COMMUNICATIVE EFFICIENCY IN UKRAINE'S BANKING SYSTEM: EVIDENCE FROM INDEPENDENT AUDITOR REPORTS

OLEKSANDR SUKHOMLYN[a]

[a]Kyiv School of Economics, GR Capital
 Email: osukhomlyn@kse.org.ua; os@gr.capital

Abstract

This study, based on the quantitative content analysis, examines communicative efficiency in the Ukrainian banking system, i.e. shows how the tone and the readability of independent auditor reports are associated with a bank performance in the next financial year. The study applies a fixed-effects estimator within the regression to an unbalanced panel dataset of Ukrainian banks. The tone of report variable is constructed with the help of Loughran and McDonald's Financial Sentiment Word Lists, while readability is estimated using the FOG and Flesch-Kincaid indices. Based on estimations of 2012-2016, the readability of audit reports is found to have no relationship with a bank's profitability in the next year. However, a more negative tone of auditor report is associated with an increase in bank's ROA and ROE in the subsequent period. This paper concludes with policy implications and remarks on the practical application and execution of the findings.

JEL Codes   C33, D82, E58, G21, M42

Keywords   quantitative content analysis, communicative value, asymmetric information, tone, readability, independent auditor report

1. INTRODUCTION

Over the last four years, the Ukrainian banking system has been exposed to numerous shocks caused by political and economic factors. Among the political factors, the annexation of Crimea and Russia's hybrid war in the Donbas region have been the most destructive. On the economic side, the instability of the financial system and the population's panicked outlook for Ukraine's economic situation have introduced substantial threats to the banking system.

Since the Revolution of Dignity in 2014, the number of banks operating in Ukraine has halved (see Figure 1) to 88 as of January 2018, according to the Ministry of Finance. Whether this constitutes a positive or negative development remains to be seen.

Figure 1. Number of Banks Operating in Ukraine
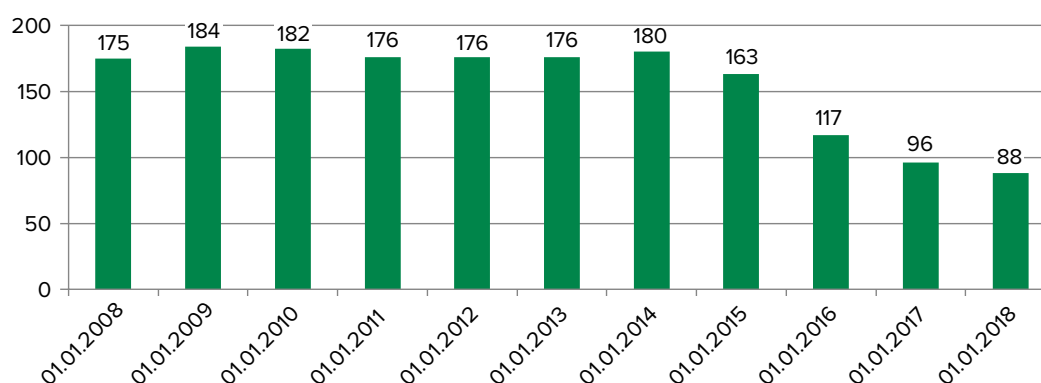
Source: Ministry of Finance of Ukraine[1]

[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] a bank can be liquidated for numerous reasons that include a large reduction of regulatory capital and capital requirements, failure to comply with obligations to depositors and creditors, and a failure to comply with instructions, decisions, or requirements of the National Bank of Ukraine (NBU). However, many recent bank liquidations in Ukraine were brought about by poor management or because the bank operated as a front (for example, to launder money or withdraw funds abroad).

Since all banks must be audited annually by an external auditor and since the number of banks operating has halved, several questions arise. Why have the liquidated banks not been removed from the banking system previously? Did the auditors have access to information not available to other economic agents? Is there a relationship between the content of the auditor report and a bank's future performance? This paper is more focused on the latter question, attempting to address asymmetric information in the Ukrainian banking system through the analysis of the auditor reports communicative value.

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 an auditor concerning the bank. The information obtained by the auditor during the investigation and review of a bank operations is not available to other economic agents.

The recent scandal with PricewaterhouseCoopers (PwC) in Ukraine is a prime example of that asymmetry: the NBU revoked PwC's right to operate in the banking sector owing to the contents of its report on PrivatBank, an institution that later had to be nationalized.

Nevertheless, we cannot state with certainty that independent auditors hide information about banks in their reports. However, there are signs that this may be the case. For example, the audits of PrivatBank by PwC and later Ernst & Young (EY) differ greatly, especially the tones of each firm's reports.

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 main indicators of reports' communicative value: tone (a measure that identifies the "a feeling of a communication" from positive to negative) and readability (a measure that identifies whether the reader can understand the message delivered by the auditor) and answer the question how the bank profitability changes in one year after report publication.

To answer that question, we form and test the following hypotheses:

1) H_0: the tone of an independent audit report is positively associated with a bank's performance in the subsequent financial year;

2) H_0: the readability of an independent audit report is negatively associated with a bank's performance in the subsequent financial year.

This study is based on a quantitative content analysis of independent audit reports of Ukrainian banks. The study intends to provide the NBU a greater understanding and evidence on the communicative value of audit disclosures from external auditors. This study can also help Ukrainians choose banks and banking institutions choose auditors.

In this paper, we consider an unbalanced panel dataset of Ukrainian banks in 2012-2016 and apply a fixed-effects estimator within a panel regression. The data is from the NBU and bank audit reports, and contains all financial indicators and the full texts of the reports.

The structure of the paper is as follows: Chapter 2 reviews the literature concerning the implementation and description of content analysis, explains how asymmetric information is characterized by the readability of reports in joint-stock companies, and justifies the importance of tone as a key measure of the communicative value of a bank's audit report; Chapter 3 outlines the methodology of the analysis, model specification, and selection of controls and methodology of defining the indices for tone and readability. The processes of data collection and preparation and the descriptive statistics of the variables are discussed in Chapter 4. The main empirical results and the discussion of findings are presented in Chapter 5. Finally, Chapter 6 provides the main conclusions of the study and policy implications.

2. LITERATURE REVIEW

The central topic of this paper (the relationship between the communicative value of independent audit reports and a bank's performance in the subsequent financial year) has not been studied in depth. Although no papers investigate the link between the tone of an auditor's report and a bank's profitability in the next financial period. Still, a few studies that explore some issues of the communicative value of firms' disclosures are relevant and informative for the section of the literature review.

Our study aims to provide practical evidence of the influence of the communicative value of auditor reports on a bank profitability, and to contribute to the existing literature about the quantitative content analysis in economics and finance, and the phenomenon of the information asymmetry in the banking system by an analysis of independent auditor reports.

This review of the literature is split into three parts. The first explores content analysis as a research approach and identifies its limitations. The second describes asymmetric information in joint-stock companies. The final group outlines the importance of the tone of the auditor's reports in the fields of finance, economics, and audit.

2.1. Content Analysis

An approach called content analysis can be used to analyze written texts (books, papers), oral texts (speeches), iconic texts (drawings, paintings), audio-visual texts (movies, videos), and hypertexts (internet-based texts) manually or via machine Learning. The approach is used mainly to investigate naturally-occurring data, so it could be considered as an unostentatious method for research (Insch et al., 1997; Harris, 2001). This method is a simple analytical approach and unobtrusive in the process of gathering information.

Possible limitations of content analysis include the sampling process and coding. The public availability of the documents used in the analysis could introduce bias in the estimations. Moreover, problems in a content analysis may emerge because of the abstraction of word groups from the context; when a phrase or word become isolated from other related parts of a text, meaning may be lost. Additionally, content analysis can ignore what is not said in a particular part of the text. As a result, significant parts of a text could be omitted from the analysis (Insch et al., 1997).

2.2. Asymmetric Information in Joint-Stock Companies

Various papers have analyzed the tone and readability of speeches by independent directors of joint-stock companies. Those two characteristics are considered the primary indicators of the quality of the communication between directors and other economic agents.

Drawing parallels, it should be noticed that both independent directors of joint-stock companies and independent auditors have access to non-public information of the institution (company and bank, respectively). Both are also aware of the institution's true financial situation and the expectations of senior management, of which other economic agents (i.e. customers and clients) are not aware. Therefore, a review of the literature concerning join-stock companies is relevant to our study of banks (an independent director corresponds to an independent auditor and a shareholder corresponds to a bank client).

Most research on the topic of information asymmetry and communicative efficiency at joint-stock companies focuses on the assertion that an analysis of communication from directors can help stakeholders that are not engaged in the firm's decision-making to understand the behavior of the firm (Simon, 1999). Further developing that point, directors' disclosures of a firm's internal information have a direct and significant relationship with that firm's profitability and earnings quality (Li, 2010).

Additionally, Li (2008) examined and brought into the financial literature the FOG Readability Index, which was developed by Robert Gunning in 1952. Li showed a link between an institution's financial performance and the readability of its annual report. In that paper, Li demonstrated that profitable firms have more readable reports than loss-making companies (i.e. showing a negative relationship between the FOG Index and profitability). Continuing that thread, Bloomfield (2008) discussed possible explanations for that negative relationship: ontology (bad news is more complicated to communicate) and obfuscation (bad news is easier to hide behind a text that is difficult to read).

2.3. The Tone of Auditor Report

Coram et al. (2011) and Mock et al. (2009) posited that an audit report is the main source of information for analysts of a firm. Those papers showed that financial analysts value the unqualified opinion included in an auditor's report. At the same time, recent analyses have shown that users of financial statements often have some difficulty understanding audit reports, which can negatively affect the communicative 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).

Academic studies by Doogar et al. (2015) and Sikka (2009) showed that auditor reports do not always inform readers of all financial risks present during a crisis. Most of the failed financial institutions included in those studies received low-qualified external audit opinions.

According to Henry (2008), the tone of an auditor's report is the main measure that defines the "effect or feeling of a communication." Literature in the field of finance has introduced the tone of reports as an appropriate method to further understand the impact of written texts 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 an auditor's report: risk-related content is associated with words that show negativity and uncertainty. In our research paper, we also rely on Loughran and McDonald's Word Dictionaries to identify the tone of auditor reports.

3. METHODOLOGY

In this section, we outline parts of our methodology (the processes of securing and preparing the data are presented in the Data Description section). The methodology for generating the continuous variable of the tone of audit reports is based on:

1) Loughran and McDonald's Dictionary of Positive and Negative Words for the main analysis;

2) A multilingual dictionary for a further robustness check of the model.

The methodology of generating the continuous variable of the readability of audit reports is based on:

1) The FOG Readability Index for the main analysis;

2) The Flesch-Kincaid Readability Index for a 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. Finally, when all the variables are ready, we apply a five-year panel data analysis.

3.1. Constructing the Tone and Readability Variables

Readability is a concept used in economics, law, linguistics, medicine, and other areas. For this paper, Loughran and McDonald (2014) offer the most relevant definition, which focuses on the business context. The authors define readability as "the ability of individual investors and analysts to assimilate valuation-relevant information from a financial disclosure." Simply put, readability is the ease with which a reader can understand the text of an auditor report.

With no precise definition of readability, we focus on ways to measure it. In that vein, however, there is no consensus as to the best measure. For that reason, we introduce the two most common approaches for readability: the Gunning Fog Index (FOG) and the 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. The sum is then multiplied by a constant (0.4) to approximate the years of education required to understand a text fragment. The FOG Index is calculated as follows:

$$FOG = 0.4 \times \left(\frac{number\ of\ words}{number\ of\ sentences} \right) +$$

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

The Flesch-Kincaid Grade Level is a function of the number of words per sentence and the proportion of complex words in an auditor's report. The index reflects the difficulty in understanding a passage in the English language based on word and sentence length. The Flesch-Kincaid Grade Level is calculated as follows:

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

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

We calculate the tone of reports using a dictionary-based approach, which matches word sentiment. We first segment positive and negative words using Loughran and McDonald's Financial Sentiment Word Lists (a specialized dictionary frequently used in economics, accounting and finance) and the multilingual dictionary of positive and negative words (a review of words from a multilingual dictionary). Then, using econometric software, we identify the number of positive and negative words in a report. Finally, we calculate the tone of every report using the formula below:

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

After constructing core regressors, we can choose the variables that will help us clarify the relationship between a report's communicative value and a bank's profitability in the subsequent period.

3.2. Selection of Control Variables

In selecting control variables, we considered studies that investigate the factors that influence a bank's profitability. Arellano and Bond (1991) show that the use of a logarithmic transformation of total assets is an effective tool for capturing bank size. Later, a number of academic papers identified a positive significant relationship between bank size and profitability (Kosmidou, 2008; Flamini et al., 2009; Pervan and Pervan, 2010; Adusei, 2015; Pervan et al., 2015). That result leads us to conclude that banks should use their size to generate cost advantages and increase efficiencies, thus increasing profitability. On the other hand, in their study using the Random Effects model, Naceur and Goaied (2008) found that a bank's size is negatively correlated with profitability. This inverse relationship could be the result of diseconomies of scale that often occur in large banking institutions (Kosak and Cok, 2008). Additionally, while studying the profitability of Chinese banks, Heffernan and Fu (2008)

used system GMM and found that the size of a bank has no significant relationship with financial performance.

Liquidity is an important factor that influences bank profitability: a bank's ability to fund asset increases and manage decreases in liabilities is material. Bourke (1989) showed a positive relationship between profitability and liquidity as 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) considered that a bank's higher profitability may be explained by a lower amount of funds allocated to liquid investments.

In terms of cost management practices at banks, studies show a negative relationship between profitability and operating expenses, or that a bank's profitability grows as expenses decrease (Bourke, 1989). Nevertheless, Molyneux and Thornton (1992) showed a positive relationship between the two variables, suggesting that greater profitability leads to larger payroll expenditures on more productive personnel.

3.3. Model Specification

To estimate the relationship between tone and readability and a bank's future-year earnings, we formulate the following hypotheses:

1) H_0: the tone of an independent audit report is positively associated with a bank's performance in the subsequent financial year;

2) H_0: the readability of an independent audit report is negatively associated with a bank's performance in the subsequent financial year.

We focus our research on the relationship between a bank's performance and lagged values of report readability and tone. This is logical because independent audit reports are published in March or April of the next year.

For further research we use the following model:

$$Bank\ Performance_{i,t} = \beta_0 + \beta_1 \times Tone_{i,t-1} +$$
$$+ \beta_2 \times Readability_{i,t-1} + \beta_3 \times Controls_{i,t-1} +$$
$$+ \beta_4 \times Dummies_{i,t-1} + \varepsilon_{i,t}$$

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 the tone of the independent audit report in bank i at year $t-1$. We generate the tone for each audit report using the "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 as the neutral view.

$Readability_{i,t-1}$ is a readability index measured by the FOG Index and Flesch-Kincaid Index. This is a continuous

variable as well; the higher the index value, the more difficult it 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 explain cost management, and the *Cash/Total Liabilities* ratio presents the amount of the most liquid funds for covering liabilities. These profitability determinants are widely used as control variables of ROA and ROE and were examined in the previous section.

$Dummies_{i,t-1}$ are dummy variables: *Time* (2012-2016 years), *Auditor* (whether an audit was conducted by a Big Four firm), *Solvency* (whether a bank is solvent or insolvent), *Ownership* (identifies banks with state participation/banks belonging to foreign banking groups/banks belonging to Ukrainian banking groups) in bank *i* at year *t-1*.

4. DATA DESCRIPTION

In this study, we use a five-year unbalanced panel dataset of Ukrainian banks. The data used is publicly available and obtained from the NBU and the annual reports of operating, liquidated, and closed Ukrainian banks from 2012 to 2016. On the financial side, for assets, we used cash and equivalents, loans and receivables from entities and individuals, and total assets; for liabilities, we used amounts due to banks, amounts due to entities, amounts due to individuals, and total liabilities; for equity, we used authorized capital, retained earnings, and total equity. To conduct the quantitative content analysis and shed a light on the issue of communicative efficiency of auditor reports in Ukraine, we use 514 independent auditor reports from the websites of Ukrainian banks.

4.1. Data Collection

Before estimating the report tone, the appropriate data must be collected and prepared. The data must be prepared to create a variable that will describe the tone of a report using sentiment analysis. First, we classified banks using their MFO Code. Then, we identified each bank's operating status (operating, liquidated, closed) using data from Ukraine's Ministry of Finance. We then sourced auditors' annual reports from the annual reports of banks and eliminated unneces-

sary parts of the reports. Since most banks disclose in PDF format, we then translate those files to Text format (.txt) to be analyzed using econometric software. Under Ukrainian law, annual reports must be published in the Ukrainian language, so we then translated the auditor reports into English.

The documents were translated using the Python programming language using Yandex Translator API. We used this translation method on all 514 auditor reports, taking into account Yandex's limitations on the free usage of API. We imported the required libraries and created a loop to read through all the files. To translate using Python, each text file must be opened, read, saved as a string variable. We then split the text into sections no larger than 3,000 symbols (owing to Yandex's API free-usage limitations) and created a new text file into which we stored the translated text. We then created a loop to translate each part of the split text separately and appended the translated sections into a newly created text file.

4.2. Data Preparation

Using the newly created text files, we create a column of string variables with the texts of the audit reports. We then sub-string the year and the bank's MFO from the file name to get two additional variables.

To analyze the data, we needed to create a monolingual corpus – a large set of texts containing all the independent audit reports from Ukrainian banks over the last five years. The main characteristics of that body are the number of types, tokens, and sentences.

The next step is to create a document-feature matrix after all the features are abstracted from the text corpus. Creating this type of matrix is important because it significantly simplifies the process of sentiment analysis. After creating the document-feature matrix, we scrubbed the text of the report by removing punctuation and all numbers and words like "the", "of", "and", "in", "to", "on", "for", "with", "by", "is", "as", "a", "that", "at", "which" etc.

After scrubbing the documents, we built a word cloud (see Figure 2) to show the most frequently used words.

Figure 2. The 50 Most Frequently Used Words in Audit Reports

4.3. Demonstration of Zipf's Law

Zipf's Law states that in a large sample of words, the frequency of any word is inversely proportional to its rank in the frequency table. In other words, the most frequently used word will occur approximately twice as often as the second most used word, three times as often as the third most used word, and so on. We test Zipf's Law in our study by plotting the data on a log-log graph, where the axes are log (rank order) and log (word frequency). As shown in Figure 3 below, our text data reflects a linear distribution, confirming Zipf's Law for our 100 most used words.

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 is calculated as a ratio of the different unique word stems to the total number of words in the auditor reports.

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

4.5. Descriptive Statistics of Financials

Let consider the statistics of key variables from the dataset we use. Since bank performance is a dependent variable, we need to know financial indicators that can be used to construct the dependent variable. If we choose ROA (return on assets) or ROE (return on equity) as a dependent variable, we should consider such financial indicators as total assets, total equity, and net income. ROA we obtain by dividing net income by total assets, ROE — by dividing net income by total equity. These ratios are used by the Central Banks of developed countries as well as by the NBU as the most appropriate ones that describe bank financial performance (see Table 1).
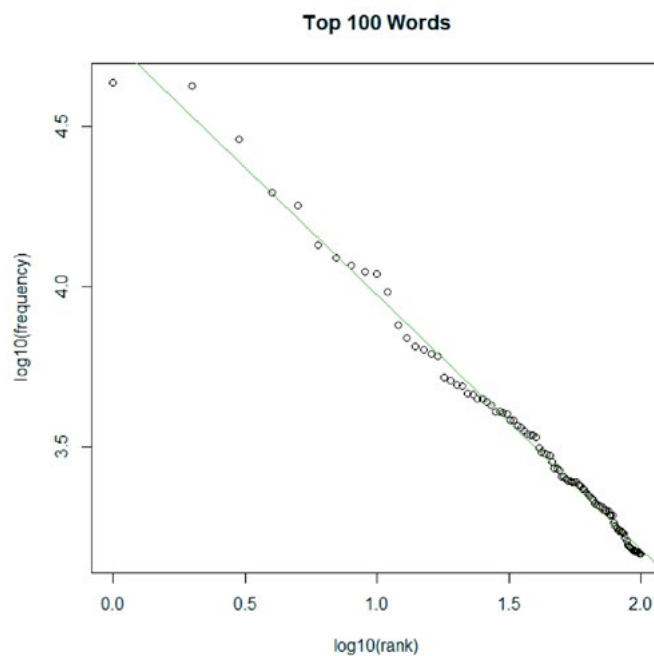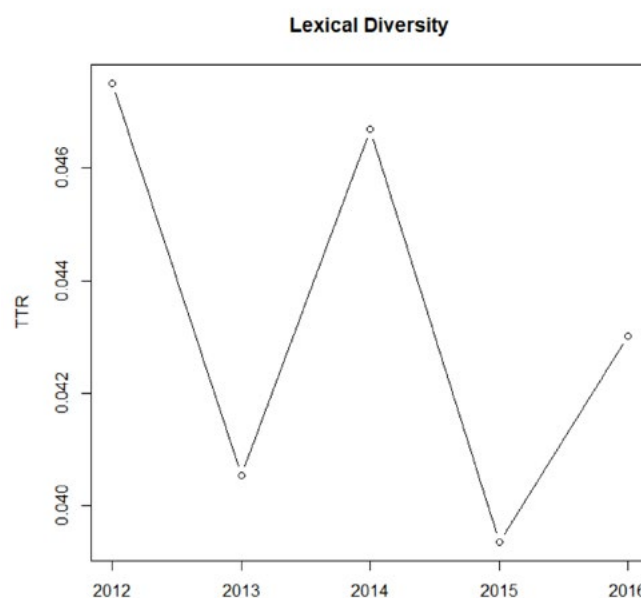
Figure 3. Frequency-Rank Graph

Figure 4. Type-Token Ratio

Using this dataset comprised of bank financials and the newly created variables, we run a regression to explain changes in a bank's profitability in the year after the publication of a report. See Appendix A for detailed descriptive statistics of the financial indicators of banks.

5. EMPIRICAL RESULTS

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

The regression was built with controls that are widely used by economists in studies that estimate bank profitability. We control our regression for bank size (expressed as a lagged value of the logarithm of Total Assets), cost management (expressed as a lagged value of the logarithm of a bank's Operating Expenses), the adequacy of most liquid funds that could be used to cover liabilities (expressed as a lagged value of the Cash-to-Total Liabilities ratio). All these control variables fit the model, and we explore them in detail below.

Bank size matters since the amount of assets is statistically significant at the 10% significance level. The relation-

Table 1. Descriptive Statistics of Financial Indicators for Banks

Variable	Obs	Mean	Std. Dev.	Min	Max
Total_Assets	718	8,648,717	25,454,958	81,341	264,886,279
Total_Equity	718	1,014,867	2,894,417	-12,269,344	27,487,223
Net_Income	718	-51,293	5,126,298	-135,309,076	8,781,142
Total_Liabilities	718	7,633,850	23,130,762	1	237,399,056
Cash	718	1,092,439	3,544,165	29	410,482,098
Oper_exp	711	200,037	683,106	1,235	9,287,553

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)	0.001*** (0.000)
Lagged Cash Ratio	0.001*** (0.000)	0.001*** (0.000)
Lagged log (Operating Expenses)	-0.033*** (0.011)	-0.033*** (0.011)
Constant term	-0.046 (0.192)	-0.059 (0.198)
Sample size	391	385
Adjusted R^2	0.133	0.151

Note: Additional controls for this regression are dummies for auditor type (Big Four/other), bank status (solvent/insolvent), ownership (with foreign capital/with Ukrainian capital). The base auditor type is "other", the base bank status is "solvent", the base ownership status is "with Ukrainian capital"; * if p-value < 0.1, ** if p-value < 0.05, *** p < 0.01.

ship is positive, which is logical: larger banks frequently have higher returns since they are better organized, more efficient, and enjoy economies of scale. According to the results of the regression, holding all other variables constant, on average, a 100% increase in a bank's assets is associated with a 0.03 increase in ROA in the one-year period.

The Cash-to-Total Liabilities ratio is found to be positively correlated with ROA. From a theoretical point of view, the relationship between extra cash and profitability is ambiguous. On one hand, profitable banks should have adequate cash and equivalents to handle a significant decrease in liabilities. On the other hand, the more liquidity a bank has, the less risky these funds are, which yields lower returns. The results of the regression show that the positive relationship holds at a highly significant level ($p<0.01$). However, the coefficient before this variable influences the model imperceptibly because it is mathematically insignificant, which may be caused by the occurrence of both the factors discussed above.

The results of the regression show a highly statistically significant ($p<0.01$) negative association between operating expenditures and profitability. Holding all other variables constant, on average, a 10% increase in operating expenditures is associated with a 0.003 decrease in ROA in the subsequent year. Other academic studies have also found a positive relationship, so the relationship is inconclusive. Generally, the literature posits that a reduction in operating expenditures improves profitability and vice versa (greater current spending reduces future returns). However, a positive relationship is also possible if profits are directed to more productive personnel. In our study, we believe the negative relationship between operating expenditures and profitability is rather a product of poor cost management at Ukrainian banks.

In terms of the explanatory variables, the results of the regression show a negative relationship between the tone of auditor reports and profitability, while the relationship between readability and profitability is found to be insignificant.

The readability (complexity) of reports has no definite relationship with ROA in one year due to the low communicative efficiency of reports, even though a review of the literature does show a negative relationship between readability and profitability (in other words, more profitable firms have more readable reports).

The tone of reports is found to be significantly (0.1 significance level) negatively associated with next-period ROA, meaning that a worse report tone is associated with better returns in the next year.

When we subdivide the sample of banks by adding interaction terms based on the auditor (Big Four/other), bank status (solvent/insolvent), and ownership (with foreign capital/with Ukrainian capital), the coefficient before the tone of the audit report becomes significant at a 5% significance level. However, adding interaction terms does not imply that the effect of the tone of the audit report for these groups statistically differs from the effect on the ROA of other groups. Nevertheless, the difference in effects is statistically significant when we choose a bank with Ukrainian capital audited not by a Big Four auditor: the tone of the reports for these banks is, on average, worse.

Results for ROE are presented in 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 (0.484)
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 (Operating 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 Four/other), bank status (solvent/insolvent), ownership (with foreign capital/with Ukrainian capital). The base auditor type is "other", the base bank status is "solvent", the base ownership status is "with Ukrainian capital"; * if p-value < 0.1, ** if p-value < 0.05, *** p < 0.01.

As with ROA, the ROE regression is controlled for bank size (expressed as a lagged value of the logarithm of Total Assets), cost management (expressed as a lagged value of the logarithm of operating expenses), the adequacy of the most liquid funds that can be used to cover liabilities (expressed as a lagged value of the Cash-to-Total Liabilities ratio).

The amount of assets is statistically insignificant; ROE is found to be independent of bank size.

The Cash-to-Total Liabilities ratio is found to be positively correlated with ROE; greater Cash and Cash Equivalents relative to Total Liabilities result in higher ROE in the next year. However, the coefficient before this variable influences our model imperceptibly because it is mathematically insignificant, even though it is highly significant (p<0.01). This is explained by the fact that profitable banks should have adequate amount of Cash and Equivalents to handle a decrease in liabilities. However, greater liquidity equals lower risk and lower returns.

We find a highly statistically significant (p<0.01) negative association between operating expenditures and profitability. Holding all other variables constant, on average, a 10% increase in operating expenditures is associated with a 0.03 decrease in ROE in the next year.

The readability of reports shows no association with next-period ROE, meaning that the complexity of a report does not impact profitability, even though a review of the literature does show a negative relationship between readability and profitability.

The main finding is that the tone of the report is found to be marginally significant (0.05 significance level) and negatively associated with ROE in the next period. This means that a worse tone of auditor report is associated with better returns in the next financial year.

When we subdivide the sample of banks by adding interaction terms based on the auditor (Big Four/other), bank status (solvent/insolvent), and ownership (with foreign capital/with Ukrainian capital), the coefficient before the tone remains marginally significant at a 5% significance level. However, adding interaction terms does not imply that the effect of the tone of the auditor report for these groups differs statistically from the effect on ROE for the other groups of banks.

To check if tone and readability variables are constructed correctly, we conduct the validation test. Since some banking institutions (Industrialbank, Citi, KredoBank, BTA Bank, Creditwest Bank, Bank Vostok etc.) publish their reports both in Ukrainian and English, we check how coefficients for tone and readability indices may well correlate for translated from Ukrainian into English reports and reports published initially in English with the help of Student's t-test. During the test, we find that the results are valid due to extremely low P-values obtained from two-tail t-test: 0.006 and 0.001 for tone and readability, respectively. In other words, we reject the hypotheses that both tone and readability samples of coefficients statistically differ for translated and originally English reports.

Table 4. Tests of the Robustness of Regressors for ROA

	Original model (Loughran and McDonald's 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 (Operating Expenses)	-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.

We conduct a Hausman test for the fixed versus random effects model and find that the fixed-effects model is appropriate in the case of the unbalanced panel dataset of Ukrainian banks (i.e. we reject the null hypothesis that random effects is the preferred model). The Wald test identifies the presence of heteroscedasticity, but since this is a common issue, we mitigate it using robust standard errors. After testing the main two independent variables (tone and readability) on the multicollinearity, we find an absence of intercorrelations or inter-associations, meaning the issue will not adversely affect the results of the regression. Finally, the Durbin-Wu-Hausman test for endogeneity shows no correlation between the independent variable and the residual term, meaning we correctly identified the style of our model and we can expect an absence of endogeneity bias in the regression results.

5.1. Tests of the Robustness of the Regressors

We examined the validity of our core regressors, report tone and readability, by substituting:

1) Tone of the report estimated using the Loughran and McDonald's Dictionary of Positive and Negative Words with tone as calculated with the help of a multilingual dictionary of positive and negative words;

2) The readability of the FOG Index with the Flesch-Kincaid Readability Index.

When testing both regressors for the model with ROA as the dependent variable, 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, the lagged logarithm of Total Assets remains marginally significant, as previously. Meanwhile, the coefficient of the lagged logarithm of operating expenses slightly increases without a change in sign and significance when altering the tone of the report.

The robustness test for the model with ROE as the dependent variable reflects the same general pattern as the ROA test, with some differences in controls. For instance, the lagged logarithm of Total Assets remains insignificant for both tests of tone and readability and remains negative. The lagged logarithm of operating expenses holds its sign and significance level when testing for readability and tone, but changes slightly in magnitude when testing for tone. Moreover, changing the method of calculating tone decreases the significance of the cash ratio and makes it insignificant at more than 90% confidence level.

One of the core regressors, readability, is insignificant and negatively correlated with ROA and ROE in all tests. The other main independent variable, tone, is found to be insignificant (p=0.14) in testing, however, it holds its sign and the level of significance when testing readability.

Tables 4 and 5 below show the detailed results of the test of the robustness of the regressors for ROA and ROE.

Table 5. Tests of the Robustness of Regressors for ROE

	Original model (Loughran and McDonald's 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 (Operating Expenses)	-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.

6. CONCLUSIONS

In our study, we apply a quantitative content analysis to independent audit reports of Ukrainian banks to identify the relationship between the tone of the reports and the bank's profitability in the subsequent year. The data have been sourced from the NBU and the annual audit reports of Ukrainian banks from 2012 to 2016. The final dataset consists of financial data from those same sources, as well as of newly created variables that embody the communicative value of auditor reports through readability and tone. We built a fixed-effects model within a panel regression to test the relationship between audit report readability and tone and bank performance in the next financial period.

The readability of financial reports is widely used in the literature as a determinant of the performance of financial institutions. However, no quantitative content analyses have been conducted for Ukraine's banking system. Moreover, incorporating the tone of audit reports is unique and has not been studied before. Thus, the research sufficiently contributes to the existing literature and provides practical evidence that helps understand the influence of the communicative value of the reports on bank profitability.

We have observed that both readability indices (the FOG Index and the Flesch-Kincaid Index) have increased slightly over time. This trend reflects a worsening of readability, or that reports are becoming more complicated to read as sentences increase in length and more sophisticated financial terms are used. According to the literature, this decreases the communicative value of reports, which is associated with a lower ROA. However, our study of the Ukrainian banking system suggests that the change in readability has not had a significant impact on the performance of banks.

This study also finds that the tone of audit reports has generally remained steady over time, judging by the Loughran and McDonald's Dictionary of Positive and Negative Words. On the other hand, an ordinary multilingual dictionary of positive and negative words does show that, on average, the tone of reports written in 2014 and 2015 is much lower than before that period (2012) or after (2016). That difference may be the result of the difficult conditions on Ukrainian financial markets and the liquidation of 63 banks during that period.

In the result of our research, we reject at the 10% significance level the initial hypothesis that posits that the tone of independent auditor reports is positively associated with ROA in the next financial period; the relationship is found to be negative. Tone is found to be marginally significant at the 0.05 significance level and negatively correlated with ROE in the next period, meaning that a worse tone in a report is associated with better returns in the next financial year. For both ROA and ROE, we reject the null hypothesis that readability has a negative correlation with bank performance in the subsequent financial year; our study found no relationship.

Thus, we conclude that Ukrainian banks internalize the information in auditor reports when considering a change in policies related to key financial indicators. Since independent auditor reports are usually made public in March or April, a bank's management has almost nine months until the next auditor report. This is an adequate amount of time to revise policies and fine-tune the direction of development efforts if the tone has proven negative.

Despite appropriate econometric specification, our model has limitations stemming from Ukraine's financial environment. For instance, in Ukraine, banks have more power than auditors, which creates a serious obstacle for the actual independence of auditors in the preparation of reports.

Since the tone of reports is found to be a significant factor in determining the profitability of banks in Ukraine, this paper aims to bring more attention to independent auditor reports in Ukraine. An increase in the importance of the reports can benefit key stakeholders within Ukraine, like the NBU, auditors, commercial banks, and bank clients (individuals and legal entities), international financial organizations, and Ukrainians in general.

Tone can also become an additional indicator for the NBU of the improper functioning of both the auditor and the bank being audited. If a report's tone were to differ substantially from the findings of the NBU's Department of Bank Supervision, the Committee on Bank Audit should examine the case and rule on both economic agents. A deterioration in tone from year to year would also be reason to further investigate the activity of a bank.

An increase in the importance of the tone of auditor reports would potentially increase the responsibility of auditors, while the adoption of proper regulations would empower auditors and eliminate the influence banks can impose on the conclusions of auditors. That would make audit reports a reliable source for international organizations to rank Ukrainian banks. Transparency and profitability can help banks attract funding at lower rates on international markets. More accessible and meaningful auditor reports would simplify their usage by bank clients, which would help develop their financial maturity.

This study contributes to the existing financial, economic, and audit literature on the determinants of bank profitability, quantitative content analysis, and the topic of asymmetric information in the banking system through an analysis of the communicative value of independent auditor reports. This study identifies areas for further investigations, especially the link between the negative tone of reports and violations of banking legislation by Ukrainian banks.

REFERENCES

• Adusei M. (2015). Bank Profitability: Insights From the Rural Banking Industry in Ghana. Cogent Economics & Finance, Vol. 3, No. 1: 1078270. https://doi.org/10.1080/233 22039.2015.1078270

• Antweiler W., Frank M. (2004). Is All That Talk Just Noise? The Information Content of Internet Stock Message Boards. Journal of Finance, Vol. 59, No. 3, pp. 1259–1294. https://doi.org/10.1111/j.1540-6261.2004.00662.x

• Arellano M., Bond S. (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. TheRreview of Economic Studies, Vol. 58, No. 2, pp. 277-297. https://doi.org/10.2307/2297968

• Asare S. K., Wright A. M. (2012). Investors', Auditors', and Lenders' Understanding of the Message Conveyed by the Standard Audit Report on the Financial Statements. Accounting Horizons, Vol. 26, No. 2, pp. 193–217. https://doi. org/10.2308/acch-50138

• Bloomfield R. (2008). Discussion of "Annual Report Readability, Current Earnings, and Earnings Persistence". Journal of Accounting and Economics, Vol. 45, No. 2-3, pp. 248-252. https://doi.org/10.1016/j.jacceco.2008.04.002

• Bourke P. (1989). Concentration and Other Determinants of Bank Profitability in Europe, North America and Australia. Journal of Banking & Finance, Vol. 13, No. 1, pp. 65-79.

• Church B. K., Shawn M. D, McCracken S. A. (2008). The Auditor's Reporting Model: A Literature Overview and Research Synthesis. Accounting Horizons, Vol. 22, No. 1, pp. 69-90. https://doi.org/10.2308/acch.2008.22.1.69

• Coram P. J., Mock T.J, Turner J. L, Gray G. L. (2011). The Communicative Value of the Auditor's Report. Australian Accounting Review, Vol. 21, No. 3, pp. 235-252. https://doi. org/10.1111/j.1835-2561.2011.00140.x

• Doogar R., Rowe S. P, Sivadasan P. (2015). Asleep at the Wheel (Again)? Bank Audits During the Lead-Up to the Financial Crisis. Contemporary Accounting Research, Vol. 32, No. 1, pp. 358-391. https://doi.org/10.1111/1911-3846.12101

• Eichengreen B., Gibson H. (2001). Greek Banking at the Dawn of the New Millennium. CEPR Discussion Paper, No. 2791.

• Fakhfakh M. (2015). The readability of international illustration of auditor's report: An advanced reflection on the compromise between normative principles and linguistic requirements. Journal of Economics, Finance and Administrative Science, Vol. 20, No. 38, pp. 21-29. https:// doi.org/10.1016/j.jefas.2015.02.001

• Flamini V., McDonald C., Schumacher L. (2009). The Determinants of Commercial Bank Profitability in Sub-Saharan Africa. Working Paper, No. 9-15, International Monetary Fund.

• Gray G. L., Turner J. L., Coram P. J., Mock T. J. (2011). Perceptions and misperceptions regarding the unqualified auditor's report by financial statement preparers, users, and auditors. Accounting Horizons, Vol. 25, No. 4, pp. 659-684. https://doi.org/10.2308/acch-50060

• Harris H. (2001). Content Analysis of Secondary Data: A Study of Courage in Managerial Decision Making. Journal of Business Ethics, Vol. 34, No. 3-4, pp. 191-208. https://doi. org/10.1023/A:1012534014727

• Heffernan S., Fu M. (2008). The Determinants of Bank Performance in China. 21st Australasian Finance and Banking Conference 2008 Paper http://dx.doi.org/10.2139/ ssrn.1247713

• Henry E. (2008). Are Investors Influenced by how Earnings Press Releases are Written? Journal of Business Communication, Vol. 45, No. 4, pp. 363-407. https://doi. org/10.1177/0021943608319388

• Hermanson D.R., Duncan P., Carcello J. V. (1991). Does the new audit report improve communication with investors? Ohio CPA Journal, (May/June): pp. 32-37.

• Insch G. S., Moore J. E., Murphy L. D. (1997). Content Analysis in Leadership Research: Examples, Procedures, and Suggestions for Future Use. The Leadership Quarterly, Vol. 8, No. 1, pp. 1-25. https://doi.org/10.1016/S1048-9843(97)90028-X

• Kosak M., Cok M. (2008). Ownership Structure and Profitability of the Banking Sector: The Evidence from the SEE-6 Region. Proceedings of Rijeka Faculty of Economics, Journal of Economics and Business, Vol. 26, No. 1, 2008, pp. 93-122 https://ssrn.com/abstract=2268462

• Kosmidou K. (2008). The Determinants of Banks' Profits in Greece During the Period of EU Financial Integration. Managerial Finance, Vol. 34, No. 3, pp. 146-159. https://doi. org/10.1108/03074350810848036

• Li F. (2008). Annual Report Readability, Current Earnings, and Earnings Persistence. Journal of Accounting and Economics, Vol. 45, No. 2–3, pp. 221-247. https://doi. org/10.1016/j.jacceco.2008.02.003

• Li F. (2010). The Information Content of Forward-Looking Statements in Corporate Filings-A Naıve Bayesian Machine Learning Approach. Journal of Accounting Research, Vol. 48, No. 5, pp. 1049-1102. https://doi.org/10.1111/j.1475-679X.2010.00382.x

• Loughran T., McDonald B. (2011). When is a Liability Not a Liability? Textual Analysis, Dictionaries, and 10-Ks. Journal of Finance, Vol. 66, No, 1, pp. 35-65. https://doi.org/10.1111/ j.1540-6261.2010.01625.x

• Loughran T., McDonald B. (2014). Measuring Readability in Financial Disclosures. Journal of Finance, Vol. 69, No. 4, pp. 1643-1671. https://doi.org/10.1111/jofi.12162

• Manson S., Zaman M. (2001). Auditor Communication in an Evolving Environment: Going Beyond SAS 600 Auditors' Reports on Financial Statements. The British Accounting Review, Vol. 33, No. 2, pp. 113-136. https://doi.org/10.1006/ bare.2001.0157

• Mock T. J., Bédard J., Coram P.J., Davis S. M., Espahbodi R., Warne R. C. (2013). The Audit Reporting Model: Current Research Synthesis and Implications. Auditing: A Journal of Practice & Theory, Vol. 32, No. Supplement 1, pp. 323-351. https://doi.org/10.2308/ajpt-50294

• Mock T. J., Turner J. L, Gray G. L, Coram P. J. (2009). The Unqualified Auditor's Report: A Study of User Perceptions, Effects on User Decisions and Decision Processes, and Directions for Further Research. A Report to the Auditing Standards Board and the 42 International Auditing and Assurance Standards Board (June), New York, NY.

• Molyneux P., Thornton J. (1992). Determinants of European Bank Profitability: A Note. Journal of Banking & Finance, Vol. 16, No. 6, pp. 1173-1178. https://doi.org/10.1016/0378-4266(92)90065-8

• Naceur B. S., Goaied M. (2008). The Determinants of Commercial Bank Interest Margin and Profitability: Evidence From Tunisia. Frontiers in Finance and Economics, Vol. 5, No. 1, pp. 106-130. https://ssrn.com/abstract=1538810

• Pervan M., Pervan I. (2010). Market Structure and Profitability of Croatian Commercial Banks. The Business Review, Vol. 20, No. 1, pp. 209-216.

• Pervan M., Pelivan I., Arnerić J. (2015). Profit Persistence and Determinants of Bank Profitability in Croatia. Economic Research-Ekonomska Istraživanja, Vol. 28, No. 1, pp. 284-298. https://doi.org/10.1080/1331677X.2015.1041778

• Sikka P. (2009). Financial Crisis and the Silence of the Auditors. Accounting, Organizations and Society, Vol. 34, No. 6-7, pp. 868-873. https://doi.org/10.1016/j.aos.2009.01.004

• Simon H. A. (1999). Administrative Behavior: A Study of Decision-making Processes in Administrative Organization. Free Press; 4th edition.

• Smith K. W. (2016). Tell Me More: A Content Analysis of Expanded Auditor Reporting in the United Kingdom. http://dx.doi.org/10.2139/ssrn.2821399

• Tetlock P. C. (2007). Giving Content to Investor Sentiment: The Role of Media in the Stock Market. Journal of Finance, Vol. 62, No. 3, pp. 1139-1168. https://doi.org/10.1111/j.1540-6261.2007.01232.x

• Tetlock P. C., Saar-Tschansky, and Sofus MacSkassy. (2008). More Than Words: Quantifying Language to Measure Firms' Fundamentals. Journal of Finance, Vol. 63, No. 3, pp. 1437-1467. https://doi.org/10.1111/j.1540-6261.2008.01362.x

APPENDIX A. DESCRIPTIVE STATISTICS OF FINANCIAL INDICATORS

Table A1. Extended Descriptive Statistics of Key Financial Indicators of Ukrainian Banks

Year = 2012

Variable	Obs	Mean	Std. Dev.	Min	Max
Total_Assets	175	6,441,025	17,485,094	122,171	172,428,712
Total_Equity	175	972,551	2,553,103	-670,739	18,300,761
Net_Income	175	104,176	282,932	-15,325	2,575,402
Total_Liabilities	175	5,468,475	15,049,505	36	154,127,951
Cash	175	941,477	2,898,498	4,524	26,957,511
Oper_exp	173	76,243	183,412	13,645	1,535,691

Year = 2013

Variable	Obs	Mean	Std. Dev.	Min	Max
Total_Assets	180	7,097,270	20,505,984	121,081	214,490,857
Total_Equity	180	1,069,994	2,909,194	68,673	20,455,511
Net_Income	180	94,441	260,013	-25,967	2,208,615
Total_Liabilities	180	6,027,276	18,040,102	1	194,179,236
Cash	180	830,753	2,631,464	467	32,157,251
Oper_exp	176	87,332	210,453	1,235	1,944,492

Year = 2014

Variable	Obs	Mean	Std. Dev.	Min	Max
Total_Assets	157	8,341,840	23,640,582	84,765	204,585,002
Total_Equity	157	938,075	3,032,732	-7,132,649	22,749,157
Net_Income	157	106,033	330,211	-250,098	2,779,612
Total_Liabilities	157	7,403,765	20,849,815	112	181,888,643
Cash	157	938,554	2,870,072	839	27,075,551
Oper_exp	156	111,936	273,731	130,977	2,333,561

Table A1 continued

Year = 2015

Variable	Obs	Mean	Std. Dev.	Min	Max
Total_Assets	113	11,167,334	33,010,876	121,359	264,886,279
Total_Equity	113	839,946	3,304,855	-12,269,344	27,487,223
Net_Income	113	617,486	1,428,050	-668,166	8,781,142
Total_Liabilities	113	10,217,887	30,830,887	128	237,399,056
Cash	113	1,363,400	4,338,635	359	36,260,225
Oper_exp	113	411,369	992,886	2,836	8,181,155

Year = 2016

Variable	Obs	Mean	Std. Dev.	Min	Max
Total_Assets	93	13,436,554	36,586,102	81,341	220,017,620
Total_Equity	93	1,329,973	2,728,832	21,460	14,932,547
Net_Income	93	-1,704,102	14,198,623	-135,309,076	3,820,644
Total_Liabilities	93	12,026,554	34,208,734	216	207,408,290
Cash	93	1,813,551	5,551,158	29	410,482,098
Oper_exp	93	534,618	1,273,828	9,031	9,287,553