

# **Predicting the occurrence of misstatements in financial statements**

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Doctoral Thesis Summary



# Tomas Bata University in Zlín

## Faculty of Management and Economics

Doctoral Thesis Summary

### **Predicting the occurrence of misstatements in financial statements**

**Predikce vzniku nesprávností v účetních výkazech**

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## **ABSTRACT**

The dissertation titled “Predicting the occurrence of misstatements in financial statements” deals with the quality of accounting information, which is presented to its users in the form of the financial statements. The thesis's main aim is to propose an approach for prediction of misstatement occurrence in financial statements presented by companies to maximise the usefulness of this information for the decision-making process of its users. This approach should help all types of possible users evaluate the reliability of information presented in financial statements and help them avoid incorrect decisions made based on unreliable data. This work should contribute to existing approaches focusing on the occurrence of the misstatements with a completely new approach to measurement, which is not purely dependent on financial variables.

The information obtained during a detailed literature review of existing literature, which is further enhanced by the results of qualitative research conducted with individual users, is used to propose quantitative research between pro-profit organisations operating in the Czech Republic. Data obtained through quantitative research is analysed using statistical methods. The results of the analysis are used to construct a predictive model, which enables the prediction of misstatements' occurrence for companies operating in the Czech Republic.

## **ABSTRAKT**

Disertační práce „Predikce vzniku nesprávností v účetních výkazech“ se zabývá kvalitou účetních informací, které jsou svým uživatelům prezentovány ve formě účetní závěrky. Hlavním cílem práce je navrhnout přístup umožňující predikci výskytu nesprávností v účetní závěrce předkládané společnostmi s cílem maximalizovat užitečnost těchto informací pro rozhodovací proces uživatelů. Tento přístup by měl pomoci všem typům možných uživatelů při hodnocení spolehlivosti informací prezentovaných v účetní závěrce a pomoci jim vyhnout se nesprávným rozhodnutím učiněným na základě nespolehlivých údajů. Tato práce by měla přispět k již existujícím přístupům zaměřeným na předpovídání vzniku nesprávností díky zcela novému přístupu k měření, který není závislý čistě na finančních proměnných.

Informace získané při podrobné literární rešerši existující literatury na toto téma, které jsou dále posíleny výsledky kvalitativního výzkumu prováděného s jednotlivými uživateli účetních informací, jsou využity k návrhu kvantitativního výzkumu mezi ziskovými organizacemi působícími v České republice. Data získaná kvantitativním výzkumem jsou analyzována s využitím statistických metod. Na základě výsledků je zkonstruován prediktivní model, který umožňuje předpovědět pravděpodobnost výskytu nesprávností pro společnosti působící v České republice.

# TABLE OF CONTENTS

LIST OF TABLES .....	6
LIST OF FIGURES .....	6
LIST OF ABBREVIATIONS .....	6
1. INTRODUCTION .....	7
2. CURRENT STATE OF RESEARCHED TOPIC .....	9
2.1 Accounting Information.....	9
2.2 The Users of Accounting Information.....	9
2.3 The Quality of Accounting Information.....	10
2.4 Misstatements' Occurrence.....	10
2.4.1 Misstatement.....	11
2.5 Current Methods for Assessing True and Fair View of Financial Statements.....	11
2.5.1 The Modified Jones Model.....	12
2.5.2 M-SCORE .....	12
3. GOALS OF DISSERTATION THESIS.....	13
3.1 Research Questions.....	13
3.2 Subsequent Goals.....	13
3.3 Hypotheses .....	14
4. METHODOICAL APPROACH.....	15
4.1 The Methodology of Qualitative Research.....	16
4.1.1 Data Collection.....	16
4.1.2 Interview of Participants.....	16
4.1.3 Data Analysis.....	17
4.2 The Methodology of Quantitative Research.....	17
4.2.1 Structure of the Questionnaire.....	18
4.2.2 Data Collection and Respondents.....	18
4.2.3 Data Analysis.....	19
5. RESULTS .....	20
5.1 Factors Affecting the Misstatements' Occurrence According to the Literature Review .....	20
5.2 Factors Affecting the Misstatements' Occurrence According to Qualitative Research.....	23
5.3 Measuring the Probability of Misstatements' Occurrence .....	23

5.3.1	Descriptive Statistics.....	24
5.3.2	Univariate analysis of the factors.....	25
5.3.3	Logistic Regression Model .....	27
5.3.4	Assessment of the Model's Performance.....	30
6.	CONTRIBUTION TO THEORY AND PRACTICE .....	33
6.1	Contribution to Theory.....	33
6.2	Contribution to Practice .....	33
7.	RESEARCH LIMITATIONS AND FUTURE RESEARCH DIRECTIONS.....	34
8.	CONCLUSION .....	35
	REFERENCES.....	36
	PUBLICATION ACTIVITIES OF THE AUTHOR .....	41
	CURRICULUM VITAE OF THE AUTHOR .....	42

## **LIST OF TABLES**

Table 1 Factors selected for the model proposal.....	22
Table 2 Univariate analysis of binomial factors.....	25
Table 3 Univariate analysis of factors measured by Likert scale.....	26
Table 4 Initial logistic regression .....	27
Table 5 The best-proposed model .....	29
Table 6 Classificatory Accuracy of the Best model.....	30

## **LIST OF FIGURES**

Figure 1 Methodological approach for the dissertation thesis	15
Figure 2 Summary of factors influencing the misstatements' occurrence	24
Figure 3 The assessment of the model performance	32

## **LIST OF ABBREVIATIONS**

BI	-	Business Intelligence
CEO	-	Chief Executive Officer
CFEBT	-	Cash Flow Earnings Before Taxes
CFO	-	Chief Financial Officer
CG	-	Corporate Governance
CSR	-	Corporate Social Responsibility
ERP	-	Enterprise Resource Planning
FS	-	Financial Statements
FV	-	Fair Value
GAAP	-	Generally Accepted Accounting Principles
IASB	-	International Accounting Standards Board
IFRS	-	International Financial Reporting Standards
IT	-	Information Technologies
MIE	-	Management Incentives Existence
RQ	-	Research Question
UK	-	The United Kingdom of Great Britain and Northern Ireland
AIC	-	Akaike Information Criterion

# 1. INTRODUCTION

Accounting information and accounting data generated in the form of the financial statements are the cornerstones for the evaluation of any business. Starting from business decisions of the management of the company and ending with the payment of corporate income taxes, approved by national Tax Office based on the financial statements. The primary objective of accounting is to provide users with a true and fair view of the entity, its financial position, performance, funding sources, or changes therein (IASB, 2019b). In general, the goal of accounting is to provide information. The information function is fulfilled for internal users, typically corporate management, as well as for a wide range of external users, such as business partners, investors, banking institutions and the state. This information provides the reader with the basis for decision-making. The uncertainty associated with the reader's decision-making process is reduced in proportion to the reliability of the information provided and the reader's confidence in it.

In a simplified way, all accounting information has two basic characteristics, namely quantitative characteristics, which are represented in the accounting by the fact that each item is valued by its financial value and qualitative characteristics. All sorts of qualitative characteristics can be seen in accounting standards around the world, they have different names, and sometimes they even lack specific definitions. In general, true and fair view, relevance and comparability are often considered to be the primary qualitative characteristics. Another characteristic to be mentioned is the understandability and materiality of individual information. These characteristics translate to the fact that the information presented must have its weight for the reader, be relevant to his decisions, and be presented in such a way that the reader can understand it.

This dissertation focuses mainly on true and fair view characteristic. Generally, the true and fair view requirement is based on the needs of readers of financial statements. The true and fair view is not achieved when the information presented in the financial statements differs from reality. This situation can happen due to many reasons, be it an error, intentional manipulation, fraud or lack of knowledge when preparing the financial statements. These situations, when true and fair view requirement is not met, are generally referred to as misstatements in financial statements. If the misstatements are identified in subsequent periods, the financial statements have to be corrected. Future corrections into already existing financial statements are usually referred to as restatements. The underlying assumption when discussing true and fair view is that the reader must have at least basic accounting knowledge to be able to read the company statements and make informed decisions based on the information found. However, if this information is not correct or complete, even with one's best knowledge and skills, the user cannot make his decision with confidence and is facing the risk of making the wrong decision.

It is clear that several factors are affecting the probability of misstatements' occurrence in the financial statements, and there are many reasons for not providing information in a true and fair view. However, in general, there are two basic categories available - deliberate and unintentional distortion of the information provided. Unintentional distortion can occur, for example, as a result of accounting errors or mistakes. The intentional misrepresentation is much more insidious and more difficult to detect. Deliberate distortion is carried out with a clear intention, and the person who commits such distortion does so consciously and thus tries as much as possible to make his act undetectable. Finding some identifiers or traces of distortion becomes increasingly difficult. Such manipulation with the accounting information can take place within the framework of the applicable accounting regulations and be balancing on the so-called law border, which continues to complicate the determination of whether the information that the reader receives is or is not provided truly and fairly. The true and fair view of accounting information is of the vital importance to readers of financial statements. However, confirming, whether the financial statements are prepared in the true and fair view, is relatively complicated or neigh impossible.

Due to the significance of this topic, important pieces of research have previously focused on this area. There are several existing models, predominantly focusing on intentional manipulation of financial statements (typically directly focused on earnings management). However, these models require significant time for calculation, and they are spread mostly within the academic area. Currently, the most discussed methods for measurement are the Modified cross-sectional Jones model and the M-Score, which are discussed in detail in the dissertation thesis. Nevertheless, models targeting misstatements, in general, are currently almost non-existent. And those that exist usually utilize only financial variables for their calculation. This dissertation aims to propose an approach for predicting misstatements' occurrence (intentional or unintentional), which would add to the existing group of models a new approach which does not stem from financial data analysis but is more focused on non-financial parameters of the company.

## **2. CURRENT STATE OF RESEARCHED TOPIC**

In this area, related literature sources are gathered. One of the research questions is connected to a literature review of factors influencing the misstatements' occurrence in the financial statements. This literature review can be seen in chapter 5.1. in detail.

### **2.1 Accounting Information**

The fundamental objective of accountancy is to provide a faithful and accurate view of an entity and its financial position. Accountancy should not only serve as a source of information that enables the assembly of the required statements and the calculation of the amount of tax liability. This information about the entity and its situation is made available to users in the form of financial statements. The financial statements, along with other instruments of financial management, should be a source of complete data for both internal and external users. Groșanu et al. (2011) state that financial performance is seen as a stake in the company's internal and external relations and companies' partners are being affected by the level and quality thereof. Porter and Norton (2015) add that external users, such as investors and creditors, often do not have access to detailed business records. They make decisions based on financial statements. The accountancy can fulfil its informative function only if the accounting data is processed in high quality. One should consider the fact that accountancy occupies a vital place in the informal enterprise system and is a reliable source of information, as pointed by Dumitru (2011). Accounting ensures certain types of quantitative data for decision making and management of a company. Accounting information, for the majority of interest groups, has become among the crucial sources of information about the company (Otrusínová & Šteker, 2013).

### **2.2 The Users of Accounting Information**

Accounting should be used not only as a source of information that allows managers to make decisions and assemble the required statements. Accounting, along with other instruments of financial management, should be a source of complete data for both internal and external users. Internal users or primary users of accounting information include management, employees and owners of the company. External users of accounting information include creditors, banks, investors, customers and regulatory authorities as was stated by, for example, by Porter and Norton (Porter & Norton, 2015). Though the categorization may differ, the fact remains that the users of the financial statements make their decisions based on financial statements. It is therefore evident that accounting can fulfil its informative function only if the accounting data are processed at a high-quality level and presented in such a form to its respective users. For this dissertation, external users of the financial statements are the main focus. The reasoning for this is the fact that managers and other internal users have access to the accounting of the company and also have insider information about the company. External

users, on the other hand, do not have such privilege and have to rely purely on the information provided to them by the management of the company. The qualitative research in this dissertation focuses namely on banks, investors and state (Tax office of the Czech Republic) as typical representatives of users of accounting information in practice.

### **2.3 The Quality of Accounting Information**

The accountant should follow the rules and principles on which accounting data processing is based to provide relevant and true and fair information (Puican *et al.*, 2011). This is one of the clear statements, which is applied in most accounting approaches around the world. For example, Baba (2009) confirms that high quality of accounting information enables measurement of performance of the company, assessment of its financial position, valuation of expenses, revenues and logically also the calculation of the profit. Performance information assists managers of firms in making more informed decisions on the control of the production process (Romolini *et al.*, 2015).

As far as the quality of accounting information is concerned, the International Financial Reporting Standards (IFRS) developed by the International Accounting Standards Board (IASB) are the best-known source of information in this area. IFRS has long been dealing with the quality of accounting information, and it is not surprising that the requirement for the quality of accounting information is embedded in the conceptual framework (the cornerstone of the IFRS system). The primary qualitative characteristics of accounting information, according to IFRS, are True and fair view and Relevance. The relevance of the information is based on a materiality condition where its omission or misrepresentation affects the users' decisions about an entity's financial statements. Information is reliable (true and fair) according to IFRS if it does not contain a material error or bias, and users can rely on the information to display what is reasonable to expect to see. The last characteristic is comparability, namely comparability of accounting information both within one company between distinct periods and between individual companies. Several papers support the existence of such basic characteristics as there are in IFRS. According to Porter and Norton (2015) or Puican *et al.* (2011), the information should be comprehensible, relevant, faithfully depicting reality, comparable and consistent. Quality depends on the quality of underlying accounting information, the quality of the financial statements, compliance with reality as well as on their presentation. The quality of accounting information can also be significantly influenced by the human factor or corporate culture of the company, as stated by Nusa (2015) in her research.

### **2.4 Misstatements' Occurrence**

The quality of information presented in the form of the financial statements significantly decreases when misstatements occur. Misstatements usually refer to

any situation when requirements on the information are not met; this is also true when discussing true and fair view. Any misstatements affecting the true and fair view of accounting information may significantly decrease the quality of presented information and possibly lead to wrong decisions of the users of the financial statements. Following subchapter describe and define misstatements and possible causes of the misstatement's occurrence, which are applied in this dissertation thesis. This dissertation focuses on general misstatements rather than on specific errors or fraud, but their categorization is also crucial for discussed problematics.

### **2.4.1 Misstatement**

Misstatements are a reoccurring problem in the world of accounting and finance. One of the groups which focus on misstatements identification the most are probably the auditors. International standards of auditing (ISA) provide the following definition: *“a misstatement is a difference between the required amount, classification, presentation, or disclosure of a financial statement line item and what is reported to achieve a fair presentation, as per the applicable accounting framework. A misstatement is considered to be material when the user of a set of financial statements alters his economic decisions because of the misstatement.”* (ISA 450, 2010, p. 370)

ISA also state that misstatement occurrence represents a situation when something has not been treated correctly in the financial statements, meaning that the applicable financial reporting framework, for example, IFRS or specific national accounting standards, has not been adequately applied. Examples of misstatement, which can arise due to error or fraud, include: (ISA 450, 2010)

- An incorrect amount has been recognised – for example an asset is not valued following the relevant requirements;
- An item is classified incorrectly – for example the finance costs are included within the cost of sales in the statement of profit or loss;
- Presentation is not appropriate – for example the results of discontinued operations are not separately presented;
- Disclosure is not correct or misleading disclosure has been included as a result of management bias – for example a contingent liability disclosure is missing or inadequately described in the notes to the financial statements.

## **2.5 Current Methods for Assessing True and Fair View of Financial Statements**

When the true and fair view of accounting information is discussed, most of the researches tend to focus on intentional manipulation of accounting information as this leads to highest disruption of presented information. Most researchers focusing on this are specifically targeting this type of manipulation, namely

earnings management problematics. Reasons for information being not provided truly and fairly, however, can be due to an error in the preparation of financial statements or due to fraud, and intentional manipulation. Nevertheless, researchers tend to focus more on deliberate manipulation of the financial statements. One of the most common reasons for misstatements' occurrence in the financial statements is the inclination of management to use earnings management methods to achieve the goals they need to. Moreover, it is generally accepted truth that one of the most common methods for earnings management is accruals management. Accruals, in general, are dependent on a high level of estimation and thus can be used at management discretion to manipulate results. Researches also focus on accruals for a representation of how much is management influencing the results. Analysing earnings management often focuses on the use of discretionary accruals. Typical examples of these methods are the M-SCORE proposed by Beneish (1999) or the Jones Model and its modifications initially proposed by Jones in 1991 (Jones, 1991).

### **2.5.1 The Modified Jones Model**

This modified model will be used as a reference in this dissertation thesis, as it vastly improved its accuracy over the previous model and limited various limitations of previous models. The original Jones Model implicitly assumes that discretion is not exercised over revenue in either the event period or in the prior period. The modified version of the Jones Model implicitly assumes that all changes in credit sales in the event period result from earnings management. This is based on the reasoning that it is easier to manage earnings by exercising discretion over the recognition of revenue on credit sales than it is to manage earnings by exercising discretion over the recognition of revenue on cash sales.

### **2.5.2 M-SCORE**

M-Score is another commonly used model for earnings management detection proposed by Professor Messod Beneish (1999). As was mentioned before, earnings management is commonly used as a simplification of reliability factor of accounting information as earnings management is a most common tool used by companies which subsequently leads to unreliable information presented in financial statements of companies. M-Score is a mathematical model that uses financial ratios calculated from the company's financial statements to judge the possibility of earnings manipulation. The eight variables necessary for calculating the M-Score are derived using the data from the balance sheet, income statement and cash flows statement of the company. This model is much easier to apply and to calculate as all data necessary for its calculation are publicly available and calculation is not complex as in previously mentioned models. If Beneish M-score is less than the -2.22 then it suggests that company under consideration is not a manipulator and if the score is higher it provides a signal of possible earnings manipulation.

### **3. GOALS OF DISSERTATION THESIS**

The main goal of this dissertation thesis is to analyse existing literature and approaches of users of financial statements in terms of misstatements' occurrence in the financial statements, and based on this assessment **propose an effective method for predicting misstatements' occurrence** which is generally applicable. With regards to the primary goal of this dissertation thesis research questions and subsequent goals are created, and they can be referenced in following subchapters.

#### **3.1 Research Questions**

Following research questions (RQs) are stated in order to fulfil the aim of this thesis:

RQ1: What factors affect the misstatements' occurrence in the financial statements of companies?

RQ2: How can the probability of the misstatements' occurrence in financial statements be measured effectively?

Research question RQ1 serves the purpose of gaining background information about researched problematics. By answering this research question, key factors which affect the occurrence of misstatements in the financial statements are identified, and these are subsequently used to create a new method (in the form of a statistical model) for assessment of misstatements' occurrence probability in financial statements to answer RQ2. As an effective measurement in RQ2 is considered such a measurement, which is applicable by users of accounting information, and it incorporates the most significant factors affecting the misstatements' occurrence. The effectivity of the model is measured based on the model's specificity, which represents the number of correct predictions of the model for misstating companies.

#### **3.2 Subsequent Goals**

Subsequent goals (SG) are tied to the main goal of the thesis, and they also correspond to individual research questions:

SG1a: Identify factors that affect the misstatements' occurrence in financial statements of companies according to existing literature.

SG1b: Identify factors affect the misstatements' occurrence in financial statements of companies based on opinions and experience of different stakeholders.

SG2a: Propose a method (in the form of a statistical model) for measurement of the probability of misstatements' occurrence based on identified factors.

SG2b: Test functionality of the proposed model and adjust the model according to data obtained through quantitative research.

SG2c: Demonstrate the effectivity of the proposed model.

### **3.3 Hypotheses**

Hypotheses stated according to the performed detailed literature review or according to the qualitative research can be referenced in chapter 5.3. Hypotheses are presented only in a graphical representation of expected impacts with green colouring representing an expected positive impact on the misstatement's occurrence (decrease in misstatements) while red colouring represents a negative impact. Sample of hypotheses in a written format can be referenced below.

H1: „The probability of misstatements' occurrence in the financial statements increases when management incentives exist in a company. “

H2: „The probability of misstatements' occurrence in the financial statements decreases when the company implements International Financial Reporting Standards. “

...

H14: „The probability of misstatements' occurrence in the financial statements decreases when the company is utilizing services of Tax Advisor. “

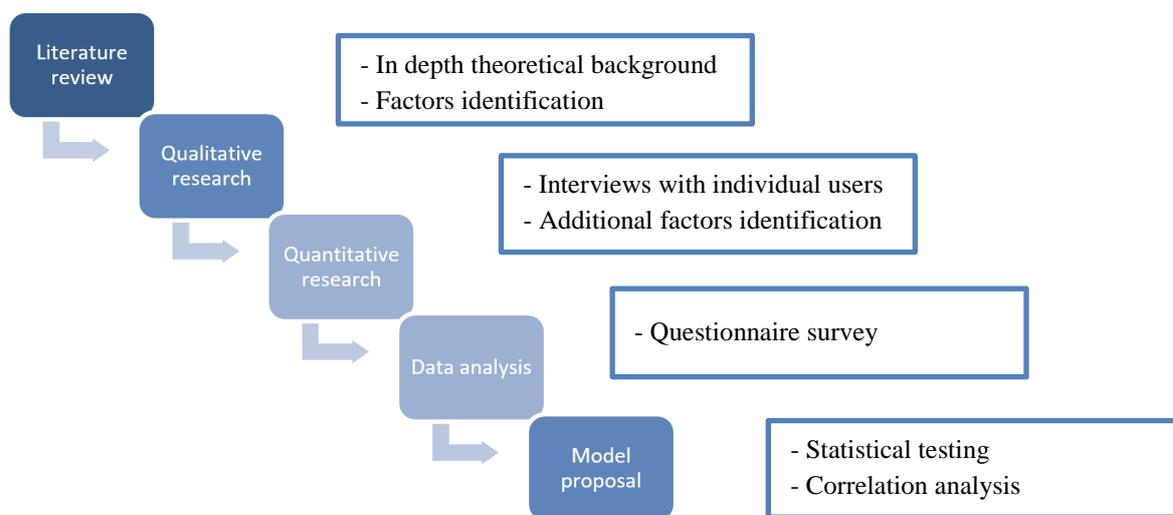
H15: „The probability of misstatements' occurrence in the financial statements increases when the company is under the influence of banking covenants. “

Total of 15 hypotheses is stated for this dissertation.

## 4. METHODOLOGICAL APPROACH

During the elaboration of the dissertation, several scientific methods are used to answer the research questions. The first step of the dissertation is to perform a literature review to obtain sufficient theoretical background to postulate the proposed method for misstatement's occurrence prediction. The final product of this dissertation thesis is a model. The purpose of this model is to depict expected relations between individual variables and the probability of misstatements occurring. The methods and techniques of both qualitative and quantitative research are used. Qualitative research is used to gain a deeper understanding of the factors influencing the probability of misstatements occurring. It focuses on how the individual users of the financial statements view the misstatements, how they deal with possible misstatements in their work and their expectations and practical experience regarding factors which cause the misstatements' occurrence. The qualitative research is used to also answer the Research question 1: *“What factors affect the misstatements' occurrence in the financial statements of companies?”* (RQ1), and the fulfilment of the sub-objectives related to this research question. Quantitative research is used to prepare and validate the model for measuring the probability of misstatements' occurrence in financial statements, as well as to statistically verify and generalize the relationships between the individual variables and the misstatements' occurrence probability. Quantitative research is used to answer the Research Question 2: *“How can the probability of the misstatements' occurrence in financial statements be measured effectively?”* (RQ2), and the fulfilment of the sub-objectives related to this research question. A more detailed description of the implementation of quantitative and qualitative research is described in the following subchapters. The methodological approach in graphical form is shown in figure 1 below.

Figure 1 Methodological approach for the dissertation thesis



Source: own

## **4.1 The Methodology of Qualitative Research**

In order to gain a deeper understanding of the issue of misstatements and their occurrence and possible impacts on the users of accounting information in practice, semi-structured interviews were chosen to obtain data. Interviews were conducted with representatives of banks from the Czech Republic (two interviews in July and August 2019), representatives of investors (two interviews in May 2019) and state institutions (two interviews in November 2019). After the interviews were transcribed, the data were analysed using methods of grounded theory (September and October 2019). Software Atlas.ti is utilised for this purpose. The grounded theory can be defined as a strategy for data processing, where the method of conceptualization is used to describe and explain the data gathered (Urquhart, 2013; Saldaña, 2016). The purpose of the grounded theory is to understand the actions of individuals of an organization, which leads to the proposal of theory (Pickard, 2013).

### **4.1.1 Data Collection**

During the interviews, respondents are asked six open-ended questions. Interviews are all conducted in person. The duration of the interviews ranges from 30 to 60 minutes. In order to maintain validity, all interviews are conducted by the same interviewer and in the same manner. Firstly, the issue of the dissertation is briefly introduced and described. The respondents are asked questions, always in the same order. Respondents have enough time to answer the questions asked, then additional and supplemental questions, which stemmed from the answers of the respondents, are also asked. The interviews are recorded and subsequently transcribed. The transcript was discussed with each respondent to make sure of correctness and completeness.

The data obtained are used to answer research question related to factors influencing misstatements' occurrence in the financial statements, approaches of the individual users to the identification of problematic companies, measuring the impact of misstatements in financial statements on decisions of the users and currently applied methods of risk assessment of the companies.

### **4.1.2 Interview of Participants**

Interviews were conducted with two representatives of bank institutions in the Czech Republic. These respondents are designated as R1 and R2 for subsequent analysis. The representatives for interview participants were selected randomly from bank institutions operating in the Czech Republic, selected banks were contacted telephonically, the dissertation thesis was described, and upon mutual agreement, the meetings were agreed on fixed time with recommended bank employees. There were no specific requirements on bank selection as all banks operating in the Czech Republic can be considered to constitute a homogenous population. Representatives of investors were selected from entities operating on the stock-market in the Czech Republic. The process of contacting such entities

was similar to other interviews. There was a requirement chosen for selecting investors to eliminated investors with low total investments, and the limit was selected to be 150 mils. CZK of investment assets owned by the entity in the year 2018. These respondents are designated as R3 and R4 for subsequent analysis. Respondents from state institutions were selected from the Tax Office of the Czech Republic, where the selection had similar attributes as in case of banks. Upon mutual agreement representatives from the Tax Office of the Czech Republic specialising in corporate income tax and in tax evasion agreed to participate in the interviews. The Tax Office of the Czech Republic required for employees interviewed to remain anonymous in the dissertation thesis and also for detailed procedures utilized by individual departments of the Tax Office not to be specific as these methods are confidential. These respondents are designated as R5 and R6 for subsequent analysis.

### **4.1.3 Data Analysis**

The methods of grounded theory are chosen for data analysis. This theory is one of the possibilities of processing the analysis of qualitative data (Urquhart, 2013; Saldaña, 2016). The grounded theory is intended to help the researcher understand the actions of the individual or collective and leads to the creation of a theory (Strauss and Corbin, 1994). First, the essential topics based on the questions asked (misstatements' occurrence, impacts of misstatements, factors influencing misstatements' occurrence, risk analysis) are determined. Then the open encoding technique is used, which means that the text is read line by line and significant units are searched for and then coded. The conceptual components are named. Each specific component is assigned corresponding code - codes specified by the author. The links between the codes are determined using axial coding. The codes are then grouped into categories. Then the data and their coding are verified by an independent consultant to ensure the validity of the data. Such a process ensures that the data is not coded incorrectly (in the sense of a misunderstanding of the text by the researcher). The author and the independent consultant discuss possible discrepancies in the understanding of the text. After explaining to each other how the text is understood and which codes best describe it, a consensus is reached and the corresponding code is assigned to the text. Data analysis is performed in the program Atlas.ti.

## **4.2 The Methodology of Quantitative Research**

The questionnaire survey is chosen as a data collection technique for quantitative research. This survey was carried out throughout 2019 and during the spring of 2020. Data analysis is performed using descriptive statistics, univariate analysis and logistic regression. The logistic regression aims at developing the best fitting model for the prediction of misstatements' occurrence in the financial statements.

### **4.2.1 Structure of the Questionnaire**

In order to determine the relationships between the probability of misstatements' occurrence in financial statement and individual factors, three types of information are examined using a questionnaire survey – the existence of misstatements in the financial statements of the tested company, internal characteristics of tested organization and questions pertaining to company identification of respondents and the company. The questionnaire has a total of 22 questions, 5 of those for respondent's identification, two on misstatements' occurrence and 15 questions focusing on factors indicating the misstatements' occurrence according to previous research.

Two questions in the questionnaire target the existence of misstatements in the financial statements of the surveyed company. The first question about the existence of misstatements is: *“In the last five years (2013 - 2018), was it necessary to make restatements to already existing financial statement from prior years?”*. This question is a closed one with possible answers being yes and no. This question's objective is to identify companies, which had misstatements in their financial statements that were subsequently identified and corrected in the following periods. The five-year criterion is selected since the users of financial statements in their procedures usually go back up to five years into the past (such as banks when the company is applying for a loan, or tax offices when performing corporate income tax controls) and this period also is consistent with other existing researches in this area. For model creation, the companies which answered yes are considered as companies with misstatements occurring in their financial statements, and this answer was subsequently coded as 0 in data analysis. Companies with opposite answer were coded as 1. These companies are considered as having financial statements without misstatements for model creation.

Questions focusing on identified factors or indicator of misstatements' occurrence total 15. From those, eleven questions are of closed nature with only two possible answers, yes and no. Four questions have multiple answers possible. Those are the questions focusing on the size of the accounting department, quality of internal communication and experience and expertise of accountants of the company. Questions focusing on respondent's categorization and identification total 5. Those are mainly focusing on company size (according to the Czech National Classification), initials, working position and sex of the person answering the questionnaire.

### **4.2.2 Data Collection and Respondents**

A total of 703 participants from organizations in the Czech Republic took part in the survey. The survey was conducted in two phases, during the first phase in 2019, a total of 456 responses was collected, the second phase in spring of 2020 yielded 247 responses. Of these organizations, 585 (82%) are Czech, and 118

(18%) respondents represent foreign companies or their branches in the Czech Republic. The final sample consisted of 181 (26%) micro-companies, 198 (28%) small-size companies, 204 (29%) medium size and 120 (17%) of large companies.

Participation in the questionnaire survey was voluntary. Total of 986 respondents was contacted either electronically or through direct contacts. 750 questionnaires were received initially. However, a total of 47 questionnaires had to be excluded due to missing some of the necessary information. After their exclusion, the total response rate to the questionnaire survey was 71.3%. Respondents filled in the questionnaires individually, either in the form of an online version using a form prepared using docs.google or by filling out a printed questionnaire. The obtained data were used to answer a research question focused on the relationship between the misstatement's occurrence probability and individual factors, which the previous research questions showed as having an impact of misstatements' occurrence.

### **4.2.3 Data Analysis**

Data analysis in the dissertation is done mainly by descriptive statistics, univariate statistical analysis, and logistic regression and other statistical methods. In particular, two statistical programs specializing in statistical calculations are used in the thesis. The first is SPSS and the second is free to use programme JASP, which is primarily used for logistic regression and the model creation purposes. SPSS provides scientists with data management and statistical analysis for elementary descriptive and inferential statistics (e.g. testing statistical hypotheses). Outputs of SPSS and JASP programs are further processed and compiled through other tools for purposes of presentation of results of this thesis.

In this thesis, the Pearson's chi-squared test is used to statistically analyse sets of categorical data to estimate how likely observed differences between the groups arose randomly. It is the most widely used of many chi-squared tests utilizing the 2 x 2 contingency tables. Another used statistic for data analysis was the phi coefficient and Cramer's V.

The logistic regression is used to create the misstatements prediction model. Logistic regression is a statistical model that in its most basic version utilizes a logistic function to model a binary dependent variable. The goodness of the fit in linear regression models is generally measured using  $R^2$ . This dissertation utilized McFadden's  $R^2$ . McFadden's pseudo- $R^2$  is ideally supposed to be between 0.2-0.4, which is considered an excellent fit. The Akaike information criterion (AIC) is an estimator of out-of-sample prediction error and thereby the relative quality of statistical models for a given data sets. Thus, AIC provides a means for model selection as lower AIC the better. Alternatively, when assessing the contribution of individual predictors in a given model, the Wald statistic can also be examined.

## 5. RESULTS

This chapter presents the results of qualitative and quantitative research. The chapter is divided into three subchapters in connection with the set research questions. The first subchapter constitutes a summary of a detailed literature review which is performed in the body of the dissertation pertaining to factors affecting the misstatements' occurrence in financial statements of companies (RQ1). The second subchapter focuses on what factors affect the misstatements' occurrence in financial statements of companies according to users of financial statements (RQ1). The third chapter deals with the issue of measuring the probability of misstatements' occurrence in the financial statements of companies (RQ2).

### 5.1 Factors Affecting the Misstatements' Occurrence According to the Literature Review

The results of this literature review focusing on factors influencing the probability of misstatements' occurrence can be referenced in this chapter, where existing researches are described in a summary format. Only a summary of identified researches and identified factors is stated due to the sheer depth of the literature review, which was performed and cannot fit into a format of this dissertation thesis summary.

Management Incentives influence the misstatements' occurrence according to several authors, e.g. Burns and Kedia (2006), Jiang et al. (2010), Feng et al. (2011).

Earnings management is also considered as a potential factor which influences the misstatements' occurrence according to several pieces of research, e.g. Türkmen (2016), (Beneish (1999), or (Gerakos, 2012).

Specifics of national accounting standards have also been identified in several pieces of research, e.g. Yang *et al.* (2005), Chen *et al.* (2007), Benston (2006), or Chaney *et al.* (2011) and the nature of such standards is expected to influence the quality of accounting information. This dissertation also considers the IFRS as a specific parameter to have a possible impact on the quality of the financial statements. For example, Tassadaq and Malik (2015), Remenarić *et al.* (2018) consider the implementation of IFRS as a valid method to reduce the misstatements' occurrence in financial statements.

According to findings of Vlčková and Friebel (2015), Jones (2011), Wahlen (1994), or Petroni *et al.* (2000), the usage of creative accounting is also included as a possible factor which influences the misstatements' occurrence.

The general environment, where the company conducts its business, significantly affects their behaviour. This fact is confirmed by Wongsunwai (2012) and Haw *et al.* (2011). The specific factor is whether the company is

audited, as was confirmed in research by Al-Khaddash *et al.* (2013), Adali and Kizil (2017), or Brown and Caylor (2005). Internal controls implementation is other specific characteristics of the business environment and its quality can influence the quality of the financial statements according to Asare *et al.* (2008), Rogers and Stocken (2005), or Bell and Carcello (2000).

Logically, characteristics of people preparing the financial statements should also influence the financial statements themselves. This was confirmed in research by Clemen and Winkler (1985), or McDaniel *et al.* (2002). Bonner and Lewis (1990), Libby and Luft (1993) also note that the skill of employees might also affect misstatements' occurrence.

Ball *et al.* (2003) argue that information asymmetry and problems with the quality of the financial statements are more likely to be resolved when the internal communication system in the company improves. This was confirmed by Laptis (2009), or by Vlčková and Friebel (2015).

The past researches also agree that the probability of misstatements' occurrence increases when owners of the company are personally in charge of accounting of the company, e.g. Core *et al.* (1999) or Shivdasani and Yermack (1999). Haw *et al.* (2011) also confirm that direct owners' participation is associated with a higher degree of misclassification, especially for companies controlled by a family.

Several papers point to the fact that state ownership has a negative connotation to the quality of management and the quality of information presented to the public, e.g. Chaney *et al.* (2011).

Information technologies also play a significant role in the creation of the financial statements, so it is only logical, that information technology also has an impact on the possibility of misstatements' occurrence in the financial statements. Ou *et al.* (2017) claim that the implementation of modern technologies improves the true and fair view of accounting information.

Corporate social responsibility and corporate governance implementation's significance has been proven by a wide range of academic articles, e.g. Larcker *et al.* (2007) or Hermanson and Rittenberg (2003) confirm that the implementation of corporate governance approaches has positive effects on the quality of accounting information.

For the model development, all identified factors influencing the probability of misstatements' occurrence were gathered and grouped based on their inherent nature or characteristics. First performed categorization was done on the basis whether the factor is inherently internal or external to the company. Subsequently, the factors were grouped into categories based on subjective judgement for simplification and presentation. Based on the specifics of individual factors and based on findings of previous researches, the factors, in the following Table 1, which influence the probability of misstatements' occurrence in the financial statements were selected for further testing and graphically

highlighted to illustrate their expected effects on the probability of misstatements' occurrence. Factors marked in green are expected to decrease the chance of misstatements' occurrence, while factors marked in red are expected to influence the chance of misstatements' occurrence positively.

Table 1 Factors selected for the model proposal

Management	Systems and People	Structure	Applied Approaches	External Control
Management Incentives	Sufficient Expertise	Size of the accounting department	IFRS	Statutory Audit
State ownership	Sufficient Experience	Existence of Internal Control System	CSR	
Owners direct participation	Modern IT solutions	Quality of internal communication	Corporate Governance	

source: own

The following paragraph illustrates the discussion for excluding some of the identified factors.

The earnings management and the creative accounting from the Applied Approaches category were not selected for the model proposal process due to the limitations of the research. As it is not probable to expect respondents of the questionnaire survey to truthfully answer question focusing on intentional manipulation of the financial statements or their decision to use methods of the creative accounting to present results they desire. More importantly, in accordance with previous researches, the earnings management, accruals management and the creative accounting constitute more of a method or approach utilized by companies which lead to misstatements' occurrence in the financial statements rather than a factor influencing misstatements' occurrence. This is evidenced by the fact that earnings management is generally used as a proxy for misstatement occurrence or low quality of accounting information by other researchers. For the model proposal purposes, it was decided that category of National Regulations from external factors category is to be excluded when preparing the model as this model is primarily prepared for application in the environment of the Czech Republic. Thus, regulations are the same for every company in the population. These factors, however, could be possibly be included during the future research, when the model which would be internationally or globally applicable is going to be proposed. Similar reasons as for excluding the category of National Regulation were used when deciding to exclude the State

supervision factor from External Control category. As the model proposal of this dissertation thesis focuses momentarily only on companies operating in the Czech Republic and the level of state control and supervision is logically same for all companies operating in this county, this factor is excluded from the model proposal process.

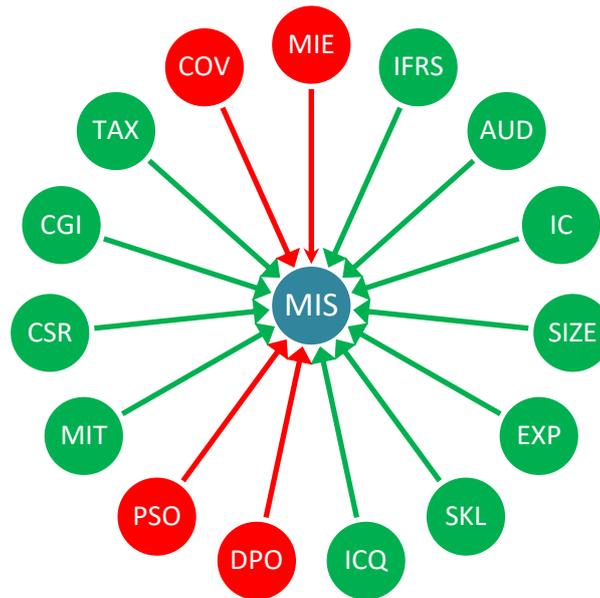
## **5.2 Factors Affecting the Misstatements' Occurrence According to Qualitative Research**

During the interviews, the respondents were asked about factors affecting the misstatements' occurrence according to their experience and according to approaches implemented in their organizations. A total of 6 interviews were conducted, and a summary of identified findings can be found in this following subchapter. Based on analysis of the responses, two categories of factors were identified, internal and external. These findings confirm selected categorization, and thus the division to internal and external factors remains intact. Several codes were identified in connection to factors affecting the misstatements' occurrence. These codes were grouped based on thematic and contextual similarities. Finally, the groups were named based on the volition of the author of the thesis. Based on the responses, new hypotheses were stated. These new hypotheses are concerning the utilization of tax advisor services and the existence of banking covenants. These factors were included in the quantitative research and constituted a part of the proposed misstatements model. Utilization of tax advisor services is coded as the variable (TAX), and the existence of banking covenants is coded as the variable (COV).

## **5.3 Measuring the Probability of Misstatements' Occurrence**

Previous chapters focused on identifying factors which affect the occurrence of misstatements in the financial statements of companies. In total 15 hypotheses were stated, from which four factors increase the probability of misstatements' occurrence (have a positive relation to misstatements' occurrence) and 11 factors should decrease the probability of misstatements' occurrence (they have a negative relation to misstatements' occurrence). Identified factors and their expected effects are graphically presented in the following figure (Figure 2). Variables are coded as follows: misstatements' occurrence (MIS); management incentives (MIE); IFRS implementation (IFRS); statutory audit (AUD); internal controls existence (IC); size of company (SIZE); experience of employees (EXP); skill of employees (SKL); internal communication quality (ICQ); direct participation of owners (DPO); partial state ownership (PSO); modern information technologies (MIT); corporate social responsibility (CSR); corporate governance (CGI); tax advisor services (TAX); and covenants existence (COV).

Figure 2 Summary of factors influencing the misstatements' occurrence



source: own

### 5.3.1 Descriptive Statistics

The sample of 703 items included a total of 170 observations (24.2%) which were identified as companies that had misstatements in their financial statements, and 533 observations (75.8%) were companies in which no misstatements were identified in their financial statements during last five years (2013 - 2018). This distribution is was demonstrated by the mean of 0.758 of MIS variable, indicating inclination of data towards value 1. The mean of the existence of management incentives (MIE) was calculated as 0.388, indicating a lower percentage of companies with management incentives applied. IFRS was implemented by 10.7% of companies in the tested sample. 60.2% of companies were subjected to an audit, and 48.4% of companies utilized services of tax advisors. Implementation of controls and direct participation of the owners on the management of companies were represented by a similar amount of companies, 56.6% and 55.6% respectively. New trends such as CSR and Corporate governance were implemented by 12.2% and 10.2% of companies from the tested sample, respectively. 30.4% of the companies were subjected to banking covenants, and 7.7% were partially state-owned during the examined period. Modern information technologies (such as Business Intelligence) were implemented by 35.7% of companies. In the tested sample, accountants of companies had, on average more than 3 – 5 years of practice and had at least a high school education. Negative Skewness of EXP, SKL, and ICQ variables indicates that they are skewed to the right side of their respective classes, meaning that sampled companies have more experienced and skilled employees and that the quality of their internal communication is mostly of higher quality. Kurtosis

test indicates that none from the variables is of normal distribution. As was already stated previously, the sample consisted of 26% micro-companies, 28% small-size companies, 29% medium and 17% of large companies. The quality of communication in tested companies was valued by a mean of 3.385, indicating that most companies have above average quality of communication system in their respective companies.

### 5.3.2 Univariate analysis of the factors

Before conducting multifactor data analysis, the dependency between the independent variable and dependent variables was considered to estimate the general connections between variables. For each factor which is binominal (10 factors in total) significant classificatory power using 2 x 2 contingency tables and the related Chi-square test of independence was tested. The results of univariate analysis for binominal factors are presented in Table 2. The factors listed in this table are listed in abbreviated form.

Table 2 Univariate analysis of binomial factors

Factor	Misstatements cases (170)		Non-misstatement cases (533)		Pearson Chi-Sq.	Phi Coef.	p-value
	Present	%	Present	%			
<b>MIE</b>	100	58.82	173	32.46	37.721	.2320	< 0.001
<b>IFRS</b>	23	13.53	52	9.76	1.926	.0052	0.165 NS
<b>AUD</b>	103	60.59	320	60.04	0.016	.0050	0.898 NS
<b>IC</b>	108	63.53	290	54.41	4.365	.0790	0.037
<b>DPO</b>	120	70.59	271	50.84	20.355	.1700	< 0.001
<b>PSO</b>	35	20.59	19	3.57	52.673	.2740	< 0.001
<b>MIT</b>	77	45.29	174	32.65	8.983	.1130	0.003
<b>CSR</b>	29	17.06	57	10.69	4.863	.0830	0.027
<b>CGI</b>	14	8.24	58	10.88	0.982	.0370	0.322 NS
<b>TAX</b>	136	80.00	232	43.58	68.735	.3130	< 0.001
<b>COV</b>	63	37.06	151	28.33	4.638	.0810	0.031

source: own

Table 2 presents the absolute and relative frequencies of influential factors occurrence responses for 170 companies with misstated financial statements and 533 companies without misstatements in their financial statements. The significance of the relationship between the factors and the misstatements' occurrence was tested using the Chi-square statistics. Factors which were not identified as significant at the 0.05 level were marked as NS in the table. Table 2 shows that seven of the ten binominal factors are significant. The most influential factors and their respective phi coefficients are the utilization of tax advisory services (.31); partial state ownership (.27); and the existence of management incentives (.23).

Similarly, significant classificatory power using contingency tables and the related Chi-square test of independence was tested for variables which are not binominal and were measured using the Likert scale. The results of univariate analysis for factors assessed on the Likert scale are presented in Table 3. The related Pearson Chi-square statistics, Cramer’s V, and observed p-values are also presented in the table. The significance of the relationship between the factors and the misstatements’ occurrence was tested using the Chi-square statistics.

Table 3 Univariate analysis of factors measured by Likert scale

Factor	Response	Misstatements cases (170)		Non-misstatement cases (533)		Pearson Chi-Sq.	Cramer’s V	p-value
		Present	%	Present	%			
SIZE	Micro	35	20.59	146	27.39	20.570	0.171	< 0.001
	Small	50	29.41	148	27.77			
	Medium	38	22.35	166	31.14			
	Large	47	27.65	73	13.70			
DPT	External	25	14.70	27	5.07	27.854	0.199	< 0.001
	Micro	50	29.41	243	45.59			
	Small	53	31.18	165	30.96			
	Medium	25	14.71	50	9.38			
	Large	17	10.00	48	9.01			
EXP	External	25	14.71	27	5.07	28.306	0.201	< 0.001
	0-2 years	24	14.12	71	13.32			
	3-5 years	42	24.71	195	36.59			
	6-10 years	9	5.29	60	11.26			
	10-more years	70	41.17	180	33.77			
SKI	External	25	14.71	27	5.07	26.284	0.193	< 0.001
	Elementary	0	0	15	2.81			
	High School	107	62.94	403	75.61			
	College	38	22.35	77	16.51			
ICQ	Low Q	27	15.88	45	8.44	34.276	0.221	< 0.001
	Minor Problems	23	13.53	56	10.51			
	Normal Q	64	37.65	174	32.65			
	Above average	40	23.53	94	17.67			
	Top Q	16	9.41	164	30.77			

source: own

The most influential factors and their respective Cramer’s V coefficients are quality of communication in the company (.22); experience of accountants (.20);

and size of the accounting department (.20), but generally all factors are expected to have a similar strength of dependency with misstatements' occurrence.

### 5.3.3 Logistic Regression Model

The results of the univariate analysis were used for the creation of the misstatements prediction model. The logistic regression was used for the development of this model. The initial model created, which utilized all significant factors according to the univariate analysis, can be referenced in Table 4. This model served as a benchmark for updating and correcting the model. The initial model includes a total of 13 variables affecting the probability of misstatements' occurrence. McFadden R<sup>2</sup> of this model is 0.258, which represents a perfect fit of the model. P-value was also calculated significantly below the threshold of 0.05. AIC of 604.841 also indicated a decrease in the amount of lost information. This model was subsequently subjected to further adjustments and modifications to achieve the highest possible effectiveness.

Table 4 Initial logistic regression

<b>Model Summary</b>							
Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p - value	McFadden R <sup>2</sup>
H <sub>0</sub>	777.756	779.756	784.312	702			
H <sub>1</sub>	576.841	604.841	668.616	689	200.916	< .001	0.258

<b>Coefficients</b>							
	Estimate	Standard Error	z	Wald test			
				Wald Statistic	df	p-value	
(Intercept)	2.782	0.610	4.557	20.762	1	< .001	
SIZE	-0.130	0.188	-0.694	0.481	1	0.488	
MIE	-0.819	0.226	-3.626	13.146	1	< .001	
IC	-0.333	0.285	-1.168	1.364	1	0.243	
DPT	0.215	0.163	1.324	1.752	1	0.186	
EXP	0.070	0.095	0.735	0.541	1	0.462	
SKI	0.084	0.184	0.456	0.208	1	0.648	
ICQ	0.306	0.087	3.526	12.435	1	< .001	
DPO	-1.546	0.269	-5.752	33.081	1	< .001	
PSO	-2.158	0.363	-5.937	35.253	1	< .001	
MIT	0.029	0.249	0.115	0.013	1	0.909	
CSR	-0.459	0.324	-1.416	2.004	1	0.157	
TAX	-1.576	0.240	-6.579	43.284	1	< .001	
COV	-0.734	0.238	-3.082	9.498	1	0.002	

Note. MIS level '1' coded as class 1.

source: own

The primary tool for assessing the model quality is the fact that is combining different factors lead to changes in McFadden  $R^2$ . Increasing McFadden  $R^2$  leads to better-fitting model, and values between 0.2 and 0.4 indicate a perfect fit of the model. AIC represents the loss of information in the model, and thus decreasing AIC improves the quality of the model. The first modifications to the model were done based on p-values of individual factors in Table 4.

To effectively test, compare and analyse the performance of alternative models, the total sample of 703 observations was randomly divided into a training sample and a test sample. This was also done to prevent overfitting the model, as was mentioned in the methodology part of this dissertation. The utilized proportion was 80% of the population as the training sample and 20% as the test sample, which is the most commonly used distribution for this type of testing. The training sample contained 131 misstatements cases and 431 non-misstatements cases. The test sample contained 39 misstatements cases and 102 non-misstatements cases. Modelling continued on the training sample, and created models were tested on the tested sample to compare their effectivity. This method was used to eliminate statistically insignificant factors further as well as to confirm that already eliminated variables should not be added back. The criteria for selection of the best model were the performance metrics of the model. The best model was selected based on highest classificatory accuracy, because of the significant number of factors, the complexity of model estimation and comparison of individual models. In over 50 valid models were modelled and compared, completely improbable models were not modelled (such as models with only statistically insignificant factors) Final selected model with best classificatory power is presented in Table 5.

As shown in Table 5 the best-proposed model contains the following variables: management incentives existence, internal communication quality, the direct participation of owners, partial state ownership, utilisation of tax advisory services and banking covenants. The model was proposed based on data of the training group. Listed performance metrics and confusion matrix are calculated based on the testing group of data. The deviance is a key concept in logistic regression. Deviance on the test population, when compared to perfect model (610.321), is significantly lower, reaching the value of 474.488 and the final deviance is also significantly lower than the deviance of initial model (decrease from 576.841 to 474.488). The p-value of the best-proposed model remained below the threshold of 0.05 (actually even below 0.001) and the McFadden  $R^2$  of the best-proposed model is 0.223, which is between 0.2 and 0.4 indicating an almost perfect fit.

From a total of 39 misstating companies in the test group, the best model was able to identify 18 of them correctly. The model performed significantly better in identifying not-misstating companies (95 from 102 correctly identified). The best model thus reached very high results in the area of sensitivity (over 93%). The

thesis aims to provide a risk-analysis tool for companies to predict companies which misstate their financial statements. The specificity of this model reached only 46.2%. The specificity of the model is further improved by identifying an ideal cut-off point. The precision of the model above 75% is considered satisfactory.

Table 5 The best-proposed model

<b>Model Summary</b>							
Model	Deviance	AIC	BIC	df	X <sup>2</sup>	p - value	McFadden R <sup>2</sup>
H <sub>0</sub>	610.321	612.321	616.653	561	135.833	< .001	0.223
H <sub>1</sub>	474.488	488.488	518.808	555			

<b>Coefficients</b>							
	Estimate	Standard Error	Odds Ratio	z	Wald test		
					Wald Statistic	df	p-value
(Intercept)	3.022	0.468	20.531	6.461	41.747	1	< .001
MIE	-0.879	0.235	0.415	-3.738	13.975	1	< .001
ICQ	0.242	0.092	1.274	2.638	6.961	1	0.008
DPO	-1.457	0.264	0.233	-5.508	30.333	1	< .001
PSO	-2.018	0.372	0.133	-5.423	29.405	1	< .001
TAX	-1.475	0.257	0.229	-5.750	33.066	1	< .001
COV	-0.313	0.128	0.534	-2.448	5.993	1	0.014

Note. MIS level '1' coded as class 1.

source: own

The model confirmed that there is a statistically significant relation between misstatements' occurrence and MIE factor (p-value < .001). Value of estimate at -0,879 and related Odds Ratio at 0.415 indicates that companies which have incentives for managers in place are by 58.5% more likely to have misstatements in their financial statements than those companies which do not. The quality of internal communication in the company has been proven to have a statistically significant relationship to the probability of misstatements' occurrence (p-value < .001). Odds ratio indicates that with increasing the quality of internal communication in the company by 1 grade decreases the probability of misstatements' occurrence by 27.4%. Another factor which was proven to have a statistically significant influence on the misstatements' occurrence in financial statements is the direct participation of owners in the management of companies (p-value = 0.008). The estimate of -1.457 for DPO indicates that DPO positively influences the probability of the misstatement's occurrence. Similarly, partial state ownership was proven to have a statistically significant influence on the misstatement's occurrence in financial statements (p-value < .001). The estimate of -2.018 for PSO indicates that PSO positively influences the probability of the misstatement's occurrence. Tax advisory variable has been proven by logistic

regression to negatively influence the probability of misstatements' occurrence in the financial statements of the companies (p-value < .001). This is in direct opposition to the stated hypothesis H14. Odds Ratio at 0.229 indicates that companies which utilize tax advisors' services are by 77.1% more likely to have misstatements in their financial statements than those companies which do not. The covenant's existence in the company has been proven by logistic regression to positively influence the probability of misstatements' occurrence in the financial statements of the companies (p-value of 0.014).

### 5.3.4 Assessment of the Model's Performance

Firstly, to assess the performance of the model, the ideal cut-off points for the model were identified. The criterion of specificity was selected as a crucial one for assessing the performance of the model, the second most essential characteristics were precision, and the sensitivity was considered to be secondary. The specificity of the model was selected due to reasoning, that companies which have misstated financial statements and are wrongly assessed as companies with high-quality financial statement constitute a higher risk than the opposite situation. On the other hand, not confirming the financial statements of misstating companies may incur the costs of wrong business decisions and other possible losses.

Table 6 Classificatory Accuracy of the Best model

Predicted probability of misstatements from the model	Train Sample		Predicted probability of misstatements from the model	Test Sample	
	Misstaterments	No Misstaterments		Misstaterments	No Misstaterments
.10	0.76	100	.10	5.13	100
.20	4.58	100	.20	5.13	100
.30	14.50	98.61	.30	15.38	100
.40	24.43	96.75	.40	28.21	96.08
.50	41.22	92.34	.50	46.15	93.14
.60	54.20	89.10	.60	56.41	91.18
.70	67.18	80.74	.70	79.49	84.31
.80	75.65	67.29	.80	89.74	72.55
.90	90.84	46.64	.90	94.87	49.02

source: own

The specificity of the model was initially assessed on the test sample and the training sample separately. The “hit rates” for the best model using both samples are presented in Table 6. The cut-off points represent the predicted probabilities of misstatements’ occurrence in financial statements that are calculated from the application of the logistic regression. With specificity (amount of correct predictions for misstating companies) being the crucial criteria, the logical solution which also balances loss in sensitivity is to select the cut-off point at the higher end of utilised percentages (above 70%) but below the range of 90%. The ideal range was marked in grey in Table 6.

To more specifically calculate ideal cut-off point for the proposed misstatements model, the Solver function in Excel was used. Solver function was used to maximize outputs of the function  $y = 4*TP + 0,75*TN - FP - FN$ , with limiting condition for cut-off stated to the interval between 0.01 and 0.99.

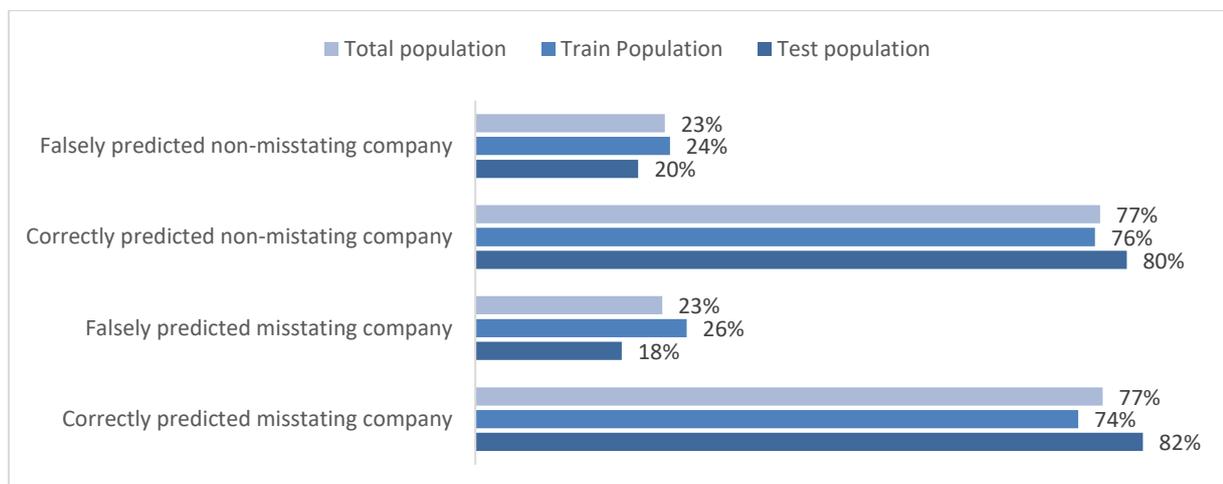
The expected function of results was created based on the confusion matrix of logistic regression, where TP is true positive, TN is true negative, FP is false positive and FN is false negative. Criteria of 4 for TP variable was selected due to the significance of the specificity criteria, and 0.75 was selected as a coefficient for TN. Coefficient of 4 was selected to promote the value of TP results. In the total population, the ratio of Misstating and Not-misstating companies is roughly 1:3. Criteria of 4 were selected to even these odds because the larger population of TN would tend to maximise sensitivity rather than the specificity of the model. 0.75 for TN was selected to decrease further the importance of the sensitivity of the model in favour of specificity. The solving algorithm was set to Evolutionary algorithm with 0.0001 convergence and 0.075 frequency of mutations.

The Solver function was used to calculate optimal cut-off for the test sample, the training sample and as well as for the population as a whole. The results of optimization for the whole population were utilized because it was the purpose of the model development to propose a model which would be the most generally applicable. The optimal solution for the cut-off point was calculated at 75.75975%. For a practical application, this percentage can be approximated to 76%, which is in line with the expected range. The calculated cut-off was used on the test sample, the training sample and the total population. Summary of performance of the proposed model can be referenced in Figure 3.

The final misstatements model was able to predict companies which had misstatements occur in their financial statements in over 77% of cases, which translates to only 39 misstated companies from a total population of 170 misstating companies. For the test population, the model performed even better, achieving 87.18% effectivity in predicting misstatements’ occurrence (only five from 39 cases were not identified). Still, this high percentage can be probably attributed to a low number of misstating companies in the test group (only 39), which significantly influences the final specificity of the model. The usual

expectation would be to achieve lower specificity in the test group than was achieved in the training group.

Figure 3 The assessment of the model performance



source: own

In general, the model achieves the average specificity of 79.43% (calculated as an average specificity of train, test and total population), which is in line with goals of the model development phase which aimed at the specificity of the model without sacrificing too much of model’s sensitivity (average sensitivity of the model is 77.42%). Average precision of the model is 92.02% which is considered satisfactory. This model was statistically proven to be effective in the assessment of the probability of misstatements’ occurrence in the financial statements of companies. The final model can be summarized into the following formula:

$$\ln\left(\frac{R}{1-R}\right) = 3.022 - 0.879 * MIE + 0.242 * ICQ - 1.457 * DPO - 2.018 * PSO - 1.475 * TAX - 0.313 * COV$$

From this formula, the probability of misstatements’ occurrence in the financial statements can be calculated as follows:

$$R = \frac{e^{3.022 - 0.879 * MIE + 0.242 * ICQ - 1.457 * DPO - 2.018 * PSO - 1.475 * TAX - 0.313 * COV}}{1 + e^{3.022 - 0.879 * MIE + 0.242 * ICQ - 1.457 * DPO - 2.018 * PSO - 1.475 * TAX - 0.313 * COV}}$$

This formula can be utilized to calculate R, and if the calculated R is compared to the optimal cut-off point (76%) the statements whether the financial statements possible include misstatements can be made. With results below 76%, the companies are considered to be misstating companies.

## **6. CONTRIBUTION TO THEORY AND PRACTICE**

The main contribution of this work is the proposal of a model for predicting the occurrence of misstatements in financial statements. This model adds to the existing portfolio of currently used reliability measurement methods such as the Jones Model or M-Score. When compared to other methods, this proposed model targets other, mainly non-financial variables, which creates an opportunity to utilize a combination of models for more precise assessment of the financial statements.

### **6.1 Contribution to Theory**

From a theoretical point of view, this dissertation dramatically contributes to the area of accounting information. The dissertation provides a broad review of the problematics of misstatements' occurrence in the financial statements. The model itself is a significant addition to a group of existing models which were historically strongly focused mainly on financial variables. This model shows specific variables, which are not purely of financial nature, and their impacts on the misstatement's occurrence in the financial statements. Additionally, individual variables affecting the misstatements' occurrence were statistically tested. Thus, this dissertation either confirms the results of previous researches or provides evidence contradicting previous findings. To present a few, the conclusions of this dissertation thesis further confirm findings of Bergstresser, and Philippon (2006) or Armstrong *et al.* (2010) pertaining to the impacts of the management incentives existence on misstatements' occurrence. On the contrary, findings of Kubickova and Jindrichovska (2016) concerning the positive effects of IFRS implementation on the misstatement's occurrence were refused in this thesis. Also, new variables affecting the misstatements' occurrence, which were not previously tested in detail in previous researches were identified and tested.

### **6.2 Contribution to Practice**

From a practice point of view, this model is a contribution to all users of the financial statements. This model can be further modified based on specific requirements of users by adding their variables, such as experience with the company or past positive results, and immediately applied into practice. The immediate application could enhance assessment capabilities of banks, investors, suppliers, state departments or any other potential user of the financial statements due to its relatively easy utilization and calculation of the final score of any company. Even for the actual users of the financial statements, this dissertation dramatically contributes to the area of accounting information, and as this dissertation provides a broad view of the problematics of misstatements' occurrence in the financial statements it can serve as a tool and the source of information for companies, when identifying what can be a possible source of distortions in the financial statements and what to look for.

## **7. RESEARCH LIMITATIONS AND FUTURE RESEARCH DIRECTIONS**

The dissertation thesis was focused on misstatements' occurrence in the financial statements of companies in the Czech Republic. Both qualitative and quantitative research was used to achieve the primary goal of this thesis. However, it is necessary to mention the limitations that affect the final results and conclusions of this thesis. These limitations also lead to suggestions for further, more profound research.

In general, the main limitation of the research is that it was conducted purely in the Czech Republic, meaning that the misstatements model can only be effectively utilized in the Czech Republic or countries with the almost identical socio-political and legislative environment, such as countries of Central Europe. This, however, presents an opportunity to broaden the research scope of this thesis to countries of Central Europe or Europe in general. Possible grander research could generate a much more applicable model. Currently, a project for this broader research is being prepared, currently at the scope of Central European countries, and it is planned to start from January 2021.

The topic of this thesis and topic of accounting fraud, errors or misstatements in general, is a somewhat sensitive topic for accountants and managers around the world as it directly aims at their faults. Gathering data for this type of research is limited in a way that not all questions can be included in the research, be it qualitative or quantitative research. This limitation is tough to circumvent and proves to be a challenge for any further research.

In the area of qualitative research, the selection of respondents for the interviews was not completely random. These were mostly users of financial statements representing organizations cooperating with Tomas Bata University in Zlín. On the other hand, these respondents were willing to discuss the topic in-depth due to their familiarity with our university. However, due to the nature of the topic and specific rules and processes of interviewed organizations such as confidentiality, the results were limited in scope and detail. Thus, the results of qualitative research did not significantly affect the overall direction of the thesis. Based on this, it would be beneficial to continue this research in the future, when the model, which resulted from this dissertation, can be presented to users of financial statements to discuss the specifics in more significant detail.

In the area of quantitative research, the range of respondents for the questionnaire survey is also limited. The total amount of respondents was sufficient, but the more significant population for statistical testing could significantly improve or change the results and make the misstatements model more efficient.

## 8. CONCLUSION

This thesis aimed to create a method for measurement of the probability of misstatements' occurrence in financial statements of companies so that the quality of the financial statements can be better assessed by the external users in their everyday operations. First research question focused on already existing theories and practice experience of real users of accounting information. To answer stated research questions, the methods of qualitative as well as the quantitative research were used. The creation of the final model was an answer to the second research question. The primary source of information was the already existing literature pertaining to this topic and practical experiences of the users of financial statement, who agreed to participate in the qualitative research. Quantitative research is used to prepare and validate the model for measuring the probability of misstatements' occurrence in financial statements, as well as to statistically verify and generalize the relationships between the individual variables and the misstatements' occurrence probability. Data collection for quantitative research is performed by the technique of a questionnaire survey of respondents from the Czech Republic.

The model for misstatements' occurrence prediction was proposed utilizing mainly the logistic regression as well as other statistical methods. The final proposed model includes 6 variables, namely the management incentives existence (MIE); the quality of internal communication in the company (ICQ); the direct participation of owners in the management of companies (DPO); the partial state ownership (PSO); the utilization of tax advisory services (TAX); and the covenant's existence in the company (COV). The proposed model was further modified by identifying the ideal cut-off points. The criterion of specificity was selected as a crucial one for assessing the performance of the model, and the optimal cut-off point was stated at 76%. The final proposed model thus can be used to calculate the probability of misstatements' occurrence (R) and companies with results below 76% are considered to be misstating companies. The final proposed model was statistically proven to be effective in the assessment of the probability of misstatements' occurrence in the financial statements of companies. This model can serve as a straightforward tool and provide users with an effective method which can be used daily throughout their work.

In conclusion, this dissertation thesis and the proposed model fill a gap in the research of misstatements' occurrence due to its focus on non-financial variables affecting the misstatements' occurrence and show a way for further researches, where the focus of researches is not only the financial data and financial variables but also non-financial, behavioural and personal aspects of people included in their preparation.

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## PUBLICATION ACTIVITIES OF THE AUTHOR

- 1) Kolářová, E., & Homola, D. (2017). *Analysis of the Relationship between the Error Rate in the Selected Accounting Areas and the Size of the Company*. In: ICFE 2017. Proceeding of the 4th international conference on finance and economics: September 21st – 22nd, 2017, Ho Chi Minh City Vietnam, 24-32. ISBN 978-80-87990-11-7
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- 4) Homola, D., & Paseková, M. (2020). Factors influencing true and fair view when preparing financial statements under IFRS: evidence from the Czech Republic. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 15(3), 595-611. <https://doi.org/10.24136/eq.2020.026>
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- 6) Kolářová, E., & Homola, D. (*bude vydáno 2020*). Impacts of tobacco excise duties on consumers and producers in the environment of the Czech Republic. *Adiktologie*

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Predikce vzniku nesprávností v účetních výkazech

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