ASYMMETRIC INFORMATION IN THE UKRAINIAN BANKING SYSTEM: EVIDENCE FROM INDEPENDENT AUDITOR REPORTS

by

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Abstract

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This research, based on the quantitative content analysis, examines the information asymmetry in the Ukrainian banking system, i.e. shows how the Tone and Readability of Independent Auditor Reports are associated with a bank's performance in the next financial year. The fixed-effects estimator within the regression is applied to unbalanced panel dataset of Ukrainian banks. The variable, which indicates the Tone of Report, is constructed with the help of Loughran and McDonald's Financial Sentiment Word Lists, while the Readability variable is estimated using FOG and Flesch—Kincaid Indices. Based on the estimations of 2012-2016, it is found that the Readability of the Auditor Report has no relationship with bank's profitability in the next year. However, worse Tone of Auditor Report is associated with the increase in both ROA and ROE of the banking institution in the next period. The study aims to contribute to the existing literature about the determinants of bank's profitability, the quantitative content analysis, and the phenomenon of the asymmetric information in the banking system through the analysis of the Independent Auditor Report's Communicating Value. The research concludes with some policy implications and remarks on the practicality and implementability of the findings.

To all Ukrainians,
who have defended
the independence of our country
and peace in the whole civilized world

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GLOSSARY

FOG – readability test for English writing that estimates the years of formal education needed by the individual to understand the text on the first reading.

MFO – six-digit sort code for identifying the bank's ID

NBU – National Bank of Ukraine

ROA – Return on Assets

ROE – Return on Equity

UK – the United Kingdom of Great Britain and Northern Ireland

Chapter 1

INTRODUCTION

Over the last four years, the Ukrainian banking system has been exposed to a significant number of shocks caused mainly by political and economic factors. Among the political factors, the most destructive are the annexation of the Crimea, and the hybrid war Russia unleashed in the Donbas region. From the economic side, the general instability of the financial system and panic expectations of the population regarding the economic situation in the country have put substantial threat on the banking system of Ukraine.

During this period, there is a significant reduction in the number of banking institutions. According to the information from the Ministry of Finance of Ukraine, after the Revolution of Dignity, their number has decreased by half (see Figure 1). But the question may arise if it is good or bad.

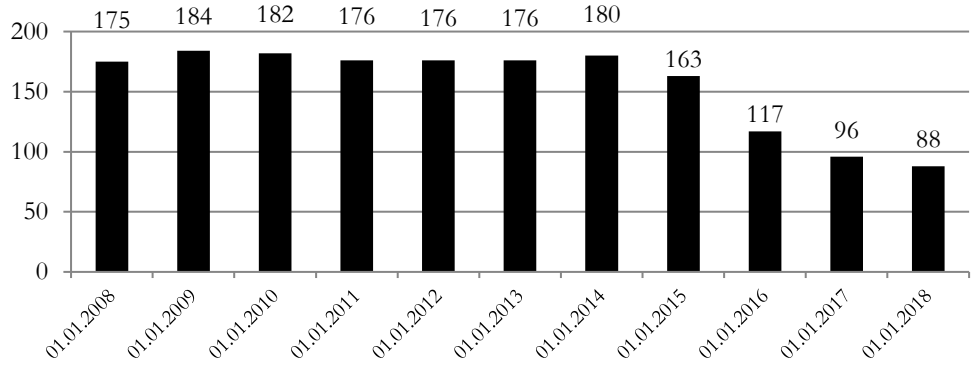

Figure 1. Number of operating banks in Ukraine
Source: Ministry of Finance of Ukraine[1]

[1] http://index.minfin.com.ua/bank/stat/count.php

A significant and sudden decrease in the number of banking institutions in the Ukrainian financial system is as an unhealthy phenomenon as the complete ignoring of legislative violations by commercial banks. According to the Law of Ukraine "On Banks and Banking"[2], one of the reasons for liquidation may be the failure of the bank to bring its activities in accordance with the current legislation, considerable reduction of the regulatory capital and capital requirements, non-completion of business obligations to depositors and creditors, the failure of the bank to comply with the instructions, decisions or requirements of the National Bank etc.

Apparently, a large number of liquidated banking institutions in Ukraine could be explained by the illiterate management inside of commercial banks or virtually the fake role of the bank (which, for instance, was created by oligarchs for money laundering or safe withdrawal of funds abroad).

Considering the fact that Ukrainian legislation requires all banks to be audited annually by an external auditor, and a 50% decrease in the number of operating banks in Ukraine, raises several questions. Why have the liquidated banks not been eliminated from the banking system before? Do the auditors possess a significant part of the information that is not available to other economic agents? Is the text written in Independent Auditor Reports associated with the bank's performance in the future? This research is more focused on the last question, which will address the subject of the asymmetric information in the Ukrainian banking system.

Asymmetric information is one of the most fundamental frictions in economics and finance. One specific manifestation of the asymmetric information is the private knowledge of a bank's auditor concerning the bank. The information

[2] http://zakon3.rada.gov.ua/laws/show/2121-14

obtained by the auditor during the investigation and review of a bank's operations is not available to the rest of the market agents.

A recent example of the scandal with PwC in Ukraine is the perfect example: the National Bank of Ukraine revoked the right for PwC to operate in the banking industry in Ukraine because of the contents of its report on PrivatBank, which later had to be nationalized.

Nevertheless, we cannot state with certainty that independent auditors can hide the actual information about banks in their reports, even though, the results of auditing PrivatBank by PwC and further EY (and tones of their reports, in particular) differ greatly. There main motive is to check how the actual state of affairs may well correlate with what auditors claim in their reports basing on the bank's future performance and answer the question how the bank's profitability change in one year after report publication. In order to answer this question, we form the following research hypotheses for further testing:

1) H_0: the Tone of Independent Auditor Report is positively associated with bank performance in the next financial year;
2) H_0: the Readability of Independent Auditor Reports has no association with banks' performance in the next financial year.

This study based on the quantitative content analysis of Independent Auditor Reports of Ukrainian banks would give the National Bank of Ukraine much more understanding and unique valuable evidence on Communication Value of audit disclosures from external auditors. Moreover, it will help Ukrainian citizens choose a bank impartially and allow banking institutions to make better decisions concerning the auditor choice.

In this thesis, we consider the unbalanced panel dataset of Ukrainian banks in 2012-2016 and apply the fixed-effects estimator within the panel regression for

the analysis. The data were obtained from the official website of the National Bank of Ukraine and bank's Audit Reports. It contains all Ukrainian bank's financial indicators and full texts from Reports.

The structure of the paper is as follows. Chapter 2 reviews literature concerning implementation and description of content analysis; explains how the asymmetric information is characterized by the Readability of Reports in the joint-stock companies; and justifies the importance of the tone as one of the key measures of the Communication Value of bank's Audit Report. Chapter 3 provides the methodology of the analysis, model specification, selection of controls and methodology of defining the Tone and Readability indices. The processes of data collection and preparation, and descriptive statistics of the variables are discussed in Chapter 4. The main empirical results and the discussion of findings are represented in Chapter 5. Finally, in Chapter 6 we draw main conclusions of the research.

Chapter 2

LITERATURE REVIEW

The main question of the thesis (to check if the Communication Value of Independent Auditor Report associated with bank performance in the next financial year) has not been studied in depth. Even though there are no papers investigating the link between the Tone of Auditor Report and bank's profitability in the next financial period, there are some papers exist, which explore the relevance and informativeness for our research.

The literature review is divided into three parts. The first group of scientific papers scrutinizes the research approach of content analysis and provides some limitations of this method. The second group of studies describes the phenomenon of asymmetric information in the joint-stock companies. The last one sheds light on the importance of the Tone of Auditor Reports in the fields of finance, economics, and audit.

2.1. Content Analysis

A lot of text sources of information can be analyzed through the research approach, which is called content analysis. This method is used for analyzing various types of the data such as written texts (books, papers), oral texts (speeches), iconic texts (drawings, paintings), audio-visual texts (movies, videos) and hypertexts (texts found on the Internet) manually or using Machine Learning. The approach is widely used mainly to investigate naturally-occurring data, so it could be considered as an unostentatious method for research (Insch

et al. 1997, Harris 2001). The main advantages of this method are simplicity of conducting and unobtrusiveness in gathering information.

Considering the limitations of this method, the sampling process and coding could cause possible weakness of the design. Bias in estimations may arise mainly because of the possible public availability of the analyzed text documents. Moreover, some problems in such analysis can emerge because of the abstraction of word groups from the context. When some phrase or a word isolated from other pieces of the text, it may cause the loss of meaning. Additionally, the content analysis will probably ignore what is not said in a particular part of the text. So, sometimes significant parts of the text could be simply omitted as well as could be included and analyzed (Insch et al. 1997).

2.2. Asymmetric Information in the Joint-Stock Companies

The Tone and Readability of Independent Directors' speeches and reports were analyzed and estimated for the joint-stock companies. These two characteristics considered as the primary indicators of Communication Quality between Directors and other economic agents.

Drawing parallels, it should be noticed that both Independent Director of the joint-stock company and Independent Auditor have access to the hidden information of the institution (company and bank respectively). Moreover, both possess the real financial situation and are well aware of expectations of top-management etc, which other economic agents (i.e. customers and clients) do not have access to. Thereby, the literature review concerning such companies is more than relevant in our case (Independent Director corresponds to Independent Auditor and Shareholders correspond to Banks' Clients).

The main idea of the basic research concerning information asymmetry inside the joint-stock company is that the analysis of directors' communication could be helpful for stakeholders, which cannot be engaged in the firm decision-making to understand the firm behavior (Simon, 1999). Developing this topic, it has been found that director's disclosures of firm's internal information have direct and significant associates with the firm's profitability and earning quality (Li, 2010).

Additionally, the FOG Readability Index, which was developed by Robert Gunning in 1952, was brought into the financial literature by Li (2008), who showed the link between the financial performance of the institution and readability of its Annual Report. In that paper, Li demonstrated that profitable firms have more readable reports if compare to those companies which had losses (i.e. negative relationship between FOG Index and profitability). In the continuation of Li's scientific paper, Bloomfield (2008) discusses some possible explanations for this negative relationship: ontology (bad news is much more complicated to communicate) and obfuscation (the more complicated the text is written, the easier to hide there some bad news).

2.3. The Tone of Auditor Report

According to Coram et al. (2011) and Mock et al. (2009), the main source of information for analysts when doing their intermediary role is the Audit Report. These papers showed that financial analysts value the unqualified opinion which included in the report of an auditor. At the same time, the recent researches have shown that users of financial statements usually have some problems with understanding of the audit reports information, which negatively affects the Communication Value of Auditor Reports (Church et al., 2008; Gray et al.,

2011; Coram et al., 2011; Asare and Wright, 2012; Manson and Zaman, 2001; Hermanson et al., 1991).

The analyzed academic studies are written by Doogar et al. (2015) and Sikka (2009) show that ordinary auditor report did not inform all financial risks during the crises because most of the failed financial institutions received low-qualified external audit opinions.

According to Henry (2008), the Tone of the Auditor Report is the main measure that defines the "effect or feeling of a communication". Literature in the field of finance has introduced the evaluating the Tone of Reports as an appropriate method to further understand the impact of the written word on the behavior of stakeholders and investors (Antweiler and Frank, 2004; Tetlock, 2007; Tetlock et al., 2008; Loughran and McDonald, 2011). Loughran and McDonald's Negative, Positive, and Uncertainty Word Dictionaries are widely used for calculating the Tone of Auditor Report: risk-related content associates with words which show negativity and uncertainty, while the dictionary of positive words contains the alternative ones. Going forward, we also will use Loughran and McDonald's Word Dictionaries for identifying the Tone of Auditor Reports in our research paper.

The current study aims to contribute to the existing literature about the determinants of bank's profitability, the quantitative content analysis, and the phenomenon of the information asymmetry in the banking system through the analysis of the Independent Auditor Reports. Moreover, this research provides practical evidence that helps to understand the influence of the Communicating Value of Reports on bank's profitability.

Chapter 3

METHODOLOGY

In this section, we proceed in few steps of the analysis. Since the procedures of data obtaining and preparation are represented in the section of Data Description, here we start with the methodology of generating the continuous variable of the Tone of Auditor Reports based on:

1) Loughran and McDonald dictionary of positive and negative words for the main analysis;
2) Multilingual dictionary for the further robustness check of the model.

The next step is describing the methodology of generating the continuous variable of the Readability of Audit Reports based on:

1) FOG Readability Index for the main analysis;
2) Flesch—Kincaid Readability Index for the further robustness check of the model.

When the key variables are generated, we explain and justify the choice of control variables used in the regression analysis. And finally, when all variables are ready, we apply five-year panel data analysis.

3.1. Constructing of the Tone and the Readability Variables

Readability is a concept which used in the different areas such as economics, jurisprudence, linguistics, medicine etc. For our case, the most relevant definition was given by Loughran and McDonald (2014), since it concentrates mostly on the business context. Authors define "readability as the ability of individual investors

and analysts to assimilate valuation-relevant information from a financial disclosure". Simply put, readability is an ease with which a reader can understand the text of Auditor Report.

Since there is no precise definition of readability, we can highlight few ways to measure it. Furthermore, it should be mentioned that no measurement has been recognized as the best one. That is why we introduce the two most common approaches for readability measurement which were used in the thesis: Gunning Fog Index (FOG) and Flesch–Kincaid Grade Level (Flesch–Kincaid).

In computational linguistics, the FOG Index is a function of the number of words per sentence plus the percentage of complex words. Then the sum is multiplied by a constant term which is equal to 0.4 in order to approximate the number of years of formal education which are required to understand the fragment of the text read. The formula of calculating the FOG Index is provided below.

$$FOG = 0{,}4 \cdot \left(\frac{number\ of\ words}{number\ of\ sentences}\right) +$$

$$+40 \cdot \left(\frac{number\ of\ words\ with\ more\ than\ two\ syllables}{number\ of\ words}\right)$$

What about the Flesch–Kincaid Grade Level, it is a function of the number of words per sentence and the share of complex words in the Auditor Report. The Index allows us to indicate how difficult a passage in English is to understand through the length of words and sentences. You can see the formula used for the estimations of the Flesch–Kincaid Grade Level below.

$$Flesch—Kincaid = 0.39 \cdot \left(\frac{number\ of\ words}{number\ of\ sentences}\right) +$$

$$+11.8 \cdot \left(\frac{number\ of\ syllables}{number\ of\ words}\right) - 15.59$$

In order to calculate the Tone of Reports, we use dictionary-based approach, which matches the sentiment words. Firstly, we segment positive and negative words with the help of Loughran and McDonald's Financial Sentiment Word Lists and the Multilingual Dictionary of Positive and Negative Words. After that, using the econometric software we find number of positive and negative words which occur in the reports. Finally, using the formula below, we calculate the Tone for every Report.

$$Tone = \frac{number\ of\ positive\ words\ -\ number\ of\ negative\ words}{number\ of\ positive\ words\ +\ number\ of\ negative\ words}$$

After the construction of core regressors, we can choose the variables which will help us to clarify the relationship between the reports' Communication Value and banks' profitability in the next period.

3.2. Control Variables Selection

During the selection of control variables, we consider studies, which investigate the factors influencing the bank's profitability. Arellano and Bond (1991)

demonstrate that usage of logarithmic transformation of Total Assets is an effective tool for capturing the bank size. Later, a positive significant association between bank size and its profitability is found in the number of scientific papers (Kosmidou, 2008; Flamini et al., 2009; Pervan and Pervan, 2010; Adusei, 2015; Pervan et al., 2015). This result leads us to the conclusion that banks should make use of their size in order to experience cost advantages, rise efficiency, and, as a result, increase profitability. On the other hand, Naceur and Goaied (2008) in their study based on the Random Effect model, find out that bank size has a negative association with its profitability. This inverse relationship could be a result of diseconomies of scale, which often occurs in the large banking institutions (Kosak and Cok, 2008). Additionally, while studying the profitability of Chinese banks, Heffernan and Fu (2008) use system GMM and find that the size of banking institution has no significant association with bank performance.

Liquidity is considered as an important factor that influences bank profitability since the ability of bank to fund increases in assets and ability to accommodate decreases in liabilities really matters. Bourke (1989) shows a positive association between the profitability and liquidity due to the fact that credits to firms and households are riskier (and have higher expected returns) than, for example, government bonds. On the other hand, Eichengreen and Gibson (2001) examine that higher profitability of the banking institution might be explained by smaller amounts of funds put in liquid investments.

What about expenditure management of the bank, the studies show us a negative association between the profitability and Operating Expenses, i.e. expenses diminution lead to increase in the profitability of the bank (Bourke, 1989). Nevertheless, a positive relationship is also observed by Molyneux and Thornton (1992), who suggested that high profitability leads to larger payroll expenditures to more productive personnel.

3.3. Model Specification

To estimate whether the Tone and Readability associated with bank's earnings in the future period, we formulate the following research hypotheses:

1) H_0: the Tone of Independent Auditor Report is positively associated with bank performance in the next financial year;
2) H_0: the Readability of Independent Auditor Reports has no association with banks' performance in the next financial year.

We focus our research on the finding of the association between the banks' performance and lagged values of Readability and Tone of the Reports, which is logically due to the fact that the Independent Auditor Reports become publicly available in March or April of the next year.

For further research we use the following model:

$$Bank\ Performance_{i,t} = \beta_0 + \beta_1 \cdot Tone_{i,t-1} + \beta_2 \cdot Readability_{i,t-1} +$$

$$+ \beta_3 \cdot Controls_{i.t-1} + \beta_4 \cdot Dummies_{i.t-1} + \varepsilon_{i,t}$$

where:

$Bank\ Performance_{i,t}$ is measured as

1) ROA (Net income after tax/Total Assets) in bank *i* at year *t*,
2) ROE (Net income after tax/Total Equity) in bank *i* at year *t*.

$Tone_{i,t-1}$ is a tone of the independent audit report in bank *i* at year *t-1*. We generate the tone for each audit report using 'quanteda' package in R econometric software and domain-specific word dictionaries: Loughran and McDonald's Financial Sentiment Word Lists, and the Multilingual Dictionary of Positive and Negative Words. This is a continuous variable, ranged from -1 (negative) to 1 (positive) and mean 0 is neutral view.

$Readability_{i,t-1}$ is a readability index measured by FOG Index and Flesch—Kincaid Index. This is a continuous variable as well; the higher index is, the more difficult is to read an auditor report.

$Controls_{i,t-1}$ are control variables of the bank: *log(total assets)* indicate bank size, *log(operating expense)* help to explain expense management of the bank, the amount of the most liquid funds for liability coverage are present by *Cash/Total Liabilities* ratio. These profitability determinants are widely used as control variables of ROA and ROE and were scrutinized in the previous subsection.

$Dummies_{i,t-1}$ are dummy variables of the bank: *Time* (2012-2016 years), *Auditor* (indicates whether audit was made by Big-4 company or not), *Solvency* (shows if the bank is solvent or insolvent), *Ownership* (presents banks with state participation/ banks belonging to foreign banking groups/ banks belonging to Ukrainian banking groups) in bank *i* at year *t-1*.

We conduct Hausman test for the fixed versus random effects model and find that the fixed effect model is appropriate in the case of the unbalanced panel dataset of Ukrainian banks (i.e. we reject the null hypothesis that the preferred model is random effects). Wald test shows us the presence of heteroscedasticity, but since it is a common issue, we mitigate it using the robust standard errors. After testing the main two independent variables (Tone and Readability) on the multicollinearity we find the absence of intercorrelations or inter-associations

among them, which means that this issue will not adversely affect the regression results. Finally, Durbin-Wu-Hausman test for endogeneity problem shows us no correlation between the independent variable and the residual term in a model, which means that the style of our model is identified correctly and we can expect the absence of endogeneity bias in the regression results. All details about the tests on fixed versus random effects, heteroscedasticity, multicollinearity and endogeneity are provided in the Appendix D.

Chapter 4

DATA DESCRIPTION

In the thesis, we deal with the five-year unbalanced panel dataset of Ukrainian banks. The data used for the research are in the public domain and were obtained from The National Bank of Ukraine and Annual Reports of operating, liquidated and closed Ukrainian banks for the period from 2012 to 2016. In order to analyze financial conditions of banking institutions we took their financials (such as *Assets:* Cash and Equivalents of banks, Loans and Receivables from Entities and Individuals, Total Assets; *Liabilities:* Amounts due to Banks, Amounts due to Entities, Amounts due to Individuals, Total Liabilities; *Equity:* Authorized Capital, Retained Earnings, Total Equity). To conduct the quantitative content analysis of Auditor Report tones, we took 514 Independent Auditor's Reports from the official websites of various Ukrainian banking institutions.

4.1. Data Collection

Before the Tone of Reports estimation, it is important to collect appropriate data and prepare it carefully for the further research. Data preparation is needed in order to create a variable which will describe the Tone of the Report by sentiment analysis in finance. First of all, we identify banks classified by their MFO Code. Then, from the website of the Ministry of Finance of Ukraine we learn the status of each Ukrainian banking institution, which could be operating, liquidated or closed (Appendix A). After that, we search Annual Reports at official websites of these banks. Further, download them and isolate Annual Auditor Reports from them. After isolation, we cut the document in order to eliminate unnecessary part of the report. Since the majority of documents our banks disclose in Portable

Document Format, we translate it into Text Format (txt-file) for further analysis in econometric software. According to current Ukrainian legislation, Annual Reports should be published in Ukrainian, so we need to translate all of the Auditor Reports into English.

Document translation is done through Python programming language using Yandex Translator API (Appendix C). We apply this translator to all of 514 txt-files appropriately taking into account Yandex limitations on the free usage of API. We import required libraries and create a loop that goes through all files from a given directory. The process of translating through Python requires opening each txt-file, then read it and save the translated text into a string variable. Then we split the text into pieces no more than 3000 symbols (because of the limitations on Yandex free usage of API) and create a new txt-file, in which we store the translated text. Then we create a loop to translate each part of the split text separately and append translated parts into the newly created txt-file.

4.2. Data Preparation

After obtaining newly created txt-files, we make a column consisting of string variables with texts of reports. Then we substring Year and bank's MFO from the file name to get two additional variables.

In order to analyze these data, we need to create a monolingual corpus – a large set of texts with all Independent Auditor Reports of Ukrainian banks over the last five years. The main characteristics of text corpus are the number of types, tokens, and sentences.

Next step is to create a Document-Feature Matrix after all features are abstracted from the text corpus. Creation of such matrix is important because it will

significantly simplify the process of sentiment analysis. After Document-Feature Matrix creating we need to "clean" the cell with the text of report: remove punctuation signs, all numbers and stop words like "the", "of", "and", "in", "to", "on", "for", "with", "by", "is", "as", "a", "that", "at", "which" etc.

After documents cleaning we can build a word cloud (see Figure 2) in order to demonstrate the most frequent words which appear in reports.

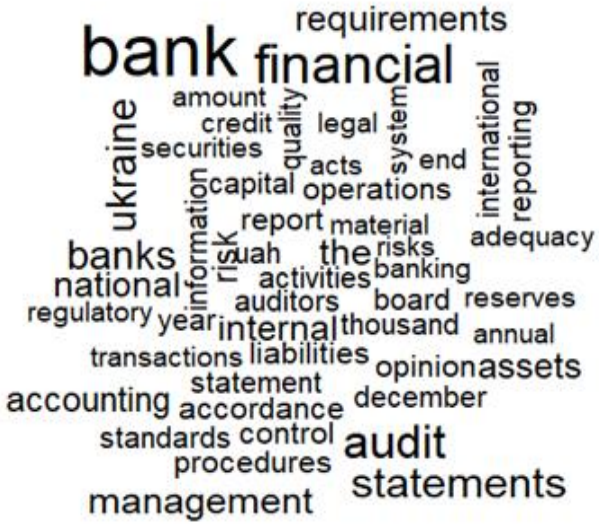

Figure 2. The most 50 frequent words in Audit Reports

4.3. Zipf's Law Demonstration

The Zipf's Law is an empirical law which states that given a large sample of words used, the frequency of any word is inversely proportional to its rank in the frequency table. Other words, the most frequent word will occur approximately twice as often as the second most frequent word, three times as the third most frequent word etc. We can observe Zipf's Law for our case by plotting data on a

log-log graph, where axes are log (rank order) and log (word frequency). From the graph below (see Figure 3) we can conclude that our text data distributed linearly and confirm Zipf's Law using top 100 most frequent words.

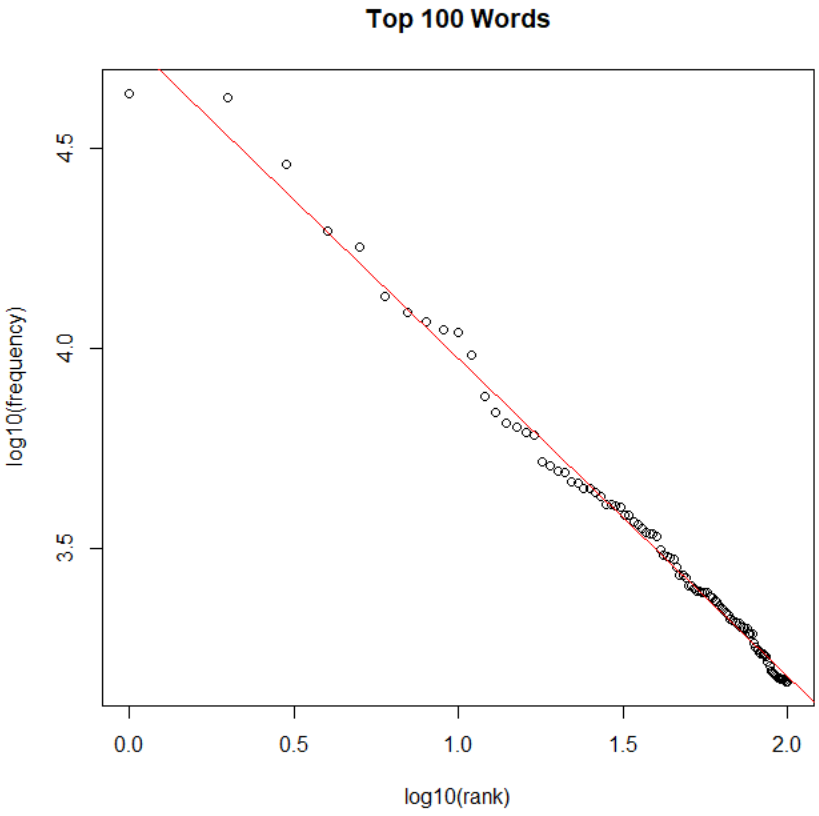

Figure 3. Frequency-Rank Graph

4.4. The Lexical Diversity of Reports

The lexical diversity of texts is also known as a Type-Token Ratio. This term is equivalent to the lexical richness and could be calculated as a ratio of different unique word stems to the total number of words in Auditor Reports.

Values of Type-Token Ratios for Audit Reports of Ukrainian banks in 2012-2016 cluster near 4-5% (see Figure 4). It means that every twentieth or twenty-fifth word in the report is new, which is normal considering sizes of documents and repetitive financial lexicon.

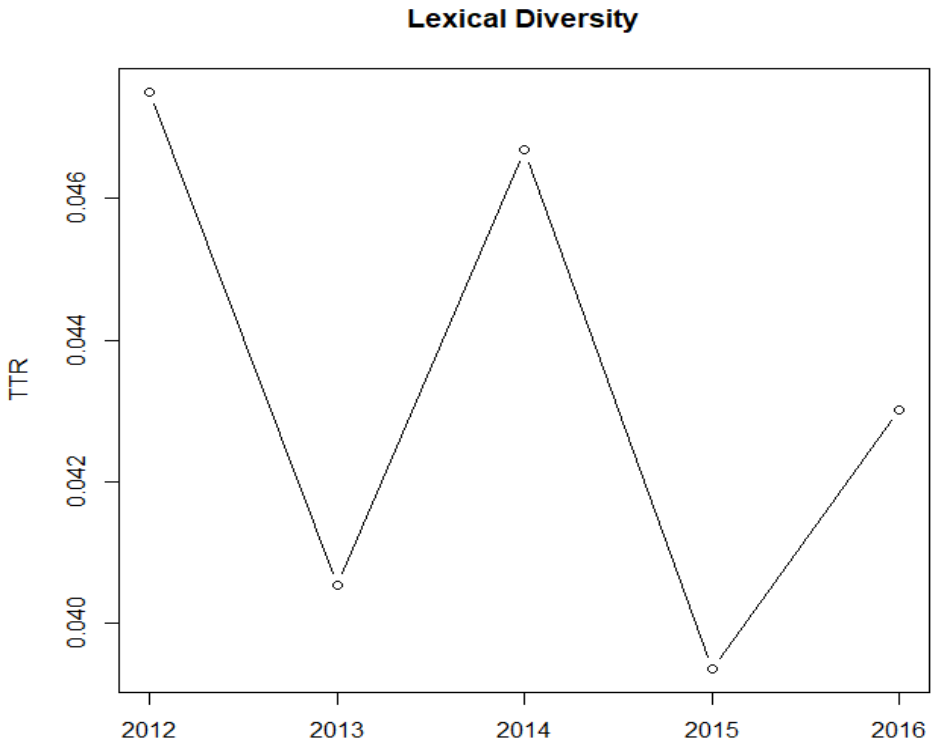

Figure 4. Type-Token Ratio

4.5. Descriptive statistics of financials

We need to know some statistics of key variables from the dataset that we use. Since we consider bank performance as a dependent variable, we will need to see some financials that could be used in order to construct the dependent variable. If consider ROA (Return on Assets) or ROE (Return on Equity), we should

consider such financial indicators as Total Assets, Total Equity, and Total Net Income. ROA we can obtain by dividing Total Net Income by Total Assets, and to know ROE we divide Total Net Income by Total Equity. Exactly these ratios used by National Banks of developed countries and the National Bank of Ukraine as one of the most reliable and appropriate which describe bank financial performance (see Table 1).

Table 1. Descriptive statistics of banks' financial indicators

Variable	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
Total_Assets	718	8648717	2.54E+07	81340.57	2.65E+08
Total_Equity	718	1014867	2894417	-1.23E+07	2.75E+07
Net_Income	718	-51293	5126298	-1.35E+08	8781142
Liab_total	718	7633850	2.31E+07	1.2	2.37E+08
Cash	718	1092439	3544165	29.25803	4.10E+07
Oper_exp	711	-70578.8	683105.9	-9287553	2333561

Based on this dataset with banks' financials and newly created variables we model and run a regression which would explain how the bank profitability changes in one year after report publication. Detailed descriptive statistics of banks' financial indicators see in Appendix C.

Chapter 5

EMPIRICAL RESULTS

Results are estimated using the fixed-effects estimator within the panel regression, where panel variable is bank's MFO sort code and time variable is Year. Results for ROA are presented in the Table 2.

Table 2. Estimation results for ROA

	Original model	*Model with added cross-terms*
Lagged Tone (ML)	-0.066* (0.039)	-0.060** (0.028)
Lagged Readability (FOG)	-0.001 (0.002)	-0.001 (0.001)
Lagged Tone*Auditor		0.029 (0.026)
Lagged Tone*Bank status		0.060 (0.078)
Lagged Tone*Ownership		-0.025 (0.048)
Lagged Tone*Auditor*Status		-0.188** (0.075)
Lagged log (Total Assets)	0.027* (0.016)	0.027* (0.016)
Lagged Cash Ratio	0.001*** (0.000)	0.001*** (0.000)
Lagged log (Oper Expeses)	-0.033*** (0.011)	-0.033*** (0.011)

Table 2 continued

	Original model	*Model with added cross-terms*
Constant term	-0.046 (0.192)	-0.059 (0.198)
Sample size	391	385
Adjusted R^2	0.133	0.151

Notes: additional controls for this regression are dummies for auditor type (Big-4/not Big-4 company), bank status (solvent/insolvent), ownership (with foreign capital/with Ukrainian capital); base level of auditor type is "not Big-4 company"; base level of bank status is "solvent"; base level of ownership is "with Ukrainian capital"; * if p-value < 0.1, ** if p-value < 0.05, *** p < 0.01.

The regression was built with controls that are widely used by economists in the researches, which estimate bank's profitability. We control our regression on the bank size (expressed as a lagged value of logarithm of Total Assets), the expense management (expressed as a lagged value of bank logarithm of operating expense), the adequacy of amounts of the most liquid funds which could be needed to cover liabilities (expressed as a lagged value of Cash-to-Total Liabilities ratio). All of these control variables fit the model, so let consider them in details below.

The size of the banking institution matters since the amount of assets is statistically significant at 10% significance level. This relationship is positive, which is quite logically: larger banks often have higher returns since they are better organized, more efficient and use benefits from the economies of scale due to comparatively lower costs. According to regression results, holding all other variables constant in the model, on average, doubling bank's assets (or 100% assets increasing) is associated with growing its Return on Assets by 0.03 in the next financial year.

While considering the Cash-to-Total Liabilities ratio, we determine that it positively correlates with ROA, which means that the more Cash and Cash Equivalents bank possesses relatively to its Total Liabilities, the greater ROA we can expect for the bank in the next year. From the theoretical point of view, it is ambiguous why the bank's extra cash has the positive correlation with its profitability. On the one hand, profitable banks should have an adequate amount of Cash and Equivalents in order to be able to promptly accommodate possible significant decreases in Liabilities. On the other hand, it is intuitively understandable that the more liquidity bank has, the less risky these funds are, so the less return on it bank could expect to receive. From the regression results we can clearly see that this positive dependence holds at highly significant level ($p<0.01$), however, coefficient before this variable influences our model imperceptibly due to its mathematical insignificance, which could be explained by overlapping both abovementioned effects.

From the regression results, we can state that amounts of Operating Expenditures have the negative correlation and highly statistically significant association with the bank's profitability (at the level of $p<0.01$). Holding all other variables constant in the model, on average, 10% increase in Operating Expenditures associated with dropping its Return on Assets by 0.003 in the next financial year. According to the scientific papers, we cannot state that this negative relationship was unequivocally proven since it was defined and observed as well as positive one. In general, literature argues that reducing Operating Expenditures improving the profitability of financial institutions and vice versa (the more funds bank spend now, the less returns it can rely on in the future). But if consider the suggestion that bank's profits may be appointed to the more productive personnel, a positive relationship also could be observed. To conclude, this negative relationship implies rather a lack of competence in expenses management of Ukrainian banks.

Considering explanatory variables, from the results of regression we can observe that the Tone of Auditor Report has a negative association with bank's profitability, while Readability is found to be insignificant.

Readability of Reports does not connected with ROA in the next financial year, which means that no matters how complicated report is written, it does not influence profitability at all, even though according to the literature, the negative relationship between readability and profitability was found (which means that more profitable firms have more readable reports if compare to those companies which had losses).

The Tone of the Report is found to be significant at 0.1 significance level and it is negatively correlated with ROA in the next period, which means that worse Tone of Auditor Report now is associated with better returns in the next financial year.

If divide the sample of banks by adding interaction terms based on the auditor (Big-4/not Big-4 company), bank status (solvent/insolvent), ownership (with foreign capital/with Ukrainian capital), the coefficient before the Tone of Audit Report becomes significant at 5% significance level. However, adding interaction terms does not imply that the effect of the Tone of Auditor Report for these groups statistically differs from the effect on the ROA of other groups. Still, if we choose some bank with Ukrainian capital that is audited not by Big-4 company, the difference in effects is statistically significant if compare to other groups: on average such banks have worse Tone of their Reports.

Results for ROE are presented in the Table 3.

Table 3. Estimation results for ROE

	Original model	*Model with added cross-terms*
Lagged Tone (ML)	-1.531* (0.779)	-1.476* (0.766)
Lagged Readability (FOG)	-0.020 (0.018)	-0.008 (0.018)
Lagged Tone*Auditor		0.621 (0.4840)
Lagged Tone*Bank status		-1.952 (3.836)
Lagged Tone*Auditor*Status		-1.753 (1.277)
Lagged log (Total Assets)	-0.116 (0.283)	(-0.054 (0.248)
Lagged Cash Ratio	0.001** (0.000)	0.002 (0.002)
Lagged log (Oper Expenses)	-0.296*** (0.105)	-0.304*** (0.103)
Constant term	4.302 (3.983)	3.084 (3.256)
Sample size	391	389
Adjusted R^2	0.05	0.06

Notes: additional controls for this regression are dummies for auditor type (Big-4/not Big-4 company), bank status (solvent/insolvent), ownership (with foreign capital/with Ukrainian capital); base level of auditor type is "not Big-4 company"; base level of bank status is "solvent"; base level of ownership is "with Ukrainian capital"; * if p-value < 0.1, ** if p-value < 0.05, *** p < 0.01.

The regression is built with the same control variables: we control our regression on the bank size (expressed as a lagged value of logarithm of Total Assets), the expense management (expressed as a lagged value of bank logarithm of Operating Expense), the adequacy of amounts of the most liquid funds, which could be needed to cover liabilities (expressed as a lagged value of Cash-to-Total Liabilities ratio), as before.

The amount of bank's assets does not matter since this variable is statistically insignificant, which means that bank's Return on Equity does not depend on the size of the banking institution.

While considering the Cash-to-Total Liabilities ratio, we determine that it positively correlates with ROE, which means that the more Cash and Cash Equivalents bank possesses relatively to its Total Liabilities, the greater ROE we can expect for the bank in the next year. However, the coefficient before this variable influences our model imperceptibly due to its mathematical insignificance, even though it is highly significant at the level $p<0.01$. It is due to the fact that profitable banks should have an adequate amount of Cash and Equivalents in order to be able to accommodate potential decreases in Liabilities. However, it should be mentioned that the more liquidity bank has, the less risky these funds are, so the less return on it bank could expect to receive.

Next, we can state that amounts of Operating Expenditures have the negative correlation and highly statistically significant association with the bank's profitability (at the level of $p<0.01$). Holding all other variables constant in the model, on average, 10% increase in Operating Expenditures associated with dropping its Return on Equity by 0.03 in the next financial year. This negative relationship implies rather a lack of competence in expenses management in Ukrainian banks, which needs to be improved by institutions.

The Readability of Reports is not connected with ROE in the next financial year, which means that no matter how complicated report is written, it does not influence profitability at all, even though according to the literature, the negative relationship between readability and profitability was found.

However, the main finding is that the Tone of the Report is found to be marginally significant at 0.05 significance level and it is negatively correlated with ROE in the next period, which means that worse Tone of Auditor Report now is associated with better returns in the next financial year.

If divide the sample of banks by adding interaction terms based on the auditor (Big-4/not Big-4 company), bank status (solvent/insolvent), ownership (with foreign capital/with Ukrainian capital), the coefficient before the Tone remains marginally significant at 5% significance level. However, adding interaction terms does not imply that the effect of the Tone of Auditor Report for these groups statistically differs from the effect on the ROE of other groups of banks.

5.1. Regressors Robustness Tests

We decide to examine whether our core regressors, Tone of the Report and Readability, are valid. For these purposes we reran our model by substituting

1) Tone of the Report estimated using Loughran and McDonald dictionary of positive and negative words by Tone calculated with the help of the Multilingual dictionary of positive and negative words;

2) Readability FOG Index by Readability Flesch—Kincaid Index.

When testing both regressors for the model with dependent variable ROA, the following results are obtained. The control variables, lagged logarithm of Total

Assets and Cash/Total Liabilities, are found to hold their signs and significance levels when testing the Tone. The same result is observed when checking for Readability. Also, while testing Readability lagged logarithm of Total Assets remains marginally significant, as previously. Meanwhile the coefficient of lagged logarithm of Operating Expenses slightly increases without change in sign and significance when alter Tone of the Report.

The robustness test for the model with ROE as dependent variable reflects the same pattern, in general, as the result of testing the model with ROA, however differs in some controls. For instance, lagged logarithm of Total Assets remains insignificant for both tests of Tone and Readability and retains its sign negative. The lagged logarithm of Operating Expenses holds its sign and significance level when testing for Readability and Tone, but slightly changes in magnitude when testing for Tone. Moreover, change of the method of calculating Tone decreases significance of the Cash Ratio and makes it insignificant on the less than 10 % confidence level.

One of the core regressors, Readability, is insignificant and is negatively correlated with ROA and ROE in all tests. Another main independent variable, Tone of the Report, is found to be insignificant ($p=0.14$) while testing this variable, however, holds its sign and the level of significance when testing Readability.

Detailed results of regressors robustness tests for ROA and ROE are provided in the Tables 4 and 5 below.

Table 4. Regressors robustness tests for ROA

	Original model (McDonald and Loughran dictionary, FOG Index)	*Tone identified using the Multilingual dictionary*	*Readability calculated using Flesch-Kincaid Index*
Lagged Tone (ML)	-0.066* (0.039)		-0.067* (0.039)
Lagged Readability (FOG)	-0.001 (0.002)	0.000 (0.002)	
Lagged log (Total Assets)	0.027* (0.016)	0.027* (0.016)	0.026 (0.016)
Lagged Cash Ratio	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Lagged log (Oper Expeses)	-0.033*** (0.011)	-0.034*** (0.011)	-0.033*** (0.011)
Lagged Tone (Multilingual)		-0.049 (0.033)	
Lagged Readability (FK)			-0.001 (0.002)
Constant term	-0.046 (0.192)	0.004 (0.194)	-0.055 (0.191)
Sample size	391	391	391
Adjusted R^2	0.133	0.126	0.133

Notes: * if p-value < 0.1, ** if p-value < 0.05, *** p < 0.01.

Table 5. Regressors robustness tests for ROE

	Original model (McDonald and Loughran dictionary, FOG Index)	*Tone identified using the Multilingual dictionary*	*Readability calculated using Flesch-Kincaid Index*
Lagged Tone (ML)	-1.531* (0.779)		-1.528* (0.778)
Lagged Readability (FOG)	-0.019 (0.018)	-0.014 (0.019)	
Lagged log (Total Assets)	-0.116 (0.283)	-0.111 (0.283)	-0.117 (0.282)
Lagged Cash Ratio	0.001** (0.000)	0.001 (0.000)	0.001** (0.000)
Lagged log (Oper Expeses)	-0.296*** (0.105)	-0.311*** (0.109)	-0.296*** (0.105)
Lagged Tone (Multilingual)		-0.234 (0.331)	
Lagged Readability (FK)			-0.020 (0.019)
Constant term	4.302 (3.983)	5.296 (4.461)	4.211 (3.967)
Sample size	391	391	391
Adjusted R^2	0.038	0.013	0.038

Notes: * if p-value < 0.1, ** if p-value < 0.05, *** p < 0.01.

Chapter 6

CONCLUSIONS

In the thesis work, we implement a quantitative content analysis to the Independent Auditor Reports of Ukrainian banks for the purpose of identifying the association between the Tone of these reports and the bank's profitability in the consecutive year. The research is conducted for the dataset from the National Bank of Ukraine and Annual Audit Reports of Ukrainian banks for the five-year period from 2012 to 2016. The final dataset consists of both financial data provided by the abovementioned sources and newly created variables, which characterize the Communication Value of the particular Auditor Report represented by Readability and Tone. In order to determine the existence of any association between the Readability and the Tone with banks performance in the next financial period we construct the fixed-effects model within panel regression.

The Readability of financial reports is widely used in the literature as a determinant of financial institutions performance. However, no corresponding research using the quantitative content analysis is conducted for Ukrainian banking system. Moreover, the idea of incorporation of the Tone of Audit Reports into the model of determining the profitability of a banking institution is unique and is not studied previously. Hence, the research sufficiently contributes to the existing literature and provides practical evidence that helps to understand the influence of the Communicating Value of reports on banks' profitability.

We find that both Readability indices FOG Index and Flesch-Kincaid Index slightly increase over time, if consider the full sample of banks. This positive trend means that Readability worsens, so it becomes more and more complicated to read reports due to the increasing number of long sentences and magnification

of sophisticated financial terms concentration. According to the literature, it worsens the Communication Value of reports and is associated with the lower Return on Assets. However, the evidence from our research on the Ukrainian banking system reveals no significant effect of Readability alteration on banks' performance.

Another important finding of the paper is that the Tone of Reports generally has neither increasing nor decreasing trend over time if use Loughran and McDonald financial Dictionary of Positive and Negative words. However, if consider ordinary Multilingual dictionary of positive and negative words, we can observe that, on average, the Tone of Reports in 2014 and 2015 are much lower than, let's say, in 2012 or 2016. The difference might be explained by the difficult situation on Ukrainian financial market in general and a resulting liquidation of 63 banks during this period.

In the result of our research, we reject on the 10% significance level the initial hypothesis, which states that the Tone of Independent Auditor Reports has positive association with banks' Return on Assets in the next financial period, since the relation is found to be negative. Moreover, the Tone of the Report is found to be marginally significant at 0.05 significance level and it is also negatively correlated with ROE in the next period, which means that worse Tone of Auditor Report now is associated with better returns in the next financial year. For both ROA and ROE we fail to reject the null hypothesis that the Readability of Independent Auditor Reports has no association with banks' performance in the next financial year.

Thus, we might conclude that Ukrainian banks take into account the information provided in Auditor Reports when considering whether to change their policies concerning the key financial indicators. Since Independent Auditor Reports usually become publicly available in March or April, the management of a bank

has almost 9 months remaining to the next auditor revision. This time is rather adequate to revise the policy bank conducts and to fine-tune the direction of further development if the Tone of Report follows a negative trend.

Despite the appropriate specifications from the econometrical point of view, the model studied has its own limitations corresponding to the features of the Ukrainian financial environment. For instance, in Ukraine, banks have more power than auditors, which creates a serious obstacle for the actual independence of auditors that prepare Independent Auditor Reports. Therefore, in Ukrainian realities, bank's top management might affect the final version of the Report by making some corrections to the draft, which in its turn smooths out the negative aspects of this very conclusion. Moreover, there are some visible problems with the bank audit quality in Ukraine. The recent case with audit of PrivatBank by two Big-4 companies proves such state of affairs: the Report published by PwC and the following Report prepared by the auditors from E&Y differ in tone.

The more severe distortions in the Ukrainian banking system are also revealed. There are real cases when the auditors give a positive conclusion to the problematic bank but modify it later under the pressure of the NBU Department of Bank Supervision. On the other hand, there are a number of facts providing the evidence of myopic behavior performed by the National Bank of Ukraine. For instance, until 2014-2015, despite the huge concentration of criticism in several Auditor Reports the NBU does not pay proper attention, and such problematic banks continue operating and conducting their corruption schemes with fictitious profits in their financial statements.

In general, the negative relationship between Tone and Profitability, and the absent association between Readability and Profitability demonstrate the low importance of the Communication Value of the Audit Reports among financial agents in the current banking system of Ukraine. Hence, the government should

provide actions aimed at increasing the role of these reports in order to make them accessible and meaningful for the ordinary users of financial statements, i.e. other economic agents.

For increasing the effectiveness and accessibility of reports, Ukraine should follow the successful experience of developed countries, e.g. United Kingdom and Ireland, and fully adopt the International Standards on Auditing. For instance, in the UK adoption of the ISA 700 results in positive changes in the financial reporting system, particularly reports become easier to read and understand, and, as a result, the process of making financial decisions for economic agents is substantially simplified (Fakhfakh, 2015; Smith, 2016).

Since the Tone of Report is found to be significant factor of determining the profitability of banks in Ukraine, this paper should bring attention to the Independent Auditor Reports in Ukraine. Increase in importance of the Reports could provide future benefits for the main stakeholders of the banking system of Ukraine, i.e. the National Bank of Ukraine, auditors, commercial banks and commercial banks' clients both physical and legal bodies, international financial organizations, and Ukrainians in general.

Should the audit quality be adequate, the Report's Tone might become an additional indicator for the NBU about the improper functioning of both auditor and bank audited. If the Tone of Report runs counter to the findings of the NBU Department of Bank Supervision, the Committee on Audit of Banks should scrutinize the case and make a decision regarding both economic agents. If this year Tone is much worse than previous year Tone, the additional reason for further investigation of bank activity arises.

The increase in importance of the Tone of Auditor Reports will impose higher responsibility on the auditors, and if proper regulations are adopted, it will

provide auditors with more power and eliminate cases of banks' management influencing on the auditors' conclusions. The resulting development of the bank audit in Ukraine will make the Auditor Reports reliable source for the international organizations to provide ranking of the Ukrainian banks. Transparent and profitable banks will become reliable on the international capital markets, which will allow them to attract funding at lower rates. More accessible and meaningful Auditor Reports will make the usage of them easier for the banks' clients, which will result in the more mature behavior of these economic agents. What about Ukrainians, they will benefit from the overall improvement of the financial situation in the banking system of Ukraine.

This study contributes to the existing financial, economic and audit literature about the determinants of bank's profitability, the quantitative content analysis, and the phenomenon of the asymmetric information in the banking system through the analysis of the Independent Auditor Reports' Communicating Value. The research provides a ground for further investigations, which are connected with identifying the link between the negative Tone of the Report and violations of economic standards by Ukrainian banking institutions.

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APPENDIX A

List of Ukrainian banks

Table 6. List of Ukrainian operating, liquidated, reorganized and closed banks (in Russian)

Number	*MFO*	*Status*	*Bank Name*
1	300012	Operating	Проминвестбанк
2	300023	Operating	Укрсоцбанк
3	300119	Operating	Альянс
4	300335	Operating	Райффайзен Банк Аваль
5	300346	Operating	Альфа-Банк
6	300465	Operating	Ощадбанк Украины
7	300506	Operating	Первый Инвестиционный Банк
8	300528	Operating	ОТП Банк
9	300539	Operating	ИНГ Банк Украина (ING Банк)
10	300584	Operating	Ситибанк Украина
11	300614	Operating	Креди Агриколь Банк (ИндЭкс-Банк)
12	300647	Operating	Клиринговый дом
13	300658	Operating	Пиреус Банк (Международный Коммерческий Банк)
14	305299	Operating	Приватбанк
15	305749	Operating	Кредит Днепр
16	305880	Operating	Земельный капитал
17	306500	Operating	Радабанк (Агрос)
18	307123	Operating	Банк Восток (Хоум Кредит Банк, Агробанк)
19	307350	Operating	Конкорд
20	307770	Operating	А-Банк (Акцент-Банк) (Украинский Кредитный Банк)
21	312248	Operating	Коминвестбанк (Коопинвестбанк)
22	313009	Operating	Мотор Банк
23	313582	Operating	МетаБанк (Металлург)
24	313849	Operating	Индустриалбанк
25	320371	Operating	Украинский капитал
26	320478	Operating	Укргазбанк

Appendix A continued

Number	*MFO*	*Status*	*Bank Name*
27	320627	Operating	Сбербанк России (НРБ)
28	320940	Operating	Альтбанк (Банк Кипра, АвтоЗАЗбанк, Неос Банк)
29	320984	Operating	ПроКредит Банк (Микрофинансовый банк)
30	321712	Operating	Родовид Банк
31	321723	Operating	БТА Банк
32	321767	Operating	ВТБ Банк (Мрия)
33	322001	Operating	Универсал Банк (Универсальный)
34	322302	Operating	Айбокс Банк (Агрокомбанк)
35	322313	Operating	Укрэксимбанк
36	322335	Operating	Аркада
37	322539	Operating	Юнекс
38	322540	Operating	Коммерческий Индустриальный Банк
39	325213	Operating	ВиЭс Банк (VS Bank) (Фольксбанк, Электрон)
40	325268	Operating	Львов
41	325365	Operating	Кредобанк
42	325990	Operating	Окси Банк (Галс)
43	328168	Operating	Марфин банк (Морской транспортный банк)
44	328209	Operating	Пивденный
45	328760	Operating	Мисто Банк
46	331489	Operating	Полтава-Банк
47	331768	Operating	Промышленно-финансовый банк (ПФБ)
48	334840	Operating	Фамильный (Донбиржбанк)
49	334851	Operating	ПУМБ
50	336310	Operating	Идея Банк (IdeaBank) (Плюс Банк, Прикарпатье)
51	339016	Operating	Портал
52	339050	Operating	Кристалбанк
53	339072	Operating	РВС Банк
54	339500	Operating	ТАСкомбанк (Бизнес Стандарт, ТАС-Бизнесбанк)

Appendix A continued

Number	*MFO*	*Status*	*Bank Name*
55	344443	Operating	Расчетный центр (Всеукраинский депозитарий ценных бумаг)
56	351005	Operating	УкрСиббанк
57	351254	Operating	Регион-банк
58	351607	Operating	Грант
59	351629	Operating	Мегабанк
60	353100	Operating	Поликомбанк
61	353489	Operating	Асвио Банк (Приватинвест)
62	377090	Operating	Европромбанк
63	380054	Operating	Финансовая инициатива
64	380106	Operating	Траст-капитал
65	380281	Operating	Банк инвестиций и сбережений
66	380366	Operating	Кредит Европа Банк (Финансбанк)
67	380377	Operating	Укрстройинвестбанк (ФОКАС)
68	380418	Operating	Форвард (Русский стандарт, АИС-банк)
69	380441	Operating	Кредитвест Банк (Вест файненс энд кредит)
70	380526	Operating	Глобус
71	380548	Operating	Агропросперис Банк (Астра банк)
72	380571	Operating	Кредит-Оптима (Укрфинансбанк)
73	380582	Operating	Международный Инвестиционный Банк
74	380634	Operating	Аккордбанк
75	380645	Operating	Банк 3/4
76	380689	Operating	Вернум Банк (Диапазон-Максимум Банк)
77	380720	Operating	Апекс-банк
78	380731	Operating	Дойче Банк
79	380742	Operating	Центр
80	380797	Operating	СЕБ Корпоративний Банк (Акцепт банк)
81	380816	Operating	Сечь (Сич)
82	380827	Operating	Диви Банк
83	380838	Operating	Правэкс-банк

Appendix A continued

Number	*MFO*	*Status*	*Bank Name*
84	380872	Operating	Финансовый партнер
85	380883	Operating	Украинский банк реконструкции и развития
86	380894	Operating	Альпари Банк
87	380902	Operating	Юнисон
88	380913	Operating	БМ Банк
89	380946	Operating	Авангард
90	322959	In the reorgani-zation	Экспресс-Банк
91	300056	Liquidated	Легбанк
92	300120	Liquidated	Петрокоммерц-Украина (Авиатекбанк)
93	300131	Liquidated	Финансы и кредит
94	300142	Liquidated	Укринбанк
95	300164	Liquidated	Омега Банк (Сведбанк, ТАС-Комерцбанк)
96	300175	Liquidated	Фидобанк (СЕБ Банк, Ажио)
97	300216	Liquidated	Интербанк
98	300249	Liquidated	Брокбизнесбанк
99	300272	Liquidated	Энергобанк
100	300498	Liquidated	Национальные инвестиции
101	300669	Liquidated	Прайм-банк
102	300670	Liquidated	Крещатик (Хрещатик)
103	300788	Liquidated	Таврика
104	300852	Liquidated	Актив-банк
105	300863	Liquidated	Кредитпромбанк
106	300885	Liquidated	Артем-Банк
107	300904	Liquidated	Фортуна-банк
108	303484	Liquidated	Захидинкомбанк
109	304988	Liquidated	Укркоммунбанк
110	305062	Liquidated	Новый
111	305987	Liquidated	Юнион Стандард Банк (ЕКБ, ФС Банк, Технобанк)

Appendix A continued

Number	*MFO*	*Status*	*Bank Name*
112	306704	Liquidated	Классик
113	307305	Liquidated	Аксиома (Сигмабанк)
114	307394	Liquidated	Актабанк
115	307424	Liquidated	ИнтерКредитБанк
116	307435	Liquidated	Мелиор Банк
117	319092	Liquidated	Киевская Русь
118	319111	Liquidated	Радикал Банк
119	320702	Liquidated	Национальный кредит
120	320735	Liquidated	Интеграл
121	320843	Liquidated	Укргазпромбанк
122	320854	Liquidated	Диамант
123	320995	Liquidated	БГ Банк (Банк Первый, УБРП)
124	321477	Liquidated	Старокиевский
125	322294	Liquidated	Экспобанк
126	322324	Liquidated	Грин Банк (Олимпийская Украина)
127	322432	Liquidated	Народный капитал (Фермерский земельный банк)
128	322465	Liquidated	Контракт (Антарес)
129	322498	Liquidated	Киев
130	322625	Liquidated	Укоопспилка
131	322799	Liquidated	Велес
132	322830	Liquidated	ТК Кредит
133	322948	Liquidated	Форум
134	328180	Liquidated	Порто-Франко
135	328210	Liquidated	Инвестбанк
136	328384	Liquidated	Имэксбанк
137	328599	Liquidated	Финростбанк
138	328685	Liquidated	Финбанк
139	334594	Liquidated	ПроФин Банк (Икар-банк)
140	334828	Liquidated	Капитал
141	334969	Liquidated	УкрБизнесБанк (Донеччина, Сельхозбанк)
142	334992	Liquidated	Промэкономбанк

Appendix A continued

Number	*MFO*	*Status*	*Bank Name*
143	335902	Liquidated	Уникомбанк (Перспектива)
144	335946	Liquidated	Южкомбанк (Пивденкомбанк)
145	339038	Liquidated	Вектор Банк
146	339339	Liquidated	МКБанк (City Commerce Bank) (Конверсбанк, Партнер)
147	339555	Liquidated	Премиум
148	351588	Liquidated	Реал-банк
149	351663	Liquidated	Меркурий
150	351931	Liquidated	Золотые Ворота
151	353575	Liquidated	Демарк
152	377120	Liquidated	Гефест
153	380236	Liquidated	Дельта банк
154	380292	Liquidated	КСГ Банк (ЕБРФ)
155	380322	Liquidated	Богуслав
156	380355	Liquidated	Евробанк
157	380388	Liquidated	Платинум Банк (Международный ипотечный банк)
158	380399	Liquidated	Камбио
159	380430	Liquidated	Европейский газовый банк
160	380474	Liquidated	Траст (РНС)
161	380515	Liquidated	Союз
162	380537	Liquidated	VAB Банк (ВАБанк)
163	380601	Liquidated	Терра Банк (Инвест-Кредит Банк)
164	380612	Liquidated	Златобанк
165	380667	Liquidated	ЭРДЭ Банк (РД Банк)
166	380690	Liquidated	Стандарт
167	380708	Liquidated	Авант-Банк
168	380719	Liquidated	Всеукраинский банк развития
169	380764	Liquidated	Надра
170	380786	Liquidated	Смартбанк (Рыночные технологии)
171	380861	Liquidated	Софийский
172	380935	Liquidated	Михайловский

Appendix A continued

Number	*MFO*	*Status*	*Bank Name*
173	380968	Liquidated	Державный земельный банк
174	380980	Liquidated	Даниэль
175	397133	Liquidated	Столичный
176	300078	Closed	Градобанк
177	300089	Closed	Трансбанк
178	300205	Closed	Укрпрофбанк (УПБ)
179	300313	Closed	Интерконтинентбанк
180	300410	Closed	АПБ Украина
181	300421	Closed	Видродження
182	300540	Closed	Банк Регионального Развития (БРР)
183	300807	Closed	Гарант
184	300896	Closed	Финансбанк (ТММ-банк)
185	303536	Closed	УниКредит Банк (Пекао)
186	304706	Closed	Восточно-промышленный банк
187	305686	Closed	Премьербанк
188	306759	Closed	Причерноморье
189	307112	Closed	Диалогбанк
190	312334	Closed	Лесбанк
191	313690	Closed	Наш банк
192	313797	Closed	Славянский
193	321228	Closed	Укрпромбанк
194	321466	Closed	Национальный стандарт (Славутич)
195	321659	Closed	Аллонж
196	322368	Closed	Укрспецимпэксбанк
197	322380	Closed	Дамиана-банк
198	322603	Closed	БИГ Энергия
199	322658	Closed	Восточно-Европейский банк
200	322692	Closed	Росток банк
201	322711	Closed	Синтез
202	322841	Closed	Инко
203	322885	Closed	ОЛБанк
204	324485	Closed	Европейский банк развития и сбережений
205	324742	Closed	Морской

Appendix A continued

Number	*MFO*	*Status*	*Bank Name*
206	325569	Closed	Днестр
207	328102	Closed	Одесса-банк
208	331100	Closed	Автокразбанк
209	333874	Closed	Княжий
210	334895	Closed	Донуглекомбанк
211	334970	Closed	Донгорбанк
212	337933	Closed	Владимирский
213	351652	Closed	Земельный Банк
214	351760	Closed	Базис
215	351878	Closed	Инпромбанк
216	377777	Closed	Украинский финансовый мир (УФМ)
217	380009	Closed	Фидокомбанк (Эрсте Банк, Престиж)
218	380010	Closed	Ренессанс Капитал (Ренессанс Кредит)
219	380087	Closed	Киевский универсальный банк
220	380128	Closed	УФГ
221	380184	Closed	Европейский
222	380270	Closed	Ипобанк
223	380300	Closed	Арма
224	380311	Closed	Финэксбанк
225	380623	Closed	Столица
226	380957	Closed	Инвестиционно-трастовый банк
227	384577	Closed	Черноморский банк развития и реконструкции
228	388313	Closed	СоцКомБанк (СКБ)

Note: the status of banks is indicated as of 01.10.2017.

Source: Ministry of Finance of Ukraine[3].

[3] https://index.minfin.com.ua/bank/

APPENDIX B

Descriptive statistics of financial indicators

Table 7. Extended descriptive statistics of key financial indicators of Ukrainian banks

Year = 2012

Variable	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
Total_Assets	175	6441025	1.74E+07	122170.5	1.72E+08
Total_Equity	175	972550.1	2553103	-670739	1.83E+07
Net_Income	175	104175.8	282932.3	-15324.8	2575402
Liab_total	175	5468475	1.50E+07	35.80904	1.54E+08
Cash	175	941477.3	2898498	4524.223	2.70E+07
Oper_exp	173	76243.26	183411.7	-13644.5	1535691

Year = 2013

Variable	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
Total_Assets	180	7097270	2.05E+07	121081.4	2.14E+08
Total_Equity	180	1069994	2909194	68672.98	2.05E+07
Net_Income	180	94441.03	260013.4	-25967.1	2208615
Liab_total	180	6027276	1.80E+07	1.2	1.94E+08
Cash	180	830752.5	2631464	466.5663	3.22E+07
Oper_exp	176	87332.37	210453.2	1235.053	1944492

Year = 2014

Variable	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
Total_Assets	157	8341840	2.36E+07	84764.96	2.05E+08
Total_Equity	157	938075.3	3032732	-7132649	2.27E+07
Net_Income	157	106032.6	330211.3	-250098	2779612
Liab_total	157	7403765	2.08E+07	111.756	1.82E+08
Cash	157	938554.2	2870072	839.1882	2.71E+07
Oper_exp	156	111936.3	273731.4	-130977	2333561

Appendix B continued

Year = 2015

Variable	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
Total_Assets	113	1.11E+07	3.30E+07	121359.1	2.65E+08
Total_Equity	113	839945.7	3304855	-1.23E+07	2.75E+07
Net_Income	113	617485.5	1428050	-668166	8781142
Liab_total	113	1.02E+07	3.08E+07	127.8419	2.37E+08
Cash	113	1363400	4338635	359	3.63E+07
Oper_exp	113	-411369	992885.8	-8181155	-2835.81

Year = 2016

Variable	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
Total_Assets	93	1.34E+07	3.65E+07	81340.57	2.20E+08
Total_Equity	93	1329973	2728832	21459.62	1.49E+07
Net_Income	93	-1704102	1.41E+07	-1.35E+08	3820644
Liab_total	93	1.20E+07	3.42E+07	216.204	2.07E+08
Cash	93	1813551	5551158	29.25803	4.10E+07
Oper_exp	93	-534618	1273828	-9287553	-9030.99

APPENDIX C

Python code used for Independent Audit Reports translation from Ukrainian into English through Yandex Translator API

```
import sys
import requests
import json
from lxml import etree
import abc

#This is a Yandex Translator API taken from the following link:
#https://pythoness.pp.ua/catalog/article/perevodchik-na-baze-python-i-storonnego-api/
class Translator(metaclass=abc.ABCMeta):

    def __init__(self):
        self._from_xml = None

    @abc.abstractproperty
    def _response(self):
        return

    def __str__(self):
        return self.get_result()

    def get_result(self):
        return self.__parse_json() if self._from_xml is False else self.__parse_xml()
```

```
    def write_file(self, path='translated'):
        return self.__write_json(path) if self._from_xml is False else
self.__write_xml(path)

    def __parse_xml(self):
        root = etree.fromstring(self._response)
        return '; '.join([i.text for i in root])

    def __parse_json(self):
        return '; '.join(self._response['text'])

    def __write_xml(self, path):
        try:
            with open(path + '.xml', 'wb') as f:
                f.write(self._response)
                f.close()
            return True
        except IOError:
            return False

    def __write_json(self, path):
        try:
            with open(path + '.json', 'w') as f:
                json.dump(self._response, f)
                f.close()
            return True
        except IOError:
            return False
```

```
class yandex(Translator):
    #This is a Yandex Translator API Key, which could be created using the link:
https://tech.yandex.ru/translate/
    KEY =
'trnsl.1.1.20180216T140211Z.6e03a9e4d77a83a6.dfc20a6e68bd068c787fe4b45e8
731d81a0a3dd1'
    LINK_JSON = 'https://translate.yandex.net/api/v1.5/tr.json/translate'
    LINK_XML = 'https://translate.yandex.net/api/v1.5/tr/translate'

    def __init__(self, text, lang, fmt='plain', from_xml=False):
        super().__init__()
        self.data = {
            'key': self.KEY,
            'text': text,
            'lang': lang,
            'format': fmt,
        }
        self._from_xml = from_xml

    @property
    def _response(self):
        if self._from_xml is True:
            return requests.post(self.LINK_XML, params=self.data).content
        else:
            return requests.post(self.LINK_JSON, params=self.data).json()

#Now we should apply this translator to our 500+ txt files appropriately taking into account
Yandex limitations on the free usage of API
#Import required libraries:
```

```
import os
import textwrap

#Create a loop that goes through all files from a given directory:
source = 'C:/Users/Sukhomlyn-ea/Desktop/Text/thesis/2_txt/'
for root, dirs, filenames in os.walk(source):
    for f in filenames:
        fullpath = os.path.join(source, f)
        #Open an i-th file from the directory:
        log = open(fullpath, 'r')
        #Read the file and save the text into a string variable:
        text2 = log.read()
        #Split the text into pieces no more than 3000 symbols (the limitation on Yandex free usage of API)
        text = textwrap.wrap(text2, 3000)
        #Create a new file, in which we will store the translated text:
        log = open(str(fullpath)[:-4]+'_translated.txt', 'a+')
        #A loop to translate each part of the splitted text separately and write/append translated parts into the created file:
        for i in text:
            t = yandex(i,'uk-en')
            #The last part of the following line is added to avoid encoding errors of some unusual characters:
            log.write(str(t.get_result().encode(sys.stdout.encoding, errors='replace')))
        log.close()
```

APPENDIX D

Tests on Fixed Effects versus Random Effects, Heteroscedasticity, Multicollinearity, and Endogeneity

1) Hausman test for fixed versus random effects model: we reject the null hypothesis that the preferred model is random effects, so the fixed effect model is appropriate:

```
                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+------------------------------------------------------------------
     tone_LM |
         L1. |   -.0659523      -.05923       -.0067223        .0258945
readabilit~G |
         L1. |   -.0009301     .0005869        -.001517        .0018272
     lassets |
         L1. |    .0264661      .011445        .0150211        .0146869
  cash_ratio |
         L1. |    .0007531     .0001075        .0006456         .000126
     lexpend |
         L1. |   -.0325244    -.0204513        -.012073        .0047703
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       39.06
                Prob>chi2 =      0.0000
```

2) Heteroscedasticity Wald test: we reject the null hypothesis that the parameter is equal to the value, which means the presence of the heteroscedasticity. We mitigate this issue using the robust standard errors:

```
   Modified Wald test for groupwise heteroskedasticity
   in fixed effect regression model for ROA and ROE estimations

H0: sigma(i)^2 = sigma^2 for all I  H0: sigma(i)^2 = sigma^2 for all i
chi2 (124)  =   1.3e+12             chi2 (124)  =   1.4e+08
Prob>chi2   =    0.0000             Prob>chi2   =    0.0000
```

3) Multicollinearity: we reject the null hypothesis that lagged Tone of the Reports is equal to the lagged Readability of Reports, which imply the absence of intercorrelations or inter-associations (thus, the absence of multicollinearity):

```
 L.tone_LM - L.readability_FOG = 0
 F(  1,   262) =    6.56
 Prob > F =    0.0110
```

4) Endogeneity Durbin-Wu-Hausman test: no correlation between the independent variables (Tone and Readability) and the residual term in both models (for ROA and ROE):

```
--------------------------------------------
                      (1)             (2)
                TONE_ENDOG    READAB_ENDOG
--------------------------------------------
residuals_~A      -0.0401           1.093
                   (0.108)         (1.326)

_cons              -0.677***        24.84***
                  (0.0116)         (0.143)
--------------------------------------------
N                     391             391
adj. R-sq          -0.002          -0.001
--------------------------------------------
Standard errors in parentheses
** p<0.05, *** p<0.01



--------------------------------------------
                      (1)             (2)
                TONE_ENDOG    READAB_ENDOG
--------------------------------------------
residuals_~E      0.00754           0.130
                 (0.00573)        (0.0704)

_cons              -0.677***        24.84***
                  (0.0116)         (0.142)
--------------------------------------------
N                     391             391
adj. R-sq           0.002           0.006
--------------------------------------------
Standard errors in parentheses
** p<0.05, *** p<0.01
```