandatory auditor rotation to ensure proper audit independence in the interests of shareholders is considered as well as the role of auditor in preventing new financial crises.

The issue of audit industry concentration in the US in the context of its sustainability, effectiveness, competition and audit of large public companies are studied by the Treasury, 2006[18] and the SEC, 2005[19].

Government Accountability Office (GAO 2003[20], 2008[21]) paid attention to the concentration of firms providing professional services and confirmed the hypothesis that tight oligopolistic market structure allows the existence of price competition. In GAO 2008 it is noted that audit market concentration has significant impact on the remuneration paid to the auditors by the largest public companies.

ACCA, 2011[22] highlights the benefits of the competition expansion and the abolition of barriers for smaller audit firms. However, its representatives warn that artificial intervention in a market environment with the requirements for the restructuring of large audit firms cannot be positive.

CIMA, 2010[23] UK, examines a number of factors that led to significant concentration of audit firms: complexity of audit and accounting standards, requirements for global coverage, significant infrastructure investments and reputational risks of choosing an auditor outside of the Big4. Despite these factors, the audit market is competitive.

[13] European Commission Green Paper (2010) Consultation on audit policy – Lessons from the Crisis, Available at: http://ec.europa.eu/finance/consultations/2010/green-paper-audit/index_en.htm

[14] Directive 2014/56/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2006/43/EC on statutory audits of annual accounts and consolidated accounts, Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0056

[15] Competition Commission (2013) Statutory audit services for large companies market investigation : a report on the provision of statutory audit services to large companies in the UK, Available at: https://www.gov.uk/...data/.../Audit_Order.pdf

[16] Oxera (2006) Competition and Choice in the UK Audit Market, Prepared for Department of Trade and Industry and Financial Reporting Council, Oxford, UK: Oxera Consulting Ltd

[17] House of Lords Select Committee on Economic Affairs (2010) Auditors: Market concentration and their role, Available at: http://www.publications.parliament.uk/pa/ld201011/ldselect/ldeconaf/119/119.pdf

[18] U.S. Treasury (2006) Remarks by Treasury Secretary Henry M. Paulson on the competitiveness of U.S. capital markets – Economic Club of New York, New York, NY, http://www.ustreas.gov/press/releases/hp174.htm

[19] Speech by SEC Chairman: Remarks Before the 2005 AICPA National Conference on Current SEC and PCAOB Developments by Chairman Christopher Cox U.S. Securities and Exchange Commission, Washington, D.C.

[20] Government Accountability Office (GAO (2003) Public accounting firms: mandated study on consolidation and competition. Washington, DC: GAO

[21] Government Accountability Office (GAO 2008) Audits of public companies: Continued concentration in audit markets for large public companies does not call for immediate action. Washington, DC: GAO

[22] ACCA (2011) Audit under fire: a review of the post-financial crisis inquiries, Available at: http://www.accaglobal.com/content/dam/acca/global/PDF-technical/audit-publications/pol-af-auf.pdf

[23] CIMA (2010) Auditors: market concentration and their role consultation response, Available at: http://www.cimaglobal.com/Documents/Insightdocs/HoL%20Auditor%20report%20September%202010.pdf.

However, further reductions among major market players can lead to a catastrophic reduction in competition and conflicts of interest, and thus is undesirable.

OECD (2009, 2010[24]) called in favor of promoting competition in the market of statutory audit and facilitating the expansion of existing intermediate accountancy networks.

The importance of audit market competition and interests of key stakeholder groups is widely discussed by above mentioned regulators on the local and global level. However, there is no consensus on the possibility of achieving free competition in these markets and on the impact of existing market concentration on key parameters of audit services.

Existing academic approaches are also different. Scientists' papers dedicated to the study of the audit market concentration can be structured in the following directions:

1) study of the relationship between competition and different variables: audit fees, the quality of audit services, mandatory auditor rotation;

2) further consolidation of audit companies and changes in the competitive environment;

3) different objects - sectoral, regional, national level;

4) study of the methodology of market concentration evaluation.

As to the first direction, it is worth noting that the study of audit market competition in general, conducted in the work Doogar and Easley, (1998) agreed with the conclusion GAO, 2008[25] about the possibility of the existence of competition in oligopolistic market structure.

The study of relationships (both negative and positive) between the level of audit market concentration and key audit market parameters demonstrates considerable variation of results.

Thus, the results of studies of the effect of audit market concentration on the company's earnings quality are provided by Francis et al. (2013). Accordingly, regulators should focus not only on the extent of Big 4 share, but also on the qualitative structure of the particles.

Boone, J. P. et al. (2012) indicate that audit market concentration leads to lower audit quality. Casterella et al. (2004) prove negative impact of competitive pressures on auditors' performance.

In a positive meaning concentration on local audit markets is by Numan and Willekens (2012) and Newton et al. (2013): the higher the concentration is, the lower the audit fees and fewer accounting restatements are.

Similar conclusions about the connection between the growth of competition in the audit market and audit fees reduction are provided by Maher et al. (1992) (period 1977 - 1981) and Sanders et al. (1995) (1985-1989).

Further audit market consolidation is considered by Dunn et al. (2013) and Gerakos and Syverson (2015). Introduction of mandatory auditor's rotation or withdrawal from the market one of the major players led to increase in audit fees.

The problem of audit market competition was comprehensively considered at all levels: local, national, global. For example, at the national level problem is studied by Francis et al. (2013). At the level of industries and local markets (using the Fama-Frenchten-industry classification system) the problem of audit competition is highlighted by Hogan and Jeter (1999). Carson (2009), Mayhew and Wilkins. (2003), Numan and Willekens (2012). Recent work emphasizes that high industry concentration does not necessarily correspond with low competition intensity.

At the level of cities and municipalities audit market competition is studied by Sanders et al. (1995), Francis et al. (2005), cities and industries - Dunn et al. (2011).

Most of the analyzed papers use traditional indicators of market power (market share of Big 4 and non-Big 4 auditors HH Index, Ginny Coefficient etc), with further integration of these parameters in regression models.

Big 4 concentrations and Herfindahl indexes based on total sales of companies are used by Francis et al. (2013). Herfindahl Index is used in logistic regression by Casterella et al. (2004), Herfindahl Indices for audit fees and the number of clients is calculated by Gerakos and Syverson (2015).

Some authors use market concentration ratios, calculated on cumulative market share of the largest auditors (Hogan and Jeter (1999). Ginny coefficient is used by Quick and Wolz (1999); Abidin et al. (2008). Dunn K, et al. (2011) proposes to use a new measure of the auditors' four largest customers' diversification in each industry.

So, the need for an integrated approach to the study of competition on developing audit market and its measurements should be emphasized. The Ukrainian audit market is relatively young as the practice of corporate governance, transparency and reporting.

The lack of domestic experience in the formation of the market and low methodological framework for the auditing standards' implementation led to blind transfer of audit practices from foreign countries, without taking into account national peculiarities and mentality.

Entering the Ukrainian audit market Big 4 companies caused him to quasi-competitive development: with concentrated segment of the world's largest accountancy network, serving the needs of the largest companies in Ukraine and relatively competitive segment of national auditors, cooperating with smaller companies.

Regarding the level of research, we offer to choose the geographical principle of structuring the audit market (by administrative regions). This principle corresponds with the level of audit activity, general level of economic activity and investment attractiveness, and allows differentiating the market segments controlled by domestic and international audit companies.

Concerning the research methodology, it should be noted that it needs further development, because most of the analyzed papers use traditional indicators of market power. These indicators should be supplemented by specific tools for market concentration research.

[24] OECD (2009 2010) Policy Roundtables Competition and Regulation in Auditing and Related Professions

[25] Government Accountability Office (GAO 2008) Audits of public companies: Continued concentration in audit markets for large public companies does not call for immediate action. Washington, DC: GAO

3. DATA AND METHODOLOGY

In this study annual data from the Audit Chamber of Ukraine (ACU - http://www.apu.com.ua/ pro-apu) is used. The sample covers the period from 2007 to the 2015 including. To assess the competiveness of the Ukrainian audit market we use the following indicators in the regional breakdown (as the object all of the 26 regions of Ukraine are used, including temporary occupied territories of Crimea and parts of the Donetsk and Lugansk regions because sample period includes time when they were complete part of Ukraine):

–number of reports provided to the ACU;
–number of orders;
–actual size of the provided services;
–average costs per order;
–number of orders per company;
–average income per company.

The key hypothesis we test is: Ukrainian audit market is quasi-competitive.

To test this hypothesis we use different methods and technics:

–average analysis
–Kruskal-Wallis test
–regression analysis with dummy variables
–specific indicators used to analyze the competitiveness of the market (Herfindahl-Hirschman Index (HHI), The Rosenbluth index, Comprehensive concentration index (CCI), Lorenz curve, the Gini coefficient, the Entropy index, The Lerner index, concentration ratio etc).

Average analysis provides preliminary evidence on whether Ukrainian audit market is highly competitive or not.

To provide additional evidences in favor of the tested hypothesis specific statistical tests can be used. To define their class (parametric or non-parametric tests) data set need to be checked for normality.

To this Pearson's and Kolmogorov-Smirnov criterions were applied. The results are presented in Appendix B. Since the critical values exceed calculated values of the Pearson's and Kolmogorov-Smirnov criterions we may conclude that data are not normally distributed and therefore only non-parametric tests are valid.

The use of Kruskal-Wallis test is explained by the large number of the analyzed groups (26).

The Null Hypothesis (H0) in each case is that the data belong to the same population, a rejection of the null representing the differences in the analyzed groups of data (groups are uneven) and thus market is not freely competitive.

As an additional element to confirm the Kruskal-Wallis test results we propose to use multiple regression analysis with dummy variables.

$$Y_t = a_0 + a_1 D_{1t} + a_2 D_{2t} + \cdots + b_n Dn_t + \varepsilon_t \quad (1)$$

where, Y_t – value on the period *t;*

a_0– mean value for the whole generation population (Ukraine);

a_n– mean value for specific data group (certain region);

D_{nt} – dummy variable for specific data group, equal to 0 or 1. D_{nt} is 1 when data belong to the specific group (for example data belong to Kiev and specific data group is Kiev). D_{nt} is 0 when data don't belong to the specific group (for example data characterize Sumy region but specific data group is Kiev);

ε_t – Random error term for period *t.*

The size, sign and statistical significance of the dummy coefficients provide information about possible differences between groups. In case of dummy coefficient is statistically significant ($p<0.05$) we conclude that this group belongs to another general population. And this indirectly evidence in favor of unevenness of the Ukrainian audit market.

If preliminary statistical assessments evidence in favor of the key hypothesis (Ukrainian audit market is quasi-competitive) we go to the next stage of the analysis – quantitative assessments of the competitiveness. To do this we use specific indicators. Their short description is provided below.

3.1. Concentration Ration (CR)

Concentration ratio is used to measure the level of market control of the largest firms in the market and to illustrate the degree to which market is oligopolistic

The concentration ratio is the percentage of market share held by the largest n firms in an industry.

$$CRn = R_1 + R_2 + \cdots + R_n \quad (2)$$

where, CRn – concentration ratio;
n – the number of the largest regions;
R_i – market share, held by the i-th region;

Depending on the value of the CR the level of market competition can be characterized as follows:

- 0% - no concentration. Means perfect competition;
- 0%-50% - low concentration. Depending on concrete size of the CR market competition ranges from perfect competition to an oligopoly
- 50%-80% - medium concentration. Usually is typical for the oligopoly.
- 80%-100% - high concentration. Market ranges from an oligopoly to monopoly.
- 100% - total concentration. The market is monopoly.

3.2. Hirschman Index (HHI)

Hirschman Index (Herfindahl–Hirschman Index or HHI) is used to measure the size of firms in relation to the whole market. First used by Hirschman (1964). This is an indicator of the competition level in the market.

$$HHI = \sum_{i=1}^{n} (R_i)^2 \quad (3)$$

where, R_i is the market share of region i in the market, and n is the number of the regions in the market.

It ranges in the interval [0;1]:
1) 0 – no concentration;
2) from 0 to 0,1 – low concentration;
3) from 0,10 to 0,18 – medium concentration;
4) above 0,18 – high concentration.

3.3. Lerner Index

The Lerner index describes a firm's market power. Formalized by Lerner (1934). The prices in the market differ from the marginal costs the less competitive market is.

$$L = \frac{P-MC}{P} \quad (4)$$

where, P is the market price set by the firm and MC is the firm's marginal cost.

The index ranges from a o to 1. Higher numbers implying greater market power. For a perfectly competitive market (where P=MC), Lerner index =0. In this case any market participant has no market power.

3.4. The Rosenbluth Index

The Rosenbluth Index includes not only the firm market share, but also the firm rank. Was developed by Rosenbluth (1955):

$$I_R = \frac{1}{2\times\sum_{i=1}^{n}(i\times R_i)-1} \quad (5)$$

where, i indicates the firm's rank position.

The Rosenbluth Index deviates in the range [1/n;1]. The higher number of the Index the more monopolized the market is.

3.5. Comprehensive Concentration Index (CCI)

Comprehensive concentration index (Horvarth 1970) reflects both relative dispersion and absolute magnitude of the biggest market participant share.

$$CCI = R_1 + \sum_{i=2}^{n} R_i^2 \times (1 + (1 - R_i)) \quad (6)$$

where, R_1 is the share of the largest market participant.

CCI ranges from 0 to 1. The higher the CCI is the less competitive is market.

3.6. The Entropy Index

The entropy index was defined by Theil (1972). The entropy index is a measure of "evenness"—the extent to which groups are evenly distributed among organizational units. It can also be interpreted as the difference between the diversity (entropy) of the system and the weighted average diversity of individual units, expressed as a fraction of the total diversity of the system

$$E = \frac{1}{n}\sum_{i=1}^{n} R_i \times ln\frac{1}{R_i} \quad (7)$$

Small values of the Entropy Index reflect high concentration.

3.7. The Lorenz Curve

The standard Lorenz curve involves a comparison between the cumulative market share and cumulative shares of the number of firms (Lorenz, 1905).

The curve is a graph showing the proportion of overall income or wealth assumed by the bottom x% of the people, although this is not rigorously true for a finite population (see below). It is often used to represent income distribution, where it shows for the bottom x% of households, what percentage (y%) of the total income they have. The percentage of households is plotted on the x-axis, the percentage of income on the y-axis. It can also be used to show distribution of assets. In such use, many economists consider it to be a measure of social inequality.

The curve is used for the visual (graph) interpretation of the unevenness of the market. The cumulative percentage of companies is plotted on the x-axis, the cumulative percentage of market share on the y-axis.

In theory, absolutely equal distribution of the market is characterized by the bisector coming out of the start point of the coordinate system. The more actual distribution deviates from the theoretical empirical distribution, the greater the degree of inequality present in the market.

3.8. The Gini Coefficient

The Gini coefficient measures the inequality among values of a frequency distribution (for example, market shares). The Gini coefficient was proposed by Gini (1909) as a measure of inequality of income or wealth.

$$G = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}|R_i-R_j|}{2n^2\bar{R}} \quad (8)$$

$\bar{R}$ – average of the market shares of the market participants

The Gini coefficient deviates from 0 (perfect competition in the market) to 1 (monopoly).

4. EMPIRICAL RESULTS

4.1. Average Analysis

The first stage of our analysis is preliminary estimations of the inequality in Ukrainian audit market. To do this we use simple average analysis. Results are presented in Appendix A.

Results show geographical inequalities in the market. Values of Kyiv and Kyiv region are several times higher than the results of other regions of Ukraine. This includes such indicators as Number of reports provided to the ACU; Number of orders; Actual size of provided services, Average costs per order; Average per company.

The only indicator that more or less evenly distributed regionally is Number of orders per company.

4.2. Kruskal-Wallis Test

Results of the Kruskal-Wallis test are presented in Appendix C.

As can be seen data from different region belong to the different general populations. This is indirect evidence in favor of the quasi-competitiveness of the Ukrainian audit market.

4.3. Regression Analysis with Dummy Variables

Results of the multiple regression analysis with dummy variables are presented in Appendix D. They confirm hypothesis of the geographical inequality of the Ukrainian audit market. Most of the coefficients at the dummy variables (Number of reports provided to the ACU, Number of orders, Actual size of the provided services) are statistically significant and differ from one another by several times. Plus the overall quality of the models is rather high.

So regressions analysis results confirm the hypothesis about quasi-competitiveness of the Ukrainian audit market.

4.4. Indicators of Market Concentration

Results of the analysis of the market concentration indicators (Concentration ratio (CR1), Concentration ratio (CR4), Hirschman Index (HHI), Rosenbluth Index, Comprehensive concentration index (CCI), Entropy index and Gini coefficient) are presented in Appendix E.

Generalization of these indicators analysis for the year 2014 is provided in table 1.

As can be seen, the level of the competiveness in the Ukrainian audit market with the regional division is rather low. And so the Hypothesis about quasi-competitiveness of the Ukrainian audit market is confirmed.

Table 1. Generalization of the special indicators analysis (case of the 2014)

Indicator	Number of reports provided to the ACU	Number of orders	Actual size of the provided services
Concentration ratio (CR1)	Dominating companies	Dominating companies	Dominating companies
Concentration ratio (CR4)	Dominating companies	Dominating companies	Dominating companies
Hirschman Index (HHI)	High concentration	High concentration	High concentration
Rosenbluth Index	Low concentration	Low concentration	Medium concentration
Comprehensive concentration index (CCI)	Medium concentration	Medium concentration	High concentration
Entropy index	High probability of the monopoly or oligopoly presence	High probability of the monopoly or oligopoly presence	High probability of the monopoly or oligopoly presence
Gini coefficient	Medium concentration	Medium concentration	Low concentration

4.5. Lerner Index

Results of the Lerner Index calculations are presented in Appendix F.

As can be seen Lerner Index is very close to 1. This means that marginal costs are very low comparing with the prices of the services and evidences in favor of high monopolization of the Ukrainian audit market.

So the Hypothesis about quasi-competitiveness of the Ukrainian audit market is confirmed.

4.6. Lorenz Curve

To provide visual interpretation of the inequality of the Ukrainian audit market the Lorenz curve is used. Results for the selected indicators are presented in Appendix G.

Results evidence in favor of the inequality in the Ukrainian audit market and confirm the hypothesis of the quasi-competitiveness of the market.

Policy Suggestions

Statistical analysis confirms the quasi-competitive nature of the Ukrainian audit market and dominance of the Big 4 audit companies. However, the situation in audit regulation in Ukraine gives additional evidences in favor of these results and requires urgent action.

Despite some attempts to reform regulation of audit field in the context of the implementation Directive 2006/43 / EU, Directive 2014/56 / EU and Regulation (4/16/2014) with the adoption of bills «On the audit of financial statements and auditing activities» 17.08 .2015 by Ministry of Finance of Ukraine, «On auditing» 10.06.2015 by ACU there are some regulations that have quite destructive impact on the competitive market environment in Ukraine.

Among these documents the Resolution of the Cabinet of Ministers № 390 «On some issues of the financial statements audit of public sector companies» can be regarded. This Resolution approved the list of criterions to choose auditors by some major companies in public sector (see Table 2 for details).

We believe these criterions are restrictive covenants. They hinder the development of free competition in the audit market in Ukraine. Implementation of these covenants is possible only for the Big 4 companies and companies from the large international networks.

Statutory audit of socially significant companies in the context of Directive 2014/56 / EU should be regulated in the interests and for the surveillance of society. But directive implementation of these criterions for the selection of audit companies by government agencies restricts competitiveness in the audit market. The right to choose the auditor should be prerogative of the company and / or its audit committee on the basis that corresponds to the company's tender practice.

Covenants/criterions mentioned above are contrary not only to the best international practice (ACCA and Competition Commission, UK) but also to the norms of Articles 6 and 31 of the Commercial Code of Ukraine, which prohibits restrictions on the audit and cooperation between public economic entities.

Table 2. Covenants for auditors of significant public companies

Covenants	1 group	2 group
Register of auditing firms and auditors	The audit company should be included in the Register	
Experience in providing audit services to business entities of the industry	Provide at least two audits or other audit services to entities of the industry over the last three years	
The number of employees who are directly involved in providing audit services and work in conditions of full time job, and which concluded the employment contract.	not less than 100	not less than 10
The number of employees with a qualification certificate to practice audit activity in Ukraine	5	3
The number of employees, who must have at least one document that certifies the passing of the full program of certification issued by one of the organizations which is a member of the International Federation of Accountants (IFAC): ACCA, AICPA, ICAEW;	15	-
Annual income of the audit company over the last three years	not less than 30 mln. UAH	not less than 3 mln. UAH).
The insurance contract to third parties (to cover possible losses related with professional activities) during the period of audit services.	not less than 50 mln. UAH	not less than 10 mln. UAH

According to the Law of Ukraine «On Protection of Economic Competition» from 11.01.2001 monopoly (dominant) position is concerned to the entity whose share alone on the market exceeds 35%, the three entities exceeding 50%, and five entities exceeding 70%.

Results of Concentration Index calculations (CR 1, CR 4) show that these quantitative criterions of audit market monopolization for analyzed parameters far exceeded norms, especially for the "actual size of provided services".

Kyiv and Kyiv region are dominating among other regions by the results of the calculations of market power indexes and regression analysis.

The level of market concentration, calculated for indicator «number of reports provided to ACU» is the result of registration in this most economically active region the vast majority of foreign and big domestic audit companies. It is also necessary to take into account the fact that the actual size of provided services, as another analyzed indicator, no such tight binding geographic as auditors provides their services in other regions.

Based on the quasi-competitive nature of audit market in Ukraine, destructive conditions that limit competition in it should be eliminated. We developed some recommendations on competition stimulation, addressing to Ukraine Ministry of Finance and ACU in the context of European integration processes:

–abolition of discriminatory conditions for auditors performing tasks in the major segments of public companies and companies of the financial services that are contrary to national law, the Commercial Code of Ukraine, the Law «On Protection of Economic Competition» and best international practice;

–prohibition of restrictive covenants and preferences for some market participants, especially international companies and Big 4 segment that have reputation and infrastructure advantages;

–promotion of integrity tendering practices in attracting auditors to perform tasks on the principles of transparency and openness;

–strengthening the monitoring, development legislative mechanisms and effectiveness of regulatory activities Antimonopoly Committee of Ukraine in audit sphere;

–promotion of the development of local audit practice with a focus on raising the quality of audit services, training and education of staff in domestic auditor companies.

CONCLUSIONS

The study of competitiveness in audit market is actualized in the post-crisis period to ensure quality of financial statements audit for the system important companies, along with the preservation of the transparency of audit practices and preventing further consolidation in this segment. The importance of the audit competition issues highlighted by the relevant regulators around the world: European Commission (EU Green Paper, Directive 2014/56 / EU), Competition Commission and the House of Lords Economic Affairs Committee, CIMA UK, Public Company Accounting Oversight Board, Government Accountability Office, USA and ACCA, OECD.

Results of previous studies are diversified as for the field of research (establishing the relationship between levels of market concentration and the parameters of the audit services) so for the methodology and objects of analysis.

Ukrainian audit market is quite interesting object of analysis because of its developing status and divergent regional structure

Using geographic (regional) research approach we compare the level of competition in the audit market with the level of audit activity and general economic activity of regions in Ukraine, to differentiate them on the basis of residency of audit companies.

Simple average analysis of reports number, number of orders, the actual size of services provided, the average costs per order, orders per subject, the average income per audit company was performed to provide preliminary information about the competitiveness on the Ukrainian audit market.

Besides the traditional methods of market concentration evaluation (Concentration Index, the Gini Coefficient, Lorenz curve, the HH index) a

number of additional indices (Rosenbluth Index, Lerner Index, Comprehensive concentration index and Entropy Index) were calculated and evidenced in favor of quasi-competitive nature of the Ukrainian audit market.

Kruskal-Wallis test and multi-factor regression analysis with dummy variables confirmed in indirect way the heterogeneity of audit market in Ukraine.

Results of non-parametric methods are consistent with calculations of presented coefficients. So, hypothesis about quasi-competitive nature of audit market in Ukraine was confirmed.

These results suggest that existing framework of audit market regulation and supervision from the Ministry of Finance of Ukraine and Audit Chamber of Ukraine need to be changed. We provide some policy implications aimed to change the current situation. Among them are refusal from restrictive covenants used to choose auditors by some major companies in public sector; promotion of integrity tendering practices in attracting auditors to perform tasks on the principles of transparency and openness; increasing the effectiveness of the Antimonopoly Committee of Ukraine regulatory activities in audit sphere; development of local audit practice. We believe their incorporation will increase competitiveness in the Ukrainian audit market.

REFERENCES

1. Abidin, S., V. Beattie, and A. Goodacre. (2008) Audit market structure, fees and choice following the Andersen break-up: Evidence from the U.K., British, Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id1096464.
2. Baumol, W.J., J.C. Panzar and R.D. Willing (1982) Contestable markets and the theory of industry structure, New York: Harcourt Brace Jovanovich.
3. Boone, J. P., I. Khurana, and K. K. Raman (2012) «Audit Market concentration and Auditor Tolerance for Earnings Management», *Contemporary Accounting Research*, Vol. 29 (4) pp. 1171-1203.
4. Carson, E. (2009) «Industry specialization by global audit firm networks», *The Accounting Review*, 84, pp. 355–382.
5. Casterella, J., J. R. Francis B. L. Lewis and P. L. Walker (2004) «Auditor industry specialization, client bargaining power and audit pricing», *Auditing: A* Doogar, R and R.Easley (1998) «Concentration without Di_erentiation: A New Look at the Determinants of Audit Market Concentration», *Journal of Accounting and Economics*, 25, pp. 235-253.
6. Francis, J., R., K., Wang D. (2005) «The pricing of national and city-specific reputations for industry expertise in the u.s. audit market», *The Accounting Review*, Vol. 80, pp. 113–136.
7. Francis, J. R. and Michas, Paul N. and Seavey, Scott (2011) «Does Audit Market Concentration Harm the Quality of Audited Earnings? Evidence from Audit Markets in 42 Countries», Available at SSRN: http://ssrn.com/abstract=1948687
8. Gerakos, J. and Syverson, C. (2015) «Competition in the Audit Market: Policy Implications», Chicago Booth Research Paper, No. 13-63, Available at: http://ssrn.com/abstract=2294508.
9. Gini, C. (1909). «Concentration and dependency ratios» (in Italian). English translation in Rivista di Politica Economica, 87(1997), pp. 769–789.
10. Hirschman, A.O. (1964) «The Paternity of an Index». 1964. *American Economic Review*, Vol. 54, pp 761-762.
11. Hogan, C. and Jeter, D. (1999) «Industry specialization by auditors», *Auditing: A Journal of Practice and Theory*, Vol., 18, pp. 1–17.
12. Horvarth, J. (1970) «Suggestion for a Comprehensive Measure of Concentration», *Southern Economic Journal*, Vol. 36, pp. 446-452
13. Dunn, K. et al. (2011) «The Impact of the Big 4 Consolidation on Audit Market Share Equality», *Auditing: A Journal of Practice & Theory*, Vol. 30, No. 1, pp. 49-73.
14. Lerner, A. P. (1934). «The Concept of Monopoly and the Measurement of Monopoly Power». *The Review of Economic Studies*, Vol. 1 (3), pp. 157–175.
15. Lorenz, M. O. (1905). «Methods of measuring the concentration of wealth. Publications of the American Statistical Association (Publications of the American Statistical Association, Vol. 9, No. 70, pp. 209–219.
16. Maher, M. W., P. Tiessen, R. Colson, and A. J. Broman. (1992) «Competition and Audit Fees», *The Accounting Review*, Vol. 67 (1), pp. 199-211
17. Minyard, D. and R. Tabor (1991) «The effect of Big Eight mergers on auditor concentration», *Accounting Horizons*, Vol. 5, pp. 79–90.
18. Newton, N. J., D. Wang, and M. S. Wilkins (2013) «Does a Lack of Choice Lead to Lower Audit Quality? Evidence from Auditor Competition and Client Restatements», *Auditing: A Journal of Practice & Theory*, Vol. 32 (3), pp. 31-67.
19. Numan ,W. and M. Willekens (2012) «An empirical test of spatial competition in the audit market», *Journal of Accounting & Economics*, Vol.,53 (1/2), pp. 450-465.
20. Quick, R. and M. Wolz. (1999) «Concentration on the German audit market—An empirical analysis of the concentration on the German market for stock corporation audits», *International Journal of Auditing*, Vol. 3, pp. 175–189.
21. Rosenbluth, G. (1955). Measures of Concentration, In Business Concentration and Price Policy by National Bureau of Economic Research. Princeton: Princeton University Press/
22. Sanders, G., A. Allen, and L. Korte (1995) «Municipal Audit Fees: has Increased Competition Made a Difference?», *Auditing: A Journal of Practice & Theory*, Vol. 14 (1), pp. 105-114.
23. Theil, H. (1972) Statistical decomposition analysis. Amsterdam: North-Holland Publishing Company.

APPENDIX A

Simple average analysis

Figure A.1. Simple average analysis "Number of reports provided to the ACU, units"

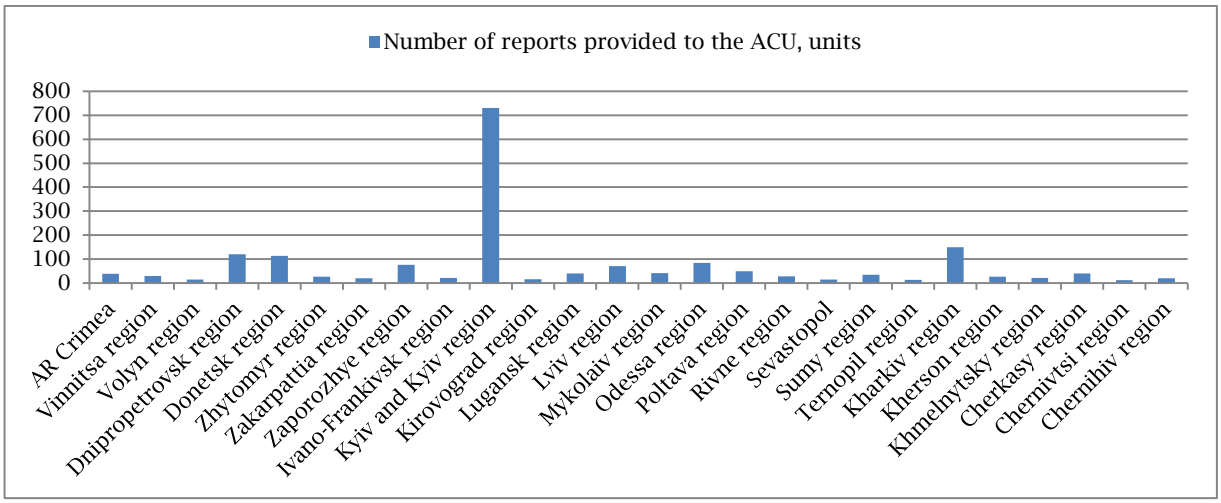


Figure A.2. Simple average analysis "Number of orders, units"

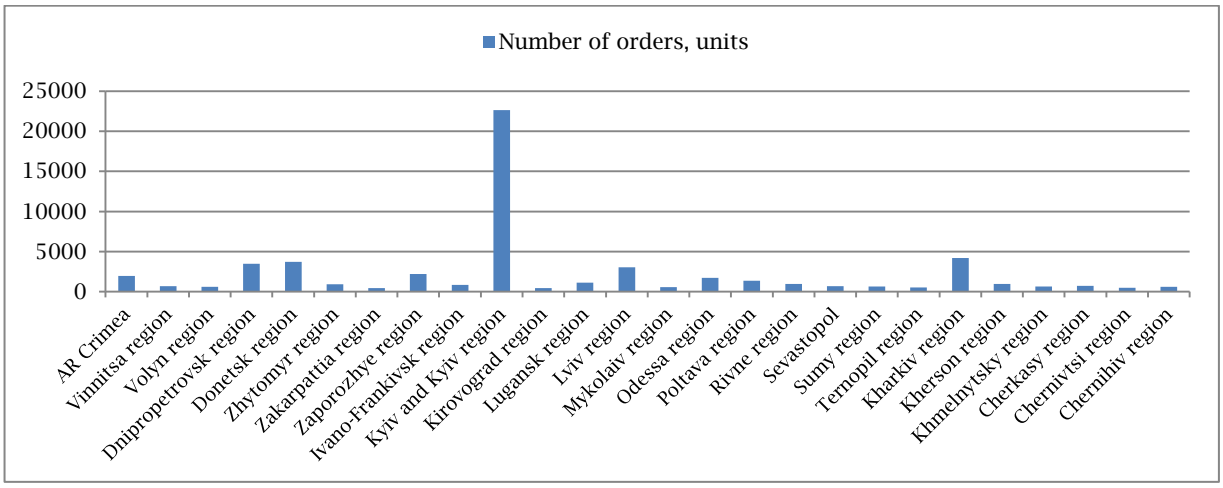


Figure A.3. Simple average analysis "Actual size of the provided services, '000 UAH"

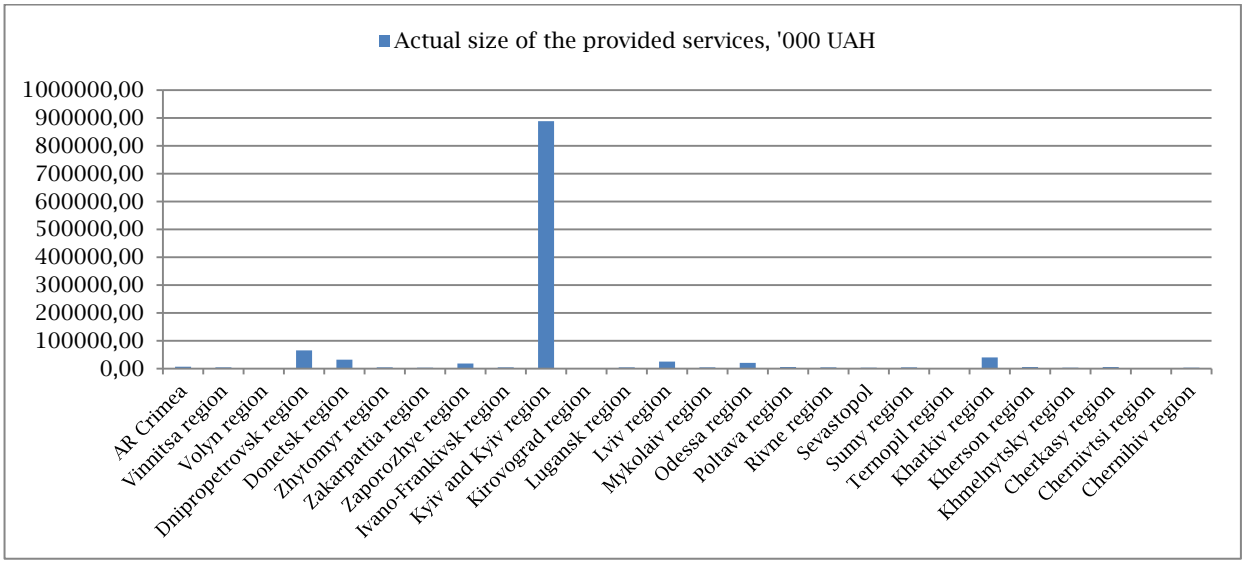


Figure A.4. Simple average analysis "Average costs per order, '000 UAH"

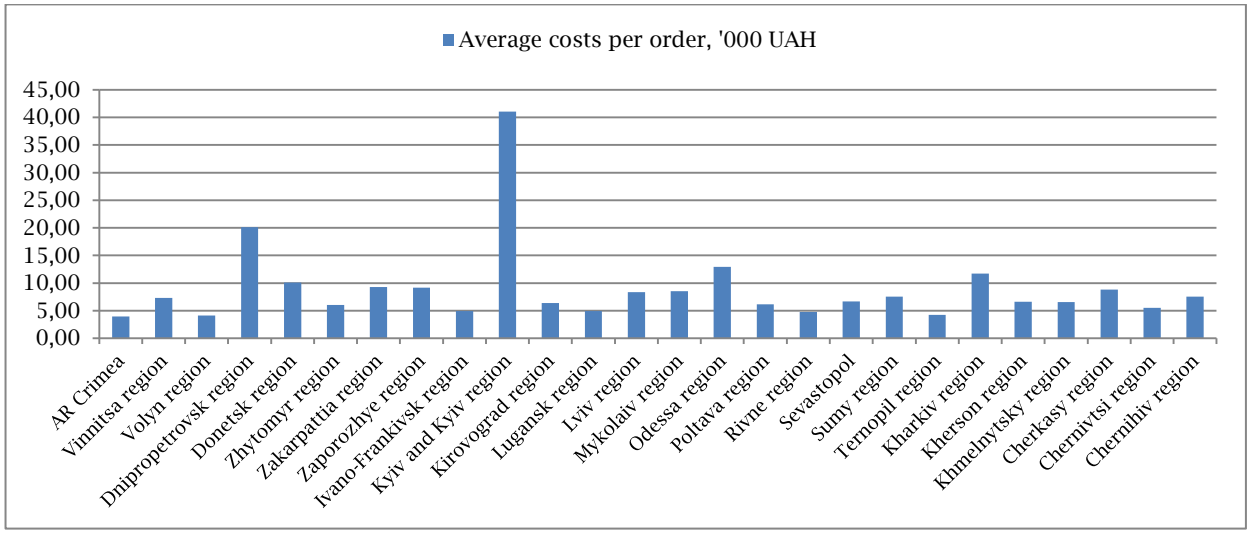


Figure A.5. Simple average analysis "Number of orders per company, units"

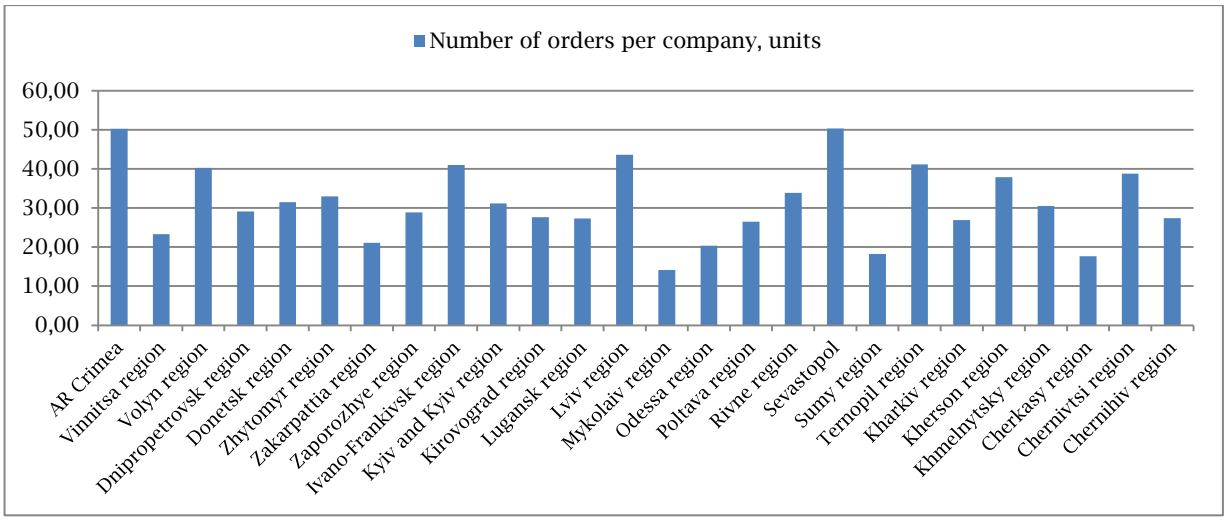
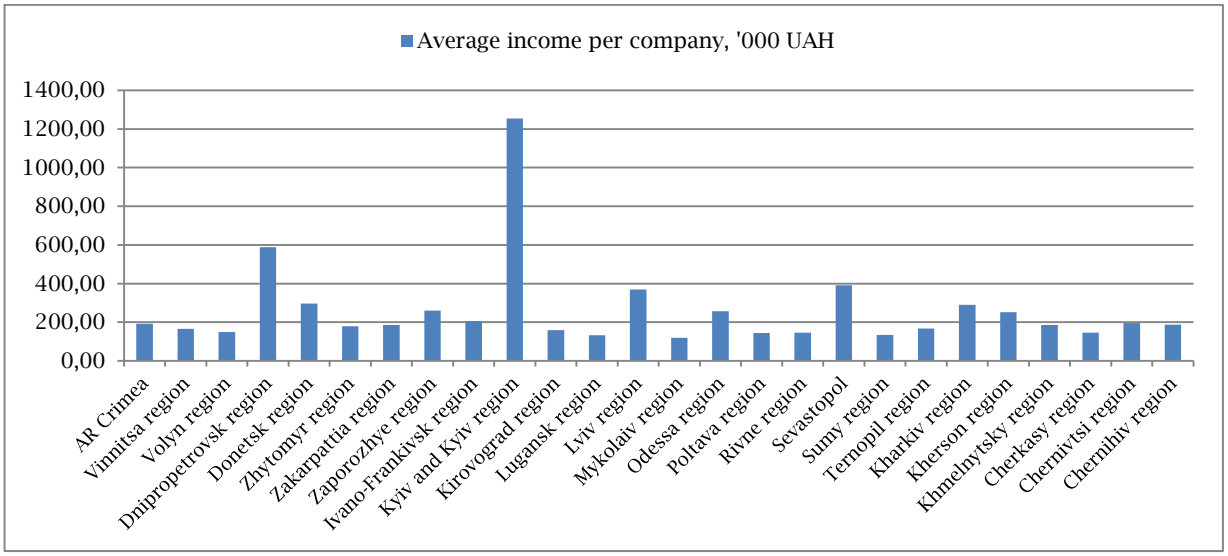


Figure A.6. Simple average analysis "Average income per company, '000 UAH"



APPENDIX B

Table B.1. "Normality" test of the data

Parameter	Number of reports provided to the ACU, units	Number of orders, units	Actual size of the provided services,'000 UAH	Average costs per order, '000 UAH	Number of orders per company, units	Average income per company, '000 UAH
Chi-Square	361.60	509.76	644.49	112.69	17.68	136.65
Chi-square distribution critical value (p=0.95)	5.99	11.07	7.81	11.07	7.81	5.99
Null hypothesis	rejected	rejected	rejected	rejected	rejected	rejected
Kolmogorov-Smirnov d	0.3036	0.309	0.3975	0.1866	0.054	0.1929
Kolmogorov-Smirnov critical value (p=0.95, n=208)	0.0943	0.0943	0.0943	0.0943	0.0943	0.0943
Null hypothesis	rejected	rejected	rejected	rejected	accepted	rejected
Conclusion	Data are not normally distributed					

APPENDIX C

Table C.1. Kruskal-Wallis test

Parameter	Number of reports provided to the ACU, units	Number of orders, units	Actual size of the provided services, '000 UAH	Average costs per order, '000 UAH	Number of orders per company, units	Average income per company, '000 UAH
Adjusted H	260.30	232.56	262.04	161.35	210.77	177.02
d.f.	24	24	24	24	24	24
P value:	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Critical value	36.41	36.41	36.41	36.41	36.41	36.41
Null hypothesis	rejected	rejected	rejected	rejected	rejected	rejected

APPENDIX D

Multiple regression analysis with dummy variables

Table D.1. Regression analysis results for the «Number of reports provided to the ACU, units»

Variables	Coefficients (B)	Standard error of B	t(190)	p-level
Average	71.4459	1.775674	40.23593	0.000000
AR Crimea	-32.9455	9.044053	-3.64278	0.000348
Vinnitsa region	-42.4455	9.044053	-4.69319	0.000005
Volyn region	-56.1955	9.044053	-6.21353	0.000000
Dnipropetrovsk region	48.8045	9.044053	5.39631	0.000000
Donetsk region	42.3045	9.044053	4.67761	0.000005
Zhytomyr region	-45.0705	9.044053	-4.98344	0.000001
Zakarpattia region	-50.5705	9.044053	-5.59157	0.000000
Zaporozhye region	4.9295	9.044053	0.54506	0.586354
Ivano-Frankivsk region	-50.0705	9.044053	-5.53629	0.000000
Kyiv and Kyiv region	658.6795	9.044053	72.83012	0.000000
Kirovograd region	-54.9455	9.044053	-6.07532	0.000000
Lugansk region	-30.9455	9.044053	-3.42164	0.000762
Lviv region	-0.9455	9.044053	-0.10454	0.916850
Mykolaiv region	-30.1955	9.044053	-3.33871	0.001013
Odessa region	12.9295	9.044053	1.42962	0.154469
Poltava region	-22.0705	9.044053	-2.44033	0.015591
Rivne region	-42.5705	9.044053	-4.70701	0.000005
Sevastopol	-55.9455	9.044053	-6.18589	0.000000
Sumy region	-36.3205	9.044053	-4.01595	0.000085
Ternopil region	-58.4455	9.044053	-6.46231	0.000000
Kharkiv region	78.1795	9.044053	8.64430	0.000000
Kherson region	-44.6955	9.044053	-4.94197	0.000002
Khmelnytsky region	-49.6955	9.044053	-5.49482	0.000000
Cherkasy region	-31.3205	9.044053	-3.46310	0.000660
Chernivtsi region	-59.3205	9.044053	-6.55906	0.000000
Chernihiv region	-50.8205	9.044053	-5.61921	0.000000

Regression Summary:
R= 0.98; R2= 0.96; Adjusted R2= 0.96
F(26,190)=218.92; p<0.0000; Standard Error of estimate: 26.08.

Table D.2. Regression analysis results for the «Number of orders, units»

Variables	Coefficients (B)	Standard error of B	t(190)	p-level
Average	2167.43	347.60	6.24	0.0000
AR Crimea	-185.68	491.58	-0.38	0.7061
Vinnitsa region	-1485.81	491.58	-3.02	0.0029
Volyn region	-1543.56	491.58	-3.14	0.0020
Dnipropetrovsk region	1325.82	491.58	2.70	0.0076
Donetsk region	1553.82	491.58	3.16	0.0018
Zhytomyr region	-1256.68	491.58	-2.56	0.0114
Zakarpattia region	-1722.06	491.58	-3.50	0.0006
Zaporozhye region	41.32	491.58	0.08	0.9331
Ivano-Frankivsk region	-1307.31	491.58	-2.66	0.0085
Kyiv and Kyiv region	20482.82	491.58	41.67	0.0000
Kirovograd region	-1698.31	491.58	-3.45	0.0007
Lugansk region	-1054.06	491.58	-2.14	0.0333
Lviv region	871.82	491.58	1.77	0.0778
Mykolaiv region	-1580.56	491.58	-3.22	0.0015
Odessa region	-437.06	491.58	-0.89	0.3751
Poltava region	-809.18	491.58	-1.65	0.1014
Rivne region	-1183.56	491.58	-2.41	0.0170
Sevastopol	-1486.68	491.58	-3.02	0.0028
Sumy region	-1520.56	491.58	-3.09	0.0023
Ternopil region	-1632.93	491.58	-3.32	0.0011
Kharkiv region	2023.44	491.58	4.12	0.0001
Kherson region	-1178.31	491.58	-2.40	0.0175
Khmelnytsky region	-1505.56	491.58	-3.06	0.0025
Cherkasy region	-1445.81	491.58	-2.94	0.0037
Chernivtsi region	-1688.31	491.58	-3.43	0.0007
Chernihiv region	-1688.31	491.58	-3.43	0.0007

Regression Summary:
R= 0.97; R2= 0.95; Adjusted R2= 0.95
F(26,189)=148.60; p<0.0000; Standard Error of estimate: 983.16.

Table D.3. Regression analysis results for the «Actual size of the provided services, '000 UAH»

Variables	Coefficients (B)	Standard error of B	t(190)	p-level
Average	45059.8	13327.10	3.3811	0.0009
AR Crimea	-38254.5	18847.36	-2.0297	0.0438
Vinnitsa region	-40657.6	18847.36	-2.1572	0.0323
Volyn region	-42845.5	18847.36	-2.2733	0.0241
Dnipropetrovsk region	20902.0	18847.36	1.1090	0.2688
Donetsk region	-13038.5	18847.36	-0.6918	0.4899
Zhytomyr region	-40583.2	18847.36	-2.1533	0.0326
Zakarpattia region	-41310.7	18847.36	-2.1919	0.0296
Zaporozhye region	-26204.9	18847.36	-1.3904	0.1660
Ivano-Frankivsk region	-40927.5	18847.36	-2.1715	0.0311
Kyiv and Kyiv region	843283.4	18847.36	44.7428	0.0000
Kirovograd region	-42535.3	18847.36	-2.2568	0.0252
Lugansk region	-39921.7	18847.36	-2.1182	0.0355
Lviv region	-19972.7	18847.36	-1.0597	0.2906
Mykolaiv region	-40630.8	18847.36	-2.1558	0.0324
Odessa region	-24363.5	18847.36	-1.2927	0.1977
Poltava region	-38763.4	18847.36	-2.0567	0.0411
Rivne region	-40955.2	18847.36	-2.1730	0.0310
Sevastopol	-41348.6	18847.36	-2.1939	0.0295
Sumy region	-40710.4	18847.36	-2.1600	0.0320
Ternopil region	-42953.1	18847.36	-2.2790	0.0238
Kharkiv region	-4497.3	18847.36	-0.2386	0.8117
Kherson region	-38988.2	18847.36	-2.0686	0.0399
Khmelnytsky region	-41199.2	18847.36	-2.1859	0.0300
Cherkasy region	-39377.5	18847.36	-2.0893	0.0380
Chernivtsi region	-42714.9	18847.36	-2.2664	0.0246
Chernihiv region	-42714.9	18847.36	-2.2664	0.0246

Regression Summary:
R= 0.97; R2= 0.96; Adjusted R2= 0.95
F(26,189)=161.39; p<0.0000; Standard Error of estimate: 37695.

Table D.4 – Regression analysis results for the «Average costs per order, '000 UAH»

Variables	Coefficients (B)	Standard error of B	t(190)	p-level
Average	8.9848	1.4700	6.1120	0.0000
AR Crimea	-5.0478	2.0789	-2.4281	0.0161
Vinnitsa region	-1.6422	2.0789	-0.7899	0.4306
Volyn region	-4.8633	2.0789	-2.3393	0.0204
Dnipropetrovsk region	11.1259	2.0789	5.3518	0.0000
Donetsk region	1.1396	2.0789	0.5481	0.5842
Zhytomyr region	-2.9190	2.0789	-1.4041	0.1619
Zakarpattia region	0.2915	2.0789	0.1402	0.8887
Zaporozhye region	0.1690	2.0789	0.0813	0.9353
Ivano-Frankivsk region	-4.0652	2.0789	-1.9554	0.0520
Kyiv and Kyiv region	32.0594	2.0789	15.4211	0.0000
Kirovograd region	-2.5962	2.0789	-1.2488	0.2133
Lugansk region	-4.0337	2.0789	-1.9403	0.0538
Lviv region	-0.6180	2.0789	-0.2973	0.7666
Mykolaiv region	-0.4755	2.0789	-0.2287	0.8193
Odessa region	3.9799	2.0789	1.9144	0.0571
Poltava region	-2.8013	2.0789	-1.3475	0.1794
Rivne region	-4.2103	2.0789	-2.0252	0.0443
Sevastopol	-2.3171	2.0789	-1.1146	0.2665
Sumy region	-1.4109	2.0789	-0.6787	0.4982
Ternopil region	-4.7343	2.0789	-2.2773	0.0239
Kharkiv region	2.7668	2.0789	1.3309	0.1848
Kherson region	-2.3701	2.0789	-1.1400	0.2557
Khmelnytsky region	-2.4030	2.0789	-1.1559	0.2492
Cherkasy region	-0.1781	2.0789	-0.0857	0.9318
Chernivtsi region	-3.4363	2.0789	-1.6529	0.1000
Chernihiv region	-3.4363	2.0789	-1.6529	0.1000

Regression Summary:
R= 0.88; R2= 0.77; Adjusted R2= 0.74
F(26,189)=24.33; p<0.0000; Standard Error of estimate: 4,16.

Table D.5. Regression analysis results for the «Number of orders per company, units»

Variables	Coefficients (B)	Standard error of B	t(190)	p-level
Average	31.2142	2.9444	10.6011	0.0000
AR Crimea	19.0515	4.1640	4.5752	0.0000
Vinnitsa region	-7.9223	4.1640	-1.9026	0.0586
Volyn region	9.0548	4.1640	2.1745	0.0309
Dnipropetrovsk region	-2.0899	4.1640	-0.5019	0.6163
Donetsk region	0.2938	4.1640	0.0706	0.9438
Zhytomyr region	1.7109	4.1640	0.4109	0.6816
Zakarpattia region	-10.1217	4.1640	-2.4307	0.0160
Zaporozhye region	-2.3106	4.1640	-0.5549	0.5796
Ivano-Frankivsk region	9.7454	4.1640	2.3404	0.0203
Kyiv and Kyiv region	-0.0605	4.1640	-0.0145	0.9884
Kirovograd region	-3.5843	4.1640	-0.8608	0.3905
Lugansk region	-3.9279	4.1640	-0.9433	0.3467
Lviv region	12.3618	4.1640	2.9687	0.0034
Mykolaiv region	-17.0805	4.1640	-4.1019	0.0001
Odessa region	-10.8316	4.1640	-2.6012	0.0100
Poltava region	-4.7035	4.1640	-1.1296	0.2601
Rivne region	2.6516	4.1640	0.6368	0.5250
Sevastopol	19.1077	4.1640	4.5887	0.0000
Sumy region	-13.0236	4.1640	-3.1276	0.0020
Ternopil region	9.8985	4.1640	2.3771	0.0184
Kharkiv region	-4.3362	4.1640	-1.0413	0.2990
Kherson region	6.6329	4.1640	1.5929	0.1129
Khmelnytsky region	-0.7422	4.1640	-0.1782	0.8587
Cherkasy region	-13.5760	4.1640	-3.2603	0.0013
Chernivtsi region	7.5909	4.1640	1.8230	0.0699
Chernihiv region	7.5909	4.1640	1.8230	0.0699

Regression Summary:
R= 0.77; R2= 0.58; Adjusted R2= 0.53
F(26,189)=10.33; p<0.0000; Standard Error of estimate: 8,33.

Table D.6. Regression analysis results for the «Average income per company, '000 UAH»

Variables	Coefficients (B)	Standard error of B	t(190)	p-level
Average	259.5391	48.7932	5.3192	0.0000
AR Crimea	-67.3289	69.0040	-0.9757	0.3304
Vinnitsa region	-94.2298	69.0040	-1.3656	0.1737
Volyn region	-111.2086	69.0040	-1.6116	0.1087
Dnipropetrovsk region	328.1951	69.0040	4.7562	0.0000
Donetsk region	37.2669	69.0040	0.5401	0.5898
Zhytomyr region	-80.9568	69.0040	-1.1732	0.2422
Zakarpattia region	-74.4410	69.0040	-1.0788	0.2821
Zaporozhye region	1.1815	69.0040	0.0171	0.9864
Ivano-Frankivsk region	-54.6773	69.0040	-0.7924	0.4291
Kyiv and Kyiv region	994.4352	69.0040	14.4113	0.0000
Kirovograd region	-100.0593	69.0040	-1.4501	0.1487
Lugansk region	-127.6035	69.0040	-1.8492	0.0660
Lviv region	109.4792	69.0040	1.5866	0.1143
Mykolaiv region	-140.7462	69.0040	-2.0397	0.0428
Odessa region	-2.6986	69.0040	-0.0391	0.9688
Poltava region	-116.0996	69.0040	-1.6825	0.0941
Rivne region	-113.4658	69.0040	-1.6443	0.1018
Sevastopol	132.2076	69.0040	1.9159	0.0569
Sumy region	-125.0288	69.0040	-1.8119	0.0716
Ternopil region	-92.6675	69.0040	-1.3429	0.1809
Kharkiv region	30.0747	69.0040	0.4358	0.6635
Kherson region	-7.3906	69.0040	-0.1071	0.9148
Khmelnytsky region	-74.7766	69.0040	-1.0837	0.2799
Cherkasy region	-112.9324	69.0040	-1.6366	0.1034
Chernivtsi region	-63.7524	69.0040	-0.9239	0.3567
Chernihiv region	-63.7524	69.0040	-0.9239	0.3567

Regression Summary:
R= 0.86; R2= 0.74; Adjusted R2= 0.71
F(26,189)=20.88; p<0.0000; Standard Error of estimate: 130,01.

APPENDIX E

Indicators of market concentration

Table E.1. Indicators of market concentration (case of "Number of reports provided to the ACU")

Indicator	2007	2008	2009	2010	2011	2012	2013	2014
Concentration ratio (CR1)	35,15%	37,02%	38,25%	39,36%	41,24%	41,14%	41,67%	44,34%
Concentration ratio (CR4)	57,46%	58,08%	59,15%	59,77%	61,38%	60,91%	61,64%	63,99%
Hirschman Index (HHI)	0.15	0.16	0.17	0.18	0.19	0.19	0.20	0.22
Rosenbluth Index	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.12
Comprehensive concentration index (CCI)	0.41	0.42	0.43	0.44	0.46	0.46	0.46	0.49
Entropy index	9.81%	9.67%	9.55%	9.46%	9.28%	9.30%	9.23%	8.87%
Gini coefficient	0,44	0,44	0,45	0,45	0,47	0,46	0,47	0,50

Table E.2. Indicators of market concentration (case of "Number of orders")

Indicator	2007	2008	2009	2010	2011	2012	2013	2014
Concentration ratio (CR1)	34,83%	39,12%	37,21%	38,36%	43,37%	43,36%	44,81%	47,82%
Concentration ratio (CR4)	58,01%	60,90%	59,78%	58,14%	61,21%	61,41%	62,78%	65,04%
Hirschman Index (HHI)	0,15	0,18	0,17	0,17	0,21	0,21	0,22	0,25
Rosenbluth Index	0,10	0,10	0,10	0,10	0,11	0,11	0,12	0,13
Comprehensive concentration index (CCI)	0,41	0,44	0,43	0,43	0,48	0,48	0,49	0,52
Entropy index	9,82%	9,45%	9,57%	9,61%	9,02%	8,99%	8,79%	8,46%
Gini coefficient	0,44	0,46	0,46	0,46	0,48	0,49	0,51	0,53

Table E.3. Indicators of market concentration (case of «Actual size of the provided services")

Indicator	2007	2008	2009	2010	2011	2012	2013	2014
Concentration ratio (CR1)	68,01%	74,77%	77,84%	76,18%	76,25%	75,33%	74,74%	79,39%
Concentration ratio (CR4)	82,13%	86,61%	88,14%	87,73%	87,92%	87,65%	88,53%	89,54%
Hirschman Index (HHI)	0,47	0,57	0,61	0,59	0,59	0,57	0,57	0,64
Rosenbluth Index	0,25	0,32	0,36	0,35	0,36	0,35	0,37	0,42
Comprehensive concentration index (CCI)	0,70	0,76	0,79	0,77	0,78	0,77	0,76	0,80
Entropy index	5,72%	4,78%	4,32%	4,53%	4,48%	4,61%	4,58%	3,99%
Gini coefficient	0,67	0,72	0,75	0,74	0,74	0,74	0,75	0,77

APPENDIX F

Table F.1. Lerner index

Region	2007	2008	2009	2010	2011	2012	2013	2014
AR Crimea	0,98	0,98	0,98	0,98	0,98	0,98	0,98	0,97
Vinnitsa region	0,97	0,96	0,95	0,95	0,95	0,95	0,95	0,96
Volyn region	0,98	0,98	0,97	0,97	0,97	0,97	0,97	0,96
Dnipropetrovsk region	0,97	0,97	0,96	0,97	0,96	0,97	0,97	0,96
Donetsk region	0,98	0,97	0,96	0,97	0,97	0,97	0,97	0,94
Zhytomyr region	0,98	0,98	0,96	0,97	0,96	0,97	0,95	0,97
Zakarpattia region	0,96	0,96	0,95	0,95	0,95	0,94	0,95	0,94
Zaporozhye region	0,97	0,97	0,95	0,96	0,97	0,97	0,96	0,96
Ivano-Frankivsk region	0,98	0,97	0,97	0,97	0,98	0,98	0,98	0,98
Kyiv and Kyiv region	0,97	0,97	0,96	0,96	0,97	0,97	0,97	0,97
Kirovograd region	0,97	0,97	0,97	0,96	0,96	0,96	0,95	0,94
Lugansk region	0,97	0,96	0,96	0,97	0,96	0,97	0,97	0,95
Lviv region	0,97	0,97	0,97	0,98	0,98	0,98	0,98	0,98
Mykolaiv region	0,94	0,94	0,92	0,92	0,91	0,93	0,93	0,94
Odessa region	0,97	0,95	0,95	0,95	0,95	0,95	0,95	0,95
Poltava region	0,98	0,96	0,95	0,95	0,95	0,95	0,96	0,96
Rivne region	0,98	0,96	0,96	0,97	0,98	0,98	0,96	0,95
Sevastopol	0,98	0,97	0,97	0,97	0,98	0,98	0,98	0,99
Sumy region	0,95	0,95	0,94	0,95	0,94	0,94	0,95	0,94
Ternopil region	0,98	0,98	0,97	0,97	0,98	0,97	0,98	0,98
Kharkiv region	0,97	0,97	0,97	0,95	0,95	0,96	0,95	0,96
Kherson region	0,97	0,97	0,97	0,97	0,98	0,98	0,98	0,97
Khmelnytsky region	0,98	0,97	0,96	0,96	0,97	0,95	0,96	0,97
Cherkasy region	0,96	0,96	0,94	0,93	0,93	0,94	0,93	0,94
Chernivtsi region	0,98	0,98	0,97	0,98	0,97	0,97	0,97	0,97
Chernihiv region	0,97	0,97	0,97	0,96	0,95	0,96	0,96	0,95
Overall	**0,94**	**0,92**	**0,90**	**0,90**	**0,91**	**0,92**	**0,91**	**0,91**

APPENDIX G

Lorenz curve

Figure G.1. Number of reports provided to the ACU

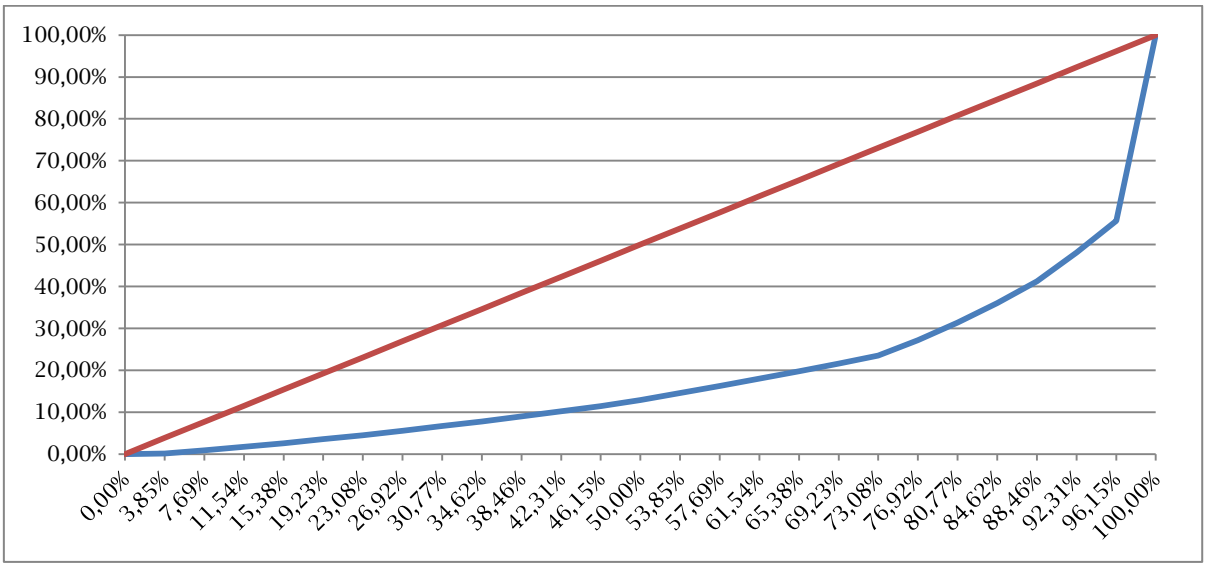


Figure G.2. Number of orders

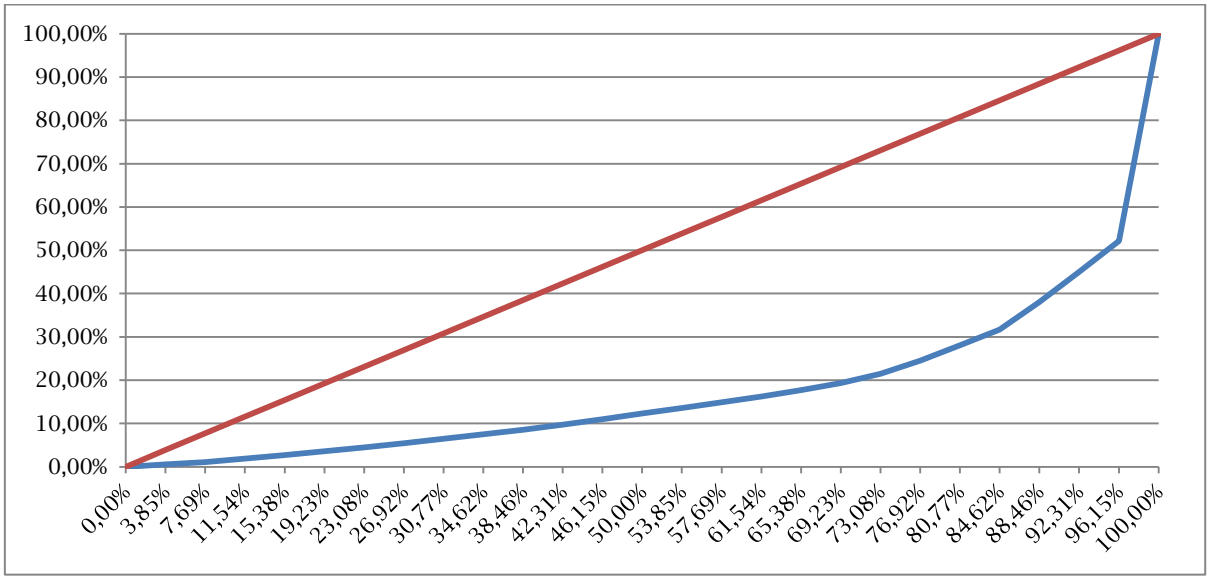


Figure G.3. Actual size of the provided services