

ASSESSMENT OF FACTORS INFLUENCING EXTERNAL AUDIT FEE IN
LITHUANIAN AUDIT MARKET

A Thesis

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Abstract

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The aim of the thesis is to determine factors that impact audit fee in Lithuanian audit market. In order to achieve this aim, firstly audit market analysis was performed for Lithuania and key global trends reviewed. Thereafter, factors that could affect audit price and models for audit fee estimation were analyzed. Afterwards, audit fee model for full sample and separately for large and small clients were estimated. Results of this paper define that there is a significant difference in factors influencing audit fee among large and small clients. There are two factors common for both samples. Firstly, Big 4 companies were reported to receive significantly larger audit fees than other audit companies. Secondly, for both samples total sales in logarithm form has a positive relationship with dependent variable. Number of subsidiaries, ROE, ratio of accounts receivables to total assets and accounting year indicators were reported as significant only for large company sample. While regulated industry and time trend variables – only for small ones. Indicators of loss, auditor change, client office location and total assets were not important in explaining audit fee in either of the models. Finally, thesis is concluded with overall results evaluation and key findings.

Keywords: Lithuanian audit market, audit fee, Big four, client size

Santrauka

Jakučionytė, R., Veiksnių darančių įtaką išorinio audito kainai, vertinimas Lietuvos audito rinkoje. [Rankraštis]: bakalauro baigiamasis darbas: finansai. Vilnius, ISM Vadybos ir ekonomikos universitetas, 2016.

Šio bakalaurinio darbo tikslas – įvertinti veiksnius, kurie daro įtaką audito kainai Lietuvos audito rinkoje. Pirmiausiai, tam, kad tikslas būtų pasiektas, Lietuvos audito rinka buvo išanalizuota bei pagrindinės globalios tendencijos identifikuotos. Toliau buvo įvertinti veiksniai, kurie gali paveikti audito kainą, bei aptarti modeliai, kuriuos galima naudoti audito kainos analizei. Tuomet, buvo sukurti modeliai visiems atrinktiems duomenims bei atskiri modeliai dideliems bei mažiems audito klientams. Rezultatai atskleidė, kad yra reikšmingas skirtumas tarp audito kainos nustatymo mažoms bei didelėms įmonėms. Du veiksniai buvo bendri abiems grupėms. Pirma, nustatyta, jog didysis ketvertas gauna žymiai daugiau negu kitos audito įmonės. Antra, natūraliu logaritmu matuojamos pajamos teigiamai veikia priklausomą kintamąjį. Dukterinės įmonės, nuosavo kapitalo grąžą, gautinų sumų santykis su turtu ir finansiniai metai – visi šie veiksniai yra svarbūs didelių įmonių modelyje. O mažoms įmonėms – reguliuojama pramonė ir laiko tendencija. Veiksniai: nuostolis, auditoriaus pakeitimas, kliento ofiso vieta bei turtas iš viso – nė viename iš modelių nebuvo reikšmingi audito kainos atžvilgiu. Galiausiai, bakalaurinis darbas yra užbaigiamas rezultatų įvertinimu ir pagrindinėmis išvadomis.

Keywords: Lietuvos audito rinka, audito kaina, Didysis ketvertas, kliento dydis

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List of Abbreviations

AB - public limited liability companies

AR – accounts receivable

BIG 4 – KPMG, EY, PWC, Deloitte

BIG 8 - Arthur Andersen, Coopers & Lybrand, Ernst & Whinney, Deloitte Haskins & Sells, Peat Marwick Mitchell, Price Waterhouse, Touche Ross and Arthur Young

ISA – International Standards on Auditing

LCA – Lithuanian Chamber of Auditors

PIE – public interest entity

POLS – pooled ordinary least squares model

PY – previous year

UAB - private limited liability companies

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Introduction

Relevance of this paper. Audit services have been always widely discussed and analyzed. Various accounting scandals: Enron (2001), WorldCom (2002) and Lehman Brothers (2010) - as well as Global Financial Crisis (2007-2008) had broken consumer's trust on businesses. This increased the importance of external audit, as it provides an independent view over fairness of financial statements. Likewise, the regulations on audit became stricter, focusing more on independence requirements, audit quality and skepticism. What is more, several audit company mergers caused a decrease in the competition in audit sector. Currently it is dominated by BIG 4 – KPMG, EY, PWC and Deloitte (Velte and Stiglbauer, 2012; Gerakos and Syverson, 2015). They audit largest companies, generate most of the revenues, spend most hours on a single audit and provide highest assurance. Therefore, most businesses pay a fortune for BIG 4 audit services.

The current audit market situation raises a concern whether the audit fees do not break the independence requirements and whether businesses pay a fair price. Audit fee is determined prior to the engagement and can be negotiated between both parties. Audit companies base the fee on the actual hours to be worked and multiply it by the hourly rate (Niemi, 2005). However, there is no universally accepted model to assess the time and audit companies do not reveal their methodology. Furthermore, businesses do not have thorough understanding of how much time audit takes and in this case it is hard for them to negotiate the price. Since actual worked hours are not published by audit companies, instead of that, various studies analyzed client attributes, like size and complexity, because the duration of audit closely depends on the magnitude of the numbers in the financial statements, while the hourly fee depends on the auditor attributes. There were no such researches performed in Lithuanian market.

Problem. Companies based in Lithuania do not know what are the key factors affecting the price and how strong the impact is, consequently, they cannot evaluate whether they are paying a proper fee. Therefore, the problem is: what are the factors influencing external audit fee in Lithuania?

The aim of the thesis - to assess the factors influencing external audit fee in Lithuanian audit market.

Objectives:

1. Examine Lithuanian audit sector and review key global audit trends
2. Perform analysis of factors affecting audit fee based on prior studies
3. Compare and analyze methods for audit fee assessment
4. Perform assessment of factors influencing audit fee in Lithuania
5. Give overall conclusions and provide recommendations of fair price evaluation.

Research methods. Lithuanian audit market is examined through comparative and statistical data analysis. For audit fee factors and models descriptive and comparative analysis is used. Finally, linear regression analysis for panel data: pooled ordinary least squares, fixed effects and random effects models, are applied to assess audit fee. Models are created with Gretl program.

Practical value of this paper. Results of the empirical study could be valuable to companies in Lithuania that use audit services. It would help to evaluate audit fee charged by the auditors. Furthermore, new audit companies and auditors could explore how the audit fee is determined in Lithuania and use the factors for their own pricing methodology. Finally, various bodies that supervise audit market could use information for further analysis.

1. Lithuanian Audit Market Analysis

Before assessing factors influencing audit fee, it is important to analyze environment which impacts the determination of the price. First of all, Lithuanian audit sector will be examined. Then, key trends in global audit industry will be covered.

Before starting, we need to clarify what audit is and why it is essential. The importance of audit developed because most of the companies are managed by hired personnel not by their owners (shareholders). As audit gives an independent opinion over company's management, operations or financial condition, it helps for shareholders to judge how their assets are actually utilized. By looking who performs the audit procedures, audit can be classified to internal and external. Internal audit is when company's employees examine internal controls, operations and governance, and afterwards they give their recommendations to management how it can be improved. While external audit is when independent auditor investigates the financial statements and confirms whether it fairly represents financial state of the company. Therefore, if financial statements are audited, society can have a higher reliance on that information. The focus of this thesis is external (financial statements) audit and the price for this service.

1.1. Lithuanian Audit Sector

Accounting and auditing is highly supervised by political and legal parties in the whole world. For the sake of financial information readers' higher trust, in Lithuania international and national regulations prevail. First of all, according to EU Directive 2014/56/EU, audit has to be performed in compliance with International Standards on Auditing (ISA), consisting of 36 standards, and with International Standards on Quality Control (ISQC 1). Moreover, Code of Ethics for Professional Accountants and EU directives has to be followed. In addition, for Lithuania, the Law of the Republic of Lithuania on Audit applies. ISA defines that if national law is stricter, audit has to be performed in compliance

with the rigid one. Finally, Authority of Audit and Accounting (AAA) and Lithuanian Chamber of Auditors (LCA) supervise audit work and have to ensure audit quality.

Audit in Lithuania does not have to be performed for all the entities. Republic of Lithuania Law on Financial Accountability of Entities (2014) defines that audit is mandatory for:

- State and municipal enterprises, private limited liability companies (UAB) whose shareholder is state or municipality, cooperatives, general partnerships, limited partnerships where members are UABs or public limited liability companies (AB);
- Public interest entities (PIE): AB, commercial banks, central credit unions, brokerage companies, insurance and reinsurance enterprises, pension funds, Vilnius Stock Exchange, Central Securities Depository of Lithuania and others;
- UABs and Agricultural companies, where all members are either public or private companies, which exceed two criteria from three: 1. net turnover for financial year – 3.500.000 EUR, 2. total assets amount to 1.800.000 EUR, 3. average number of employees during financial year – 50.

All other companies legally are not required their financial statements to be audited. Nevertheless, they still have an option to choose and if they see any additional value, audit can be performed.

1.1.1. Audit companies and number of audits in Lithuania. The regulations over audit in Lithuania have been covered, now this part will focus on the analysis of audit companies, auditors and number of audits performed. First of all, we will begin with audit companies. In Lithuania all BIG 4 audit companies are present: KPMG, PWC, EY and Deloitte. LCA Audit Market Review 2014 stated that in total there were 173 audit companies (Figure 1). The number is constantly decreasing since 2003, except 2011, when there was an increase by 1 from previous year (PY). In 2014 the sharpest decrease of 5% occurred.

Moreover, 48% of audit companies (in 2014) in Lithuania had only one certified auditor, while 33% had 2 (LCA 2014). This implies that most of the companies are relatively small. Looking further, the number of auditors is declining since 2009 and as well last year the largest drop occurred (by 3%). LCA states that the main reason auditors want to suspend their licenses is that they have stopped performing audits, consequently there is no need to continue mandatory trainings and pay LCA member fee. All in all, it can be presumed that since 2009 the decrease of audit companies is partially caused by smaller number of auditors.

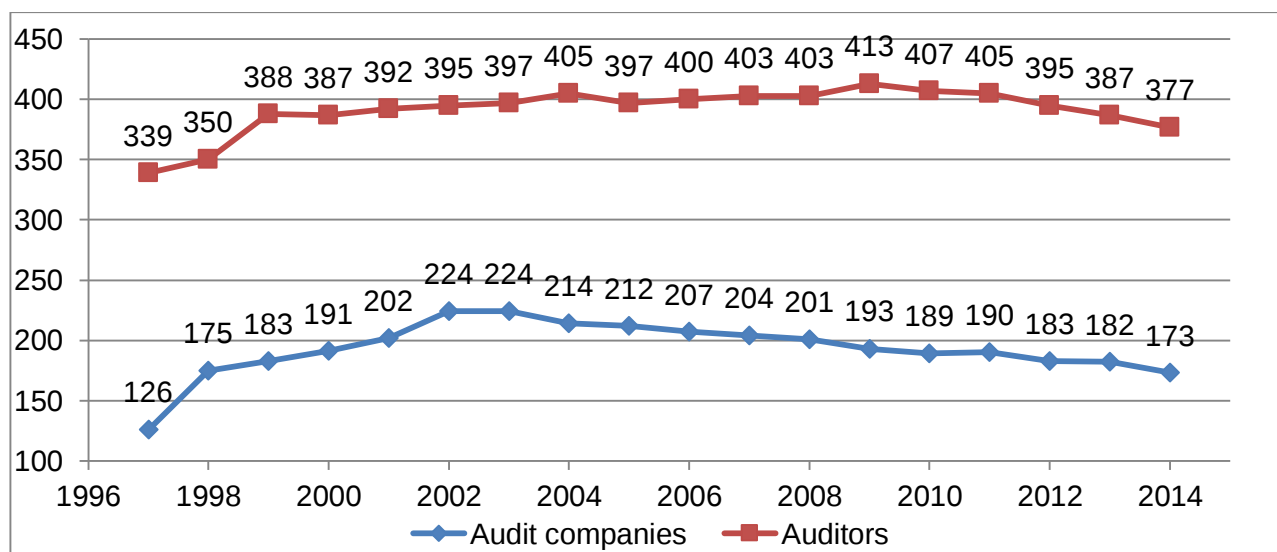


Figure 1. Number of audit companies and auditors in 1996-2014

Source: LCA Audit Market Reviews 2010-2014

Secondly, in regards to the number of performed audits, Figure 2 presents that there is an overall increasing trend. In 2014, total number grew by 9% from PY, reaching 3926 audits. In addition, from 2010 statutory audits are constantly growing and makes 72% from total, while non-statutory fluctuated over 2010-2014, though ascended mostly during the last year. It means that more and more companies tend to perform external audit even if it is not mandatory for them. What is more, in 2013 the main force for increased performed audits was new registered companies, while in 2014, as mentioned, the growth of non-statutory audits. What does it mean for audit companies? The audit fee for non-statutory audits can be

smaller, as by law companies are not required to perform an audit, therefore, they can choose the scope.

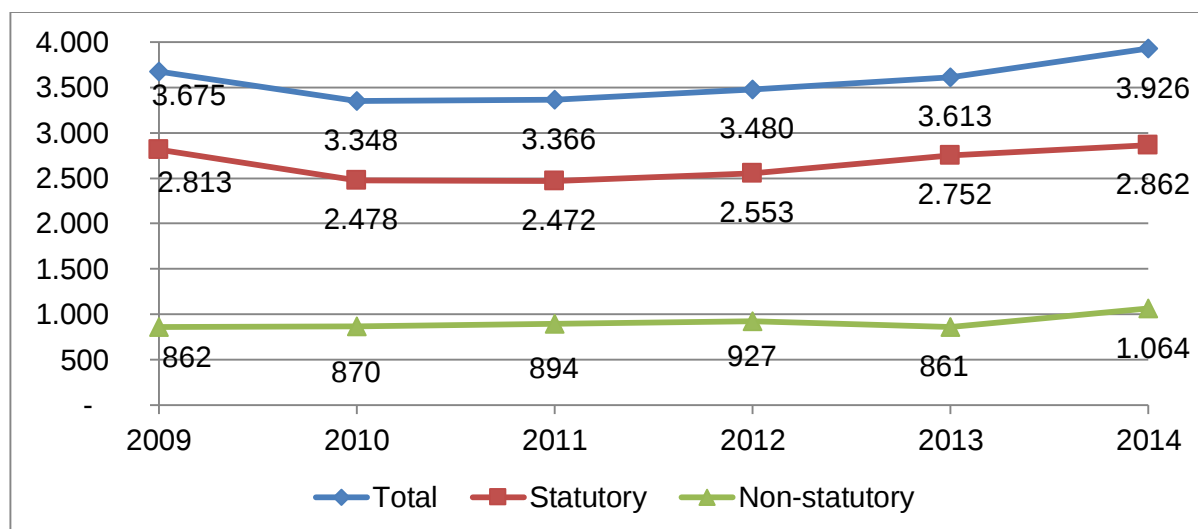


Figure 2. Number of audits performed (total, statutory and non-statutory) in 2009-2014

Source: LCA Audit Market Reviews 2010-2014

Going further, Figure 3 presents how the number of audits is distributed among different audit companies. According LCA audit companies are grouped like this: 1. BIG 4; 2. audit companies with 1 certified auditor; 3. audit companies with 2 certified auditors; 4. other audit companies (with more than 2 certified auditors, excluding BIG 4). It represents that since 2010 the number of audits performed by BIG 4 is constantly increasing, while for the smallest companies (1 auditor) the number decreased almost by half since 2009. In addition, it is important to note that according to LCA 2014 data BIG 4 audited 88% of all PIE companies, while they still have least state and municipal enterprises. Likewise, it would be interesting to find out how audit companies are divided among industries and if they have any specialization and whether it makes an impact on the audit fee. Also to verify the rotation of auditors, as it is defined by national audit law that they have to be changed after 7 years, while in PIEs – after 5 years.

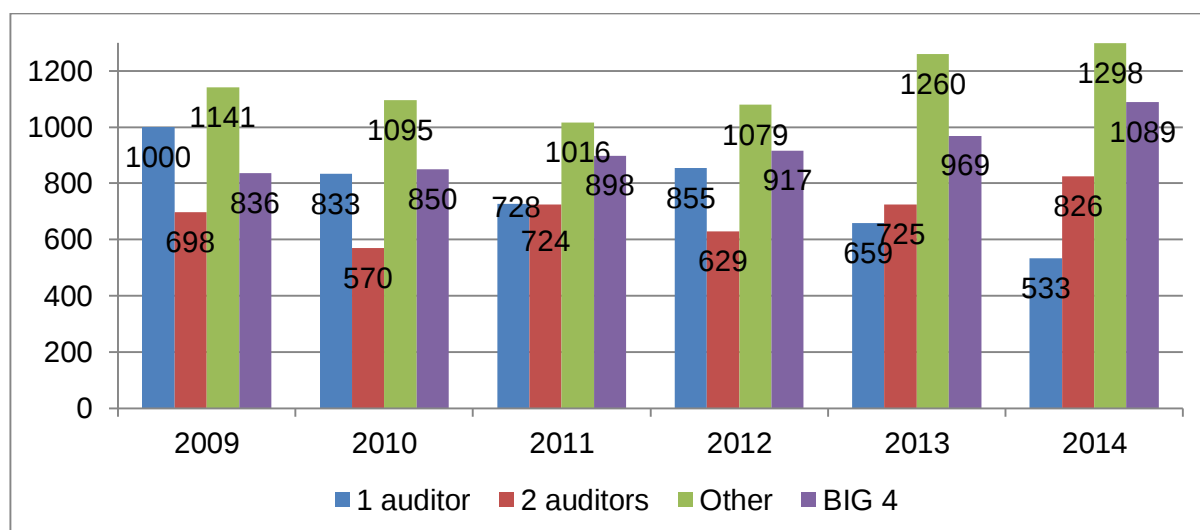


Figure 3. Audits performed by BIG 4 and other audit companies (grouped by number of certified auditors) in 2009-2014

Source: LCA Audit Market Reviews 2010-2014

Now let's refer to the number of audits done according the type of customer. As already mentioned before, in 2014 there was a sharp jump for non-statutory audits. In addition, Table 1 presents that audits for UABs reached 2164, the highest number over 5 years. Also it is visible that audits for UABs and for other companies (non-statutory) compose most of the portion of total audits, 55% and 27% respectively.

Type of the company	2009	2010	2011	2012	2013	2014
PIE	159	132	171	161	178	162
Other AB	242	237	219	211	201	208
State and municipal enterprises	202	203	181	156	155	146
UAB statutory audit	2.111	1.737	1.789	1.922	1.977	2.164
Other companies (statutory audit)	99	126	112	128	241	182
Other companies (Non-statutory)	862	913	894	902	861	1.064

Table 1. Number of audits performed by the type of auditee company for period of 2009-2014

Source: LCA Audit Market Reviews 2010-2014

1.1.2. Audit sector revenue and fees in Lithuania. In this section audit market revenue and fees will be analyzed. First of all, in compliance with Audit Law, audit

companies can provide services other than audit. However it is important to note that providing those services cannot break Code of Ethics for Professional Accountants. Therefore, most of audit companies provide these services: audit, accounting, consulting (advisory), other assurance services and other. As it can be seen in Figure 4, since 2011 the largest part of revenue is received from advisory services and it is still increasing, while revenues from audit had dropped in 2011 and thereafter remained almost unchanged, except 2014, when there was a small an increase of 3,59%. Therefore, it is evident that audit companies are now providing more and more other services than audit. Consequently, in order not to violate independence requirements, audit companies have to choose between audit and other services for each specific company because if they provide other services, they cannot perform an audit. Thus, what is the underlying reason for this switch? Is it because the decreasing number of auditors or is it because of the higher gross margin within advisory services?

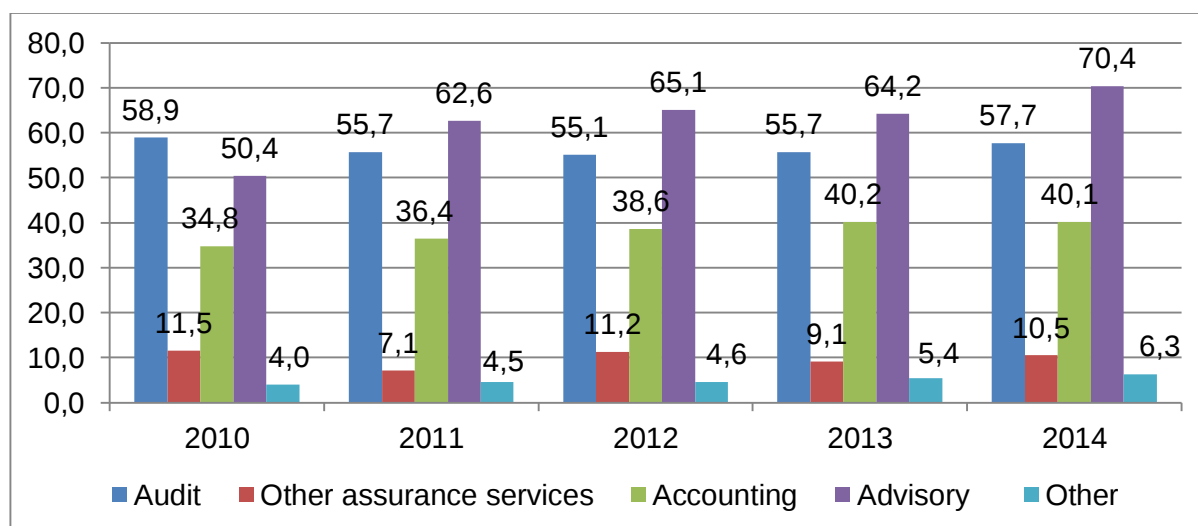


Figure 4. Revenues of audit companies distributed by type of the service for period of 2010-2014 (in 1M LTL).

Source: LCA Audit Market Reviews 2010-2014

Looking into more detail revenue distribution, Figure 5 illustrates revenues in 2014 by audit services and by audit company type. It is evident that the largest portion of revenue is earned by BIG 4 and mostly from advisory department. In Lithuania, from BIG 4, EY

generated the most of revenue from consulting (42M LTL) in 2014. Moreover, for BIG 4 revenues in 2014 comparing to PY, grew for audit by 3%, for accounting - 2,71% and mostly for advisory - 10,71%. While smaller audit companies earn revenue mostly from accounting and audit services. Additionally, comparing revenue with PY, all revenue streams for 1 auditor companies decreased by 17% (mainly in accounting), for 2 auditor – increased by 13% (mainly in accounting and advisory). What is more, LCA review 2014 presents that for BIG 4 revenues from audit has constantly decreased since 2009, except last year (from 44M to 33M LTL). While for all audit companies, except BIG 4, it started to decline since 2008, however from 2011 it is slightly growing. Therefore, as number of audits performed by BIG 4 is increasing (see Figure 3), it means that the revenue from single audit has declined, just the question remains is this either because of different audited companies or due to general decrease in audit fee.

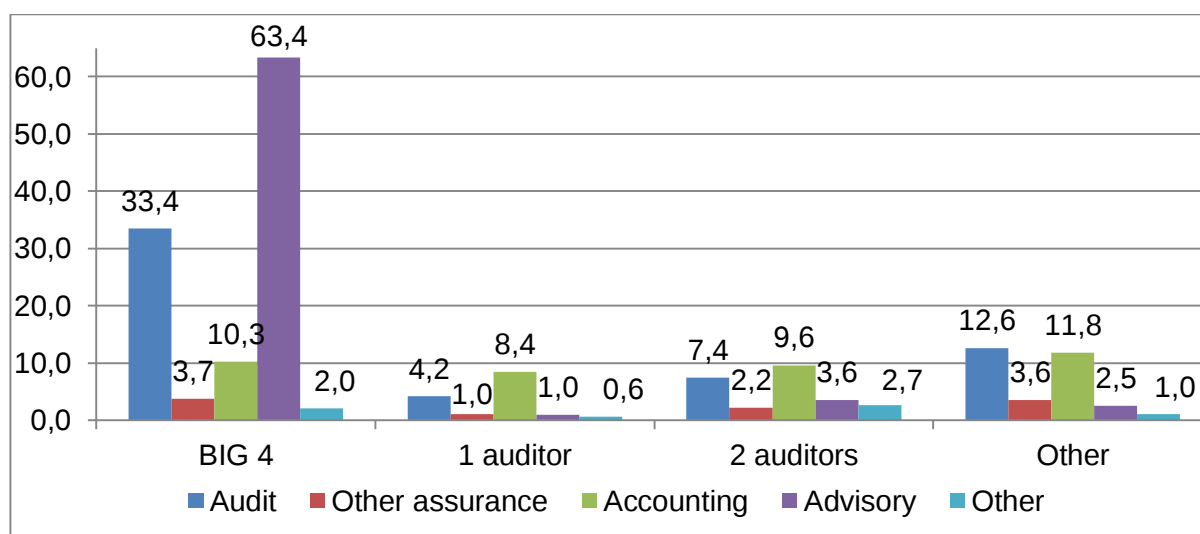


Figure 5. Revenues of audit companies distributed by service type and audit company type in 2014 (in 1M LTL).

Source: LCA Audit Market Reviews 2010-2014

Since we already examined audit sector revenue, now the time spent on a single audit will be analyzed. Figure 6 shows that there is an overall trend that number of hours for a single audit is decreasing (from 611 in 2010 to 518 in 2014). The decline is mostly visible

among BIG 4, while for the rest it was only slightly smaller. Does the revenue decline relate to the drop of time spent on a single audit?

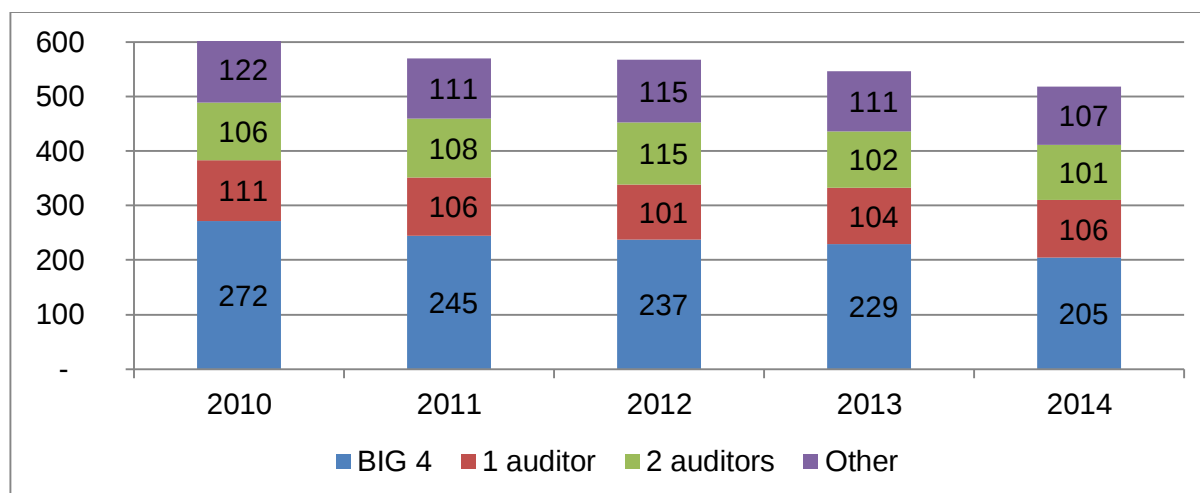


Figure 6. Average hours spent on single audit distributed by audit company type for period of 2010-2014.

Source: LCA Audit Market Reviews 2010-2014

For data of average fee per hour spent please refer to Figure 7. It represents that the prices of BIG 4 had dropped significantly since 2010, only previous year it slightly recovered. For small companies having 1 and 2 auditors average fee per hour increased. Actually, for 2 auditor companies it jumped by 22,5% in the last year comparing with PY. It raises a question what are the reasons for the changes. What is hourly fee dependent on? Is this subject to the type of companies audited? Does BIG 4 charge more than others because of their specialization or because of their reputation?

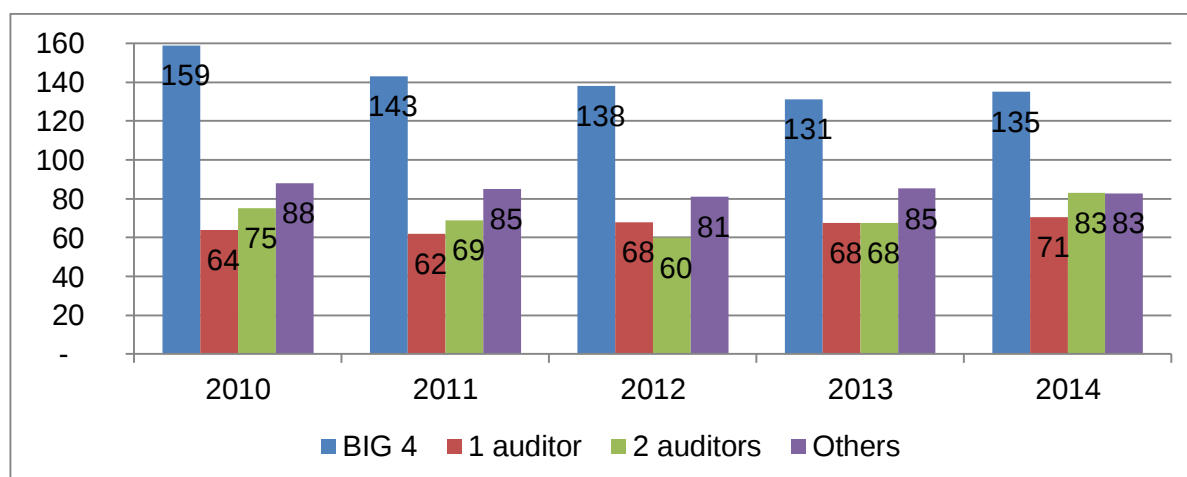


Figure 7. Average fee per hour spent (in LTL) distributed by audit company type for the period of 2010-2014.

Source: LCA Audit Market Reviews 2010-2014

1.2. Global Audit Industry

Not only national audit environment makes an impact on prices, global trends are important as well. Therefore, this section presents a brief overview of what is happening in audit market around the world.

One of the most important changes in 2014 is that EU decided to reform audit legislation which is expected to be adopted from June 2016. The main reform elements are: mandatory rotation of audit company every 10 years (for now there is a mandatory rotation for auditors but not for the companies); more informative audit report; list of non-audit services that cannot be performed and fee limitations for non-audit services (European Commission Memo, 2014). This would definitely change the audit environment. Audit companies would be more tightly restricted on the services they can provide that could mean less revenue from other services and higher prices for audit services or vice versa focus on non-audit services and less on audit. In the latter case, it would be hard to differentiate whether those firms can be still named as audit companies. What is more, with mandatory rotation EU wants to encourage activity of smaller audit companies because it is broadly discussed that BIG 4 acts as oligopoly in audit market. They are the market leaders and they dictate the conditions for clients and for other audit companies. More frequent rotation also would confirm that auditors are for sure independent. However, for new auditors it takes more time to familiarize with the company environment and activities, therefore, for the first audit prices could be higher. In addition, comprehensive reports would make auditors to work longer as well. Consequently it would costs more for the customers. Therefore, the reforms are likely to make an impact on audit fees. Nonetheless it is still uncertain how exactly it would affect audit fees and audit quality.

What is more, audit market is very dependent on business performance and trends. In order to perform valuable and insightful audit, employees must have a deep understanding of

client's operations and environment. According to KPMG Global Audit Committee Survey 2015, the economic and political uncertainty is still present. How does it affect audit market? Firstly, it raises fraud risk as companies earn less but in order to show the strong performance numbers can be forged. In this case, audit companies have to be more cautious and obtain sufficient audit evidence, meaning more work. Moreover, it also can have an effect on audit prices. As companies have less money, they would choose cheaper auditors. Consequently, audit companies probably would reduce their prices. In addition, it can have a negative effect on audit quality. What is more, currently firms rely more on IT systems which raises a risk of cybercrime. For auditors to adequately examine the internal controls to minimize this risk they need to have a sufficient knowledge. These additional services could increase the hours spent on audit and therefore increase the audit costs.

Another global trend is that stakeholders are requesting more information about what was learnt during the audit (Forbes Insights, 2014). It was already mentioned that EU with the reform wants to have more informative reports. Now auditor's report is usually only 1 page stating whether client's books are correct or not. Management usually receives a full letter with auditor's recommendations. However, it is not available for stakeholders. Comprehensive reports would be more useful for society. However, it raises a doubt what can be published for everyone and what information is relevant only for managers. Naturally, for auditors it would cost more time.

1.3. Problem Formulation

Audit fee is usually determined before signing the contract. According to Niemi (2005), fee is determined by estimating hours of audit work and multiplying by the hourly rate. Therefore, before the actual work starts, engagement team has to evaluate how much audit evidence will be sufficient to obtain and how much resources it will use or use any other method to assess the price. Neither the client wants to pay too much for the audit, nor

does the audit company want to work wastefully. Not only there is no universally accepted model for calculating the fee but also auditing companies do not reveal the process of estimating it. Accordingly, an open question remains about the factors associated with audit price. Therefore, it is hard for businesses to evaluate whether they pay a fair price.

The first section of thesis indicated several important points:

1. BIG 4 charges 1.6 times more for one hour of work than other audit companies. Therefore, by having even smaller number of audits than other audit companies, they still earn 3 times larger revenue. It raises a doubt if audit fee premium is related to higher reputation, industry specialized auditors or is it because of the more complex client's financial statements.

2. 88% of all PIEs in 2014 were audited by BIG 4 companies. This high percentage stayed throughout the years. Problem of rotation emerges here: whether audit companies follow the law, how long on average companies stay with the same auditor and is there any effect on the price related to audit tenure.

3. There are no universally accepted audit fee models and each company estimate prices differently. Therefore, it is hard for buyers of audit services to evaluate charged fee. What is more, auditors also do not know what price other audit companies are offering and how they determine it.

All in all, it is evident from the situation analysis that there are significant differences in the audit prices, especially between BIG 4 and the rest of audit companies. Therefore, it is an open question how the audit fee is determined and what it depends on.

2. Theoretical Framework for Audit Fee Assessment

The second part of the thesis is divided into two sections. At first, factors affecting audit fee will be analyzed. Then, in the second part, methods for audit fee assessment will be compared and evaluated.

2.1. Theoretical Framework for Audit Fee Factors

Based on prior researches, factors can be classified in to two categories: client and auditor features. Mostly researched client attributes are size, complexity, risk, profitability and season effect. Auditor features include size, reputation, rotation and industry specialization. Therefore in the following part each attribute will be defined, methods to assess the factors will be discussed and evaluated, finally, findings of prior researches will be reviewed.

There is only one research paper related to audit market in Lithuanian. Staliūnienė and Stungurienė (2009) used a regression model to determine audit fee. Authors tested how fee is related with the hours worked by employees that were grouped into three categories: experienced group, inexperienced group and specialists. The time of experienced group was eliminated due to high correlation to total time. However, the linear relationship between audit fee and actual hours worked was not significant due to low R^2 (0,07). Therefore, in addition audit complexity variables were added (dummy variables for complex audit and very complex audit). For the second regression the R^2 was 0,73 and it was concluded that total audit time, actual time spent by inexperienced employees, actual time spent by specialists and the complexity of the audit are significant factors for audit fee. It is important to note that authors took the data only from one certain audit company. Therefore, theoretical analysis is performed based only on prior studies performed in other countries.

2.1.1. Client features.

All the client attributes are summarized in Table 2 below. Ways how those attributes were measured are defined and in which specific study they were examined.

Attribute	Measure	Studies
Auditee size	Total Assets	Simunic (1980); Palmrose (1986); Ireland and Lennox (2002); Carson, Fargher and Simon (2004); Simon (2005); Besacier and Schatt (2006); Hassan and Naser (2013); VulHaq and Leghari (2015); Khan, Muttakin and Siddiqui (2015)
	Total Turnover	Chan, Ezzamel and GwiUiam (1993); Ezammel, Gwilliam and Holland (1996; 2002); Zhang and Myrteza (1996), Ireland et. al (2002); Ji-Hong (2005)
Complexity	Number of subsidiaries	Simunic (1980); Chan et. al. (1993); Ezammel et. al. (1996; 2002); Ireland et. al. (2002); Carson et. al. (2004); Simon (2005); Hay, Knechel and Wong (2006) Hassan et. al. (2013), Khan et. al. (2015)
	Number of reports	Palmrose (1986); Schellemen (2001)
Audit Risk	Industry	Simunic (1980); Chan et. al. (1993); Ezammel et. al. (1996; 2002); Zhang et. al. (1996); Besacier et. al. (2006)
	Ratio of inventory or accounts receivable to total assets	Simunic (1980); Zhang et. al. (1996); Besacier et. al. (2006); VulHaq et. al. (2015)
Profitability	ROA or ROE	Simunic (1980); Chan et. al. (1993); Ezammel et. al. (1996; 2002); Besacier et. al. (2006); VulHaq et. al. (2015)
	Profit margin	Hassan et. al. (2013), Schellemen (2001)
	Whether company experienced loss	Simunic (1980); Zhang et. al. (1996); VulHaq et. al. (2015); Ireland et. al. (2002); Simon (2005); Carson et. al. (2004)
Other	The end of financial year	Ireland et. al. (2002); Carson et. al. (2004); Besacier et. al. (2006); VulHaq et. al. (2015), Khan et. al. (2015)
	Client office location	Palmrose (1986); Chan et. al. (1993); Ezammel et. al. (1996; 2002); Ireland et. al. (2002)

Table 2. Summary of client attributes influencing audit fee

Size. Since the first publication on audit pricing of Simunic (1980), most of the studies include client size as the main factor impacting audit fee. Theoretically, in a bigger company there are more financial transactions and larger balances, therefore, auditors spend more time to obtain sufficient evidence to support the auditor's opinion. Consequently, auditors charge higher fees for their work. What is more, most of the studies use logarithm form for audit fee and auditee size due to highly skewed data (Carson et. al. 2004). On the other hand, it is argued that the relationship between audit fee and the size is positive but not a linear function (Gerrard, Houghton, Woodliiff, 1994). One of the reasons behind is that larger companies have better internal controls and auditors can rely more on them, in this case less detail tests are required (Ahmed and Goyal, 2005). Moreover, audit sampling also enables to perform

relatively less testing because when the size of the population increase, the sample grows at a decreasing pace (Low, Tan and Koh, 1990).

Various researchers choose different measures for client's size. Some of them take total assets, others – total revenue (Table 2). There are also cases when both total assets and total revenue are used. It is argued that total assets is a better measure because in most cases when the company has a lawsuit due to fraudulent accounting they relate to assets valuation. While others take sales as most auditors base the level of materiality on items from profit and loss statement. All of the researchers presented in the Table 2 found that there is a significant positive relationship between client's size and audit fee.

Complexity. Another variable that can explain audit fee is complexity of the business. In theory it should result in higher audit fees. There are several methods to assess complexity. They can be classified into two groups: legal and reporting complexity. Firstly, legal is measured by number of subsidiaries or countries that auditee operates in. With subsidiaries, company is required to disclose more information, therefore, faces more legal requirements. Secondly, reporting is assessed by number of reports to be issued. Naturally, if there are more reports, then auditors have more work. However, this variable is rarely investigated. Even though the definitions for complexity differ, the prior empirical studies show positive relationship with audit fees (Table 2: 8 out of 9 studies found significant relationship). Additionally, it is argued that complexity closely relates to auditee size because the larger company, the more complex it is. Therefore, both increases audit fee as it requires better understanding or longer working hours.

Risk. In general, the more risky an auditee is, the auditor has to be compensated for taking that higher risk. Therefore, they charge larger fees. What are the ways to measure audit risk? Some researchers base the factor on client's industry (Chan et al. 1993; Besacier et al. 2006). Prior studies showed that audit fee differs for certain industries. Ezzamel et. al (2002)

in research found significant negative relationship between the regulated industries and audit fee. Regulated industries consisted of electricity, telecommunications and water companies. Therefore, it showed that auditors charge less if a company operates in a regulated industry. Another example is from study of Besacier et al. (2006), the empirical evidence presented that for high growth industries, as information technology sector, the fees are larger. Other examiners measure inherent risk by calculating ratios of accounts receivable to total assets or inventory to total assets. The rationale for taking ratios is that both, inventory and accounts receivable have higher risk of misstatements. Therefore, usually required procedures for audit testing are confirmations and observation. Moreover, to properly evaluate the balances of both components, the future events have to be considered. Consequently, larger amounts of inventory and accounts receivable would require more audit evidence which would cost more. Studies of Simunic (1980), Zhang et. Al (1996), Besacier et al (2006) and VulHaq et al (2015) used the measure and all of them found this variable significant.

Profitability. Profitability variable shows whether company is good at asset's management and whether it is under financial distress. For a profitable firm, auditors have to perform more detail testing to obtain sufficient evidence that revenues and expenses are fairly accounted. Consequently, auditors charge higher fees for more work. Conversely, if the company is performing at a loss, then auditors face a higher risk that company will fail and auditor will also incur a loss. Or that auditee will forge financial statements to look better for society which could later lead auditors to litigations. Various researchers choose different methods to measure profitability: 1. return on assets (ROA) or return on equity (ROE); 2 profit margin 2. dummy variable if a company had a profit or a loss in any of prior two – three years. Only 2 out of 5 studies showed significant relationship between ROA/ROE and audit fee. It was found that the higher the return, the smaller audit fee (Ezzamel et al., 1996). However, other study of VulHaq et al., (2015) found that ROA is positively correlated and

that higher profitability means auditors charge more. Therefore, the results are diverse. Profit margin was used in the studies of Shelleman (2001) and Hassan et. al. (2013), however, neither of them showed any effect on audit fee. When it comes to a loss factor, it is evidenced through empirical researches to be positively associated with audit price (5 out of 6 studies found a significant influence on fee).

Other. Most of the companies' financial year ends at the same time (December 31st). Therefore, it is expected that audit fees should be smaller for companies that have different fiscal year end because at that time auditors have more time available. In this case, it would seem that auditors encourage having different accounting year, however, it is not simple to change it. Thus, I would conclude that there might be some discounts but there should not be any strong effect. There are some prior studies that investigated this factor (Table 2). Most did not find any important effect. Only Ireland et. al. (2002) found a significant positive relationship that companies pay more if their fiscal year ends between December 1 and March 31. What is more, several prior studies include variable of client office location. The rationale is that if client office is located in other city than audit company, then the audit services would cost more. In this case auditors experience additional costs: travelling, accommodation and daily allowance. This variable was found to be significant in all analyzed prior studies that included it in the model. However, the issue can occur here as in some cases those additional costs can be charged separately (not included in the audit fee).

2.1.2. Auditor features. All the audit related characteristics are summarized in Table 3 below. Methods to measure it are presented and which researchers used it in their studies.

Attribute	Measure	Studies
Auditor size	Big4/6/8	Simunic (1980); Palmrose (1986); Chan et. al. (1993); Ezammel et. al. (1996; 2002); Zhang et. al. (1996); Carson et. al. (2004); Simon (2005); VulHaq et. al. (2015), Khan et. al. (2015)
	International/National	Hassan et. al. (2013)
Tenure	Number of years	Schellemen (2001), Patel and Prasad (2013), Elliot, Ghosh and Wagner (2008)
	Change of the auditor	Schellemen (2001), Kasai (2009)
Industry specialist	Self-identification in a website	Palmrose (1986)
	Market leaders	Khan et. al (2015), Basioudis and Francis (2005), Mazza, Azzali and Reichelt (2015)

Table 3. Summary of auditor attributes influencing audit fee

Size. One of the most discussed and investigated factor is audit company size. It is questioned whether there is a premium charged from larger audit firms or conversely discount applied. It is mostly expected that fee paid to BIG 4 would be larger than for others. The reason behind is that big, international companies have more resources and better trainings for employees and provide higher quality audit. Also there are globally accepted methodologies that are applied for audits. What is more, BIG 4 also has a better reputation and investors can have higher reliance on the information audited by them. In addition, it is important to note that audit companies also choose their customers. International audit companies do not want to be associated with suspicious firms because it can harm their reputation and result in litigation. For audit companies reputation is a crucial fact because if once audit fails, then it takes time to gain people trust. Therefore, the size of the audit company can be associated with audit quality.

Some previous researches failed to find relationship between auditor's size and audit fee (Simon, 1995). However most of them reported that there is a fee premium charged by big international companies (Simunic, 1980; Chan et al., 1993; Carson et al., 2004; VulHaq et al., 2015). What is more, most of the studies measure audit size by a dummy variable, assigning 1 for BIG 4 and 0 for others. There are also examples when 1 is assigned for international audit companies (Hassan et al, 2013). All in all, the results of prior studies are

mixed and the question whether the premiums are associated with higher quality or with non-competitive market is not answered.

Audit firm tenure. There are several hypothesis tested in prior studies that are related to audit firm tenure. Firstly, it can be expected that audit fees would be smaller for a new client because audit companies would lower price in the open competitions to win the client or auditors can offer reduced fees due to higher efficiency. However the same case applies to previous auditors that could also give a discount in order to keep the client. Another expectation would be reversed as new auditors can charge higher fees because for the first year of the audit, full understanding of all business processes has to be obtained and more sufficient evidence has to be gathered. Also, it implies that independence requirements are not violated. It is expected that longer tenure brings better quality audits.

Tenure can be measured in two ways: 1. Change in an auditor (a dummy variable when 1 is assigned if auditors have changed). 2. Number of years audited by current auditor. In prior researches audit fee is mostly linked to audit quality. It is expected that longer tenure brings better quality audits because auditors have gained company specific knowledge. For example, Geiger and Raghunandan (2002) found that auditors that are early in the engagement tend to sign unconditional opinions before the bankruptcy. It means that it is harder to perform good quality audit in the first years because it takes time to fully understand client's business. What is more, researchers also found that longer tenure has a positive impact on audit quality. Myers, Myers and Omer (2003) obtained evidence that auditors with longer tenure are capable to constrain management decisions that are related to financial statement reporting. To be explicit, with constant auditors the level of accruals is lower which is associated with better conservatism and better audit quality. All in all, prior studies prove that with longer tenure, the quality of audit improves and it should increase the audit fee, while new auditors should charge less.

Industry specialization. Audit companies that are specialized in a certain business line ensure higher audit quality. First of all, it is due to the fact that specialists are more efficient at performing an audit, hence the costs decrease. In addition, specific knowledge helps to enhance audit quality. However, the theoretical expectation how it would affect the price is controversial. Higher audit quality would mean higher prices, though increased efficiency would lower the costs and prices could be smaller.

Industry specialization is differently measured by researchers. Some just observe how audit company presents itself in a website. Others define specialists that are market leaders by evaluating the percentage of audits performed in a certain industry to total audits in that industry. The last group sets a certain benchmark for a percentage and all auditors above that are defined as specialists. What is more, the market share is also measured in few different ways. Firstly, some calculate with auditee sales, others – with number of clients. It is also possible to use a portfolio approach, in which auditor's revenue in certain industry is divided by all auditor revenue. Furthermore, industry specialization can be measured on audit firm, individual auditor or on audit-partner level.

Craswell, A., T., Francis, J., R. and Taylor, S., L. (1995) argued that BIG 8 charges higher fees not only due to their reputation but also because of industry specialized auditors. They tested whether prices from specialist BIG 8 differs from non-specialist BIG 8 in Australia and found that specialist BIG 8 charges significantly higher fees. However, another research performed in Australia by Ferguson and Stokes (2002) did not find any evidence. Also, US studies demonstrated that the industry specialist factor was insignificant (Palmrose, 1986; Pearson and Trompeter, 1994). Therefore, the results are diverse. However, it can be explained by different audit markets in the countries and different methodology used by writers.

2.2. Theoretical Framework for Audit Fee Model

In prior studies audit fee was analyzed mostly using single linear equation models, as ordinary least squares (OLS), pooled OLS, fixed or random effects. There were only several researchers that used structural equation models (SEM). While simultaneous models are not used because it is clear that audit fee does not affect the explanatory variables and there is no dual causality. What is more, for linear equation to be unbiased, Gauss-Markov assumptions must hold. For summary of models used in prior research and specific studies refer to Table 4 below. In the following part single linear equation models and structural equations models will be briefly discussed, as well as, most common problems will be reviewed. Information about the models is summarized according to Studenmund (2006).

Model	Studies
OLS	Ireland et. al. (2002); Carson et. al. (2004), Besacier (2006); Hassan et. al. (2013),
Pooled OLS, fixed or random effects	Zhanga et. Al. (1996); VulHaq et.al. (2015)
SEM	Giroux and McLelland (2008), Suhayati (2012)

Table 4. Summary of empirical methods used for audit fee assessment

2.2.1. Single equation models. OLS is most commonly used model. In majority of studies, authors have cross-sectional data, therefore, if regression model satisfies assumptions, most accurate results can be received by OLS and it is generally preferable model. If obtained data is panel type (multiple companies and several years of audit fee), then three models have to be observed: POLS, fixed and random effects. At first, POLS is estimated and then other models are examined. Fixed effects model includes additional variable which is different across the sections but stays the same over time. This model removes individual entity effect (fixed over time) on dependent variable that the true result should be seen. While “[t]he fixed-effects model controls for all time-invariant differences between the individuals, so the estimated coefficients of the fixed-effects models cannot be biased because of omitted time-invariant characteristics” stated Kohler and Kreuter (2009,

p.245). While random effects model assumes that the differences between entities are random and uncorrelated with independent variables. It is used when unobserved differences between sections could have an influence on outcome variable.

2.2.2. Structural equation models (SEM). In addition to estimating the direct effect of factors, structural equation allows testing indirect effects and interrelationships. However, for most of the authors it is not an aim of the research, therefore, model is rarely used. Two studies were identified using SEM: Giroux & McLelland (2008), Suhayati (2012).

2.2.3. Problems. There are several most common problems in analyzing panel data with regression models. Firstly, heteroskedasticity – when error term does not have a constant variance. It can be caused if individual or time effects are ignored and can result in biased standard errors. Secondly, serial correlation when observations of error term are correlated with each other over different time periods. To control for both of the problems robust heteroskedasticity and autocorrelation consistent standard errors can be used.

2.3. Audit Fee Factors and Model Selection

First of all, for measurement of client size, both total assets and total sales were observed. All the analyzed studies reported that size of the auditee is a significant variable. Even though, most of studies include only one measurement, for assessment of this thesis, it will be tried to include in models only total assets, then only total sales and then both. The rationale is that both factors measure client size from different perspectives, therefore, it can bring diverse results.

Secondly, another client attribute – complexity – was measured with number of subsidiaries. As all of the methods to calculate characteristic (number of subsidiaries; number of reports) indicate the same conclusion, it was decided that it is easiest to obtain information about the subsidiaries. The list of client's subsidiaries can be found in financial report section

explanatory notes. Therefore, in each year financial report subsidiaries were calculated and added for testing.

Furthermore, to measure risk attribute ratio of accounts receivable to total assets was selected. Inventory to total assets was not used as there are various industries within the sample and it would be necessary only for manufacturing/producing companies. Therefore, it was considered that accounts receivable is a better way to measure audit risk and is applicable and important for all the industries. In addition, industry variable was added. It is a dummy variable where 1 is assigned for clients that operate in regulated industries. In this paper regulated industries are defined as oil, gas and electricity, tobacco, pharmacy and all companies managed by state and municipality.

For profitability factor two measures were selected: ROE and Loss. Firstly, it was decided to take ROE because it already incorporates ROA as well as financial leverage. Hence, ROE covers more information. Furthermore, loss element is a dummy variable where 1 is assigned for companies that experienced loss in current and in prior year. Accordingly, ROE covers only one respective year, while loss includes two years. Therefore, it is considered that both factors can bring different results.

Even though most of the studies did not find any significant relationship of audit fee with client's accounting year, I contemplated that in Lithuania most of the companies finish their year at the December 31st and it is apparent that auditors have most of the work in the beginning of the year. Therefore, the dummy variable for the year end (YE) was added, where 1 was given for those companies which had different accounting year than fiscal year.

Furthermore, office location of the auditee was added as a variable. This factor simply is measured by a dummy variable, where 1 is assigned for those companies that are located in different city than audit company (within 100 km). It was decided to include this variable because most of the audit companies are located in Vilnius while clients are spread all over

the country. In addition, this variable will show whether audit fee already incorporates the additional costs or they are charged separately.

Going further, for auditor size dummy variable BIG 4 was used, where all BIG 4 firms were marked as 1, others - 0. In Lithuania, except for BIG 4, there is only one international company (Grant Thornton Rimess) and its revenues are significantly smaller than BIG 4. Hence, it is more reasonable to use BIG 4 factor than international company measure. What is more, Lithuanian market analysis showed that most of the revenues are generated by BIG 4 companies, as well as they are most expensive for one hour of work, while other audit companies are about on the same level (refer to Figure 6 and Figure 8). Therefore, it is considered appropriate to differentiate audit companies to BIG 4 and the rest. What is more, in the model this factor will show whether there is BIG 4 premium.

Dummy variable for change of the auditor was selected to measure tenure. All the companies that changed audit company in the current year (in PY there was a different auditor) were assigned value of 1. It was expected that new auditors would charge less because it is probably the main reason why companies change auditors (they are cheaper).

Finally, at first it was thought to include variable of auditor specialization (dummy variable), where 1 would be assigned for specialists. However, the measurement ways (market share and portfolio approach) are not appropriate to use, considering the small sample. For self-proclaim method, all the websites of audit companies that are in the sample were reviewed. Though, all BIG 4 firms claim to be specialist, while from other 13 companies only 2 mentioned several industries. Therefore, this factor was not included in the model as it would be collinear to BIG 4 indicator.

When it comes to the model selection, data will be panel type and as the aim of the thesis is to evaluate the direct effect on audit fee, single linear equation models will be used. At first pooled OLS and then fixed or random effects model will be estimated.

3. Empirical Research for Audit Fee Factors in Lithuania

3.1. Workflow of Research

Third section of the thesis will consist of several parts. At first regression model will be specified and limitations of the research will be presented. Then, sample data will be reviewed. Finally, the empirical research will be performed and results will be discussed.

The workflow of empirical research goes as follows. At first various POLS models will be created, and then according to panel diagnostics the best between (POLS, fixed and random effects) will be chosen. While modeling, natural logarithm forms will be tried. What is more, time trend and lags will be added to check whether it improves models. Finally, models will be checked for: multicollinearity, heteroskedasticity and autocorrelation.

3.2. Regression Model for Audit Fee

Regression model used in this paper:

$$\text{AuditFee} = b_0 + b_1\text{Assets} + b_2\text{Subsidiaries} + b_3\text{Location} + b_4\text{ARAssets} + b_5\text{ROE} + b_6\text{Loss} + b_7\text{Big4} + b_8\text{Year end} + b_9\text{AuditorChange} + b_{10}\text{Industry} + b_{11}\text{Sales} + \varepsilon$$

where all variables are explained in the Table 5 below. For selection of variables details refer to second part of the thesis, section “Audit Fee Factors and Model Selection”.

Experimental Variable	Expected Sign	Description
Auditfee		Audit fee paid by clients for audit services (in LTL)
Assets	+	Total assets of the client
Sales	+	Total sales of the client
Subsidiaries	+	Number of subsidiaries client has
Location	-	Dummy variable where 1 is assigned for companies that are located in a different city than audit company (within 100 km distance)
ARAssets	+	Ratio of accounts receivable to total assets
ROE	-	Financial ratio calculated as net income divided by total shareholder's equity
Loss	+	Dummy variable where 1 is assigned to companies which experienced loss in either of 2 year (current and prior year)
Big4	+	Dummy variable where 1 is if the auditor is from the BIG 4 companies
Year end	-	Dummy variable where 1 is if client financial year end is not on December 31 st
Industry	+	Dummy variable where 1 is for clients operating in regulated industries
AuditorChange	-	Dummy variable where 1 is if the auditor has changed from prior year

Table 5. List of variables, expected sign and definition of factors used in this research

3.3. Limitations of Audit Fee Model

One of the main study limitations is that the data of hours spent for specific audit is not available. Time is the main cost driver for auditors, as they calculate audit fee based on time and hourly fee. However, instead of actual time in this thesis various client and auditor attributes are used. The rationale is that auditors as well have to estimate time budget before the engagement and they calculate it by evaluating client's financial statements. Therefore, it is considered appropriate that instead of hours, client attributes are used.

Another important limitation is the fees received by auditors for non-audit services. These are not separately indicated in the financial statements and cannot be obtained from public information. If audit company provides any other services for the client, in most cases there are discounts applied for audit fee. Therefore, this effect is not included in thesis.

Additionally, I consider that audit committees in companies have an effect on audit prices. The reason behind is that if firm has a strong internal audit, then external auditors can rely more on their work and in this case less testing is needed. It is mostly applicable for large companies. However, it is hard to measure and evaluate internal audit from financial statements, in most companies only narrow information is available which is not enough for inclusion in testing.

Finally, models for financial firms, such as banks, insurance, credit unions and funds, should be estimated separately due to different composition of financial statements. However, most of financial institutions did not publish audit fee, from 14 companies observed only 3 disclosed audit fee. Therefore, due to lack of data model for financials firms was not estimated and they were not included in general audit fee model. It implies that the whole research is performed only for a part of the audit market in Lithuania which excludes financial firms.

3.4. Data and Descriptive Statistics

The sample consists of 2010-2014 audits performed in Lithuania. All data is secondary, collected by the author from the publicly available information of audited company, shareholder minutes or board meetings and financial statements. In 2014 there were total 3.926 audits performed (see Figure 2), however, most of the companies did not publish their financial statements, as well as audit fee. Overall, 54 firms selected for testing as all required information was obtained. In addition, for some companies only several years of data used as other was not available. All in all, there are total 231 observations.

Table 6 presents descriptive statistics for continuous variables used in model. The average audit fee is 64.135 LTL, while the minimum is only 1.050 LTL and maximum - 367.000 LTL. It indicates that sample consists of diverse companies, where audit is very simple and where it is more complex. It is also confirmed by total assets variables. Minimum amount is 690.672 LTL (UAB Zarasų būstas), while maximum is more than 5 billion LTL (AB Orlen Lietuva). Furthermore, distribution of total assets is positively skewed, as most of companies have total assets valued at around 109 million LTL, however, there are several firms with values above 1 billion LTL. Total sales in sampled companies have a mean of 568 million LTL. There are several new established companies which did not generate any revenue in first year, therefore, minimum sales is equal to 0, while the maximum value of 21 billion LTL was earned by AB Orlen Lietuva. For subsidiaries variable, most of companies do not have any subsidiaries, however, there are several units that have even 67 (AB Invalda). Going further to ARAssets variable, the ratio varies between 0 and 0,77. There was one company without any accounts receivable, therefore, the ratio equaled to 0. When it comes to ROE variable, on average firms have 6% of return on equity. There were total 47 observations with a negative ROE ratio and one extremely negative -1247% in 2014 (AB Orlen Lietuva).

Variable	Mean	Median	Minimum	Maximum	Std. Dev.
Auditfee	64.135	53.519	1.050	367.000	57.861
Date	2012	2012	2010	2014	1
Assets	449.847.000	108.666.000	690.672	5.257.240.000	982.736.000
Sales	568.427.000	78.169.000	-	21.630.700.000	2.591.120.000
Subsidiaries	5	-	-	67	14
ARAssets	0,19	0,15	-	0,77	0,17
ROE	0,06	0,08	- 12,47	2,34	0,88

Table 6. Descriptive statistics of continuous variables

For dummy variables descriptive statistics refer to Table 7. First of all, loss variable indicate that most of the companies did not incur loss within two years (current year when audit was performed and prior year). Furthermore, 78% of all audits were performed by BIG4 audit companies. It could be explained by the fact that most companies that publish financial statements for society are big ones, therefore, better quality auditors are selected (BIG4) as it increases investors' trust. In addition, only 8% of total sampled companies changed auditors. It proves that most of the clients tend to have the same auditor in 5 year tested period. Sample contains only 9 observations were client's had different accounting year than fiscal year. Finally, location variable shows that in the sample half of the clients are in the same city as auditor and half are located in different cities (at least 100 km distance).

Variable		Frequency	Percentage
Loss	Loss incurred within 2 years	62	27%
	No loss incurred within 2 years	170	73%
Big4	Auditor is BIG4	180	78%
	Auditor is other companies than BIG4	52	22%
Change	Auditor has changed from prior year	19	8%
	Auditor has not changed from prior year	213	92%
Industry	Regulated	85	37%
	Unregulated	147	63%
YearEnd	Accounting year end on December 31st	223	96%
	Account year end on other date	9	4%
Location	Client office located in the same city as audit company	108	47%
	City different than audit company	124	53%

Table 7. Descriptive statistics for dummy variables

Finally, dynamics of audit fee variable were observed in the graph (Figure 8). It indicates that there is a poor audit fee variation over time. In most cases audit price is the same or very similar to prior year. Therefore, it could mean that factors did not change over time or that factors changed but audit fee remained the same.

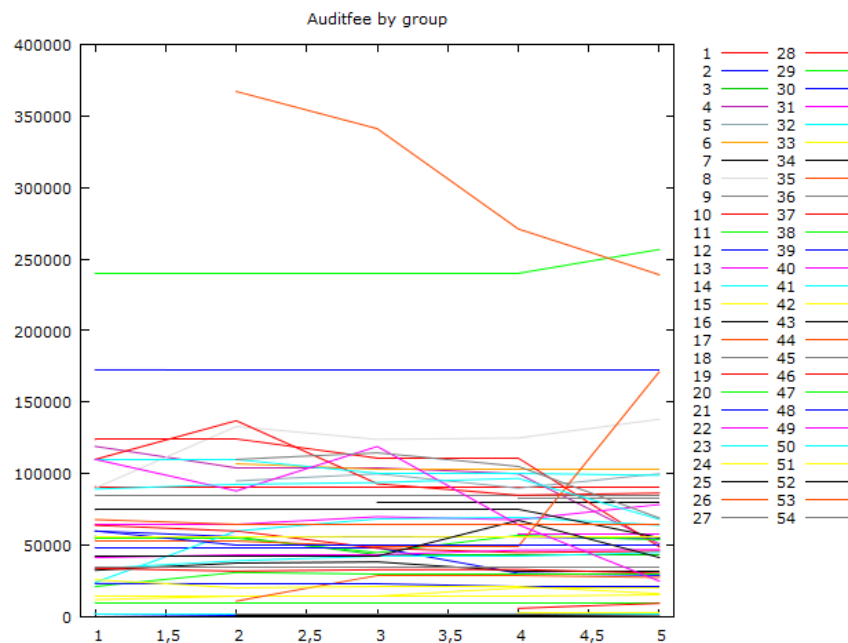


Figure 8. Dynamics of audit fee over time

3.5. Audit Fee Assessment Results

The results are presented in two sections. At first research was performed for full sample. However, the fit of the models was quite poor therefore the whole sample was divided into two groups by total assets of the client. Companies with total assets that are above 100 million LTL are defined as large ones, while others are small ones. The rationale is that there can be significant differences between large and small companies audit fee estimation which result in poor overall model specification e.g. large companies have better internal procedures. Therefore, separate models for each group will be estimated in the second section.

3.5.1. Model for full sample. The first step of the empirical research was to create various POLS models. At first plain values were included. Then variables total assets, sales

and audit fee were transformed to logarithm form and tested in the model. Additionally, time trend variable and various lags were examined. For three best POLS models refer to Table 8 below. It shows that model number 3 has the highest adjusted R^2 , which is equal to 0,8591. For all models robust standard errors were used, therefore, standard errors are corrected in case of heteroskedasticity and autocorrelation. In addition, no multicollinearity was identified. Afterwards in GRETL program panel diagnostics were run for each of the model to examine which model is the best between POLS, random and fixed effects.

Dependent variable: l_Auditfee	POLS estimates		
Model Number	1	2	3
const	2,610**	2,297**	1,866**
Subsidiaries	0,03579**	0,01310**	0,02797**
ARAssets	-0,03067	1,041**	0,477
ROE	0,01818	- 0,04990**	0,002552
Loss	0,01572	-0,07305	-0,0227
Big4	0,8666**	1,045**	0,8391**
Change	0,1224	0,1481	0,09842
Industry	-0,4563**	-0,6808**	-0,6047**
YearEnd	0,2447	0,1588	0,2094
Location	-0,007979	-0,01429	-0,005737
time	- 0,04285**	- 0,03936**	- 0,03900**
l_TotalSales	0,4083**		0,2578**
l_TotalAssets		0,4136**	0,1908**
Adj. R^2	0,8425	0,8209	0,8591

Table 8. POLS models for whole sample.

Note: ** indicates significance at the 5 percent level

Panel diagnostics (using Breusch-Pagan and Hausman tests) recommended using fixed effects model. It means that there are some omitted variables that are different across cross sectional groups however they stay the same over time. Therefore, fixed effect models were examined for all 3 best POLS models. For summary of those models refer to Table 9 below. Though, all three models have adjusted R^2 below 30%. However, F-test of overall significance of regression models had p-values below 5% of level of significance. Therefore,

null hypothesis that “the fit of the intercept only model and estimated model are equal” had to be rejected. This means that estimated relationships are significant.

Dependent variable: l_Auditfee	Fixed-effects estimates		
Model Number	4	5	6
const	8,682**	6,597**	7,552**
l_TotalAssets	0,06729		-0,06479
Subsidiaries	0,01773**	0,04959**	0,05160**
ARAssets	0,425	0,4142	0,3998
ROE	0,005447	0,007753	0,01307
Loss	-0,007887	0,004651	-0,006701
Big4	0,7192**	0,7145**	0,7028**
Change	0,0272	0,03659	0,03838
YearEnd	- 0,09159**	-0,1143**	-0,1083**
Location	- 0,07099**	-0,03661	-0,04291
time	-0,01777	-0,02255	-0,02172
l_TotalSales		0,1759**	0,1889**
Adj. R ²	0,2164	0,2591	0,2622

Table 9. Fixed effects models for whole sample.

Note: ** indicates significance at the 5 percent level

All three models yield similar results. Firstly, neither of the models suffers from heteroskedasticity. Serial autocorrelation exists. However, again robust standard errors were used to solve the problem. In addition, industry variable was removed from models because it is a dummy variable that is assigned for each unit and it does not vary other time (omitted by GRETL program). Hence, industry variable is collinear to fixed effects. By adjusted r-squared, fixed effect model number 6 is the best, therefore, let us consider this model as the most sufficient and discuss the results.

There are total 4 variables that are statistically significant. First of all, results show that there is a significant (at 5% level) positive relationship between audit fee and number of subsidiaries the client has. According to estimated model, when number of subsidiaries increase by 1 unit, then audit fee rises by 5,16% (ceteris paribus). Therefore, the results are as

expected and in line with previous studies that the more subsidiaries entity has, it is more complex and auditors charge higher fees.

Another significant (at 5% level) variable in the model 6 is BIG4. It has a positive relationship with audit fee which means that all BIG 4 companies charge more than other audit companies. Therefore, BIG 4 premium exists in Lithuanian market. Results indicate that if the audit is performed by KPMG, Deloitte, PWC or EY, then the audit fee is 70% larger than when it is performed by other auditors.

Third significant variable (at 5% level) is total sales in a natural logarithm form. As expected, client size measured in sales is positively correlated to audit fee. It concludes that 1% increase in total sales cause a rise in audit fee by 0,19%.

Finally, last variable which was found to be significant is year end. Estimated model states that audit fee is significantly different for companies who have different accounting year. Results show that if company's financial year ends at other date than December 31st, then audit fee is 11% smaller than for other companies.

Most surprisingly, total assets variable was found to be insignificant. All prior studies found it as the main explanatory variable. However, our estimated model showed that only total sales are significant. What is more, auditee risk which was measured by ratio of accounts receivable to total assets (ARAssets) was not important in explaining variations of audit fee. Therefore, in Lithuania inherent audit risk is not important in estimating the price.

Going further, none of the profitability measures (ROE and Loss) in estimated model are significant. Hence it can be concluded that the profitability of the client does not affect the price of an audit. Therefore, auditors do not see any associated risks with unprofitable clients and the audit price do not depend on that.

Additionally, variables auditor change and office locations also are not important in determining audit fee. Hence, if the company chooses other auditor for the next year, the

audit fee should not be significantly different. What is more, for audit fee it does not matter whether the client is located at the same city as auditor. The reason could be as noted above in the chapter that additional expenses are charged separately.

Finally, time trend was added to the models, however, they do not impact audit fee. Therefore, there is no significant trend in time which would affect the prices. Results only present that prices are decreasing over the year (negative variable sign).

3.5.2. Model for large and small clients. As noted in the beginning, the whole sample was divided to two groups by total assets of the clients. For each of the group separate models estimated. For summary of best POLS model and fixed or random effects model refer to Table 10 below.

	Large		Small	
Dependent variable: l_Auditfee	7	8	9	10
	Pooled OLS	Fixed	Pooled OLS	Random
const	5,467**	8,938**	2,201*	3,774**
Subsidiaries	0,02489**	- 0,006792**	0,09688	0,1317
ARAssets	0,7677	1,357*	0,5832	0,1547
ROE	-0,01259	0,02223**	0,08856	-0,07754
Loss	-0,0005169	-0,04355	-0,05815	-0,01613
Big4	0,5062*	0,6150**	0,6644**	0,7598**
AuditorChange	-0,05504	0,008633	-0,02551	0,07635
Industry	-0,06608		- 0,9436**	-0,6934*
YearEnd	0,2823	-0,09056**	- 0,3652**	-0,1259
Location	0,03155		-0,09072	-0,03187
l_TotalSales	0,1729**	0,1261**	0,2590**	0,3769**
l_TotalAssets	0,09177	-0,03343	0,1846	-0,03834
time	-0,01658	-0,02671	- 0,04542*	- 0,02748*
Adj. R ²	0,438	0,4535	0,8416	0,8196

Table 10. POLS and fixed/random effects models for the sample of large and small sized clients

Note: ** indicates significance at the 5 percent level; * indicates significance at the 10 percent level

After estimating POLS for large clients, panel diagnostics recommended to use fixed effects model. Fixed effects model for large clients have an adjusted r-squared of 0,45, which

is larger than in models for the full sample. No heteroskedasticity found but the test for autocorrelation was inconclusive. Therefore, now the results of this model will be reviewed.

There are total 7 variables that are important in determining audit fee. Variables Big4, year end and total sales were reported to be significant in explaining audit fee. These results are the same as in the full sample model, also the same as expected. Variables loss, change, total assets and time were not important in explaining audit fee. While industry and location variables were removed from the sample by Gretl program due to collinearity. Again the reason is that both variables are constant over time, therefore, they are collinear with fixed effects.

Now new findings will be discussed. Strangely, number of subsidiaries has a negative effect on audit price. It means that an increase in subsidiaries causes smaller audit price. According to estimated model, if there is one more subsidiary acquired, then the audit fee decreases by 0,68%. Results could be explained that usually parent company selects the auditor and in most cases it is the same for all subsidiaries. Therefore, if additional subsidiary is acquired and the same auditor is selected, then audit companies can give discounts for parent company.

Furthermore, two additional variables found to be important. It is ARAssets ratio and ROE. Firstly, auditee risk measured by ratio of accounts receivable to total assets was estimated to be significant at the confidence level of 10%. The results are as expected that larger ratio causes audit fees to be greater. Ratio increase by 1% boosts audit fees by 1.36%. Secondly, ROE is powerful in explaining audit price at the significance level of 5%. It was expected that the coefficient would be negative, however, it was estimated to be positive. Therefore, it means that with better return on equity of the client, audit fees are larger. If ROE increases by 1%, then audit fees should increase by 0,02%. The only reasonable explanation would be that in case ROE grows due to change in equity multiplier, then it means that the

ratio of debt to equity changes (either debt increases, either equity decreases). Therefore, the increase in debt would be expected to cause a growth in audit price.

For small firms, after estimating POLS, random effects model was recommend. It means that among the small firms there is unobserved effects which is not correlated with independent variables. Estimated random effects model has a r-squared of 0,8196. This means that the fit of the model is relatively good, it is the highest from all the estimated models (fixed for full sample and fixed for large firms). There are total 4 variables important in explaining audit prices. Big4 and total sales yield the expected results and same as in full sample and for large firms, of course, only coefficient values are slightly different. However, number of subsidiaries and year end was not found to be significant. It could be due to the fact that in general small companies do not have any subsidiaries or they usually do not vary over time. What is more, most of the companies have the same accounting year as fiscal year, therefore, the season effect is not important. In consistent with prior estimated models loss, auditor change, location and total assets were insignificant.

When it comes to different findings than in prior models, within small firms industry variable was important in explaining audit fee. The results show that if company operates in regulated industry, then the audit fee is 69% smaller. The relationship is as expected because the more regulated industry of the client, then fewer misstatements should be found, meaning that auditors spend fewer hours performing an audit. What is more, it was found that time trend is significant for small companies. It presents that there is an overall decreasing trend and each year the audit fee decreases by 2.7%. It does make sense because for most of the small companies the audit is not compulsory, therefore, if the price is too large, clients simply can decided not to perform audit all. What is more, most of small firms are not ABs, they do not have shares that would be available for society. Therefore, for them the reputation of audit company does not matter and the main criteria for audit company selection is price. In

this case, small firms select auditors that offers smallest prices, hence, the overall decreasing trend is significant in the audit fee model.

Going furthermore, neither ARAssets, nor ROE are powerful in explaining audit fee. These were found to be significant for large companies. However, in case of small companies, there is no impact. Therefore, when determining audit fee, auditors do not evaluate profitability and inherent risk of the company. It could be due to the fact that within small companies, net income as well as sales varies a lot and causes larger variations in ROE and accounts receivable ratio, which are not seen in audit fee. Therefore, these variables do not represent any additional risk for auditors.

3.5.3. Comparison between models. First of all, the fit of the models is better for divided sample (full - 0,2622; large – 0,4535; small – 0,8196). In reality, it is rational that factors that influence audit fee could be different for large and small clients. Therefore, it is acceptable that the fit is better for divided sample.

Now variables between those three models will be reviewed. Firstly, there are four variables that were not significant among all models: total assets, loss, change and location. Therefore, in Lithuanian market audit fee does not depend on these factors. Likely, total assets variable is not important because for the size of the audit total sales indicator is more appropriate. When it comes to loss factor, the results demonstrate that auditors do not take in mind whether company experienced loss and do not see any higher risks with unprofitable firms. Additionally, auditors neither charge more nor less for the first year audit. It means that audit companies do not lower audit fee to attract new clients and/or do not increase price for the first year client. Finally, office location of auditee is not important for audit fee. Therefore, it implies that additional expenses are charged separately.

Furthermore, there are two variables that are significant in all the models: BIG4 and total sales. Accordingly, in Lithuania KPMG, Deloitte, PWC and EY, charge premiums for

all clients, either large or small. Therefore, clients have to pay more for better reputation of audit companies which increase the reliability of the auditor's report. In addition, auditee size measure by total sales was found to be significant. From prior studies, the size of the client, either measured by total assets or total sales, is the main explanatory variable. Therefore, in Lithuanian market audit fee depends more on total sales than on total assets. It is reasonable taking in mind that materiality for audit is mostly based on profit and loss statement.

Number of subsidiaries and the accounting year were both significant for full sample and large clients. Therefore, the financial year was not important only within small companies which could be the result that in sample only two observations had different accounting year. Number of subsidiaries had a negative coefficient in the model for large clients which is quite surprising. Most large firms have many subsidiaries and the number varies quite a lot over the years. The only rational explanation that auditors gain additional client – new subsidiary, therefore, parent company receives a discount. Hence, the total audit fee from the whole group remains similar.

There are two factors that were powerful in explaining dependent variables only in large firms model: ARAssets and ROE. Firstly, large companies usually have high level of accounts receivables. Therefore, auditors see greater inherent risk and understand that more procedures will be needed to test this financial statement line. In case of small companies, the level is usually low and there are only several clients that owe money which client is aware of. Hence, auditors do not see any inherent risk for which they should be compensated. Furthermore, only for large firms ROE was significant. The reported coefficient was positive, therefore, results indicate that the more profitable company, the higher audit fee. The only reason why this could be true is that one part of ROE is financial leverage. It increases when total assets grow and/or total equity declines. Hence, if ROE changes due to higher level of debt, then it is reasonable to think that audit price would also be higher.

Finally, there are two factors significant only for small firms: industry and time trend. As it was discussed above, trend is more important for small companies because they base their choice of auditor on price, while larger ones pay attention to reputation. Therefore, auditors became more efficient and they need less time to perform an audit, which cause general audit prices to be lower. This does make an impact for small firms. Finally, fixed effect model removed industry variable as it was collinear to fixed effect, therefore, only in random effects model it remained as independent factor. Hence, the significant relationship was noted only within small firms. It was found that for clients operating in regulated industries, audit fee is significantly smaller because it requires less work.

3.6. Audit Fee Research Implications

All in all, in this section models for three different samples were estimated and discussed. According to results, in Lithuanian market there is a significant difference in assessment of audit fee for large and for small clients.

For large firms, as expected, the increase on total sales causes a growth in audit fee. As well the results noted that BIG 4 companies charge large companies more than other audit companies. Therefore, BIG 4 premium exists. Going further, it was found that accounting year end makes an influence on audit fee. Companies that have different financial year end than December 31st tend to gain discounts. One of the unexpected findings is that number of subsidiaries has a negative impact on audit fee. It can be explained that if audit company performs audits for all subsidiaries, then due to larger number of subsidiaries, parent firm gains a discount. Therefore, the discount is offset by additional audit client. Finally, only for large companies it was found that ARAssets variable and ROE positively influence audit fees.

For small companies, total sales and BIG 4 were as well significant in explaining audit fee. Additionally, the results suggested that if small firms operate in regulated industry,

then audit fee is smaller. This is rational, taking in mind that in regulated markets auditors can easily obtain necessary information and detailed testing is not required. Therefore, less hours of work are required which decrease the audit fee. Furthermore, time trend was found to be significant for small firms. Usually small clients select audit company based on the audit price. Hence, as there is an overall decrease in audit fee it is as well reflected in the dependent variable.

Finally, estimated models still are not good enough to be used for fair audit value estimation. Nevertheless, companies can evaluate how the change in certain factors could affect the audit price. What is more, it was evidence that there are different factors that influence the price of the audit among large and small sized clients. Only two indicators (total sales and BIG 4) are common for both samples. Other variables can be either attributed to large or to small firms. Additionally, four factors were not significant in either of the models: loss, auditor change, location and total assets.

However, this assessment of audit fee factors has several limitations. Firstly, financial institutions were not included in this research because for them separate model should be estimated, though, due to lack of data it cannot be reliable. Furthermore, in general sample is limited to 54 companies which can be not fully representative. In addition, future researches could obtain data which is not publicly available from questioning auditees. Likewise, factors such as audit committees, non-audit fees could be included in the models. Additionally, it could be explored why there is a BIG 4 premium, either due to reputation or due to industry specialists.

Conclusions

1. Situation analysis of audit market revealed that since 2003 number of audit companies constantly decreased. Despite this, the number of audits performed steadily increased since 2010. The major part of audits is mandatory for companies (72%). However, in 2014 there was a growth of 20% since prior year in non-statutory audits. Furthermore, BIG 4 performed 29% of all audits in 2014 and the number is constantly growing since 2009.

2. Total audit revenues remained almost unchanged in the period of 2010-2014. However, there was a sharp growth in advisory revenues. 58% of all audit revenues and 90% of all advisory revenues are attributed to BIG 4. In addition, total revenues earned from audit were evidence to be declining since 2009 until 2014, when it slightly recovered. Similarly, hours spent on single audit is decreasing since 2010, totally it had dropped by 15%. While, average hourly fee step by step is converging among audit companies. However, still the average fee charged by BIG 4 is almost two times larger.

3. Global audit market is facing several trends. Firstly, from 2016 June EU audit reform will be adopted. The aim of reform is to increase competition in audit market and improve audit quality by launching mandatory audit firm rotation and making audit reports more informative. Furthermore, it is evident that audit companies have to spare additional attention to client IT systems.

4. After the analysis of audit fee factors in prior studies, it was decided to explore 9 client characteristics and 2 auditor attributes. Client characteristics are as follows: total assets, total sales, number of subsidiaries, office location, AR to total assets, ROE, whether company experienced loss, accounting year and whether client's industry is highly regulated. Big 4 indicator, industry specialist and whether auditor has changed from prior year was selected as auditor characteristics. Due to lack of data, industry specialist indicator could not be properly estimated, therefore, it was omitted.

5. In prior studies, audit fee was assessed using either single linear equations (OLS, POLS, fixed and random effect) or structural equation models. Firstly, as the purpose of this thesis is to find direct relationships, single linear equations were selected. Moreover, as the data obtained is panel type, POLS, fixed and random effect models were used.

6. After estimating POLS models for full sample, fixed effects models were recommended. The best model according adjusted r-squared suggested that number of subsidiaries, BIG 4 and total sales variables have a significant positive influence on audit fee. While only accounting year end indicator has a significant negative impact on audit fee. However, this model has quite poor adjusted r-squared, equal to 26%.

7. Best model for large companies sample was fixed effects, while for small companies – random effects. Improved fit of the models suggest that there is a significant difference on audit fee determination for large and for small firms. For large, 4 variables had significant positive impact on audit fee: ARAssets, ROE, BIG 4 and total sales. While powerful negative relationship is found with subsidiaries and accounting year. For small firms sample total sales, industry and BIG 4 variables concluded to have positive effect on dependent variable. Only time trend reported as having significant negative relationship with audit fee.

8. Overall results demonstrated that auditors determine audit fee differently for large and small clients. Furthermore, it was found that BIG 4 premium exists in Lithuania. What is more, in consistent with prior studies, total sales variable was significant. Additionally, it was evidenced that when determining audit fee, it is not important where client office is located, whether it is a first year client, how large total assets are and whether it has experienced any loss in two years. Other indicators were significant either for large or for small clients.

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Appendices

Appendix 1. List of companies used in research, number of years of data obtained, information whether client operates in highly regulated industry and average audit fee

Company	Number of years	Highly regulated (Y/N)	Average audit fee	Company	Number of years	Highly regulated (Y/N)	Average audit fee
Apranga	5	N	90.794	Kauno autobusai	5	Y	52.600
City Service	5	Y	172.607	Kauno švara	5	Y	9.540
Grigiškės	5	N	48.340	UAB Zarasų būstas	5	Y	1.440
AB Lietuvos dujos	5	Y	99.541	UAB Zarasų autobusai	3	Y	2.053
AB Lesto	4	Y	96.250	UAB Zarasų vandenys	5	Y	2.500
Linas Agro	4	N	104.447	Nemenčinės poliklinika	2	Y	2.893
Lietuvos energijos gamyba	3	Y	80.000	Nemenčinės komunalininkas	4	Y	1.448
Panevezio statybos trestas	5	N	116.500	Orlen Lietuva	4	Y	304.500
Pieno zvaigždės	5	N	85.000	UAB Pakruojo komunalininkas	4	Y	1.961
Rokiskio suris	5	N	102.312	AB Panėvėžio būtų ūkis	2	Y	7.750
TEO LT	5	Y	243.334	Kazlų rūdos komunalininkas	1	Y	4.500
Utenos Trikotazas	5	N	56.640	Baltisches Haus	5	N	52.000
Amber Grid	2	Y	58.000	Berlin Chemie	5	Y	44.252
Agrowill group	5	N	103.800	Deichman avalynė	5	N	40.703
Gubernija	5	N	16.420	Drogas	5	N	56.040
INVL Techn	1	N	8.000	Elektrolux	5	N	34.352
INVL Baltic farmland	1	N	24.000	Ermitazas	4	N	24.342
INVL Baltic Real Estate	1	N	10.000	Fazer Lietuva	5	N	34.528
Invalda	5	N	103.800	Havi logistics	5	N	32.550
Klaipėdos nafta	5	Y	53.200	Industek	5	N	28.179
Kauno energija	5	Y	40.973	Konica Minolta Baltija	5	N	22.388
Litgrid	5	Y	69.177	Mars Lietuva	5	N	88.165
Lietuvos jūrų laivininkystė	5	N	57.247	Kraft Foods Lietuva	5	N	81,283
Linas	5	N	15.100	Ober Haus NT	5	N	21.200

Vilniaus baldai	5	N	71.049	Philip Morris	5	Y	47.300
Vilniaus degtinė	5	Y	75.479	Vilniaus duona	5	N	65.600
Žemaitijos pienas	2	N	83.000	Statoil	4	Y	99.715

Appendix 2. List of audit companies and number of observations in analysis

Audit company	Number of observations
PwC	117
EY	33
KPMG	29
Deloitte	6
UAB Grant Thornton Rimess	11
Nepriklausomas auditas	1
Šiaulių Pagautė	5
Baltijos auditas	3
AUDITAS	2
Revizorius	4
Audito sprendimai	1
UAB "MGI IN SALVO"	5
Audata	13
Apskaitos ir mokesčių konsultacijos	2
UAB "Aruditas"	4
UAB "RG verslas"	2
Dvigubas įrašas	1

Appendix 3. Financial Institutions Observed whether they disclosed audit fee

Financial Institutions	Audit fee disclosed (Y/N)
Bankas Snoras	N
Danske Bankas	N
DNB NORD	Y
Finasta Bankas	N
Medicinos Bankas	N
Swedbank	N
BTA Draudimas	N
Šiaulių Bankas	Y
Compensa	N
Ūkio Bankas	Y
Ergo Draudimas	N
SEB Bankas	N
Gjensidige Baltic Draudimas	N
PZU	N

Appendix 4. Details of Model 3 and various tests

Model 3: Pooled OLS, using 223 observations

Included 51 cross-sectional units

Time-series length: minimum 1, maximum 5

Dependent variable: l_Auditfee

Robust (HAC) standard errors

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	1,86592	0,614637	3,0358	0,00270	***
Subsidiaries	0,0279706	0,00268797	10,4058	<0,00001	***
ARAssets	0,476995	0,319813	1,4915	0,13734	
ROE	0,00255208	0,0200677	0,1272	0,89892	
Loss	-0,0227018	0,112057	-0,2026	0,83965	
Big4	0,839076	0,266208	3,1520	0,00186	***
Change	0,0984221	0,119944	0,8206	0,41283	
Industry	-0,604722	0,165437	-3,6553	0,00032	***
YearEnd	0,209381	0,189255	1,1063	0,26984	
Location	-0,00573657	0,128611	-0,0446	0,96447	
l_TotalSales	0,25779	0,0446704	5,7709	<0,00001	***
time	-0,0390003	0,0132587	-2,9415	0,00363	***
l_TotalAssets	0,190795	0,0652577	2,9237	0,00384	***
Mean dependent var	10,53944	S.D. dependent var	1,262889		
Sum squared resid	47,18618	S.E. of regression	0,474021		
R-squared	0,866730	Adjusted R-squared	0,859115		
F(12, 210)	113,8126	P-value(F)	7,54e-85		
Log-likelihood	-143,2559	Akaike criterion	312,5118		
Schwarz criterion	356,8050	Hannan-Quinn	330,3927		
rho	0,869080	Durbin-Watson	0,226543		

4.1. Heteroskedasticity test

White's test for heteroskedasticity -

Null hypothesis: heteroskedasticity not present

Test statistic: LM = 97,2233

with p-value = $P(\text{Chi-square}(80) > 97,2233) = 0,0923458$ *Result:* no heteroskedasticity (at 5% significance level)

4.2. Collinearity test

Variance Inflation Factors

Minimum possible value = 1.0

Values > 10.0 may indicate a collinearity problem

There are no values above 10. *Result:* no

collinearity.

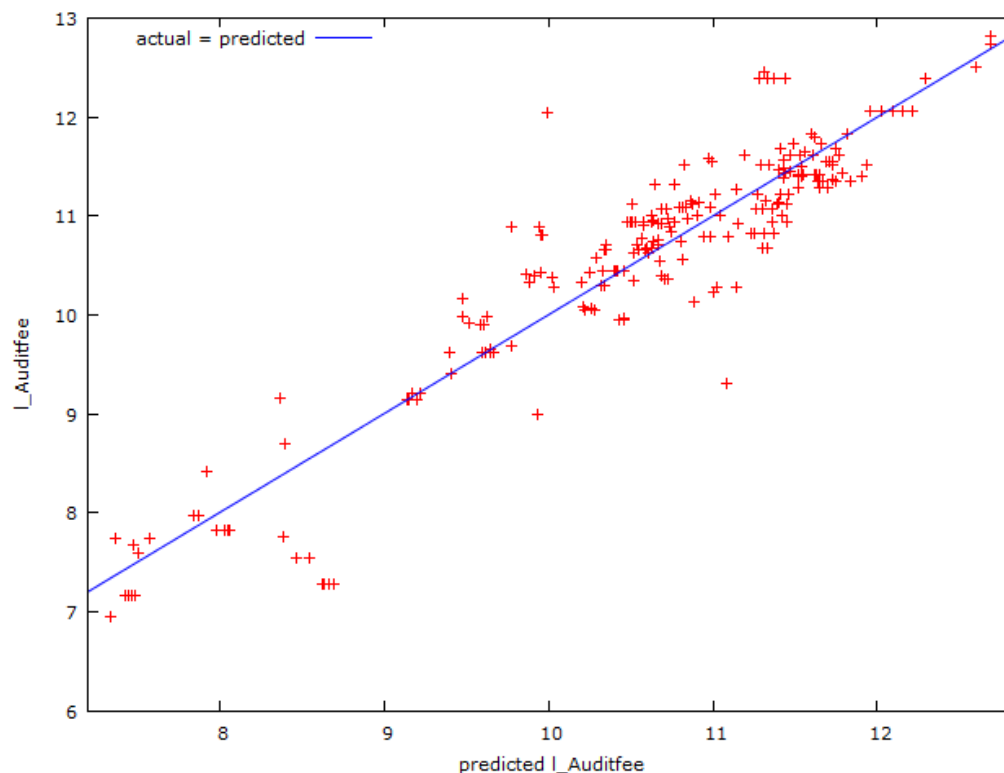
l_TotalAssets	1,912
Subsidiaries	1,110
ARAssets	1,294
ROE	1,127
Loss	1,148
Big4	1,695
Change	1,047
Industry	1,327
YearEnd	1,033
Location	1,164
time	1,031

4.3. Autocorrelation

dL = 1,6655 dU = 1,8950 d = 0,226543

Result: d < dL, positive autocorrelation

4.4. Actual vs fitted values plot



Appendix 5. Details of Model 6 and various tests

Model 6: Fixed-effects, using 223 observations

Included 51 cross-sectional units

Time-series length: minimum 1, maximum 5

Dependent variable: l_Auditfee

Robust (HAC) standard errors

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	7,55174	1,32335	5,7065	<0,00001	***
Subsidiaries	0,0515988	0,021166	2,4378	0,01586	**
ARAssets	0,399796	0,2774	1,4412	0,15146	
ROE	0,0130654	0,0134135	0,9740	0,33150	
Loss	-0,00670066	0,0478724	-0,1400	0,88886	
Big4	0,702792	0,172515	4,0738	0,00007	***
Change	0,0383777	0,036938	1,0390	0,30037	
YearEnd	-0,108276	0,0374112	-2,8942	0,00433	***
Location	-0,0429054	0,0296968	-1,4448	0,15046	
l_TotalSales	0,188868	0,0746207	2,5310	0,01233	**
time	-0,0217177	0,013896	-1,5629	0,12005	
l_TotalAssets	-0,0647852	0,0614415	-1,0544	0,29327	
Mean dependent var	10,53944	S.D. dependent var	1,262889		
Sum squared resid	5,504572	S.E. of regression	0,184905		
LSDV R-squared	0,984453	Within R-squared	0,262235		
LSDV F(61, 161)	167,1286	P-value(F)	8,7e-120		
Log-likelihood	96,30429	Akaike criterion	-68,60859		
Schwarz criterion	142,6361	Hannan-Quinn	16,66946		
rho	-0,106098	Durbin-Watson	1,414605		

Joint test on named regressors -

Test statistic: $F(11, 161) = 5,20243$

with p-value = $P(F(11, 161) > 5,20243) = 5,55109e-007$

Test for differing group intercepts -

Null hypothesis: The groups have a common intercept

Test statistic: $F(50, 161) = 32,6086$

with p-value = $P(F(50, 161) > 32,6086) = 1,65973e-062$

5.1. Heteroskedasticity test

Distribution free Wald test for heteroskedasticity -

Null hypothesis: the units have a common error variance

Asymptotic test statistic: Chi-square(49) = 1,1698e+029

with p-value = 0

Result: heteroskedasticity is not present

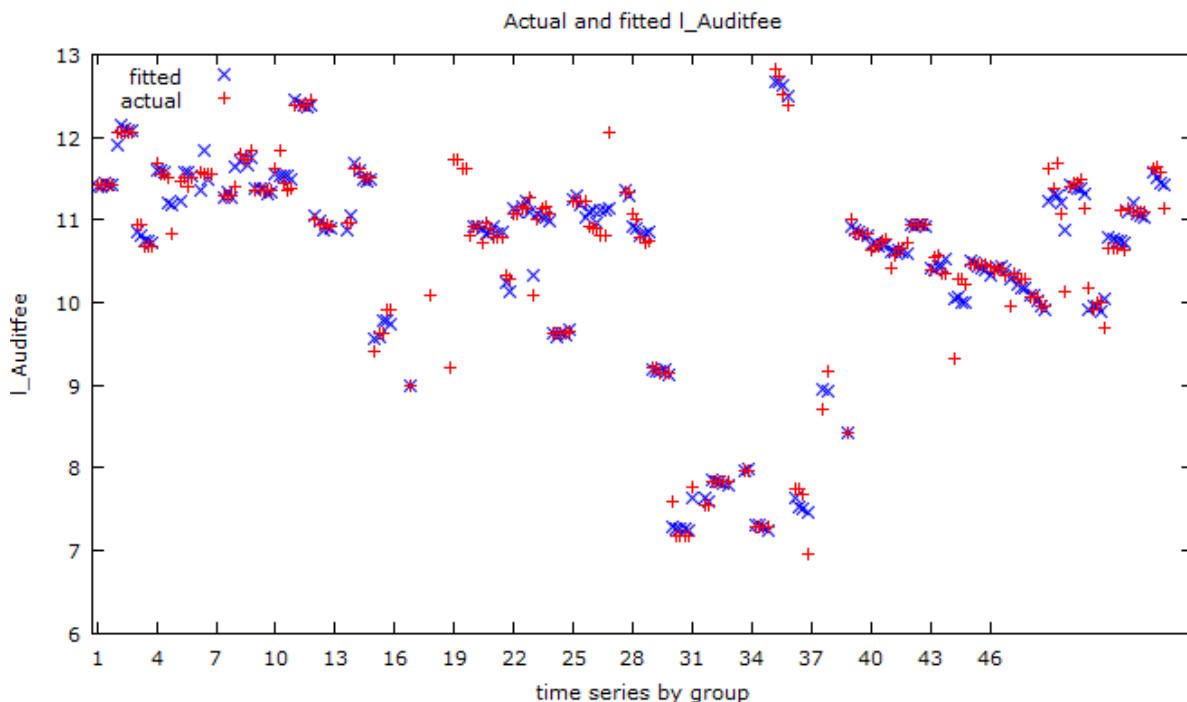
5.2. Collinearity – in fixed effects model Gretl automatically removes collinear variables. *Result:* estimated model has no collinearity problems.

5.3. Autocorrelation

$dL = 1,6753$ $dU = 1,8849$ $d = 1,414605$

Result: $d < dL$ – there is positive autocorrelation

5.4. Actual vs fitted values plot



Appendix 6. Details of Model 8 and various tests

Model 8: Fixed-effects, using 110 observations

Included 26 cross-sectional units

Time-series length: minimum 1, maximum 5

Dependent variable: $\ln_Auditfee$

Robust (HAC) standard errors

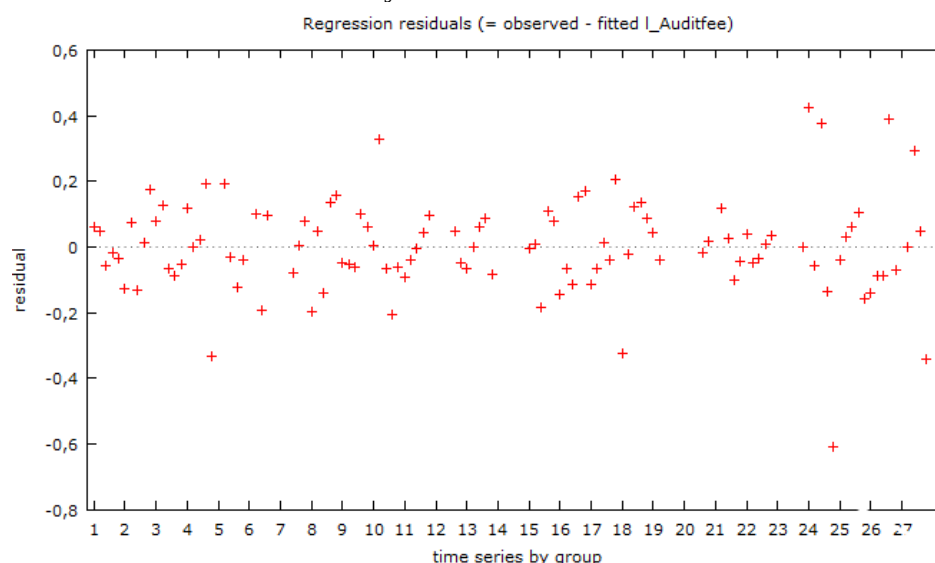
	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	8,93777	2,07088	4,3159	0,00005	***
$\ln_TotalSales$	0,126148	0,0631133	1,9988	0,04931	**
$\ln_TotalAssets$	-0,0334327	0,0957185	-0,3493	0,72787	
Subsidiaries	-0,00679153	0,00284173	-2,3899	0,01940	**
ARAssets	1,35667	0,713243	1,9021	0,06105	*
ROE	0,0222303	0,0106349	2,0903	0,04002	**
Loss	-0,0435531	0,0654268	-0,6657	0,50769	
Big4	0,615023	0,226776	2,7120	0,00831	***
Change	0,00863262	0,0561073	0,1539	0,87814	
YearEnd	-0,0905648	0,0390232	-2,3208	0,02306	**
time	-0,0267143	0,0177208	-1,5075	0,13594	
Mean dependent var	11,34517	S.D. dependent var	0,530241		
Sum squared resid	2,278435	S.E. of regression	0,175470		
LSDV R-squared	0,925653	Within R-squared	0,453541		
LSDV F(35, 74)	26,32375	P-value(F)	1,33e-29		
Log-likelihood	57,15130	Akaike criterion	-42,30259		
Schwarz criterion	54,91470	Hannan-Quinn	-2,870732		
rho	-0,078992	Durbin-Watson	1,519997		

Joint test on named regressors -

Test statistic: $F(10, 74) = 6,14172$ with p-value = $P(F(10, 74) > 6,14172) = 9,51112e-007$

Test for differing group intercepts -

Null hypothesis: The groups have a common intercept

Test statistic: $F(25, 74) = 17,0685$ with p-value = $P(F(25, 74) > 17,0685) = 1,45993e-021$ **6.1. Heteroskedasticity test**

Graph above indicates that residuals are in general evenly distributed. *Result:* heteroskedasticity is not present.

6.2. Collinearity – in fixed effects model Gretl automatically removes collinear variables. *Result:* no collinearity problems.

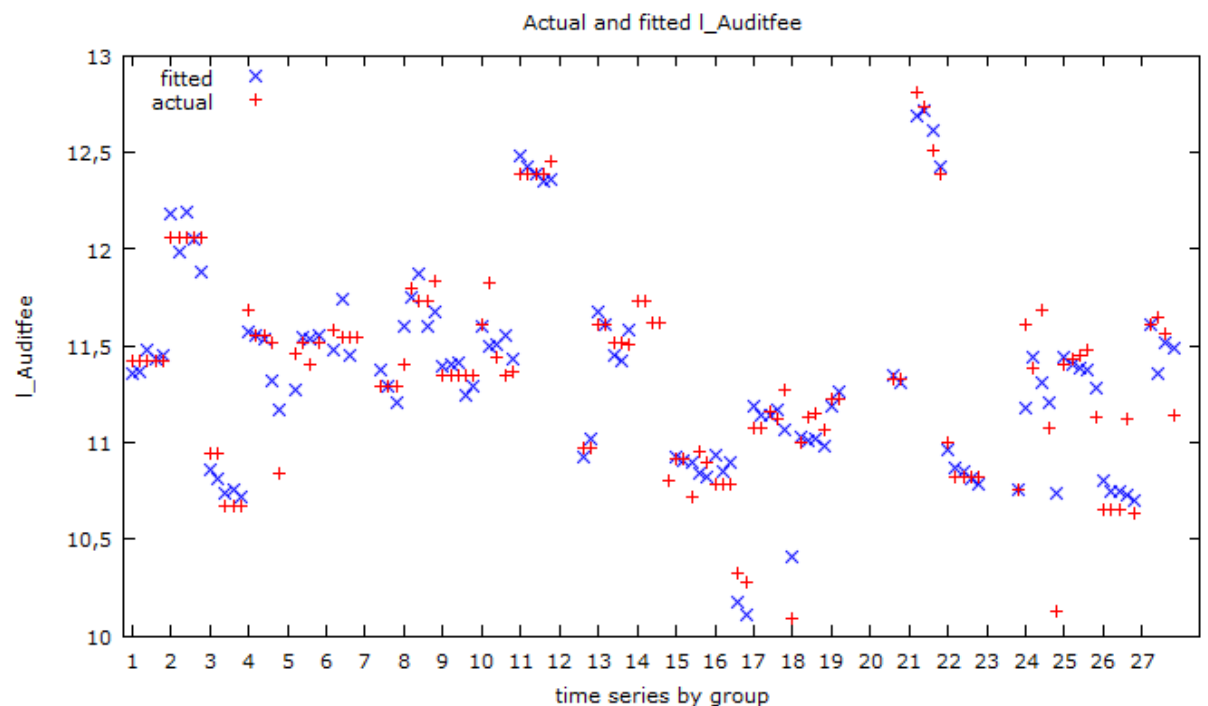
6.3. Autocorrelation

$dL = 1,4965$ $dU = 1,8906$ $d = 1,5199$

Results1: $dL < d < dU$ – test is inconclusive for positive autocorrelation

Results2: $4-d > dU$ – no negative autocorrelation

6.4. Actual vs fitted values plot



Appendix 7. Details of Model 10 and various tests

Model 10: Random-effects (GLS), using 113 observations

Included 27 cross-sectional units

Time-series length: minimum 1, maximum 5

Dependent variable: l_Auditfee

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	3,77404	1,52061	2,4819	0,01473	**
l_TotalSales	0,376889	0,099312	3,7950	0,00025	***
l_TotalAssets	-0,0383416	0,0966586	-0,3967	0,69246	
Subsidiaries	0,131684	0,226446	0,5815	0,56220	
ARAssets	0,154658	0,237441	0,6514	0,51631	
ROE	-0,0775425	0,0656487	-1,1812	0,24034	
Loss	-0,0161321	0,0611197	-0,2639	0,79237	
Big4	0,75981	0,368419	2,0624	0,04177	**
Change	0,0763476	0,0875097	0,8724	0,38505	
Industry	-0,69335	0,370034	-1,8737	0,06388	*
YearEnd	-0,125915	0,177785	-0,7082	0,48044	
Location	-0,0318711	0,157559	-0,2023	0,84011	
time	-0,0274797	0,0155938	-1,7622	0,08109	*
Mean dependent var	9,755107	S.D. dependent var		1,276475	
Sum squared resid	33,84224	S.E. of regression		0,578854	
Log-likelihood	-92,21925	Akaike criterion		210,4385	
Schwarz criterion	245,8945	Hannan-Quinn		224,8262	

'Within' variance = 0,038167

'Between' variance = 0,484249

 $\text{corr}(y, \hat{y})^2 = 0,819682$

Hausman test -

Null hypothesis: GLS estimates are consistent

Asymptotic test statistic: Chi-square(9) = 6,84459

with p-value = 0,653296

7.1. Heteroskedasticity test

Breusch-Pagan test -

Null hypothesis: Variance of the unit-specific error = 0

Asymptotic test statistic: Chi-square(1) = 90,989

with p-value = 1,44475e-021

Result: heteroskedasticity is present

7.2. Actual vs fitted values plot

