“Forecasting the level of earnings management of Russian and Chinese companies”

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FORECASTING THE LEVEL OF EARNINGS MANAGEMENT OF RUSSIAN AND CHINESE COMPANIES

Abstract

The purpose of the current paper is to elaborate a model to forecast a particular type of earnings management by companies: upward earnings management, downward earnings management or the absence of significant manipulation.
The sample analyzed in the current paper comprises 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 Classification and Regression Tree modelling (CART), were used. The data forecast for 2014 was compared with actual data for that year, and the accuracy of the forecasting model was assessed.
The paper outlines the main conditions under which a particular type of earnings manipulation is expected to take place in a company in the accounting period following the current one. It is shown that 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. The other important factors are: the company size, return on equity, earnings persistence, the level of earnings manipulation in the current period and stock emission.

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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 & Chiou, 2009).

1 In the current paper, the terms "earnings management" and "earnings manipulation" are treated as synonyms. We consider such an approach 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).

The phenomenon of earnings management has been extensively studied over recent decades, with the focus on different aspects of this process. As Healy and Wahlen (1999) state, the previous 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 manipulation 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 that is treated as an alternative to accrual-based earnings management (e.g., Zang, 2012; Chan et al., 2015; Malik, 2015).

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 manipulation (Tsai & Chiou, 2009). However, 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 identify factors that influence a company's intention to manage earnings in the future. Given the scale of the potential negative consequences of earnings management for company's shareholders, this task also has significant practical importance. 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 & Chiou, 2009; Etemadi & Moghadam, 2014).

The purpose of the current study is to develop a model to identify factors that will determine a particular earnings management behavior in the future: upward earnings management, downward earnings management or the absence of significant manipulation. The model is tested on the data of two BRICS countries: Russia and China. Methods of regression analysis and CART are used.

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 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, which is another reason for considering these countries in the current study. First, both underwent serious political changes throughout the 20th century, which ultimately made 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 labor 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 & Lu, 2015).

The rest of the paper is organized as follows. The next section discusses the concept of earnings management and identifies the main motives for earnings management. The main models for forecasting the level of earnings management are described in the second section. The third section is devoted to a description of the sample and methodology used, and the fourth to research results and their discussion. The fifth section contains some illustrative cases of companies. In the concluding part of the paper, limitations and directions for further research are depicted.

1. CONCEPT 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 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 company's attractiveness to investors and other external stakeholders. The second motive considers the intention to meet 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 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.

To sum up, earnings management can be either legal or illegal, with the former generally being the object of research in the scientific literature.

There are two main types of earnings management depending on the underlying method of manipulation: accrual-based earnings management and real earnings management (Schipper, 1989; Healy & Wahlen, 1999; Zang, 2012).

Accrual-based earnings management implies that managers manipulate 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 company's operations in the ordinary course of events; and discretionary accruals that result from a com-

pany's manipulation behavior (Ibrahim, 2009). The amount of discretionary accruals is assessed using different models (see, e.g., Jones, 1991; Teoh, Welch, & Wong, 1998; Kothari, Leone, & 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, & 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, & Lys, 2008; Cohen & Zarowin, 2010).

According to Zang (2012), these two types of 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.

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 company's debt covenants are about to be breached (DeFond & 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, & Wong, 1998). Other motivations include: minimization of income tax (Maydew, 1997), management buyouts (Wu, 1997), and income smoothing (McNichols & Wilson, 1988).

2. FORECASTING THE LEVEL OF EARNINGS MANAGEMENT OF A COMPANY

As 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 & Chiou, 2009; Etemadi & Moghadam, 2014; Loukianova, Nikulin, & 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[2].

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 af-

2 Gaganis (2009) used a large variety of models (including artificial and probabilistic neural networks) in his research; however, he was pursuing the goal of detecting fraudulent financial statements, i.e., he focused on illegal earnings management.

ter 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 was the restriction of the sample to a single industry, and the application of the results only to cases of upward earnings management. In our study, we aim to develop their ideas by using company data from two countries (Russia and China) and several industries. Another distinctive feature of our 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 enables us to form a more comprehensive view of earnings management behavior in different markets.

3. SAMPLE AND METHODOLOGY

Our sample is from Russian and Chinese public companies with available data. Public companies are chosen, because, according to many authors, stock emission can be considered as an earnings management motive (see, e.g., Teoh, Welch, & Wong, 1998). 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 we assume that they had not yet exerted their full effect on companies and their financial reports. For this reason, we have not considered later years. The overall sample size was 664 Russian companies and 2,380 Chinese companies. The main sources of data were: the SPARK database (http://spark.interfax.ru), the Thomson Reuters database (http://thomsonreuters.com/en.html), and companies' annual reports and official websites.

The industrial affiliation of companies is shown in Figure 1.

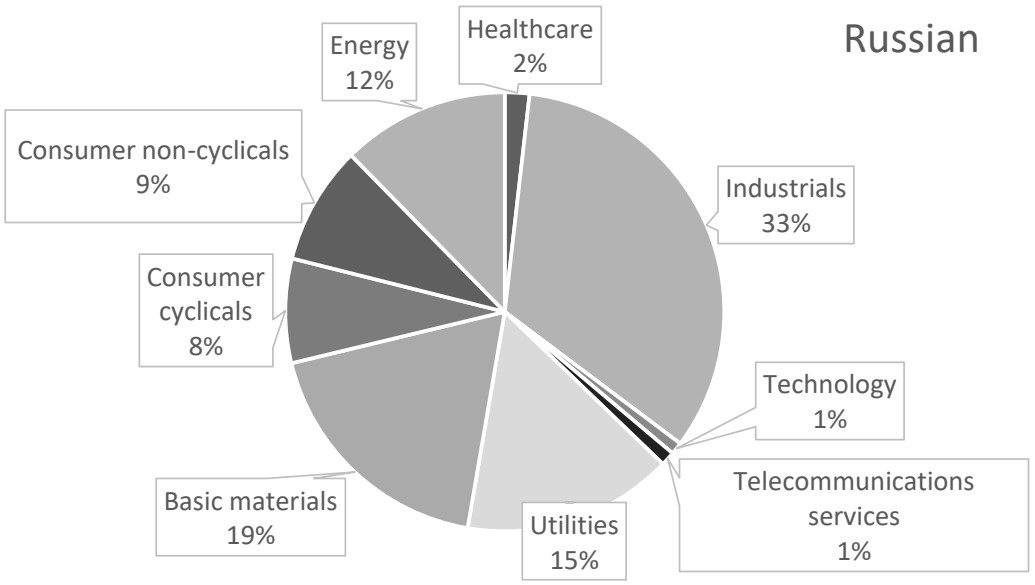

Figure 1a. Industrial affiliation of companies[1]

1 The classification of industries is according to the Thomson Reuters Business Classification Economic Sector.

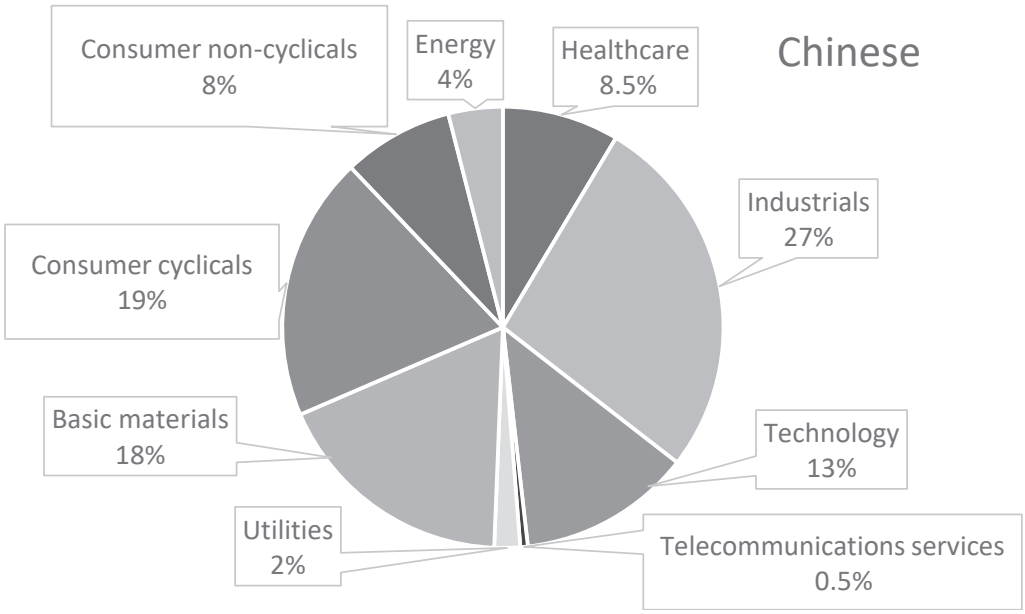

Figure 1b. Industrial affiliation of companies

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 (17.90%).

The research was conducted in several stages. First, for each company in the sample, we assessed the level of earnings manipulation based on actual data. In line with Tsai and Chiou (2009) and Etemadi and Moghadam (2014), we used the Jones model (Jones, 1991). This is a regression model to estimate the total accruals of a company. The residual of this model, i.e., the difference between actual total accruals and their predicted value according to the model, represents company's discretionary accruals. Discretionary accruals represent the total accruals that are not required in the ordinary course of company's operations, that is why they are generally considered a sign of earnings management (see, e.g., Van Tendeloo & Vanstraelen, 2005; Iatridis, 2010; Alves, 2013; Nazer, 2013).

The Jones model in our research has the following form:

$$\frac{Total\ Accruals_{2014}}{TA_{2013}} = \beta_1 \cdot \frac{1}{TA_{2013}} + \\ + \beta_2 \cdot \frac{\Delta \mathrm{Re}v_{2013-2014}}{TA_{2013}} + \beta_3 \cdot \frac{PPE_{2014}}{TA_{2013}} + e, \quad (1)$$

where $Total\ Accruals_{2014}$ – total accruals of company for 2014; TA_{2013} – total assets at the end of 2013; $\Delta \mathrm{Re}v_{2013-2014}$ – change in revenue between 2013 and 2014; PPE_{2014} – property, plant and equipment at the end of 2014; β_1, β_2, β_3 – model parameters, e – error term.

Using equation (1), the value of discretionary accruals for each company in the sample was computed. The companies were, then, divided into three clusters according to their presumed level of earnings manipulation (in terms of the amount of discretionary accruals). If the observation fell within the first quartile, a company was assigned to Cluster 1 "Earnings decreasing companies"; if it fell in the second or third quartiles, the company was assigned to Cluster 2 "Insignificant earnings manipulation"; finally, if the observation fell within the fourth quartile, the company was allocated to Cluster 3 "Earnings increasing companies".

The next step was to forecast the level of company's earnings management for 2014 based on the data for 2009–2013. The initial set of variables used for forecasting was chosen according to Tsai and Chiou (2009), and Etemadi and Moghadam (2014), although some were omitted due to lack of data on Russian and Chinese companies. The final list of variables used here, and the formulae for their calculation, are presented in Table 1.

Table 1. Variables used to forecast companies' level of earnings manipulation

Variable	Variable designation	Formula for calculation
Return on equity	*ROE*	$\frac{NI}{E}$, where NI – net income, E – equity
Debt ratio	*LEV*	$\frac{TL}{TA}$, where TL – total liabilities, TA – total assets
Company's size	*SIZE*	$ln(Rev)$, where Rev – a company's revenue
Operating cash flow	*CFO_TA*	$\frac{CFO}{TA}$, where CFO – operating cash flow, TA – total assets
Earnings persistence (standard deviation of net income based on the annual data for 5 years, i.e., from 2009–2013)	*PERS_TA*	$\frac{\sigma \cdot (NI_{2009-2013})}{TA}$, where NI – net income, TA – total assets
Discretionary accruals of 2013 scaled by total assets at the end of 2013	*DA_TA*	According to the Jones model for 2013
Proxy for company's financial operations	*SHARVAR*	1, if a company issued additional stock in 2013; 0 otherwise

The forecasting was conducted using the decision tree approach, and the value of discretionary accruals of each company for 2014 was obtained. The companies were, then, divided into three clusters of different levels of earnings management, as described above. After that, the distribution of companies among the three clusters based on actual data was compared with the distribution derived from the model. The proportion of correct forecasts was used as a proxy of prediction accuracy of the decision tree model.

In the final stage, the decision tree method enabled us to determine the quantitative conditions under which a company is expected to belong to a particular cluster of earnings management level in the next accounting period. The conditions were set based on the seven variables previously described. In other words, our results show under which conditions companies are expected to demonstrate a particular type of earnings management behavior in the future.

4. RESULTS

Table 2 presents descriptive statistics of the sample companies.

As it 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 we have companies with different earnings management behavior over the period of time considered, i.e., with both upward and downward earnings management.

Table 3 shows the results of the Jones model assessment for both Russian and Chinese companies for 2014.

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

Table 2. 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
$\frac{Total\ Accruals_{2014}}{TA_{2013}}$	–0.0259	0.0574	–0.1593	0.1251	–0.0207	0.3644	–0.2351	0.4464
$\frac{\Delta \mathrm{Re}v_{2013-2014}}{TA_{2013}}$	–0.4102	0.4178	–2.63678	0.2033	0.1204	0.7125	–0.8616	2.0767
$\frac{PPE_{2014}}{TA_{2013}}$	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
$PERS_TA_{2009-2013}$	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

Table 3. The Jones model parameters estimation for 2014 (Russian and Chinese companies)

Variable	Russian sample		Chinese sample	
	Coefficient	P-value	Coefficient	P-value
$\frac{1}{TA_{2013}}$	132.65	0.068	–1459.11	0.000
$\frac{\Delta \mathrm{Re}v_{2013-2014}}{TA_{2013}}$	0.026	0.000	–0.005	0.000
$\frac{PPE_{2014}}{TA_{2013}}$	–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

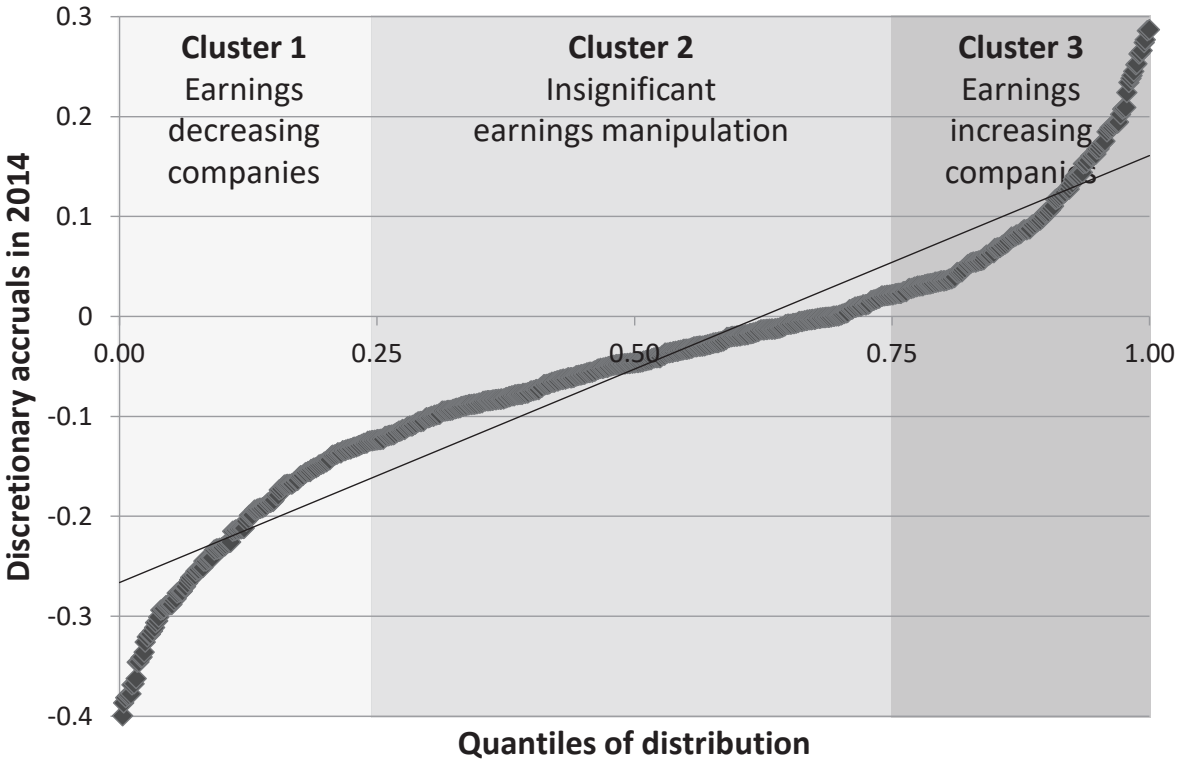

Figure 2a. Quantiles of distribution of discretionary accruals of the companies of the sample based on actual data for 2014 (Russia)

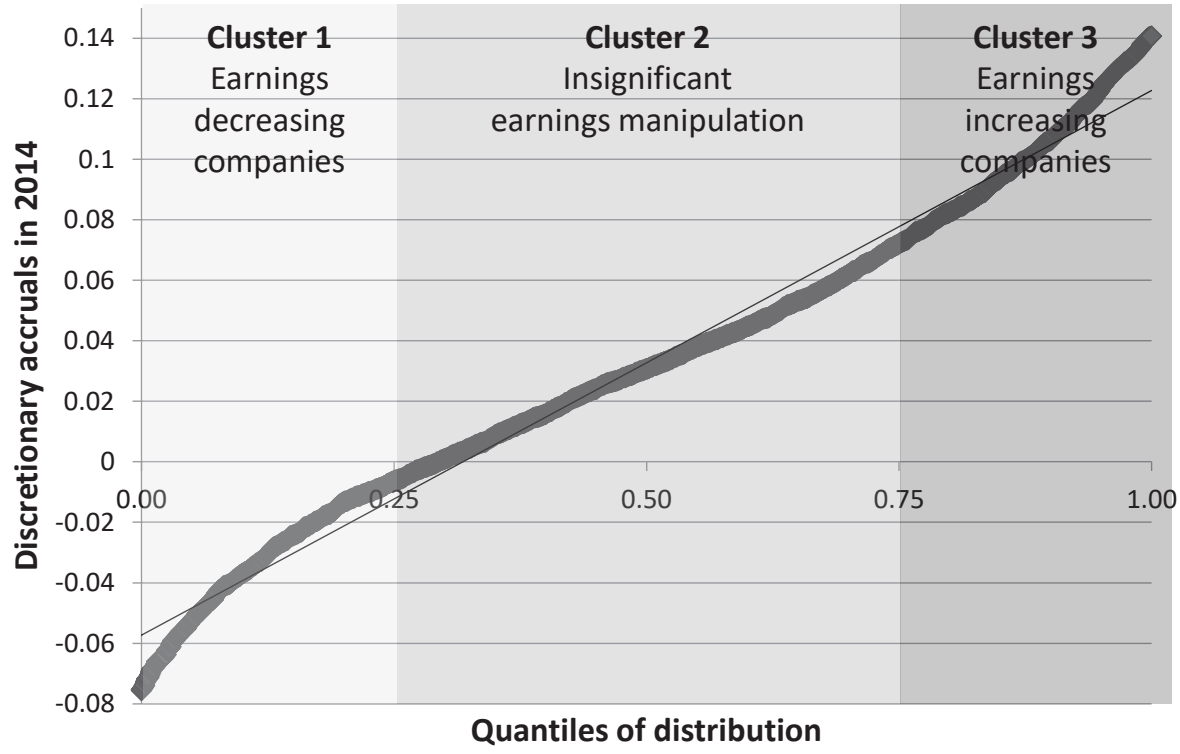

Figure 2b. Quantiles of distribution of discretionary accruals of the companies of the sample based on actual data for 2014 (China)

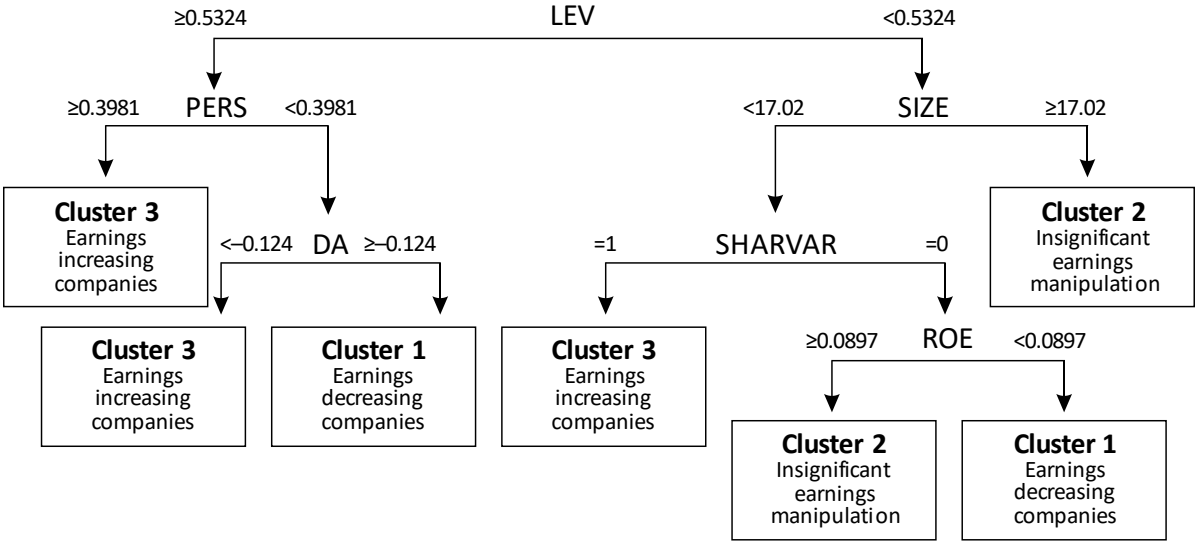

Figure 3a. Decision tree to determine clusters of earnings management (Russia)

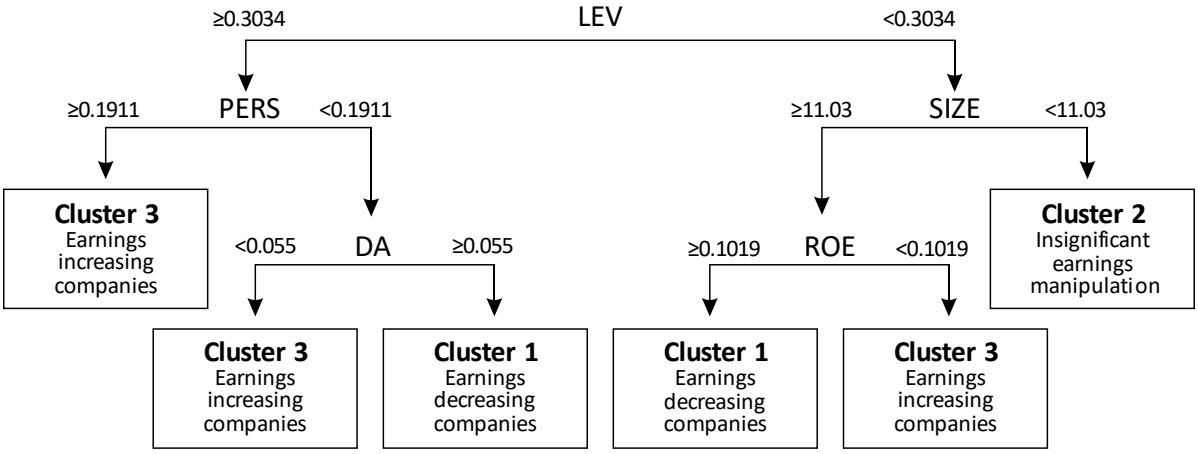

Figure 3b. Decision tree to determine clusters of earnings management (China)

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.

Figure 2 illustrates the values of discretionary accruals for each company in ascending order. The vertical axis shows the values of discretionary accruals, and the horizontal axis shows the quantiles of distribution.

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 75th percentile equals 0.072 for Chinese companies and 0.022 for Russian companies), so, for these companies, we make the assumption that they do not manipulate earnings significantly (Cluster 2 "Insignificant earnings manipulation"). Finally, companies of the fourth quartile were allocated to Cluster 3 "Earnings increasing companies".

After we estimated the level of earnings manipulation (cluster) of each company based on actual discretionary accruals for 2014, we used 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.

Figure 3 shows the decision trees for Russia and China.

Analysis of the results presented in Fig. 3 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 & Jiambalvo, 1994; Stanley & 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 $\left(ln\left(Rev\right)\geq 17.02\right)$, whereas in China they are small $\left(ln\left(Rev\right)<11.03\right)$. 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. In China, companies in Cluster 1 (Cluster 3) have high debt ratio (≥ 0.3034), high earnings persistence (< 0.1911) and high (low) discretionary accruals for the current year.

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 $\left(ln\left(Rev\right)<17.02\right)$ and issued stock in the current accounting period. The reason why these companies inflate earnings is possibly to stimulate their stock price (Teoh, Welch, & Wong, 1998). If a company has low debt ratio (<0.5324), small size ($ln\left(Rev\right)<17.02$) 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 ac-

Table 4. Parameters of company X compared to the decision tree conditions for Cluster 1 "Earnings decreasing companies"

Indicators	LEV	SIZE (ln (Sales))	SHARVAR	ROE
Decision tree	< 53.24%	< 17.02	0	< 8.97%
Company X	9.62%	14.56	0	–15.99%

counting (Scott, 1997). This technique implies that a company strives to recognize more expenses in unfavorable accounting periods in order to have fewer expenses in favorable periods.

Chinese companies that have low leverage (< 0.3034), large size $\left(ln\left(Rev\right) \geq 11.03\right)$ 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.

5. 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 illustrate decision trees results[3].

Russia – "downward manipulation" (X company). An example of the firm, which was expected to artificially downgrade its earnings in 2014 could be X. This firm operates in automotive industry, manufacturing and selling full range of light-to-medium commercial vehicles. By some of its financial characteristics for 2013, X 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 can be found in Table 4.

We can see that X refers to companies with relatively low debt ratio (9.62%), medium size, that 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). In case of X, 2014 fiscal year was extremely negative, posting 150% decline in net income. The primary reason was economic crisis, which hurt Russian economy right in 2014, imposing huge negative impact on automotive industry. However, for X, 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% growth. 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 the 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, selling, general and administrative expenses 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.

Russia – "insignificant manipulation" (Y company). Y company operates in oil exploration, production, refining, marketing and distribution. Table 5 provides information on specific financial characteristics of Y for 2013, referring it to one of the "branches" identified by the decision tree on

3 It should be noted that cases depicted in the following section of the paper are hypothetical, i.e., we can not definitely know whether a company considered actually implied a particular type of legal earnings management in 2014. Nevertheless, for the sake of anonymity, all names of companies are hidden.

Russian sample, which predicts it to insignificantly manipulate earnings in 2014.

Table 5. Parameters of company Y compared to the decision tree conditions for Cluster 2 "Insignificant earnings manipulation"

Indicators	LEV	SIZE (ln(Sales))
Decision tree	< 53.24%	> 17.02
Company Y	17.43%	18.77

Given a relatively small debt burden in capital structure (17.43%) and large revenues, Y had no incentives to manipulate its earnings. Therefore, we can hypothesize that decrease in net income of the firm of 40% in 2013–2014 accounting periods is mostly related to non-discretionary accruals, i.e., changes in general economic environment and negative industrial trends in oil and gas industry (Gridina, Kosmina, Starodubtceva, 2014).

Russia – "upward manipulation" (Z company). Z company operates in civil and military aircraft industry and is engaged in design, testing, manufacturing, selling and after-sales support of its products. The set of financial characteristics for 2013, which explain earnings management behavior of Z in 2014, can be found in Table 6. These characteristics assign the company to the cluster of upward earnings management.

Table 6. Parameters of company Z compared to the decision tree conditions for Cluster 3 "Earnings increasing companies"

Indicator	LEV	SIZE (ln(Sales))	SHARVAR
Decision tree	< 53.24%	< 17.02	1
Company Z	38.29%	14.46	1

Specific attention should be paid to variable SHARVAR, which indicates whether the firm issued its common stock. As for Z, the company announced issuance of additional shares as of September 2013, in the amount of 210 mln shares, RUB 3 each. As was indicated in prospectus, the primary purpose of the issuance was to finance investment program of the firm and its subsidiaries. Some research findings suggest that firms, which raise capital via secondary public offerings (SPOs), tend to use upward earnings management techniques to stimulate share price growth or, at least, support it at some level (Teoh, Welch, & Wong, 1998).

The company reported significant contraction in net income in 2014 (–95%), however, it was still profitable, beating consensus estimates of analysts. Sharp decline in bottom line was typical for the whole aerospace and defense industry at that period of time, given international sanctions imposed on Russia, as the main source of revenue for these companies comes from export contracts. Since Z 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 was. As Teoh and Welch indicate (Teoh, Welch, & Wong, 1998), it is extremely important for companies to show positive results, outperforming consensus forecasts in the periods subsequent to SPOs.

China – "downward manipulation" (XX company). XX is engaged in the operation supermarkets and department stores primarily in China and some international markets. Based on the decision tree developed, this company was expected to artificially deflate earnings in 2014. The set of financial characteristics of the firm for 2013 can be found in Table 7.

Table 7. Parameters of company X compared to the decision tree conditions for Cluster 1 "Earnings decreasing companies"

Indicator	LEV	SIZE (ln(Sales))	ROE
Decision tree	< 30.34%	≥ 11.03	≥ 10.19%
Company XX	12.51%	15.32	25.64%

XX company refers to companies with relatively low debt ratio (12.51%), large size and high ROE (25.64%). The downward earnings management of this company in 2014 may be caused by the reversal of accruals effect. 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 financial year recording the lowest value (approximately –$98,747 mln). Such reverting dynamics testifies to the hypothesis that downward manipulation of earnings by XX company was expected as the consequence of previous upward manipulation.

China – "insignificant manipulation" (YY company). YY company is engaged in research, devel-

opment, manufacturing and selling military high-performance transmission cables and cable assemblies. Table 8 provides information on specific financial characteristics of YY company for 2013, allocating it to one of the "branches" identified by the decision tree on Chinese sample, which predicts it to insignificantly manipulate earnings in 2014.

Table 8. Parameters of company YY compared to the decision tree conditions for Cluster 2 "Insignificant earnings manipulation"

Indicator	LEV	SIZE (ln(Sales))
Decision tree	< 30.34%	< 11.03
Company YY	8.28%	10.36

YY represents the case of a stable Chinese mainland firm with relatively low financial leverage (8.28%) and medium size. By nature, the firm operates in niche market: it supplies military forces with high tech cables used in aerospace, aviation, military electronics and weapons. Given that majority of its sales come from Chinese government and considering also limited size of the company and its 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.

China – "upward manipulation" (ZZ company). ZZ company manufactures and sells the full range of trucks: from medium-to-heavy duty trucks to buses and related components. The set of financial characteristics of this company for 2013, which could explain its future earnings management behavior can be found in Table 9. These characteristics assign the company to the cluster of upward earnings management.

Table 9. Parameters of company ZZ compared to the decision tree conditions for Cluster 3 "Earnings increasing companies"

Indicator	LEV	SIZE (ln(Sales))	ROE
Decision tree	< 30.34%	≥ 11.03	< 10.19%
Company ZZ	25.16%	15.31	0.66%

The motive to increase earnings for this company may stem from the intention to upgrade its ROE. ZZ lagged behind its eight main peers in terms of ROE in 2013. It managed to slightly improve its ROE up to 2.1% and move higher in the rankings. 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 ZZ company was inclined to increase earnings in trying to further improve its profitability among peers.

CONCLUSION

The purpose of the current paper was to develop a model to forecast a particular type of earnings management, i.e., upward, downward or no significant manipulation. In contrast to the majority of studies on earnings management that focus on historical data, our paper describes an approach to directly forecasting the level of earnings management of a company in the accounting period following the current one.

The empirical part of the paper was based on material from two national markets: Russia and China. There were three main reasons for the choice of these two countries for comparison. First, there is a certain resemblance in terms of economic development, reflected in the fact that both are referred to as "transition 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. Our paper aims to make a contribution to this stream of literature. Thirdly, China and Russia provide good opportunities for research in terms of the amount of statistical data available for the methods we use, especially for CART.

The sample analyzed comprises 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.

Another distinction of our study is that it reveals different combinations of quantitative parameters that might influence earnings management behavior of companies in the future, i.e., earnings-increasing, earnings-decreasing and insignificant earnings manipulation.

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 findings for Chinese companies are generally consistent with those obtained for Russia. In order to be allocated to Cluster 1 "Earnings decreasing companies", a company should either have high debt ratio, high earnings persistence and high discretionary accruals for the current period or low debt ratio, large size and high return on equity. Companies in Cluster 2 "Insignificant earnings manipulation" have low debt ratio and small size. Finally, Cluster 3 "Earnings increasing companies" comprises Chinese companies that 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, large size and low return on equity.

Our research is not free of limitations. First, we focus on accrual-based earnings management, while real earnings management could also be considered in this regard. Secondly, the robustness of the results could be checked by using different discretionary accruals models. Thirdly, the predictive power of forecasting models could be improved by considering other factors that might influence the level of earnings management of a company.

The results of our study have certain practical implications. They can be used by many external users of accounting information (potential investors, creditors, analysts, regulators, etc.) in order to predict financial results for the companies they deal with. We believe that such an opportunity will enable them not only to reduce their financial risks, but in the long term, it will positively impact national economies in general.

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