St. Petersburg University
Graduate School of Management
Master in Corporate Finance

A STUDY OF FACTORS THAT DETERMINE THE LEVEL OF A COMPANY'S EARNINGS MANIPULATION

Master's Thesis by the 2nd year student
Concentration – Corporate Finance
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ЗАЯВЛЕНИЕ О САМОСТОЯТЕЛЬНОМ ХАРАКТЕРЕ ВЫПОЛНЕНИЯ ВЫПУСКНОЙ КВАЛИФИКАЦИОННОЙ РАБОТЫ

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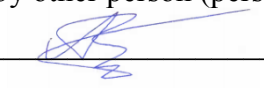

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АННОТАЦИЯ

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Название ВКР	Исследование факторов, определяющих уровень манипулирования прибылью компании
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Год	2017
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Описание цели, задач и основных результатов	Цель исследования – изучение факторов, определяющих то, насколько компании склонны манипулировать прибылью в будущем отчетном периоде: завышать, занижать или незначительно манипулировать. Задачи: 1) определить основные факторы, влияющие на склонность компаний к манипулированию прибылью; 2) выявить комбинации данных факторов, ведущие к определенному уровню манипулирования (занижению, завышению, незначительному манипулированию); 3) сравнить результаты между Россией и Китаем; 4) проиллюстрировать на примере реальных компаний выявленные комбинации факторов. Результаты: 1) основными факторами, влияющими на уровень манипулирования прибылью компаний в будущем отчетном периоде, являются:

	уровень долга, размер компании, устойчивость прибыли, рентабельность собственного капитала, активность по привлечению собственного капитала и уровень манипулирования в предыдущем отчетном периоде; 2) наиболее значимый фактор (и в России, и в Китае) - уровень долга.
Ключевые слова	Управление прибылью, Россия, Китай, прогнозирование, дерево решений.

ABSTRACT

Master Student's Name	Andrei Zinchenko
Master Thesis Title	A study of factors that determine the level of a company's earnings manipulation
Main field of study	Corporate finance
Year	2017
Academic Advisor's Name	Egor Nikulin, Phd in Economics, Associate Professor
Description of the goal, tasks and main results	Goal – study the factors which influence particular type of earnings manipulation.: upward earnings management, downward earnings management or the absence of significant manipulation. Tasks: 1) identify main variables driving company's earnings manipulation; 2) outline combinations of these variables under which a particular type of earnings manipulation is expected; compare results across Russian and Chinese markets; 3) compare results across Russia and China; 4) illustrate combinations of factors found by real cases. Results: 1) the main factor influencing the company’s level of earnings manipulation of the next accounting period for both Russian and Chinese companies is the debt ratio calculated as the ratio of total liabilities to total assets. 2) The other important factors are: the

	company's size, return on equity, earnings persistence, the level of earnings manipulation in the current period and stock emission.
Keywords	Earnings management, Russia, China, forecasting, decision tree.

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INTRODUCTION

Earnings management (manipulation) is one of the most widely investigated topics in the current accounting literature[1]. The considerable attention given to this subject results from the fact that national as well as international accounting standards provide companies with a certain degree of freedom in accounting choices, which can be used by organizations to affect their financial results in a particular way. Companies may manipulate earnings in order to mislead external users of accounting information about their true economic performance. In the extreme, earnings management can also encompass illegal practices that can eventually damage shareholders. For example, it is presumed that the corporate scandals involving large US and European companies in the early 2000s were partly fostered by the fact that the users of accounting information were unable to identify in time the signs of illegal earnings manipulation in these companies (Tsai and Chiou, 2009).

The peculiarity of the existing research on earnings management is that it mostly focuses on historical data and consequently reveals factors that are somehow correlated with earnings manipulations (Tsai and Chiou, 2009). However, there is little research proposing specific models for forecasting the level of earnings manipulation of a company, with papers only starting to appear (e.g. Tsai and Chiou, 2009; Etemadi and Moghadam, 2014). In order to gain a more thorough understanding of the earnings management process, it is equally important to be able to forecast the level of a company's earnings manipulation, i.e. to study factors that influence a company's intention to manage earnings in the future. This will constitute the research topic of the Thesis.

The scale of the potential negative consequences of earnings management for company's stakeholders underlines the relevance of the research topic. For example, US listed firms which were publicly alleged in earnings management, lost, on average, from 9% to 13% of their share price. At the same time, earnings management in such companies as Enron Inc. and Parmalat, at some point in time, turned into illegal form and led to the largest corporate scandals and bankruptcies in history. This empirical evidence makes the research topic even more relevant, since timely identification of possible signs of earnings management may help preserve shareholder's wealth, avoid bankruptcy and save jobs for employees.

Given the research gap in existing literature and practical relevance for the broad array of stakeholders, the research goal of the Thesis is to explore typical characteristics of the companies

[1] In the current master thesis the terms "earnings management" and "earnings manipulation" are treated as synonyms. Such an approach is assumed to be feasible, since some research papers use the term "earnings manipulation" instead of "earnings management" implying the same meaning, e.g. Dechow, Sloan and Sweeney (1996); Strobl (2013).

expected to manipulate their future earnings either upwards, downwards, or insignificantly. To achieve this goal, the current Thesis will follow three main research objectives:

1) identify the motives driving companies to use earnings management activities;
2) find out combinations of factors under which companies deflate, inflate or not manipulate their earnings;
3) compare factors and their combinations across different geographical markets (i.e. Russia and China);
4) check validity of these factors and combinations on specific companies.

The methodology of the Thesis was designed so that each step of it could sequentially reach the objectives outlined above. The empirical body of the research contains data over 664 Russian and 2,380 Chinese public non-financial firms, from 2009 through 2014. The reason why Russia and China were chosen for this research stems from some economic similarities between the two countries and general interest in comparing these markets which has risen recently in academic and business communities. In the underlying Thesis, Jones model was used to measure the level of earnings management, since it is not officially disclosed financial metric. By using the data from 2009-2013, the level of earnings manipulation in 2014 was predicted via CART decision-tree, separately for Russia and China (classification and regression tree). These decision trees derived combinations of factors influencing future earnings manipulation (i.e. in 2014). Afterwards, each combination was tested on real companies through 6 short case studies.

Research findings of the underlying Thesis have managerial implications for various stakeholders and primarily encompass three groups: shareholders, banks, and regulators. Though sample-specific, the first and foremost result lies in the critical thresholds which are calculated to define firms "suspect" to manipulate future earnings. For example, investment managers can re-weigh their equity portfolios to minimize exposures. Bankers can re-adjust covenants for manipulating borrowers to avoid "fictitious" maintenance. Finally, various government authorities, including tax service, may create "black list" of suspect companies and investigate their profits under more scrutinized view. Basically, the findings offer the greatest value for those stakeholders who are exposed to relatively large number of firms and thus possess large amount of data. Therefore, investment funds, commercial banks, tax service, etc. are among these potential users of this research.

The rest of the paper is organized into three parts. The first chapter discusses the concept of earnings management: its definition, methods, and implications, while summarizing existing research on the topic and introducing the main models for forecasting the level of earnings management. The second chapter describes the sample and methodology used, presents research

results, and concludes with their discussion. The last part draws general conclusions of the Thesis.

1. CONCEPT OF EARNINGS MANAGEMENT: DEFINITIONS AND CONTEXT

1.1.Definition of earnings management

One of the first reviews of the earnings management literature was provided by Schipper (1989). The paper contains a definition of earnings management as "a purposeful intervention in the external financial reporting process, with the intent of obtaining some private gain" (Schipper, 1989, p. 92). This definition implies that managers can manipulate a company's accounting figures to reach their private goals, which are presumed to contradict those of external stakeholders. Healy and Wahlen (1999) state that earnings management happens when "managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers". This second definition clarifies the main motives for earnings manipulation. The first involves increasing a company's attractiveness to investors and other external stakeholders. The second motive considers the intention to meet a company's contractual obligations if contracts contain stipulations concerning particular accounting figures.

Earnings management in the accounting literature is generally distinguished from fraudulent practices. Dechow and Skinner (2000) state that financial fraud is an "extreme form of earnings management". By fraud they mean accounting practices that violate generally accepted accounting principles (GAAP). Such actions clearly demonstrate a company's intention to deceive its stakeholders. On the other hand, there are different practices that formally fall within GAAP, but at the same time demonstrate obvious deviation from neutral accounting. These are called conservative and aggressive accounting. Their relation to earnings management depends on whether there was a particular managerial intent behind these actions or whether they were just consequences of legally accepted discretion within accounting standards. In practice, it is difficult to draw the line between these two positions. Therefore, earnings management can be either legal or illegal, with the former generally being the object of research in the scientific literature.

Several motives underlie managers' intentions to manipulate earnings. First, it can be done in order to ensure desirable compensation. When managers' bonuses are tied to accounting indicators, they have an incentive to manage earnings in a particular way (Healy, 1985). Secondly, earnings can be managed when a company's debt covenants are about to be breached (DeFond and Jiambalvo, 1994). Thirdly, earnings manipulation can occur prior to an initial public offering in order to increase the share price (see, e.g., Teoh, Welch and Wong, 1998).

Other motivations include: minimization of income tax (Maydew, 1997); management buyouts (Wu, 1997); and income smoothing (McNichols and Wilson, 1988).

1.2.Methods of earnings management

There are two groups of methods used by companies for earnings manipulation purposes: accounting-based earnings management and real earnings management. Accounting-based earnings management methods rely on the use of the accruals and lie within accounting standards. They include the choice of accounting policies given the object: for example, the choice of depreciation policy) or the choice of accounting estimates: for example, bad debt provisioning, guarantee liabilities provisioning (Schipper, 1989; Healy and Wahlen, 1999; Zang, 2012).

Accrual-based earnings management implies that managers manipulate a company's accrual accounts to affect income; at the same time, the company's cash flows are not influenced. In order to detect this type of earnings management, accruals are generally divided into two parts: non-discretionary accruals that are the consequence of a company's operations in the ordinary course of events; and discretionary accruals that result from a company's manipulation behavior (Ibrahim, 2009). The amount of discretionary accruals is assessed using different models (see, e.g., Jones, 1991; Teoh, Welch and Wong, 1998; Kothari, Leone and Wasley, 2005). Accrual manipulation can include premature revenue recognition, capitalization of expenses, and manipulation of accounting reserves (Ibrahim, 2009).

Real earnings management encompasses managerial practices that deviate from the normal business cycle and aim to achieve a particular earnings benchmark (Roychowdhury, 2006). Its particular feature is that it involves changing the timing or structuring of an operation, investment, or financing transaction of a company, something accrual-based earnings management never does (Zang, 2012). Examples of real earnings management are: overproduction, cutting R&D expenses, postponing a new project (Graham, Harvey and Rajgopal, 2005). The assessment of a level of real earnings management is usually done using an abnormal level of production costs (Roychowdhury, 2006; Cohen, Dey and Lys, 2008; Cohen and Zarowin, 2010).

Real earnings management methods mean running business activities which influence the main financial indicators of a company (revenues, costs, other expenses, etc.) other real earnings management methods are mentioned by S. Roychowdhury (Roychowdhury, 2006).

1) *Aggressive sales* - companies increase their sales volume, therefore, revenues recorded in accounting period, by means of increased discounts and softer credit policy.

2) *Decrease of discretionary expenditures* - companies cut R&D costs and advertising cost.
3) *Excessive production* - companies produce odd units of output in order to keep the majority of fixed costs within end goods` surplus but not within COGS (cost of goods sold).

Real earnings management methods have been widely used in the USA since enactment of Sarbanes-Oxley Act in 2002 which significantly tightened regulations of financial reporting. As a result companies have become more active in running business transactions in order to enhance the financial result. One of the advantages of the use of these methods is that it is much more difficult to find out that a company utilizes them in comparison with the use of accounting-based earnings management methods (Graham, Harvey, Rajgopal, 2005).

According to Zang (2012), accrual-based and real earnings management are not mutually exclusive. On the contrary, Zang's results show that managers first implement real earnings management and then, after the fiscal-year end, adjust the accrual accounts in order to intensify the desirable earnings manipulation effect.

1.3.Prior research on forecasting of earnings management

1.3.1. Factors driving earnings manipulation

As Healy and Wahlen (1999) state, the initial research on earnings management had two main goals: first, to find empirical evidence on whether earnings management exists and, second, to explain motives that drive companies to engage in these activities. Indeed, several models of detecting accrual-based earnings management were proposed (e.g. Healy, 1985; DeAngelo, 1986; Jones, 1991), revealing earnings manipulations in several cases: managers' bonus plans; import relief investigations; takeovers, etc. The power of different earnings management models was compared by Dechow, Sloan and Sweeney (1995). Since the early 2000s the main focus of research has switched to specific methods / instruments of earnings management and how they are used. For example, Marquardt and Wiedman (2004) provide a thorough examination of the use of specific accruals to manage earnings in three different settings: equity offerings, management buyouts, and when avoiding earnings decreases. There are also papers that focus on a particular type of accruals. For instance, Rasmussen (2013) analyzes earnings management on the basis of revenue recognition, while Guidara and Boujelbene (2015), Shust (2015) and Garanina, Nikulin and Frangulantc (2016) consider accounting treatment of R&D costs as an earnings management tool. Much attention in recent years has also been given to real earnings management and treated as an alternative to accrual-based earnings management (e.g. Zang, 2012; Chan et al., 2015; Malik, 2015).

1.3.2. Earnings manipulation forecasting models

As was already mentioned, most research papers on earnings management use historical data and therefore do not explicitly attempt to forecast the future level of earnings manipulation of a company. Papers that address this issue directly started to appear only recently (see, e.g., Tsai and Chiou, 2009; Etemadi and Moghadam, 2014; Loukianova, Nikulin and Zinchenko, 2016). Tsai and Chiou (2009) consider the sample of Taiwanese companies in the electronics industry for 2002-2005, Etemadi and Moghadam (2014) analyze data on Iranian companies for 2002-2010, and Loukianova, Nikulin and Zinchenko (2016) consider Russian companies for 2009-2014.

The main methodological peculiarity of these studies is that they involve machine learning methods (neural networks and decision trees), in addition to the traditional statistical methods used for forecasting, such as regression analysis.

An artificial neural network is a classification technique which simulates the behavior of biological neurons (Gaganis, 2009). Within the network, neurons are considered to be nodes that connect a particular number of variables. Using a neuron's input as determined by the number of nodes from the previous stage, it is possible to compute its output. A decision tree is a classification technique whose output is tree-structured. It performs a split test on its internal nodes and predicts the target class of an example of its leaf nodes (Zeng et al., 2014). All in all, the machine-learning methods are potentially able to provide more insight into the factors that contribute to a particular future earnings management behavior, justifying their use in this research.

Etemadi and Moghadam (2014) compared the predictive power of regression model and neural network and found that the regression model produces less accurate results. Loukianova, Nikulin and Zinchenko (2016) came to the same conclusion after comparing regression model and CART. Tsai and Chiou (2009) used both neural networks and decision trees in their study, which can be considered as one of the first attempts to apply machine learning to earnings management tasks. First, they forecasted the level of companies' earnings manipulation using neural networks and then determined the factors that influence this level. The authors performed short-term forecasting, predicted the level of earnings management for the last quarter of 2006 using the data from the three previous quarters. The results indicated that companies will be inclined to inflate earnings if they have low financial performance as well as high earnings persistence, and if they have recently issued stock. Strict supervision from outsiders also stimulates earnings inflation. In general, Tsai and Chiou's (2009) model showed a good rate of accuracy in predicting cases of upward earnings management.

Tsai and Chiou (2009) pointed out the main limitations of their research. Among them there was the restriction of the sample to a single industry, and the application of the results only to cases of upward earnings management. The current study is to develop their ideas, by using company data from two countries (Russia and China) and several industries. Another distinctive feature of the underlying research is that its results can be used in order to predict all the main types of earnings management behavior, i.e. upward and downward, or its absence. This approach allows to form a more comprehensive view of earnings management behavior in different markets.

1.4.Possible negative implications of earnings management

The reason why earnings management is being extensively researched and discussed both by practitioners and academicians stems from its negative effect it may bring to unlimited number of firm's stakeholders. The most concerned are: investors, creditors and regulators. Although stakeholders are the same, the implications differ extensively between legal and illegal cases of earnings management.

1.4.1. Implications of legal earnings management

Implications for investors. The term "investors" is more relevant here rather than shareholders simply because earnings management targets both existing and potential owners of the firm's stock. Various earnings measures serve as the basis for company valuation performed by investors/analysts. There was a bulk of research in the US which found empirical evidence: companies which were alleged by SEC to have manipulated their earnings, their shares declined by 9 to 13%, on average (Feroz, Park, Pastena, 1991 and Dechow, Sloan, Sweeney, 1996, respectively). As a result, part of shareholders' wealth was destroyed.

Implications for creditors. Apart from investors, creditors are also exposed to negative effects caused by revelation of earnings management practices in the firm. For instance, it was found that companies in the US were using upward earnings management activities prior to bond issuance (Liu, Ning, Davidson III, 2010). In turn, it resulted into better pricing of bonds, shifting yields to maturity lower and, thus, leading buyers of bonds to overpay for the corporate debt. Furthermore, given accrual basis of accounting, this upward earnings management led to the reverse effect on the operating income, i.e. decreasing corporate profits (Volkov, Nikulin 2013). Therefore, downside in earnings negatively affects perceptions over public debt of the company, squeezing its market value.

Implications for regulators. From the government standpoint, the most serious impact from earnings management stems from underpayment of corporate taxes. It was found (Othman, Zeghal, 2006) that companies from Continental Europe apply earnings management techniques

primarily for tax saving purposes. This fact distinguishes European firms from their American peers which use earnings management to influence investors in most of the cases. Another evidence of government-affecting earnings management comes from Jones study (Jones, 1991). It was revealed that some US companies were applying for import relief seeking protection from foreign competition, while intentionally downgrading their earnings. As the author indicates, public authorities should take into account such cases in order to prevent unfair limitation of competition or no-purpose budget expenses.

1.4.2. Implications of illegal earnings management

Much more severe effects are associated with illegal earnings management. To see the exposure of such practices, it is recommended to refer to some of the biggest corporate scandals – bankruptcy of Enron Inc. in the beginning of 2000s (Jones, Jones, 2011; Knapp, 2013) and bankruptcy of Parmalat.

Enron Inc. One of the biggest corporate scandals in the USA is related to the bankruptcy of the company Enron Inc. — the biggest energy provider in the country. During 1996-2000 the company increased its profits from $493 mln till $1,266 mln. The growth was associated with the active use of the following instruments: special purpose vehicles (SPV) and options contracts. SPVs were organized as Enron Inc. subsidies with tax-haven arrangements. New SPVs were financed by only 3% of equity provided by the parent company and 97% of debt. Later the company Enron Inc. signed fictitious contracts of energy supply (the main product group) with these SPVs for unreasonably overestimated prices, thus, providing high margins. Another tool for earnings overestimation was option contract of energy supply. According to relevant the USA accounting standards, options earnings were stated at the moment of making a deal, even if deals took plenty of time (from one week to several years). The price of such options directly depended on the forecast of an underline asset that allowed the sellers to overestimate the earnings significantly. For example, in case the company-buyer signed a contract to buy 1 000 m3 for $3, the trader-supplier (in our case Enron Inc.) could aggressively suppose that in the future the gas price will be $2 per 1 000 m3, thereby having admitted the earnings of $1 as per the contract in the current financial period. The fact that these mechanisms were used more and more frequently, many SPVs went bankrupt and started asking the parent company for financial backing. Enron Inc. injected cash into the capital of SPVs in order to re-establish its creditworthiness and to keep the scheme secret. However, the increased number of the subsidies recapitalization resulted in the organization of the Internal Forensic Committee that later on revealed the true purpose of these SPVs. As a result of publishing of the reconsidered

financial report for 1996-2000 and articles about illegal actions of top-management, a number of negative events for the company and all its stakeholders happened:

1) The share price dropped from $90.56 in August, 2000 to $0 in December, 2001, that resulted in depreciation of $70 bln. investments by shareholders among which there were major pension funds.
2) Outstanding debt of $13.1 bln. (of the parent company), of $18.1 bln. (affiliated firms), and $20 bln., issued to SPVs pledged by shares Enron Inc.
3) 20 thousands employees were lost their job.
4) The auditor of Enron Inc. — company Arthur Andersen — was brought to responsibility and lost all its clients, ultimately being acquired by another audit firm.

Parmalat. Another example of negative consequences of illegal earnings management is the bankruptcy of Italian food conglomerate Parmalat in 2003. During the 1990s, the company actively used the method of double billing when each transaction of an end product (for example, milk bought by a supermarket) was registered twice. Firstly, a real transaction was registered with entry to the accounts receivable book; secondly, a fictitious sale of the same amount was recorded in the accounts payable book reflecting fake liabilities behind suppliers of the products being sold. It should be noted that these suppliers were related to the offshore companies registered in Malta, Virgin Islands, Antilles, etc., and the owner was Parmalat. Thanks to the bank secrecy acts, the scheme of double billing was almost impossible to reveal, taking into account the fact that the company did not use it when dealing with independent partners. As a result, Parmalat managed to overestimate the assets by $16 bln, underestimate liabilities by $10 bln, and accumulate $5 bln. Of fictitious cash and cash equivalents on the offshore subsidies` accounts. Thanks to artificially managed financial sustainability, the company was actively attracting debt through bonds and by 2003 it had accumulated 35 issues. In 2003, the company announced that it failed to pay a small coupon, thus, it made Italian and American banks to check its financial statements in more detail. As a result, the criminal scheme was revealed and a number of arrests of the company`s top managers followed. Fictitious assets were acknowledged fake, so that in December, 2003 Parmalat claimed going bankrupt. The business was stooped and it highly hampered the economy of Italy, as the company used to generate around 1.5% of GDP. Later on, the company continued its operations but with new top-management and shareholders.

1.5.Discussion of theoretical findings

Literature survey and review of earnings management implications revealed the importance of studying the factors which determine the level of future earnings management.

First of all, the peculiarity of the existing research on earnings management is that it mostly focuses on historical data, revealing factors that are simply correlated with earnings manipulation, but do not in fact predict it. Secondly, taking into account financial and business risks of earnings management activities for external stakeholders, it is vital and relevant to provide solution that includes a model aimed at forecasting possible actions of a company in the future – earnings inflating, earnings deflating or insignificant level of earnings manipulation. Finally, prior empirical studies attempted to forecast the level of earnings manipulation only on the single market, without making comparisons between different countries/regions. This approach is limited in the sense that it considers only one economic context.

Another important consideration which emphasizes the research relevance of the underlying Thesis comes from possible severe implications of earnings manipulation. For shareholders, potential losses may rise up to 13% of share price depreciation, while more than half of bond issuers artificially inflate their earnings in years surrounding the issuance. As was illustrated by cases of Enron and Parmalat, earnings management may also take illegal form and lead to complete disruption of the business, when the fraud is being revealed.

To sum up, both gap in existing research and severe implications of earnings manipulation for companies' stakeholders imply significant relevance of the underlying research study. The next chapter will proceed with empirical part of the study, deriving concrete results on typical characteristics of the firms expected to perform certain type of earnings manipulation in the future.

2. FORECASTING THE LEVEL OF EARNINGS MANIPULATION IN RUSSIA AND CHINA

2.1.Methodology

2.1.1. General overview

The research goal of the underlying Thesis is to explore typical characteristics of the companies expected to manage their future earnings. It implies two-fold basis of the research methodology, i.e. two models which will constitute the empirical part of the Thesis: Jones regression model and classification and regression tree (CART). As will be explained further, the former measures the level of a company's earnings management (the dependent variable), while the latter outlines the combinations of factors (the independent variables) indicating company's propensity for a particular earnings management behavior. To briefly introduce the research methodology, Table 1 is presented below, summarizing key steps in empirical part of the Thesis.

Table 1. Methodology summary

Step	Description	Outcome
1. Data collection	Collecting data across selected variables from all publicly listed, non-financial firms in Russia and China, during 2009-2013	Dataset with 664 firms from Russia and 2,380 firms from China
2. Jones model	Using Jones regression model, two variables are calculated: 1) the level of earnings management in 2013 – DA_{2013} ("level of prior year earnings management", i.e. one of the independent variables in subsequent CART decision tree); 2) the level of earnings management in 2014 - DA_{2014} ("future level of earnings management", i.e. dependent variable in subsequent CART	Independent variable DA_{2013} – "the level of prior earnings management"; dependent variable DA_{2014} – "the level of future earnings management"

Step	Description	Outcome
	modeling)[2]	
3. Clustering dependent variable	For CART modeling purposes, variable DA_{2014} is clustered into three "classes" based on its percentile distribution: "1" – class of companies which are expected to "deflate" their earnings in the next financial year (0-25 percentiles of DA_{2014}); "2" – class of companies which are expected to insignificantly/not to manage their earnings in the next financial year (25-75 percentiles of DA_{2014}); "3" – class of companies which are expected to "inflate" their earnings in the next financial year (75-100 percentiles of DA_{2014})	Dependent variable DA_{2014} converted from numeric to categorical format
4. CART decision tree	CART decision tree is constructed to find out which combinations of factors influence the class of future earnings management (DA_{2014}), listing them in nodes, i.e. from the most significant variables at top to the least significant at bottom	Decision tree with critical variables and corresponding value thresholds which would indicate companies suspect to manipulate future earnings
5. Brief case studies	After decision tree is constructed and different combinations of factors are identified, each cluster of earnings management will be illustrated by real companies from Russia and China	Total of 6 cases (3 per country): 2 cases for downward; 2 cases for insignificant; 2 cases for upward manipulation

Source: made by author

[2] Please, also note that the level of prior earnings management (DA_{2013}) is also estimated, which will be used as independent variable in CART modeling.

Although quite complicated, such methodology ensures reaching all research objectives and ultimately helps to achieve the goal of the Thesis, i.e. to study factors impacting the level of a company's earnings management in the future accounting periods. More detailed overview of each step will be provided further.

2.1.2. Choice of geographical markets: Russia and China

The choice of the Chinese market as a base for comparison with Russian companies was made for several reasons. First of all, Russian-Chinese relationships have been attracting attention in recent years, especially from the business perspective. This phenomenon has given rise to many research studies, primarily of an empirical nature, with attempts to compare the two countries from different perspectives: business environment, legislation, corporate performance, etc. For instance, the scientific database Elsevier ScienceDirect indicates an increasing number of working papers comparing Russian and Chinese markets, and the number of new research studies comparing them within the Business, Management and Accounting section rose dramatically from 76 in 2010 to 386 in 2016.

Furthermore, several institutional and macroeconomic factors make Russia and China reasonably comparable, another reason for considering these countries in the current study. First, both underwent serious political changes throughout the 20th century, which ultimately making these ex-socialist countries considered as "transition economies" (Kim, 2015). Both economies have been following a reasonably strict course of economic development, primarily driven by the export of natural resources in Russia and the availability of low-cost labour in China. However, economic growth in both countries was largely steered by government rather than by the market. The largest enterprises in Russia and China are ultimately controlled by the government. 71% of national GDP is produced in state-owned enterprises (SOEs) in Russia (Russia…, 2016), while China has at least 60% of GDP concentrated in non-financial SOEs (Graceffo, 2016). Such a deep penetration of the state into the economy also imposes illiquidity on the financial markets, although Chinese authorities made significant efforts to liberalize it when they reduced the size of non-tradable shares in the corporate sector.

Finally, given the large size of the economy and, hence, a relatively high number of listed firms, China offers the large amount of statistical data necessary for our analysis, especially for CART. As some authors indicate, a larger sample size increases prediction and/or classification accuracy of decision trees (see, e.g., Song and Lu, 2015).

2.1.3. Data collection and sample

Given availability of financial information, only public companies were considered, both in Russia and China. Data was collected over 664 Russian open joint stock companies and 2,380

Chinese public firms which had all the necessary information available from 2009 through 2014 calendar years, inclusively. The main sources of data were: the SPARK database, the Thomson Reuters database, FINAM web-site and companies' annual reports and official web-sites. As for Russian firms, the primary stock exchange is RTS-MICEX, while for Chinese companies – three exchanges were considered simultaneously: Shanghai, Shenzhen and Hong Kong stock exchanges.[3] In case of Russian companies, correspondence of the issuers' equity securities to specific trading tiers was ignored, since the author was more interested in the amount of data rather than liquidity of respective stock. Apart from data availability, public firms were considered because their trading status may serve as one of the motives for earnings management, especially in the years surrounding IPOs/SPOs.

Only non-financial companies were selected, given the specific accounting standards applied to financial firms and their incompatibility with the Jones model used for estimating level of earnings management.

For the sake of consistency, all the data were collected in the United States dollars, using the corresponding exchange rates as of 31st December closing quotes for the years 2009 through 2014.

The timeframe (2009-2014) of the underlying research was selected for two reasons:

1) One of the independent variables (namely, "Earnings persistence" – refer to Table XX for the formula) is being calculated on the basis of 5 consecutive years – from 2009 through 2013;
2) It covers relatively stable period of growth for both Russian and Chinese economies, staying between global financial crisis of 2008 and years 2014-2015 when economic trends in either country changed (namely, imposition of sanctions on Russia and growth slow-down in China).

One more important note about the timing of the research should be stated. All the financial figures collected were calendarized to match calendar years and ensure consistency across the data, since different firms may have different financial year-ends.

It should be emphasized that there will be three sets of data/variables collected/calculated[4], each corresponding to specific step of modeling in the current research:

1) 1st set – variables used for the Jones model to measure the level of earnings management in 2013 (will serve as independent variable in decision tree);

[3] Only companies incorporated in China were included.

[4] All three sets of data/variables will be described in more detail in following sub-paragraphs which present corresponding modeling steps

2) 2nd set – variables used for the Jones model to measure the level of earnings management in 2014 (will serve as dependent variable in decision tree);
3) 3rd section – variables used in decision tree to forecast companies' level of earnings management in 2014.

Hence, after collecting all the necessary data and calculating full set of variables, the decision tree will be constructed to predict the level of companies' earnings manipulation in 2014 using the data from 2009-2013 years.

2.1.4. Jones model

As was already stated, the primary goal of the underlying thesis is to explore typical characteristics of the companies expected to manipulate their future earnings. To understand the extent to which companies manipulate their earnings, it is necessary to measure the "level" of manipulation. This is the first research objective in the empirical part of the thesis. To achieve it, the author will refer to Jones regression model, which estimates the level of discretionary accruals, i.e. the magnitude of earnings manipulation.

Before moving to mathematical representation of the model, a few words need to be given to explain why it was chosen for measuring the level of earnings manipulation. First and foremost, it gained extreme popularity within academic, business and regulatory communities, leaving alternative models almost unused. There are multiple advantages offered by Jones model.

1. *Intuitive functional form* – the model is a linear regression with three parameters, including the constant term (will be demonstrated further) which enlightens the estimation process.
2. *Superior explanatory power* – Jones model was proved to have the strongest explanatory power among alternative models, as per R-squared metric (Dechow, Sloan, Sweeney, 1995).
3. *Simple interpretation* – the model can be interpreted rather easily, with error term representing the estimated level of earnings management: negative values indicate "downward" earnings manipulation, while positive values mean the "upward" one.

However, apart from obvious advantages, one should be aware of some negative sides behind the model.

1. *Incompatibility with financial companies* – unfortunately, Jones model deals only with non-financial companies, since it was developed for the firms following more unified accounting standards (different from banks and/or other financial institutions).

2. *Industry-specific application* – it is desirable to run the model separately for each industry, since different industries may have different accrual patterns, which complicates computations.

Given limited data, especially in case of Russian market, it was decided to ignore the last prerequisite on industrial separation, otherwise, the model could not have been run on some of the Russian/Chinese industries due to very small amount of data (e.g., technology - in Russia, utilities – in China).

Jones' regression model was originally proposed to estimate the level of earnings management by American companies, seeking import relief (Jones 1995). These firms were suspect in artificial underestimation of reported earnings to get government protection from foreign competitors. To achieve that goal, managers could have used accruals, which Jones tried to estimate in her study. Therefore, the model was built on the assumption that there are two types of accruals: discretionary and non-discretionary. The former accruals arise from managerial intention to manipulate earnings (e.g. change of depreciation policy, shift in inventory valuation method, etc.). At the same time, the latter accruals stem from changes in general economic conditions and are outside of managers' control. Given these assumptions, Jones suggested a linear regression model which estimates total level of accruals, with error term representing discretionary part of accruals, i.e. deviation from economy-related accruals.

Before presenting the model, we should first introduce formula for calculating total accruals:

$$TAcc_t = (\Delta CA_t - \Delta CL_t - \Delta CS_t)/TA_{t-1}, (1)$$

where $TAcc_t$ is the level of total accruals of the firm in accounting period *t*; ΔCA_t – change in total current assets between the end of accounting period *t* and the end of previous accounting period *t-1*; ΔCL_t – change in total current liabilities between the end of accounting period *t* and the end of previous accounting period *t-1*; ΔCS_t – change in cash and short-term investment between the end of accounting period *t* and the end of previous accounting period *t-1*; TA_t – total assets the end of previous accounting period *t-1*. Total accruals are normalized by the level of total assets to smooth the variability in the data, since this variable will be used further in the regression model.

After total accruals are calculated, it is plugged into Jones regression model as the dependent variable:

$$TAcc_t = \beta_1 * (1/TA_{t-1}) + \beta_2 * (\Delta Rev_t/TA_{t-1}) + \beta_3 * (PPE_t/TA_{t-1}) + \varepsilon, (2)$$

where $1/TA_{t-1}$ is the reversed constant term; ΔRev_t – change in revenue between accounting periods *t* and *t-1*; PPE_t – net property, plant and equipment at the end of accounting period *t*; $\beta_1 \dots \beta_3$ — model parameters , ε — error term.

As it was previously discussed, Jones model initially estimates the level of non-discretionary accruals. Thus, the error term ε here is the level of discretionary accruals in the accounting period *t*, or the level of earnings management performed by the firm. Therefore, to calculate it, we can rearrange (2) and write down the following formula:

$$DA_t = TAcc_t - \overline{TAcc_t}, \quad (3)$$

where DA_t is the level of discretionary accruals in the accounting period *t* (or the error term ε from [2]); $TAcc_t$ - the level of total accruals in the accounting period *t* (from [1]); $\overline{TAcc_t}$ – the level of normalized total accruals estimated by Jones model, i.e. non-discretionary accruals (from [2]).

In the underlying thesis, these calculations will be repeated for each firm twice. The first time - for estimating the level of earnings management in 2013 (it will go as the independent variable in the decision tree "DA13" – prior earnings management). The second time - to estimate the level of earnings management in 2014 (it will go as the dependent, or outcome, variable in the decision tree "DA14" – expected future earnings management).

The summary of data and variables used in these two Jones models is presented in Table 2.

Table 2. Data collected for Jones model

Variable	Variable designation	Formula for calculation
1st phase – variables for the level of earnings manipulation in 2013		
Total accruals of 2013 scaled by total assets at the end of 2012	TAcc13	$(\Delta CA_{2013} - \Delta CL_{2013} - \Delta CS_{2013})/TA_{2012}$, where ΔCA_{2013} – change in total current assets over 2012-2013 calendar years, ΔCL_{2013} – change in total current liabilities over 2012-2013 calendar years, ΔCS_{2013} – change in cash and short-term investment over 2012-2013 calendar years, TA_{2012} – total assets as of 31.12.2012.
Change of revenue in 2013 compared to revenue in 2012, scaled by total assets at the end of 2012	ΔREV13	$\Delta Rev_{2013}/TA_{2012}$, where ΔRev_{2013} – change of revenue over 2012-2013 calendar years, TA_{2012} – total assets as of 31.12.2012.
Net property, plant and equipment at the end of 2013, scaled by total assets at the end of 2012	PPE13	PPE_{2013}/TA_{2012}, where PPE_{2013} – net property, plant and equipment as of 31.12.2013, TA_{2012} – total assets as of 31.12.2012.
Discretionary accruals of 2013 scaled by total assets at the end of 2012	DA13	$TAcc13 - \overline{TAcc13}$, where $TAcc13$ – total accruals of 2013 (actual), $\overline{TAcc13}$ – total accruals of 2013 (estimated by Jones/ regression model[5]).
2nd phase – variables for the level of earnings manipulation in 2014		

[5] The more detailed overview of the Jones regression model will follow in the next sub-chapter.

Variable	Variable designation	Formula for calculation
Total accruals of 2014 scaled by total assets at the end of 2013	TAcc14	$(\Delta CA_{2014} - \Delta CL_{2014} - \Delta CS_{2014})/TA_{2013}$, where ΔCA_{2014} – change in total current assets over 2013-2014 calendar years, ΔCL_{2014} – change in total current liabilities over 2013-2014 calendar years, ΔCS_{2014} – change in cash and short-term investment over 2013-2014 calendar years, TA_{2013} – total assets as of 31.12.2013.
Change of revenue in 2014 compared to revenue in 2013, scaled by total assets at the end of 2013	ΔREV14	$\Delta Rev_{2014}/TA_{2013}$, where ΔRev_{2014} – change of revenue over 2013-2014 calendar years, TA_{2013} – total assets as of 31.12.2013.
Net property, plant and equipment at the end of 2014, scaled by total assets at the end of 2013	PPE14	PPE_{2014}/TA_{2013}, where PPE_{2014} – net property, plant and equipment as of 31.12.2014, TA_{2013} – total assets as of 31.12.2013.
Discretionary accruals of 2014 scaled by total assets at the end of 2013	DA14	$TAcc14 - \overline{TAcc14}$, where $TAcc14$ – total accruals of 2014 (actual), $\overline{TAcc14}$ – total accruals of 2014 (estimated by Jones/ regression model).

Source: the author

2.1.5. Clustering the level of earnings manipulation

Before moving to decision trees, it is necessary to perform some minor transformation with the data. As was discussed in previous chapter, there is no convention over which level of earnings management is large and which is small. It makes definition of the magnitude of earnings manipulation blurred and sample-specific. Hence, rather than predicting exact values of earnings management, decision tree in the underlying thesis will predict general patterns of manipulation, i.e. whether it was "downward", "insignificant" and "upward". Therefore, values of discretionary accruals in 2014 needed to be converted from continuous to discrete form, i.e. to become "categorical" variables.

The author adopted empirical approach, whereby firms were differentiated based on the percentile distribution of their discretionary accruals in 2014. Lower and upper quartiles boundaries were found for each country dataset, i.e. the values of discretionary accruals corresponding to 25th and 75th percentiles. It divided the data into three "clusters", and then each firm was assigned the corresponding numerical value indicating whether it performed "downward", "insignificant" or "upward" earnings manipulation in 2014. Ultimately, these values were plugged into decision tree as outcome variable "DA14" – expected future earnings manipulation.

The approach is summarized in the Table 3.

Table 3. "Clustering" discretionary accruals of 2014

Cluster name	Percentile	Value assigned to the firms in the cluster
"Downward earnings management"	[0 – 25]	1
'Insignificant earnings management"	(25 – 75][6]	2
"Upward earnings management"	(75 – 100]	3

Source: the author

Ultimately, these values were plugged into decision tree as an outcome variable "DA14" – expected future earnings manipulation. It should also be noted that the same procedure was repeated for dependent variable "DA13" – prior year earnings management, which was inserted into decision tree as well.

2.1.6. CART decision tree

After all the necessary data/variables are collected/calculated, it then needs to be modeled so that to find out which factors in which combinations determine future level of earnings manipulation. To achieve this research objective, CART decision tree (classification and regression tree) is used. To understand this step of analysis better, some basic technicalities of the CART algorithm should be explained which will also make it clear why this particular model was chosen for the research.

Classification and Regression Trees, CART, is a classification method which uses historical data to construct decision trees. CART analysis statistically demonstrates the factors that are important in a model in terms of explanatory power and variance. In the result, a decision tree is obtained that is used as an instrument to classify new data. The methodology was first introduced by Breiman, Freidman, Olshen, Stone in their paper "Classification and Regression Trees" (1984).

It is necessary to distinguish between two statistical processes behind CART analysis. If a response variable has classes, then classification method is used meaning that the dataset is split into groups (which is the case for the underlying Thesis). If a response variable is numeric or continuous, regression trees are used in order to predict the outcome (irrelevant for the Thesis). A purity criterion underpins classification trees that the latter tends to split more homogeneous data filtering out the "noise" and, thus, making it more "pure".[7] The process is visualized in the Figure 1 below.

[6] The reason why the 2nd cluster takes the largest portion of dataset stems from the shape of percentile distribution function (see Fig. 4 and Fig. 5).

[7] Morgan. J. (2014) "Classification and Regression Tree Analysis" available at: *https://www.bu.edu/sph/files/2014/05/MorganCART.pdf*

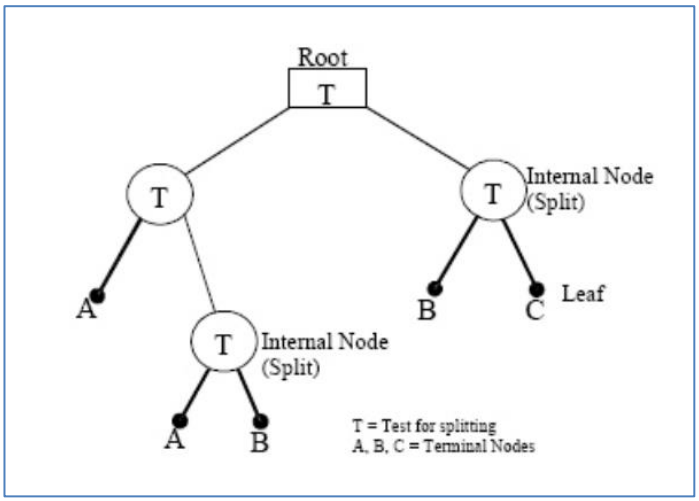


Figure 1. *The structure of the CART*

Source: Morgan J. (2014) "Classification and Regression Tree Analysis"

CART analysis is based on recursive partitioning – partitioning of the data into smaller sections where variable interactions are clearer, that allows to get a tree where each node T (according to Figure 1) presents a cell of the partition. Each cell has an "own" model applied specifically to it, which presents conditioning on this variable in the cell (in our case, these are leverage, earnings persistence, etc.). The final split is called a "leaf" (e.g., A, B or C in the Figure XX), and indicates irrelevance of splitting the data deeper as there is no enough variance left in outcome variable Y. In our case, these leaves will represent one of the three outcomes: downward (1), insignificant (2) or upward (3) future level of manipulation.

In case of classification regression, Ginni splitting rule is widely used. Gini algorithm searches in learning sample for the largest class and isolates it from the rest of the data. Ginni works well for noisy data.[8] These manipulations are run at the first step in order to generate maximum trees. The result might be too complex to interpret, thus, it should be optimized.

The second step of CART analysis contains tree optimization, i.e. cutting off insignificant nodes and subtrees. There are two pruning mechanisms that are used for these purposes – optimization by number of points in each node and cross-validation.

As soon as the tree is finalized, it turns to be an instrument for new data classification. The output is the assigned class to each observation went through a response variable, i.e. a node, in the tree.

Although the CART algorithm is a numerically complex tool of predictive analytics, it gained extreme popularity in recent time for the set of reasons.[9]

1. *Machine-learning basis* – in principle, it means that decision tree is being constructed through learning, or "training" to be more precise. The modeling implies splitting the

[8] The same.
[9] https://eight2late.wordpress.com/2016/02/16/a-gentle-introduction-to-decision-trees-using-r/

dataset into two sets: "training" and "testing" (in case of very large datasets, there is even the third set - "validating"). After learning the data on the "training" set, the prediction accuracy of the model is being checked on the "testing" set. Such an approach allows the algorithm to find hidden patterns in the data, which is relevant in case of earnings management. Since the response variable[10] itself in the Thesis is obtained from regression, it can be hard for classical econometric models to capture relationships between this *estimated* variable and other factors.

2. *"Tree" structure* – this particular feature of the CART algorithm has two consequences in light of the underlying Thesis. First of all, it best suits the goal of identifying the combinations of factors rather than factors per se. Each node of the tree corresponds to the independent variable with two branches, each leading to other independent variables. Each branch ultimately ends up with the underlying "leaf", which represents the specific class of the response variable. This "top-down" flow basically indicates the relative importance of each factor, which constitutes a number of different combinations leading to different classes of the response variable. Hence, the higher the variable is in the tree, the more important it is in predicting the future level of earnings manipulation.
3. *Intuitive principle of binomial choice* – CART decision tree is easy to interpret. Basically, it resembles the typical decision-making process embedded in human beings. When making decisions, people usually find out all available options and then decide which one to choose, based on the set of criteria. In case of the current Thesis, each node "asks" us whether the specific independent variable is smaller or larger than defined threshold (calculated by the tree). If the answer is "yes", we move further on the left side along the tree, if "no" - on the right side. Such binary choices are easy to follow and require no specific knowledge to be able to "read" the results of the tree. The following example on how to differ the glue from the packing tape briefly illustrates the intuitive nature of decision trees (see Figure 2).

[10] The same as dependent variable, on the CART language.

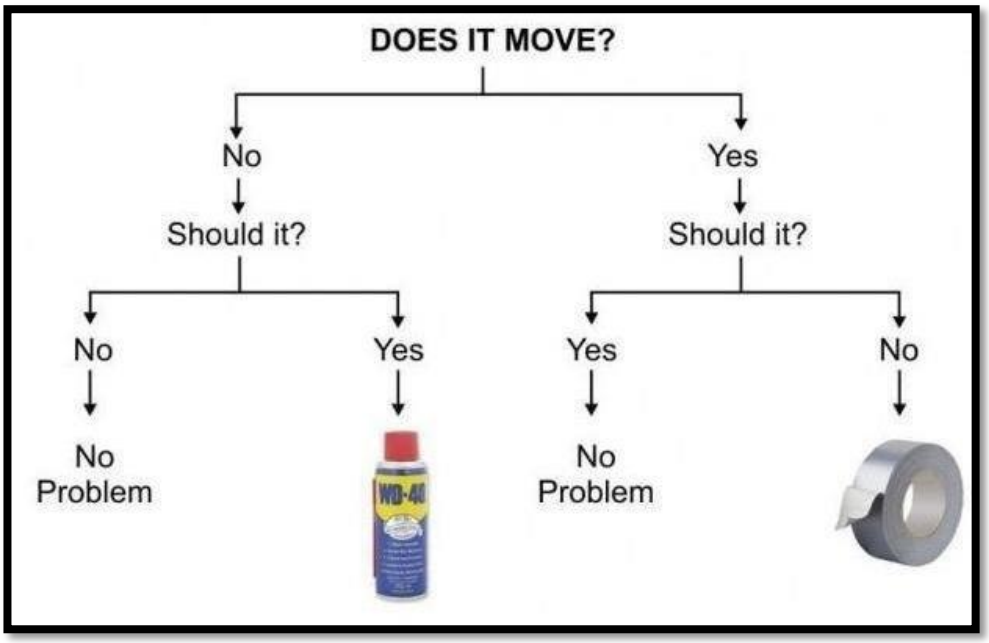


Figure 2. *Decision tree example*

Source: https://www.flickr.com/photos/dullhunk/7214525854

Like any other model, CART decision trees also have some limitations, both in general and in particular case of this research.

1. *Sensitivity to dataset* – to some extent, this limitation can be applied to any prediction model. However, in case of decision trees and almost every other machine learning algorithm, balanced structure of the underlying data is extremely important. Since these models are "learning" the data, they may appear predicting well particular class of response variable simply because that class took the largest portion of the dataset in comparison with other classes. In case of the underlying Thesis, this problem actually pertains, because the cluster "2" (with insignificantly manipulating companies) takes the 50% of the dataset.
2. *Risk of overfitting the data* – this limitation arises from the previous one. The idea is that CART trees may train to predict not only "true" variations in the response variable, but also the "noise" variations, in an attempt to increase prediction accuracy. This risk is usually tackled by running the model multiple times, trying different combinations of "training versus testing" sets (e.g. 90:10, 80:20, 70:30, 60:40, etc. in % of the overall dataset).

Despite some peculiarities and computational complexity, CART decision trees offer relevant tools to reach the research goal: explore typical characteristics of the companies expected to manage their future earnings.

The summary of the data/variables collected/calculated to be used in decision tree modeling is presented in the Table 4.

Table 4. Data collected for the CART decision tree

Variable	Variable designation	Formula for calculation
3rd phase – variables for decision tree		
Discretionary accruals of 2014 scaled by total assets at the end of 2014	DA14	According to the Jones model for 2014, after "clustering" (dependent variable)
Discretionary accruals of 2013 scaled by total assets at the end of 2013	DA13	According to the Jones model for 2013 year
Return on equity	ROE	NI_{2013}/E_{2012}, where NI_{2013} – net income for the 2013 calendar year, E_{2012} – equity as of 31.12.2012.
Debt ratio	Lev	TD_{2013}/TA_{2013}, where TD_{2013} –total debt, TA_{2013} – total assets, both figures are as of 31.12.2013.
Company's size	SIZE	$\ln(Rev_{2013})$, where Rev_{2013} – a company's revenue for the 2013 calendar year.
Operating cash flow	CFO_TA	CFO_{2013}/TA_{2012}, where CFO_{2013} – cash flow from operations for the 2013 calendar year, TA_{2012} – total assets as of 31.12.2012.
Earnings persistence (standard deviation of net income based on the annual data for 5 years, i.e. from 2009-2013)	PERS_TA	$\sigma(NI_{2009-2013})/TA_{2013}$, Where σ – standard deviation, $NI_{2009-2013}$ – series of net income from 2009 through 2013 calendar years, TA_{2013} – total assets as of 31.12.2013.
Proxy for company's financial operations	SHARVAR	1, if a company issued additional stock in 2013; 0 – otherwise.

Source: the author

The final outcome of CART modeling will be predicted values of outcome variable "DA14" – future level of earnings manipulation. What is more important, decision tree will outline independent variables in hierarchical order: from the most important at the top to the least important at the bottom. Additionally, it will represent multiple combinations of variables leading to specific levels of expected earnings manipulation (shown as "leaves" of the decision tree).

2.1.7. Brief case studies

The final step in the empirical part of the Thesis is to illustrate how identified combinations of factors lead to specific levels of earnings manipulation in future accounting periods. For each country dataset, three companies will be selected, each demonstrating particular level of earnings manipulation in 2014: downward, insignificant and upward

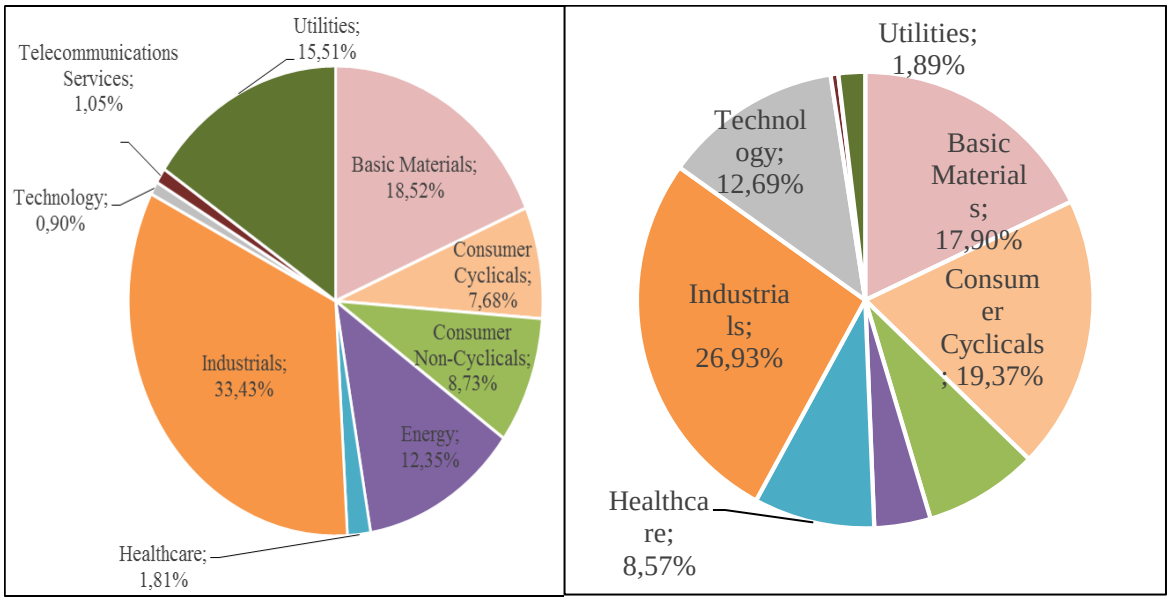
manipulation. The idea behind these short case studies is to ensure credibility of results obtained via CART decision trees. Each case will be organized as follows:

1) background information about the firm;
2) financial characteristics of the firm as of 31.12.2013 (the same set as stipulated by decision tree);
3) hypothesis explaining why it manipulated earnings downwards/upwards/not manipulated in 2014, given its characteristics in 2013;
4) hypothesis testing based on some empirical evidence or general findings from existing research.

After completing these case studies, the discussion of results, limitations and directions for further research will conclude the empirical part of the underlying Thesis.

2.2.Descriptive statistics

As was mentioned in the methodology paragraph, the research sample includes Russian and Chinese public companies with available data. The forecast was performed for 2014 based on annual data from 2009 to 2013. The choice of 2014 was appropriate for Russia because it was the first year of international sanctions, and it is assumed that they had not yet exerted their full effect on companies and their financial reports. For this reason, later years are not considered. The overall sample size was 664 Russian companies and 2,380 Chinese companies. The industrial affiliation of companies is shown in Fig. 3.



a b

Figure 3. *The industrial affiliation of companies*

Source: made by author

Industrial affiliation of companies (a – Russian; b – Chinese)[11]

The diagram shows that the largest proportion of each sample is the industrial companies (33.43% in Russia and 26.93% in China). The next largest group in Russia is basic materials (18.52%) and in China consumer cyclicals (19.37%), and the third is utility companies in Russia (15.51%) and basic materials in China (17.9%).

Before moving to regression and decision trees modeling results, descriptive statistics of the underlying data should be analyzed (see Table 5).

[11] The classification of industries is according to the Thomson Reuters Business Classification Economic Sector.

Table 5. Descriptive statistics of Russian and Chinese samples of data

Variable	Russian companies				Chinese companies			
	Mean	**Standard deviation**	**Minimum value**	**Maximum value**	**Mean**	**Standard deviation**	**Minimum value**	**Maximum value**
Total $Accruals_{2014}/TA_{2013}$	-0.0259	0.0574	-0.1593	0.1251	-0.0207	0.3644	-0.2351	0.4464
$\Delta Rev_{2013\text{-}2014}/TA_{2013}$	-0.4102	0.4178	-2.63678	0.2033	0.1204	0.7125	-0.8616	2.0767
PPE_{2014}/TA_{2013}	0.2562	0.1624	0.0003	0.9455	0.3342	0.3247	0.0001	1.3826
$DA_{2014}\_TA_{2013}$	-0.0529	0.1287	-0.4154	0.2866	0.0266	0.3012	-0.0757	0.1406
ROE_{2013}	0.0636	0.2195	-0.9218	0.9832	0.2103	4.9498	-1.0446	1.5047
Lev_{2013}	0.2681	0.1855	0.0001	0.9136	0.2072	0.2293	0.0001	0.7802
$SIZE_{2013}$	12.149	2.0974	5.4796	18.8894	12.1798	1.6221	3.867	19.9185
CFO_TA_{2013}	0.0558	0.1232	-0.8583	0.5205	0.0549	0.1186	-1.6685	1.8167
$PERS\_TA_{2009\text{-}2013}$	0.0409	0.0418	0.0001	0.3129	0.0225	0.0129	0.0001	0.6298
$DA_{2013}\_TA_{2013}$	-0.0053	0.1151	-0.5742	0.4068	0.1281	0.3262	-5.1922	3.5847

Source: made by author

As is clear from Table 2, both Russian and Chinese samples contain companies with positive and negative discretionary accruals in 2013 and 2014. This implies that there are companies with different earnings management behavior over the period of time considered, i.e. with both upward and downward earnings management.

2.3.Modeling results

Table 6 shows the results of the Jones model assessment for both Russian and Chinese companies for 2014.

Table 6. The Jones model parameters estimation for 2014 (Russian and Chinese companies)

Variable	Russian sample		Chinese sample	
	Coefficient	**P-value**	**Coefficient**	**P-value**
$1/TA_{2013}$	132.65	0.068	-1459.11	0.000
$\Delta Rev_{2013\text{-}2014}/TA_{2013}$	0.026	0.000	-0.005	0.000
PPE_{2014}/TA_{2013}	-0.032	0.001	-0.327	0.000
R^2	0.1043	-	0.3575	-
R^2-adjusted	0.0964	-	0.3569	-
Probability > F	-	0.0000	-	0.0000

Source: made by author

The Jones model for 2014 is shown to be statistically significant for both Russian and Chinese data. All parameters are also statistically significant. Despite the relatively low predictive power of the models ($R^2_{adj} = 0.3569$ for the Chinese sample and $R^2_{adj} = 0.0964$ for the Russian market), their statistical significance proves that their coefficients can be used in order to predict the level of earnings manipulation.

Fig. 4, 5 illustrate the values of discretionary accruals for each company in ascending order in Russia and China, respectively. The vertical axis shows the values of discretionary accruals, and the horizontal axis the quantiles of distribution.

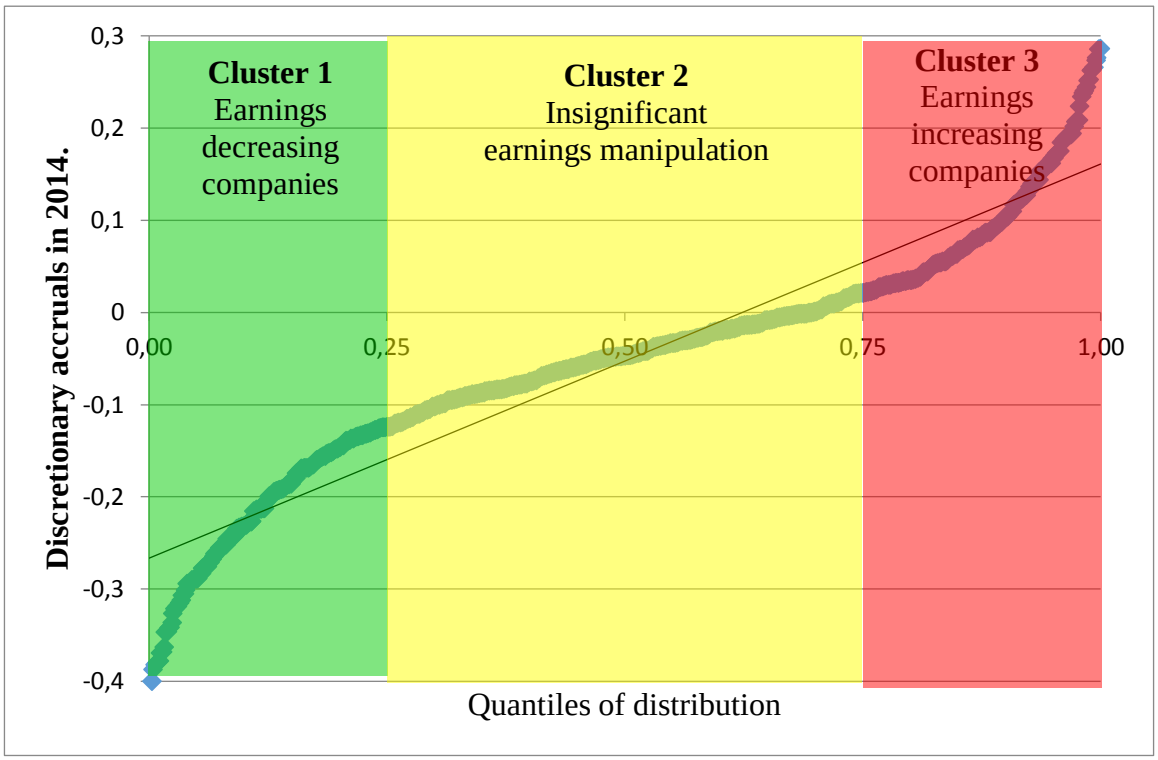


Figure 4. *Quantiles of distribution of discretionary accruals of the companies of the sample based on actual data for 2014 in Russia*

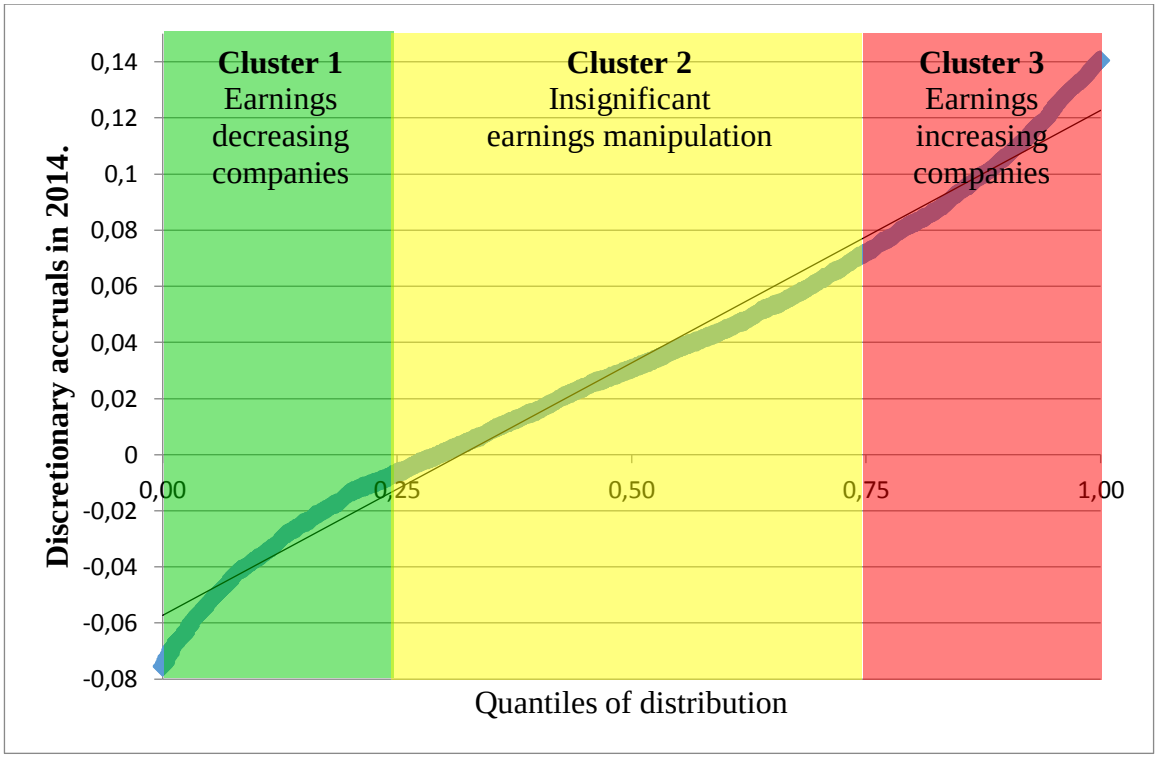


Figure 5. *Quantiles of distribution of discretionary accruals of the companies of the sample based on actual data for 2014 in China*

Source: made by author

This distribution of discretionary accruals can be used in order to distribute companies to clusters of earnings manipulation. It can be seen from the graph that discretionary accruals of

companies in the first quartile are negative, which implies that they are engaged in downward earnings management (Cluster 1 “Earnings decreasing companies”). Discretionary accruals of companies in the second and third quartiles are close to zero (the 75^{th} percentile equals 0.072 for Chinese companies and 0.022 for Russian companies), so these companies are assumed not to manipulate earnings significantly (Cluster 2 “Insignificant earnings manipulation”). Finally, companies of the fourth quartile were allocated to Cluster 3 “Earnings increasing companies”.

After the level of earnings manipulation (cluster) of each company is estimated based on *actual discretionary accruals* for 2014, I use the data from previous accounting periods in order to predict the earnings management behavior of companies in 2014, using the decision tree. The predicted level of earnings management was then compared to the real value (based on actual data for 2014) and so that the accuracy rate of the decision tree was computed. The R-squared coefficient for the decision tree for Russia is 65.78%, and the corresponding coefficient for China 72.32%. This result is comparable with that of Tsai and Chou (2009), who achieved 81% accuracy for their decision-tree model.

Fig. 6, 7 show the decision trees for Russia and China, respectively.

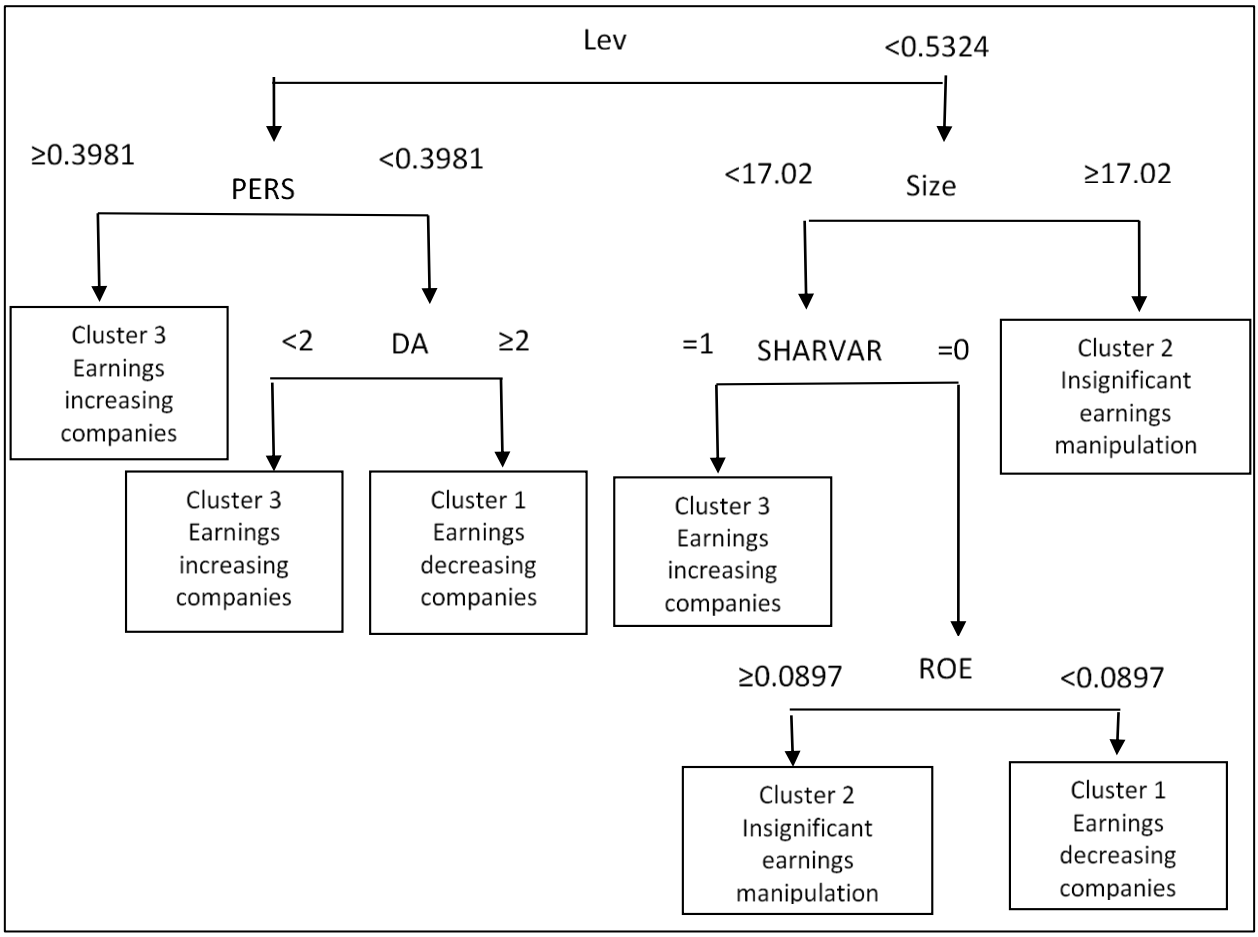


Figure 6. *Decision-tree to determine clusters of earnings management in Russia*

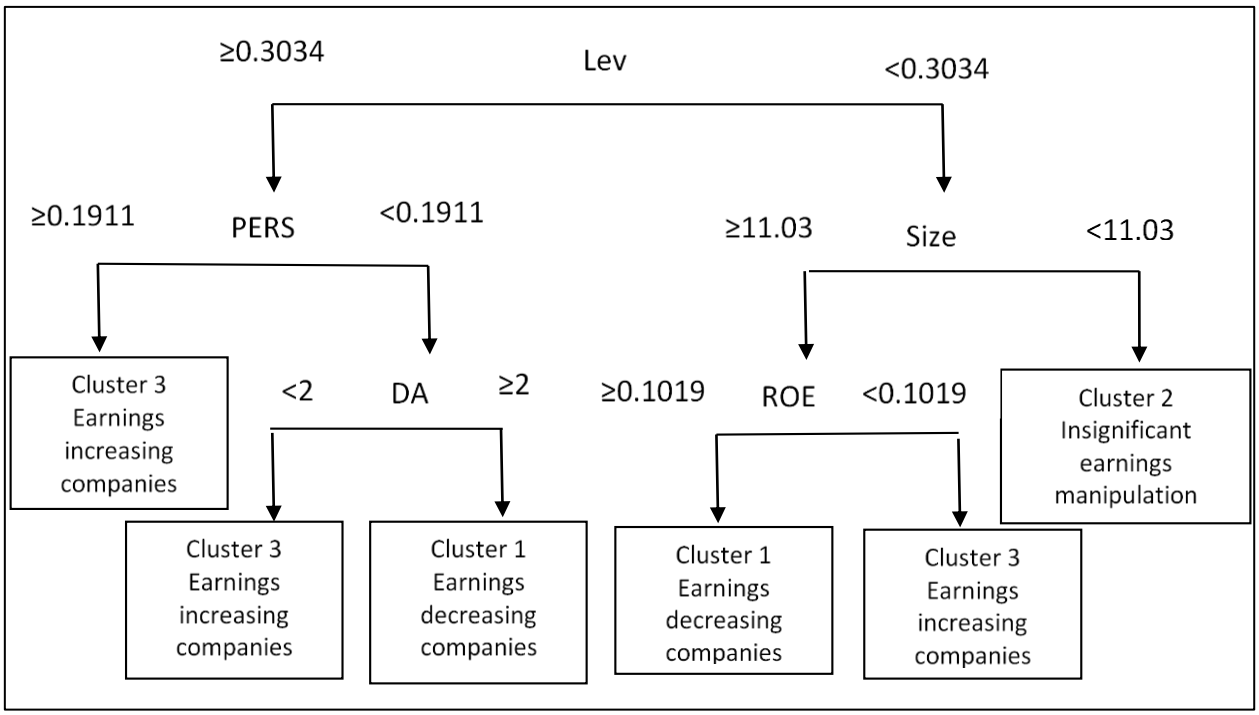


Figure 7. *Decision-tree to determine clusters of earnings management in China*
Source: made by author

Analysis of the results presented in Fig. 6 and 7 shows that the main factor contributing to earnings management behavior in the next-to-current accounting period both in Russia and

China is the degree of financial leverage (debt ratio). This is feasible, since many previous researchers have shown that the greater the debt ratio, the greater the company's propensity to manipulate its earnings in order to meet its debt covenants (see, e.g., Defond and Jiambalvo, 1994; Stanley and Sharma, 2011). The corresponding finding for Chinese companies was revealed by Li, Liu and Eddie (2011), who pointed out that Chinese companies tend to increase their earnings when they face a high debt-to-capital ratio.

A further comparison shows that the set of variables influencing the earnings management behavior of companies in both markets is approximately the same. Among significant factors in both markets there are earnings persistence, company size, discretionary accruals of the current year and return on equity. An additional factor significant only in Russia is whether a company issued stock in the current accounting period.

Some of the conditions that determine the level of earnings management are similar in both markets. For example, companies that demonstrate *earnings-increasing behavior* (Cluster 3), have a high debt ratio (≥0.5324 in Russia and ≥0.3034 in China) and low earnings persistence (≥0.3981 in Russia and ≥0.1911 in China). It can be assumed that since the financial result of such companies is highly volatile, they use income-increasing accruals in order to reduce their risks in the situation of a high degree of financial leverage.

In both Russia and China, companies that demonstrate no signs of significant earnings manipulation (Cluster 2) possess a particular combination of debt ratio and size. In order for a company to be assigned to Cluster 2, it should have a low debt ratio (<0.5324 in Russia and <0.3034 in China). In addition, companies in Russia should be large (ln(Rev)≥17.02), whereas in China they are small (ln(Rev)<11.03). One explanation of this result is that size alone can not explain earnings management behavior, that is why this factor should be used in combination with the other significant variables, such as debt ratio.

In both Russia and China, the allocation of companies to Cluster 1 or 3 depends on a combination of debt ratio, earnings persistence and discretionary accruals for the current year. In Russia, companies that belong to Cluster 1 (Cluster 3) have high debt ratio (≥0.5324), high earnings persistence (<0.3981) and high (low) discretionary accruals for the current year (more or less than 2 respectively). In China, companies in Cluster 1 (Cluster 3) have high debt ratio (≥0.3034), low (high) earnings persistence (<0.1911) and low (high) discretionary accruals for the current year (less or more than 2, respectively). So, the main difference between Russian and Chinese companies in this regard refers to how their current level of discretionary accruals (i.e. current level of earnings management) affects their future earnings management behavior. Russian companies with high discretionary accruals in the current year (i.e. presumably increased earnings) tend to decrease them in the next accounting period and vice versa, implying

that these companies follow an income-smoothing strategy (Scott, 1997). Chinese companies, on the other hand, follow the same earnings management strategy (i.e. income-increasing or income-decreasing) over consecutive accounting periods. This result is generally consistent with the previous findings that incentives for earnings management can differ between countries (see, e.g., Garanina, Nikulin and Frangulantc, 2016).

Some other conditions under which companies belong to a particular cluster of earnings management can be stated for Chinese and Russian companies. In Russia, companies in Cluster 3 have low debt ratio (<0.5324), small size (ln(Rev)<17.02) and issued stock in the current accounting period. The reason why these companies inflate earnings is possibly to stimulate their stock price (Teoh, Welch and Wong, 1998). If a company has low debt ratio (<0.5324), small size (ln(Rev)<17.02) and has not issued stock in the current accounting period, it will belong to either Cluster 2 or Cluster 1 depending on its return on equity. If return is high (≥0.0897), the company will be assigned to Cluster 2, otherwise to Cluster 1. In the first case the company will belong to Cluster 2 because it has no obvious reasons to manipulate earnings. The allocation to Cluster 1 of companies with low debt ratio, small size, low return on equity and the absence of stock emission in the current accounting period can be attributed to the big bath accounting (Scott, 1997). This technique implies that a company strives to recognize more expenses in unfavourable accounting periods in order to have fewer expenses in favourable periods.

Chinese companies that have low leverage (<0.3034), large size (≥11.03) and low return on equity (<0.1019) will be allocated to Cluster 3. Their motive to increase earnings may be the intention to counterbalance negative financial results. As Jiang (1998) reports, when listed companies in China expect that their return on equity (ROE) will be less than 10 percent, they are inclined to manipulate profits in order to make the ROE slightly larger than 10 percent. Companies that have low leverage (<0.3034), large size (≥11.03) and high return on equity (≥0.1019) will be allocated to Cluster 1. One reason for these companies to decrease earnings is income smoothing. Another explanation is that the behavior is not intentional, but a mere consequence of the reversal of the accruals-effect that is typical for accrual-based earnings management.

2.4.Illustrative cases

To illustrate the modeling results, let us refer to actual companies, which correspond to thresholds obtained via decision trees and fall within predicted clusters of earnings manipulation. Hence, for both Russia and China three cases will be found and analyzed (one company per each manipulation level) to prove decision trees results.

2.4.1. Russia – downward manipulation (PAO GAZ)

The clearest example of the firm which was expected to artificially downgrade its earnings in 2014 was PAO GAZ (MCX: GAZA). This firm operates in automotive industry, manufacturing and selling full range of light-to-medium commercial vehicles.[12] By some of its financial characteristics, PAO GAZ corresponds to one of the "branches" identified by the decision tree on Russian sample, which predicts it to *deflate* earnings in the next accounting period. The set of these characteristics[13] can be found in Table 7.

Table 7. Financial characteristics of PAO GAZ

Cluster	Company name	LEV	SIZE (Sales)	SHARVAR	ROE
1 - "Downward manipulation"	Decision tree	<53.24%	<$24.6 bln	0	<8.97%
	PAO GAZ	9.62%	$4.5 bln	0	-15.99%

Source: Annual Company Report 2013

We can see, that PAO GAZ refers to companies with relatively low debt ratio (9.62%), smaller size (revenues $2.1 bln), have not issued stock and have low ROE (-15.99%). As it was already discussed, possible reason for such type of firms may come from so-called "the big bath accounting" (Scott, 1997), when company strives to recognize more expenses in unfavourable accounting periods in order to have fewer expenses in favourable periods. In case of PAO GAZ, 2014 fiscal year was extremely negative, posting 150% decline in net income leading to the net loss of $56.3 mln. The primary reason was economic crisis which hurt Russian economy right in 2014, imposing huge negative impact on automotive industry. However, for PAO GAZ, contraction in profits began even earlier: in 2013 it recorded 54.6% decline in net income. The profits stopped shrinking only in 2016 fiscal year, when the company achieved nearly 125% percent growth and finally recorded net income of $13.4 mln. Therefore, it can be hypothesized that management of the firm referred to the means of "big bath accounting", trying to concentrate as much expenses as possible in these years of poor economic performance and leave the room for recovery later on. The hypothesis can be validated if we look at dynamics of discrete costs items in the company's income statement. For instance, SG&A expenses (selling, general and administrative) started rising right in 2013, i.e. in the first year of net income decline, and continued the growth till 2016, when the trend reversed.

[12] Gaz PAO (GAZA.MM) available at: http://www.reuters.com/finance/stocks/companyProfile?rpc=66&symbol=GAZA.MM

[13] For each illustrative firm, the set of financial characteristics in the table will differ, since each case is matched against specific branch of the decision tree.

2.4.2. Russia – insignificant manipulation (NK Lukoil PAO)

Within firms which were expected to manipulate earnings insignificantly (relative to other firms in the sample), NK Lukoil PAO offers the great example (MCX: LKOH). This firm operates in oil exploration, production, refining, marketing and distribution.[14] Table 8 provides information on specific financial characteristics of NK Lukoil PAO, referring it to one of the "branches" identified by the decision tree on Russian sample, which predicts it to *insignificantly manipulate* earnings in the next accounting period.

Table 8. Financial characteristics of NK Lukoil PAO

Cluster	Company name	LEV	SIZE (Sales)
2 - "Insignificant manipulation"	Decision tree	<53.24%	>$24.6 bln
	NK Lukoil PAO	17.43%	$141.5 bln

Source: Annual Company Report 2013

NK Lukoil PAO represents a more generic case rather than PAO GAZ, since there are only two variables which help us assign the firm to specific cluster of expected earnings manipulation: leverage and size. Given a relatively small debt burden in capital structure (17.43%) and outstandingly large revenues ($141.5 bln), NK Lukoil PAO had no incentives to manipulate its earnings. Therefore, we can hypothesize that change in net income of the firm in 2013-2014 accounting periods (-40%, from $7.8 bln to $4.7 bln) is almost related to non-discretionary accruals, i.e. changes in general economic environment and industrial trends. For instance, in its equity research report on Lukoil 2014 fiscal year results, VTB Capital refers to efficiency deterioration across the whole oil and gas industry in Russia for being the source of bottom-line underperformance, apart from drop in oil prices.[15]

2.4.3. Russia – upward manipulation (NP Korporatsiya Irkut PAO)

Regarding firms which were expected to artificially upgrade its earnings in 2014, NP Korporatsiya Irkut PAO (MCX: IRKT.ME) would serve as the best example. This firm operates in civil and military aircraft design, testing, manufacturing, selling and after-sales support.[16] The set of financial characteristics, which explain future earnings management behavior of PAO Irkut, can be found in Table 9. As you will see, these characteristics assign the company to the cluster of *inflating* earnings management.

Table 9. Financial characteristics of PAO Irkut

[14]Profile: NK Lukoil PAO (LKOH.MM) available at: http://www.reuters.com/finance/stocks/companyProfile?rpc=66&symbol=LKOH.MM

[15] VTB Capital Report, Earnings Release of Lukoil (2015)

[16] Profile: NP Korporatsiya Irkut PAO (IRKT.MM) available at: http://www.reuters.com/finance/stocks/companyProfile?rpc=66&symbol=IRKT.MM

Cluster	Company name	LEV	SIZE (Sales)	SHARVAR
1 - "Downward manipulation"	Decision tree	<53.24%	<$24.6 bln	1
	PAO Irkut	38.29%	$1.9 bln	1

Source: *Annual Company Report 2013*

Specific attention should be paid to variable *SHARVAR* which indicates whether the firm issued/bought back its common stock. As for PAO Irkut, the company announced issuance of additional shares as of 04.09.2013, in the amount of 210 mln shares, RUB 3 each.[17] As was indicated in prospectus, the primary purpose of the issuance was to finance investment program of the firm and its subsidiaries.[18] Some research findings suggest that firms which raise capital via secondary public offerings, tend to use "upward" earnings management techniques to stimulate share price growth or, at least, support it at some "ground" level (Teoh, Welch and Wong, 1998). The dynamics of PAO Irkut share price can be seen on Fig. 8 below.

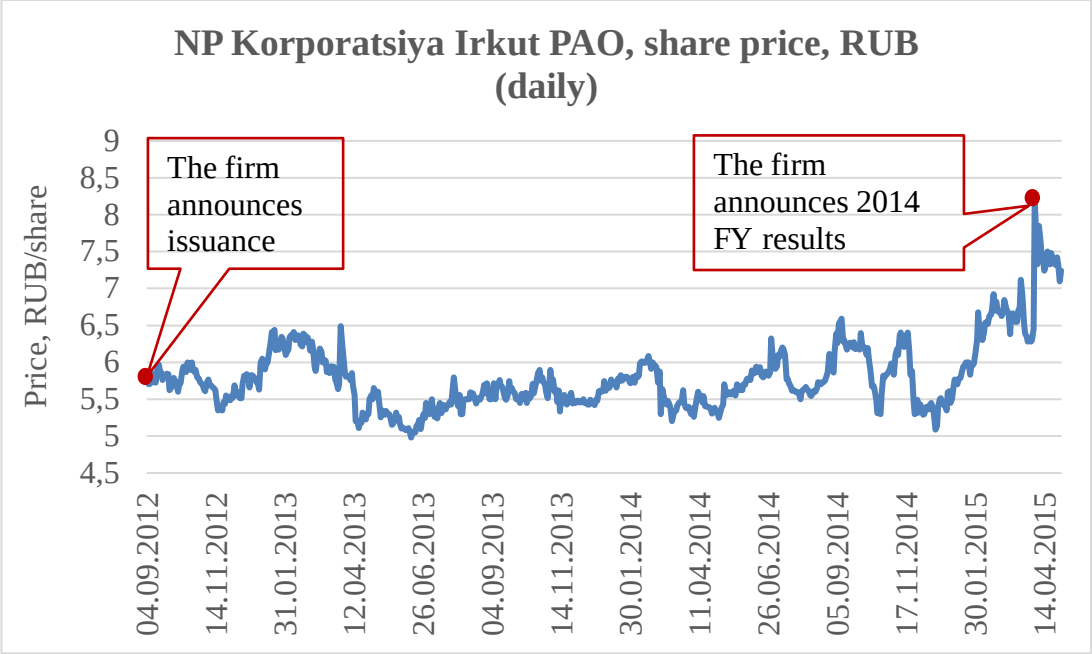


Figure 8. *Dynamics of PAO Irkut share price*

Source: Finam.ru, available at: https://www.finam.ru/profile/moex-akcii/irkut-3/export/

The chart indicates uneven dynamics of the company's share price, though some positive spikes can be seen, especially the one in April 2015, when the firm announced its 2014 FY (full-year) results. Although it reported significant contraction in net income (-95%, from $36 bln to $2 bln), it was still profitable, beating consensus estimates of analysts. Sharp decline in bottom-line was typical for the whole aerospace and defense industry, given international sanctions imposed on Russia, as the main source of revenue for these companies comes from export

[17] Shares issue of Irkut, available at: http://www.irkut.com/investors-and-shareholders/securities/issues-of-shares/1301/

[18] Prospectus of shares of Irkut (2013), PP. 44-45.

contracts. Since PAO Irkut was issuing the stock at that time, it can be hypothesized that the firm strived to record at least some profit, regardless of how much it is. As Teoh and Welch indicate (Teoh, Welch and Wong, 1998), it is extremely important for companies to show positive results, outperforming consensus forecasts in subsequent periods to SPOs (secondary public offerings).

2.4.4. China – downward manipulation (Chongqing Department Store Co Ltd)

Chongqing Department Store Co Ltd (SHA: 600729) is engaged in the operation supermarkets and department stores primarily in China and some international markets.[19] Based on the decision tree developed, this company was expected to artificially *deflate* earnings in the next accounting period (namely, in 2014 FY). The set of financial characteristics of the firm can be found in Table 10.

Table 10. Financial characteristics of Store Co Ltd

Cluster	Company name	LEV	SIZE (Sales)	ROE
1 - "Downward manipulation"	Decision tree	<30.34%	≥$61.7 mln	≥10.19%
	Chongqing Department Store Co Ltd	12.51%	$4,517 bln	25.64%

Source: Annual Company Report 2013

We can see, that Chongqing Department Store Co Ltd refers to companies with relatively low debt ratio (12.51%), larger size (revenues $4.5 bln), and have high ROE (25.64%). As it was already discussed, possible reason for such type of firms may either come from the so-called "income smoothing" or reflect the reversal effect if the firm performed "upward" earnings manipulation before. The former hypothesis is likely to be rejected in case of Chongqing. Since the primary purpose of income smoothing is to stay in line with consensus estimates and minimize negative effect of "earnings surprises" on price, it is relevant for Chongqing. Seven-days price response[20] for Chongqing Department Store Co Ltd was -10.5%, when it released 2014 FY results (the worst since 2012 FY). Therefore, the hypothesis about reversal effect is the only one left. To test its validity, let us calculate the difference between net income (NI) and cash flows from operations (CFO) of the firm and check its dynamics over 2009-2014. This metric is believed to be the "rough" proxy for total accruals of the firm and it may give some sense of how it impacted firm's bottom-line (see Fig. 9).[21]

[19]Profile: Chongqing Department Store Co Ltd (600729.SS), available at: http://www.reuters.com/finance/stocks/companyProfile?rpc=66&symbol=600729.SS

[20] Seven-days price response (7d Price Reaction) – metric calculated by Thomson Reuters Eikon which measures how stock price reacts on earnings press releases over the first 7 days after publication by the firm.

[21] Keefe T. Earnings Quality: Measuring The Discretionary Portion Of Accruals, available at: http://www.investopedia.com/university/accounting-earnings-quality/earnings9.asp

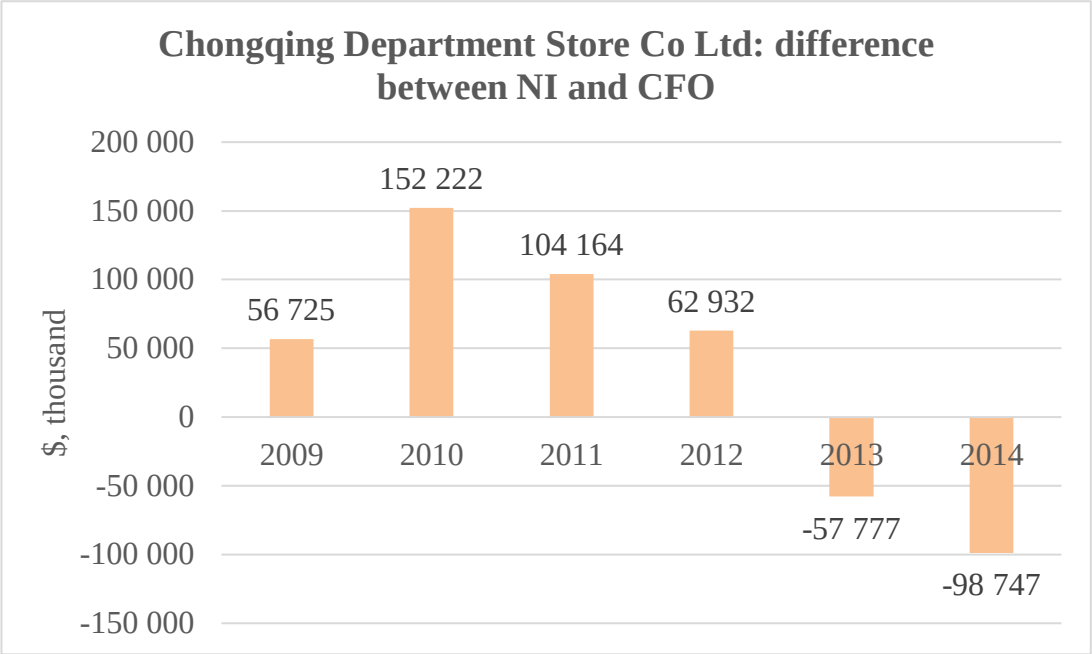


Figure 9. *Chongqing Department Store Co Ltd: difference between NI and CFO*

Source: Thomson Reuters Eikon

We can see how accruals of the firm reached the peak level in 2010 (approximately, $152,222 mln) and then started to decline, ultimately entering negative zone, with 2014 FY recording the lowest value (approximately, -$98,747 mln). Such reverting dynamics proves hypothesis that downward manipulation of earnings by Chongqing Department Store Co Ltd was expected as the consequence of previous upward manipulation which is typical for accrual-based earnings management.

2.4.5. China – insignificant manipulation (Nanjing Quanxin Cable Technology Co Ltd)

Within firms which were expected to manipulate earnings insignificantly (relative to other firms in the sample), Nanjing Quanxin Cable Technology Co Ltd offers the great example (SHE: 300447). This firm operates in research, development, manufacturing and selling military high-performance transmission cables and cable assemblies.[22] Table 11 provides information on specific financial characteristics of Nanjing Quanxin Cable Technology Co Ltd, referring it to one of the "branches" identified by the decision tree on Chinese sample, which predicts it to *insignificantly manipulate* earnings in the next accounting period.

Table 11. Financial characteristics of Nanjing Quanxin Cable Technology Co Ltd

Cluster	Company name	LEV	SIZE (Sales)
2 - "Insignificant	Decision tree	<30.34%	<$61.7 mln

[22] Profile: Nanjing Quanxin Cable Technology Co Ltd (300447.SZ), available at: http://www.reuters.com/finance/stocks/companyProfile?rpc=66&symbol=300447.SZ

Cluster	Company name	LEV	SIZE (Sales)
manipulation"	Nanjing Quanxin Cable Technology Co Ltd	8.28%	$31.1 mln

Source: Annual Company Report 2013

Nanjing Quanxin Cable Technology Co Ltd represents the case of a stable Chinese mainland firm with relatively low financial leverage (8.28%) and smaller size ($31.1 mln). By nature, the firm operates in quite niche market: it supplies military forces with high tech cables used in aerospace, aviation, military electronics and weapons. Given majority of sales coming from Chinese government, low leverage, limited size and specialized market with high entry barriers, it can be hypothesized that such company simply does not have incentives to manipulate its earnings in either direction: upwards or downwards. The firm consistently recorded growing net income in 2012-2014 (see Fig. 10).

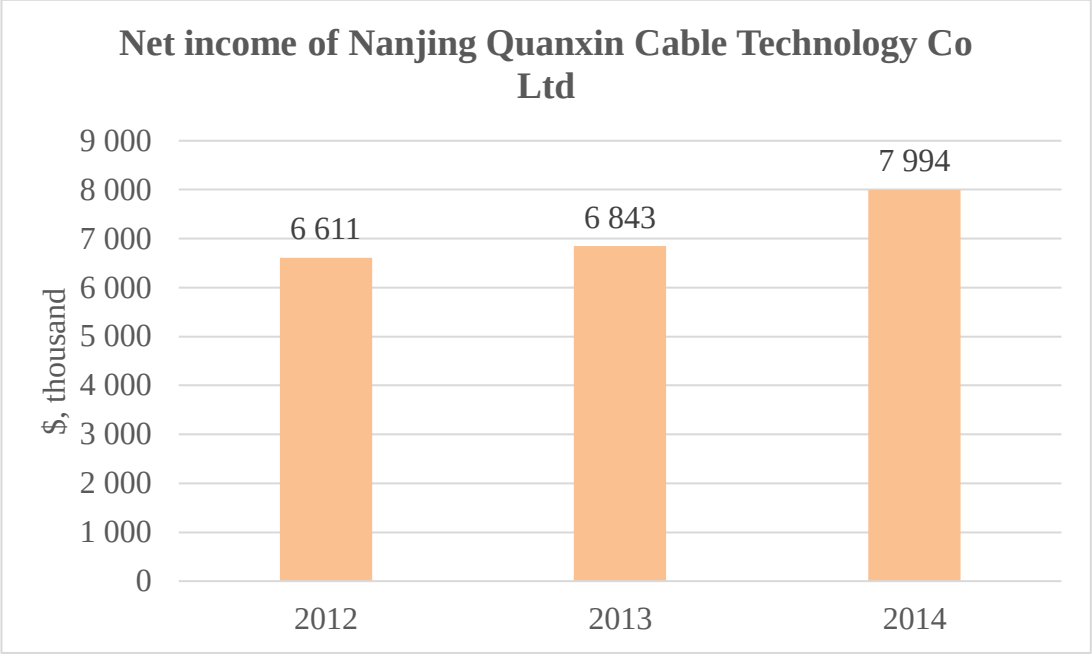


Figure 10. *Net income of Nanjing Quanxin Cable Technology Co Ltd*

Source: Thomson Reuters Eikon

As can be inferred from the graph, Nanjing Quanxin Cable Technology Co Ltd had really stable financial position, which coupled with limited debt burden, makes earnings manipulation unreasonable for the company.

2.4.6. China – upward manipulation (Sinotruk Hong Kong Ltd)

Regarding firms which were expected to artificially upgrade its earnings in 2014, Sinotruk Hong Kong Co Ltd (HKG: 3808) would serve as the best example. This firm operates in the research and development, manufacturing and selling the full range of trucks: from medium-to-

heavy duty trucks to buses and related components.[23] The set of financial characteristics, which explain future earnings management behavior of Sinotruk Hong Kong Ltd, can be found in Table 12. As you will see, these characteristics assign the company to the cluster of *inflating* earnings management.

Table 12. Financial characteristics of Sinotruk Hong Kong Ltd

Cluster	Company name	LEV	SIZE (Sales)	ROE
1 - "Downward manipulation"	Decision tree	<30.34%	≥$61.7 mln	<10.19%
	Sinotruk Hong Kong Ltd	25.16%	$4,476 bln	0.66%

Source: Annual Company Report 2013

The motive to increase earnings may stem from the intention to upgrade return on equity, especially if it is closely monitored by analysts in the industry. This evidence was initially found by Jiang (1998), suggesting when listed companies in China expect that their ROE will be less than 10 percent, they are inclined to manipulate profits in order to improve the ROE. To test the validity of this hypothesis, let us refer to comparable companies of Sinotruk and check their respective ROE (see Fig. 11).[24]

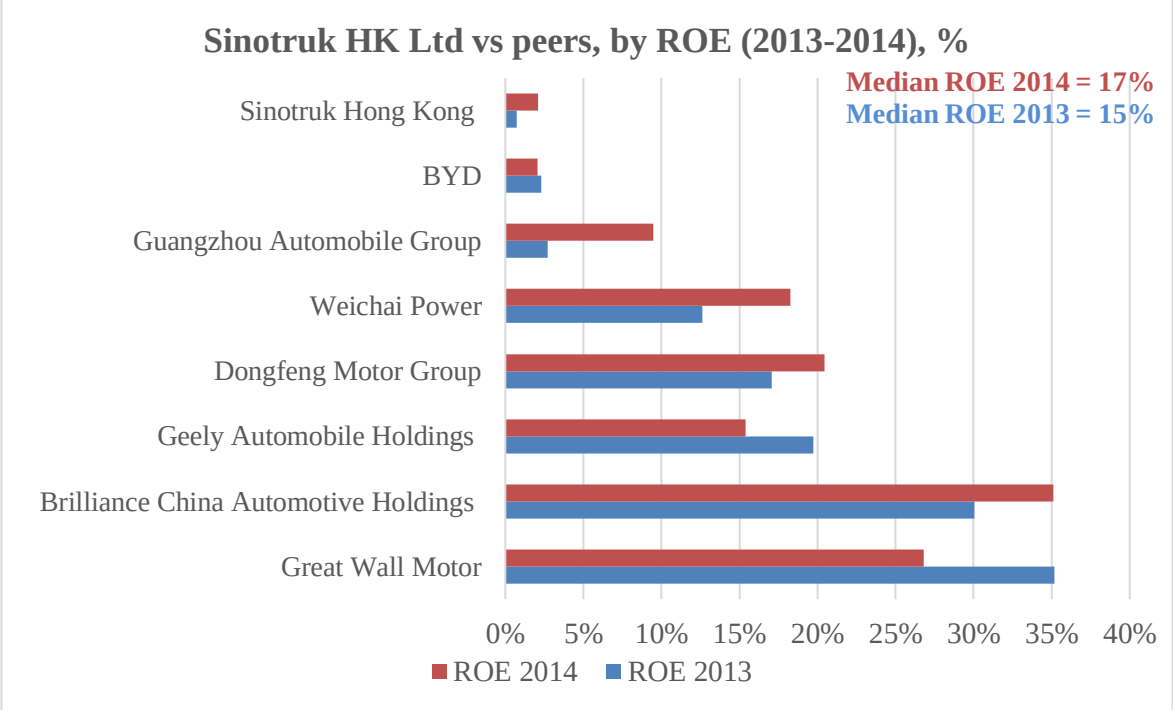


Figure 11. *Sinotruk HK Ltd vs peers, by ROE (2013-2014), %*

Source: Thomson Reuters Eikon

[23] Sinotruk Hong Kong Ltd (3808.HK), available at: http://www.reuters.com/finance/stocks/overview?symbol=3808.HK

[24] The list of comparable companies included direct competitors of Sinotruk, operating in the same is formed on the basis of affinity to the same industry – heavy machinery and vehicles).

The figure above implies that Sinotruk far lagged behind its peers in terms of ROE, being the 8th out of eight companies in the sample in 2013 with ROE equal to 0.7%. However, we can see how it managed to slightly improve its ROE up to 2.1% and move higher in the ranking. Nonetheless, it was still far behind the median ROE (14.8% in 2013 and 16.8% in 2014). Therefore, it is feasible to assume that Sinotruk Hong Kong Ltd was inclined to perform "upward" earnings manipulation trying to improve its profitability metric among peers – ROE.

2.5.Discussion of empirical findings

2.5.1. Summary of results

To summarize modeling results, Table 13 was drawn emphasizing key findings and comparing them across Russia and China.

Table 13. Modeling results

Russia-China	**Key findings**	**Reasons**
Commonalities	1) The main factor contributing to earnings management behavior in the next accounting period is financial leverage (debt ratio)	Company's propensity to meet its debt covenants (Defond and Jiambalvo, 1994)
	2) Other important factors are: earnings persistence, company size, discretionary accruals of the current year and ROE	Since the financial result of such companies is highly volatile, they use income-increasing accruals in order to reduce their risks in the situation of a high degree of financial leverage
Difference	1) Russian companies use income-smoothing practices, while Chinese companies follow the same earnings management strategy over consecutive periods	Differences across national accounting standards (Garanina, Nikulin and Frangulantc, 2016)

	2) ROE threshold of 10% serves an important benchmark for Chinese firms and may incline them to perform upward earnings management	As Jiang (1998) reports, when listed companies in China expect that their return on equity (ROE) will be less than 10 percent, they are incentivized to manipulate profits in order to make the ROE slightly larger than 10 percent.

Source: made by author

These results were further confirmed by illustrative cases of real companies from Russia and China. Each of those firms corresponds to the specific "leaf" in the CART decision tree for respective country. It should be recalled, that only those cases were selected which could have been explained by some empirical evidence or existing theoretical knowledge. The summary of the case studies is presented in Table 14.

Table 14. Summary of the case studies

Earnings manipulation level in 2014	**Company name**	**Country**	**Reason for manipulation**
1 – downward manipulation	PAO GAZ	Russia	"Big bath accounting", i.e. trying to concentrate as much expenses as possible in years of poor economic performance and leave the room for recovery later on.
	Chongqing Department Store Co Ltd	China	The consequence of previous upward manipulation which is typical for accrual-based earnings management
2 – insignificant manipulation	NK Lukoil PAO	Russia	No incentives given low leverage and extremely large size
	Nanjing Quanxin Cable Technology Co Ltd	China	No incentives given low leverage, specialized market niche and bulk of sales from government

Earnings manipulation level in 2014	Company name	Country	Reason for manipulation
3 – upward manipulation	NP Korporatsiya Irkut PAO	Russia	Target to record a profit following SPO
	Sinotruk Hong Kong Ltd	China	Target to improve ROE relative to peers

Source: made by author

The table above shows that, at least, in case of insignificant earnings management, Russian and Chinese firms simply do not have incentives to manipulate earnings, given low leverage and some form of competitive advantage: either defensible market niche with high entry barriers or extremely large market share. Furthermore, companies which are expected to manipulate earnings upward in both countries follow the same ultimate goal: to stimulate growth or support the share price.

2.5.2. Limitations of the research

Along with interpreting the results of the underlying Thesis, one should be aware of some limitations behind the research. These limitations are as follows.

1) *Design complexity* – although extensive, the research design may seem too complex and difficult to follow, particularly when switching from Jones model to CART decision-tree.
2) *Small and unbalanced dataset for Russia* – as it was already discussed, data quality and sufficiency is of extreme importance for CART-modeling. In context of Russia, the latter prerequisite was not the case: 664 observations is still relatively small amount of data for proper estimation of decision tree. Moreover, some industries in Russia have just a few public firms, making the dataset more unbalanced.
3) *Focus on accruals-based earnings management* – Jones model which was used to calculate the level of earnings manipulation, captures only accounting earnings manipulation, i.e. it ignores portion of earnings manipulated by real transactions (e.g. R&D overspending, excessive production, etc.).
4) *Limited number of factors included into decision tree model* – the set of independent variables discussed in the paper is far away from being extensive. It is not a secret, that inclusion of larger number of variables may increase explanatory power and predictive performance of decision trees.[25]

[25] Morgan. J. "Classification and Regression Tree Analysis", May, 8, 2014. available at: *https://www.bu.edu/sph/files/2014/05/MorganCART.pdf*

2.5.3. Possible directions for further research

Given limitations outlined above, some possible directions for further research in this field can be proposed.

1) *Apply alternative machine-learning algorithms* – CART decision-tree is one of the large variety of machine-learning techniques which has its own advantages and drawbacks. Alternative tools may include random forest, neural network, etc.
2) *Extend the research sample* – first and foremost, some other geographical markets can be studied in greater scale and scope (e.g. extend the sample to cover emerging/developed markets or to include both and compare them). Secondly, this direction may also encourage more detailed and diverse case studies to gain deeper insights on real-life earnings manipulation.
3) *Explore patterns within real activities earnings management* – real activities earnings management started to gain traction and today offers a broad domain of research, especially in finding some patterns which will help to predict future manipulations.
4) *Study other variables* – although motives driving earnings management are limited, the number of underlying variables may go far beyond the former. It implies possibility to extend the number of financial and other characteristics of the firm to include in the dataset and explore their impact on the future level of earnings manipulation.

CONCLUSIONS

The goal of the underlying Thesis was to study typical characteristics of the companies expected to manage their future earnings, i.e. upwards, downwards or insignificantly. Apart from the majority of studies on earnings management that focus on historical data, the Thesis adopts an approach whereby the level of earnings manipulation of a company in the future accounting period is predicted.

The research design of the Thesis covered two geographical markets: Russia and China. These two countries were selected primarily for three reasons. Firstly, Russia and China have similar historical patterns, i.e. both experienced transition from socialist to market-driven economies. Secondly, Russian-Chinese relations have recently started to intensify and as a result more research papers comparing them from different perspectives have started to appear. Finally, Russia and China provide good opportunities for research in terms of the amount of statistical data available for the methods used in the underlying research, especially for CART.

The study analyzed 664 Russian and 2,380 Chinese public companies for the period 2009-2014. The forecast was made for 2014 based on annual accounting data for 2009-2013. Regression analysis as well as the CART method were used. The case of accrual-based earnings management was considered. The value of discretionary accruals assessed via the Jones model was used as a proxy for the level of earnings management of a company. The companies were divided into three clusters based on the value of this indicator: Cluster 1 “Earnings decreasing companies”, Cluster 2 “Insignificant earnings manipulation”, Cluster 3 “Earnings increasing companies”. The forecasts for 2014 were compared with actual data for 2014, to assess the accuracy of the forecasting model.

The main outcome of the Thesis is development of value thresholds which indicate combinations of different variables and their influence on future level of earnings manipulation by the company.

For a Russian company to be assigned to Cluster 1, “Earnings decreasing companies”, it should *either* have high debt ratio, high earnings persistence and high discretionary accruals for the current period *or* low debt ratio, small size, no stock emission in the current period and low return on equity. In order to be allocated to Cluster 2, “Insignificant earnings manipulation”, it should have *either* low debt ratio and large size *or* low debt ratio, small size, no stock emission in the current period and high return on equity. Russian companies in Cluster 3, “Earnings increasing companies”, have *either* high debt ratio and low earnings persistence *or* high debt ratio, high earnings persistence and low discretionary accruals for the current period *or* low debt ratio, small size and stock emission in the current period.

The results obtained for Chinease company can be employed for Russian ones. Cluster 1, “Earnings decreasing companies”, contains companies that have high debt ratio, high earnings persistence and low discretionary accruals for the current period or low debt ratio, large size and high return on equity. Cluster 2, “Insignificant earnings manipulation”, is characterised by ow debt ratio and small size. Cluster 3, “Earnings increasing companies”, describes Chinese companies that have either high debt ratio and low earnings persistence or high debt ratio, high earnings persistence and high discretionary accruals for the current period or low debt ratio, large size and low return on equity.

There are some limitations in the current research. Firstly, it is focused on accrual-based earnings management but not real earnings management. Secondly, the robustness of the results could be checked by using different discretionary accruals models. Lastly, there some room to improve the predictive power of forecasting models by means of other factors related to the level of earnings management of a company.

There are certain managerial implications of the study`s results. They are relevant for external users of accounting information, such as potential investors, creditors, analysts, regulators, etc. as they are useful for prediction of financial result of the companies they interact with. For example, investment managers can re-weigh their equity portfolios to minimize exposures. Bankers can re-adjust covenants for manipulating borrowers to avoid “fictitious” maintenance. Finally, various government authorities, including tax service, may create “black list” of suspect companies and investigate their profits under more scrutinized view. Basically, the findings offer the greatest value for those stakeholders who are exposed to relatively large number of firms and thus possess large amount of data. Therefore, investment funds, commercial banks, tax service, etc. are among these potential users of this research. The provided opportunity will allow them not only to reduce financial risks but also it will enhance national economies in general.

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