

THE RELATIONSHIP BETWEEN ACCRUAL-BASED EARNINGS MANAGEMENT AND REAL EARNINGS MANAGEMENT: REFERENCE TO THE POLISH CAPITAL MARKET

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Abstract

Research background: The literature on the subject matter emphasizes the lack of empirical research on the relationships between accrual-based earnings management (AEM) and real earnings management (REM), while studies conducted so far are characterized by highly ambiguous results.

Purpose: The main aim of the paper is to present the results of empirical research on the relationships between the *AEM* and *REM* practices used to create financial results in industrial public companies listed on the WSE.

Research methodology: The research sample concerns 72 listed companies whose shares were traded on the Warsaw Stock Exchange (WSE) for a minimum 13 years in the adopted reference period of 2003–2017. The estimation of *AEM* and *REM* practices was made by using: the Jones model, the Kang-Sivaramakrishnan model and the Roychowdhury methodology.

Results: The empirical results allowed showing the existence of a statistically significant, negative relationship between discretionary accruals and the abnormal level of an operational cash flow indicator, as well as between discretionary accruals and the total *REM* indicator. An in-depth cross-sectional analysis showed the existence of significantly differentiated relationships between the studied variables in individual branches of industry.

Novelty: Research on the relationship between *AEM* and *REM* practices in the context of the Polish capital market has not been carried out so far, hence it can be considered a new research area in which there is a justified need to deepen theoretical and empirical research on the *EM* phenomenon.

Keywords: accrual-based earnings management, real earnings management, industrial listed companies, the Warsaw Stock Exchange

JEL classification: L25, M41

Introduction

Although managerial practices in the field of accrual-based earnings management (AEM) or real earnings management (REM) are quite widely described in the literature on the subject, there is still a lack of empirical research regarding the connections between these two categories of shaping the financial result in an enterprise. The main postulate prompting any further implementation of this type of analysis is the commonly cited fact that focusing attention only on one of two dimensions of earnings management may lead to an imprecise estimation of the scale of manipulation of the financial results in an economic entity.

The main goal of the article is to present the results of empirical research on the relationships between the accrual-based and real earnings management methods used to create financial results in industrial public companies listed on the Warsaw Stock Exchange (WSE). In the analyzed research perspectives of *AEM* and *REM* there are various tasks, tools and techniques for influencing the levels of reported profit (loss), as well as diversified possibilities and their optimal use for the good of the various groups of the company's stakeholders. Both points of view create a holistic picture of undertaking and implementing actions in the regulatory sphere by enterprises, creating specific financial results with respect for legal and social determinants of their functioning in the areas of operational, investment and financial activities.

1. Literature background

The previous literature on the subject matter presents a different approach to defining the phenomenon of earnings management. These various views apply to both accrual-based and real earnings management. The diversified contents of *AEM* reflects earnings management options with the use of flexibility and discretion in financial reporting as well as a variety of ethical justifications for actions taken. It seems that it can be emphasized that in *AEM* practices intentional shaping of the financial result serves to expose the reported information in a way that will show the financial position of the entity in a more favorable light in the "eyes" of its stakeholders and/or will make it difficult to see and assess phenomena and processes reflecting potential weaknesses of the enterprise. For the sake of order, it should be noted that the article adopts the definition of *AEM* proposed by P.M. Healy and J.M. Wahlen (1999, pp. 365–383), which states that *AEM occurs 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 practices.*

On the other hand, intentional shaping of the company's financial results, reduced to *REM* practices, consists in interfering with the value of reported profit (loss) by conducting various business operations, which are not based on subjective accounting choices, directed for – *inter alia* – above average sales acceleration, unnatural growth of production costs or reduction of discretionary expenses. According to the terminological approach proposed by X. Hunag, L. Sun (2017, p. 92) we define *REM* as *management operational activities to alter reported earnings in a particular direction, which is achieved by overproducing inventory to lower the cost of goods sold or cutting discretionary expenses (i.e., advertising expenditures, research and development expenditures, selling, general and administrative expenditures) to improve reported margins. In other words, real earnings management is the management action that deviates from normal business practices and has suboptimal business consequences.*

Generally, practices that fall under the concept of *REM* are clearly different from *AEM* methods based on solutions that use flexibility in the selection of accounting policies. Their characteristic features are: more difficult and cost-intensive implementation, a smaller spectrum of potential activities related to intentional impact on the entity's financial result, more frequently encountered negative consequences of implementing these practices (interference in the adopted sales policy and change in the strategy of managing asset components not directly related to the market conditions of these transformations, regardless of the effect achieved, directly affects the entity in subsequent periods), lower risk of detecting the "intentionality" of low motives of actions taken etc. (Schipper, 1989, pp. 91–103; Fischer, Rozenzweig, 1995, pp. 433–444; Sankar, Subramanyam, 2001, pp. 365–386; Roychowdhury, 2006, pp. 335–370; Sellami, 2015, pp. 206–213; Ewert, Wagenhofer, 2005, pp. 1101–1124). Beside this, accrual manipulations usually take place at year-end when actual earnings figures fall below targets. On the contrary, *REM* practices should be planned in advance; it cannot be manipulated at year-end. Due to the distinguishing features, the need for in-depth analyzes between the relationships between two described earnings management practices and methods becomes particularly relevant.

According to A.Y. Zang (2011, pp. 675–703), managers while making decisions regarding the type of implemented earnings management consider costs associated with each one. The author also claims that managers use *AEM* and *REM* practices alternately, treating them as specific substitutes for the intentional shaping of the reported profit (loss) in the enterprise. In this way, the level of discretionary accruals (illustrating the accounting type of earnings management) is adjusted to the appropriately profiled level of abnormal operational cash flows, abnormal production costs or abnormal discretionary expenses (and thus the three main areas of real earnings management). What is more, managers, who use *AEM* or *REM* respectively,

depend on the benefits of an individual earnings management method, regardless of corporate events or a specific reference period. Also M. Pincus and S. Rajgopal (2002, pp. 127–160) have provided evidence that managers, seeking to smooth out reported earnings, use derivatives (one of the real earnings management instruments) and discretionary accruals separately. Negative relationships between two conceptual dimensions of earnings management have also been noted in the works of: D.A. Cohen, A. Dey, T.Z. Lys (2008, pp. 757–787), D.A. Cohen and P. Zarowin (2010, pp. 2–9) or E. Paulo, R.H.G. Mota (2019, pp. 216–233).

On the other hand, T.Y. Chen, S.-H. Huang and H.-S. Fan (2012, pp. 93–108) present evidence suggesting a complementary relationship between both methods of earnings management for enterprises operating in Taiwan (the mentioned complementary nature of the implementation of both earnings management strategies consists in the parallel implementation of *AEM* and *REM* practices in a given reference year). Similar conclusions from empirical research are presented, among others, by S.E. Hamza and N. Kortas (2019, pp. 1195–1227) in relation to Tunisian companies and S. Matsuura (2008, pp. 63–78) in the context of Japanese business entities. The complexity of interactions between accounting and real earnings management phenomena is also indicated by studies by M.A. Ismail (2017, pp. 1–38). This researcher has proved that within Egyptian public companies there can be noticed negative correlation relationships between discretionary accruals and abnormal operating cash flow as well as positive correlation relations between discretionary accruals and abnormal production costs or abnormal levels of discretionary expenses.

A significant part of the research presented in the literature on the subject proves that the substitutive or complementary nature of the implemented *AEM* and *REM* practices is conditioned by the specific features of the enterprises analyzed. Important factors determining the scale and directions of activities in the field of earnings management include, among others: capital ownership structures, organizational structures or financial strategies. The multifaceted and complexity of the undertaken issues is underlined in selected results of empirical research conducted by: G. Braam, M. Nandy, U. Weitzel, S. Lodh (2015, pp. 111–141), T.-Y. Chen, Z. Gu, K. Kubota and H. Takehara (2015, pp. 21–47), A.-K. Achleitner, N. Gunther, C. Kaserer and G. Siciliano (2014, pp. 431–461), H. Vakilifard and M.S. Mortazavi (2016, pp. 53–60), or J. Barton and P. Simko (2002, pp. 1–27). The cited, selected results of empirical analyzes create a picture of diverse research results on the heterogeneous methods used to shape financial results in companies around the world and at the same time reveal the contextual determinants of their effectiveness and the legitimacy of their implementation.

2. Research methodology and studied sample

The research covered 72 enterprises listed on the Warsaw Stock Exchange that shares have been traded for at least thirteen years with the 2003–2017 reference horizon. Additionally, the sample selection was based on the criteria as following: the fiscal year of a firm should be end up to 31 December and all of the financial required data must be available. Consequently, the study was investigated within industrial companies belonging to the twelve branches of industry. Empirical research based on financial information taken from the Notoria Service database.

To implement the research objective of this study, in order to assess the degree of *AEM* practices in industrial enterprises two regression models were used, namely: the Jones model (Jones, 1991, pp. 193–228) and the Kang-Sivaramakrishnan model (1995, p. 358). The Jones model assumes that the value of operational accruals is determined by two variables: change in sales revenues (ΔREV) and average value of property, plant and equipment (PPE). Whereas, the value of discretionary accruals ($DACC_{Jones}$) is based on the difference between the empirical and theoretical value of total accruals ($TACC$) as the explained variable. For the sake of comparability of data, the model should be standardized using the value of lagged total assets. Consequently, the formula of the Jones Model takes the final form as below:

$$\frac{TACC_{i,t}}{TA_{i,t-1}} = \alpha_1 \left(\frac{1}{TA_{i,t-1}} \right) + \alpha_2 \left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}} \right) + \alpha_3 \left(\frac{PPE_{i,t}}{TA_{i,t-1}} \right) + \varepsilon_{i,t}^{Jones} \quad (1)$$

where: $TACC_{i,t}$ indicates total accruals of the company i in year t (calculated as a difference between net income and operational cash flows); $TA_{i,t}$ points out an average value of total assets of the company i in year t ; $REV_{i,t}$ indicates sales revenues of the company i in year t ; $PPE_{i,t}$ points out an average value of gross property, plant and equipment of the company i in year t ; $\alpha_i, i = 0, 1, \dots, k$ are specific regression parameters while $\varepsilon_{i,t}$ denotes an error term in the regression model.

At the same time the value of $\varepsilon_{i,t}$ forms the essential basis for the assessment of direction and range of accrual-based earnings management ($\varepsilon_{i,t} = DACC_{Jones}$) in the analyzed company:

$$DACC_{Jones\ i,t} = \frac{TACC_{i,t}}{TA_{i,t-1}} - \left[\alpha_1 \left(\frac{1}{TA_{i,t-1}} \right) + \alpha_2 \left(\frac{REV_{i,t}}{TA_{i,t-1}} \right) + \alpha_3 \left(\frac{PPE_{i,t}}{TA_{i,t-1}} \right) \right] \quad (2)$$

where $DACC_{i,t}$ – discretionary accruals (estimating using the selected model) of company i in year t ; other designations – as above.

In the Kang-Sivaramakrishnan model it has been assumed that the estimation of non-discretionary accruals can be carried out by separately forecasting the amount of non-discretionary accruals related to the category of sales revenues and operational accruals related to generated costs. The authors of this model state that the value of unmanaged receivables is a function of generated sales revenues in the analyzed period and the previous one, as well as a derivative of the value of these receivables from the previous year. Similarly, the value of net operating current assets in a given year depends on the expired expenses in the periods: t and $t-1$, as well as the value of net operating current assets from the period preceding the analysis. In turn, the value of unmanaged costs due to depreciation is a derivative of these costs from the previous period and the initial value of fixed assets from periods t and $t-1$. At the same time, in the Kang-Sivaramakrishnan model, it was assumed that the total accruals (referred to by the authors as “accrual balances”) are equal to the average value of receivables increased by the average values of inventory and operational current assets and reduced by the average value short-term liabilities and depreciation. The presented dependencies can be described by the following formulas:

$$\begin{aligned} \frac{TACC_{i,t}}{TA_{i,t-1}} = & \beta_0 + \beta_1 \frac{REV_{i,t}}{TA_{i,t-1}} \left(\frac{REC_{i,t-1}}{REV_{i,t-1}} \right) + \beta_2 \frac{EXP_{i,t}}{TA_{i,t-1}} \left(\frac{OCAL_{i,t-1}}{EXP_{i,t-1}} \right) + \\ & + \beta_3 \frac{PPE_{i,t}}{TA_{i,t-1}} \left(\frac{DEP_{i,t-1}}{PPE_{i,t-1}} \right) + \varepsilon_{i,t}^{Kang} \end{aligned} \quad (3)$$

and

$$\begin{aligned} DACC_{Kang\ i,t} = & \frac{TACC_{i,t}}{TA_{i,t-1}} - \\ & - \left[\beta_0 + \beta_1 \frac{REV_{i,t}}{TA_{i,t-1}} \left(\frac{REC_{i,t-1}}{REV_{i,t-1}} \right) + \beta_2 \frac{EXP_{i,t}}{TA_{i,t-1}} \left(\frac{OCAL_{i,t-1}}{EXP_{i,t-1}} \right) + \beta_3 \frac{PPE_{i,t}}{TA_{i,t-1}} \left(\frac{DEP_{i,t-1}}{PPE_{i,t-1}} \right) \right] \end{aligned} \quad (4)$$

where: $REC_{i,t}$ indicates reported receivables of the company i in year t ; $OCAL_{i,t}$ points out an average value of operational net current assets of the company i in year t ; $EXP_{i,t}$ indicates a value of expired costs of the company i in year t ; $DEP_{i,t}$ is the depreciation cost the company i in year t ; other designations – as above.

On the other hand, real earnings management practices (*REM*) are measured based on S. Roychowdhury (2006, pp. 335–370) research methodology. Diagnostic imaging of the size

and extent of abnormal deviations from the normal economic events of enterprise was carried out using three econometric models, more widely exposed also in the works of: P.M. Dechow, S.P. Kothari and R.L. Watts (1998, pp. 133–168); G. Braam et al. (2015, pp. 111–141); D.A. Cohen et al. (2008, pp. 757–787). These models allowed distinguishing the following economic measures describing the scale of intentional shaping of the financial result of an economic entity through *REM*:

- abnormal level of cash flow from operations (OCF_{disc}), whose value represents the residual component of the model describing the shaping of operational cash flows using such exogenous variables as: sales revenues and change in sales revenues. It can be represented by the equation:

$$\frac{OCF_{i,t}}{TA_{i,t-1}} = \alpha_1 \left(\frac{1}{TA_{i,t-1}} \right) + \alpha_2 \left(\frac{REV_{i,t}}{TA_{i,t-1}} \right) + \alpha_3 \left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}} \right) + \varepsilon_{i,t}^{OCF} \quad (5)$$

where: $OCF_{i,t}$ – operating cash flows of company i in year t ; other designations – as above.

Considering the fact, that $\varepsilon_{i,t}$ sets the value of *REM* (in this case $\varepsilon_{i,t}^{OCF} = OCF_{disc}$), it is noticeable that:

$$\varepsilon_{i,t}^{OCF} = OCF_{disc\ i,t} = \frac{OCF_{i,t}}{TA_{i,t-1}} - \left[\alpha_1 \left(\frac{1}{TA_{i,t-1}} \right) + \alpha_2 \left(\frac{REV_{i,t}}{TA_{i,t-1}} \right) + \alpha_3 \left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}} \right) \right] \quad (6)$$

- abnormal level of production cost ($PROD_{disc}$), estimating by using the following regression model:

$$\frac{PROD_{i,t}}{TA_{i,t-1}} = \alpha_0 + \alpha_1 \left(\frac{1}{TA_{i,t-1}} \right) + \alpha_2 \left(\frac{REV_{i,t}}{TA_{i,t-1}} \right) + \alpha_3 \left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}} \right) + \alpha_4 \left(\frac{\Delta REV_{i,t-1}}{TA_{i,t-1}} \right) + \varepsilon_{i,t}^{PROD} \quad (7)$$

where: $PROD_{i,t}$ – production costs (including: cost of goods sold and value of goods and materials sold at purchase prices increased by a change in inventories) of company i in year t ; other designations – as above.

Similarly as in the case of the OCF_{disc} indicator, the value of abnormal levels of production cost ($PROD_{disc}$) reflects the value of the residual component of the analyzed regression model. It can therefore be seen that:

$$\begin{aligned} \varepsilon_{i,t}^{PROD} = PROD_{disc\ i,t} = \frac{PROD_{i,t}}{TA_{i,t-1}} - \\ - \left[\alpha_0 + \alpha_1 \left(\frac{1}{TA_{i,t-1}} \right) + \alpha_2 \left(\frac{REV_{i,t}}{TA_{i,t-1}} \right) + \alpha_3 \left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}} \right) + \alpha_4 \left(\frac{\Delta REV_{i,t-1}}{TA_{i,t-1}} \right) \right] \end{aligned} \quad (8)$$

- abnormal level of discretionary expenses ($DISX_{disc}$), calculated as the difference between the forecasted value and the actual value of the discretionary expenses of the enterprise scaled with the average value of total assets from the previous period:

$$\frac{DISX_{i,t}}{TA_{i,t-1}} = \alpha_1 \left(\frac{1}{TA_{i,t-1}} \right) + \alpha_2 \left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}} \right) + \alpha_3 \left(\frac{REV_{i,t}}{TA_{i,t-1}} \right) + \varepsilon_{i,t}^{DISX} \quad (9)$$

where: $DISX_{i,t}$ – discretionary expenses (equated with: sales costs, general and administrative expenses and research and development expenditures) of company i in year t ; other designations – as above.

At the same time:

$$\varepsilon_{i,t}^{DISX} = DISX_{disc\ i,t} = \frac{DISC_{i,t}}{TA_{i,t-1}} - \left[\alpha_1 \left(\frac{1}{TA_{i,t-1}} \right) + \alpha_2 \left(\frac{\Delta REV_{i,t}}{TA_{i,t-1}} \right) + \alpha_3 \left(\frac{REV_{i,t}}{TA_{i,t-1}} \right) \right] \quad (10)$$

In the course of the research, it turned out that only some entities present data on expenditure on research and development in their financial statements. Therefore, it was assumed that in those companies, in which this information was not disclosed, costs related to research and development works, which were not activated intangible assets, were not realized. However, they may to some extent limit the possibilities of companies to recognize the techniques used to shape the financial result by the managing of the discretionary expenses.

Consequently, using the presented Roychowdhury models in the study to assess total real earnings management (TOT_REM), a synthetic indicator of the following form was adopted:

$$TOT\_REM_{i,t} = -OCF_{disc\ i,t} + PROD_{disc\ i,t} - DISX_{disc\ i,t} \quad (11)$$

where: $TOT\_REM_{i,t}$ – total real earnings management of company i in year t ; other designations – as above.

This measure was calculated by multiplying OCF_{disc} and $DISX_{disc}$ by negative one (-1) so that the larger their value, the higher their upward REM , and then adding together all resulting amounts plus the value of $PROD_{disc}$ to derive one single comprehensive measure of REM . Given the way the TOT_REM is defined, the higher the value it yields, the higher upward REM is expected to be for a single company (Ferentinou, Anagnostopoulou, 2015, p. 11).

3. Results of empirical research on the cross-sectoral relationships between *AEM* and *REM* in industrial listed companies using Pearson's linear correlation coefficient

Focusing on the results of the analysis of Pearson's linear correlation coefficients between the presented earnings management indicators, it should be pointed out that the discretionary accruals, extracted by the Jones model ($DACC_{Jones}$) is most closely related to measures of REM activities (Table 1). This observation applies to all enterprises included in the research sample, as well as companies classified into individual branches of industry. From the perspective of all public listed companies listed on the Warsaw Stock Exchange subjected to empirical research, the analysis of the relationships between *AEM* and *REM* practices showed two statistically significant relationships. The first one includes relationships between the $DACC_{Jones}$ coefficients and abnormal level of operational cash flow ratios (OCF_{disc}). Whereas the second one refers to the relationship between $DACC_{Jones}$ coefficients and total values of REM activities (TOT_REM indicators). The strength of the mentioned relations, measured by Pearson's linear correlation coefficient, was 44% (negative correlation) and 20% (positive correlation), respectively.

An in-depth cross-sectoral analysis of the relationships between two types of earnings management has also enabled the identification of further important relationships which are worth a broader reference. Narrowing the description to display only those compounds that had at least a strong degree of correlation (above 50%), it is worth noting that:

- a) within enterprises belonging to the group of electromechanical industry companies there were statistically significant correlations between: $DACC_{Jones}$ coefficients and OCF_{disc} indicators (a very strong relationship of a negative nature, described in 71%), as well as between $DACC_{Jones}$ coefficients and TOT_REM indicators (positive, strong correlation determined in 54%);
- b) the results of the empirical research carried out indicate that among the companies classified to the group of light industry there are two statistically significant dependencies of a strong nature. These include the relationships between: $DACC_{Jones}$ coefficients and OCF_{disc} indicators (negative relationship, expressed in 56%) and, on

the other hand, between: $DACC_{Kang}$ and OCF_{disc} indicators (negative relationship, described by Pearson's linear correlation coefficients in 53%);

- c) in the case of food and plastics industry companies, the results of empirical research indicate the existence of statistically significant relationships with high strength. These included relationships between the discretionary accruals estimated using the Jones model ($DACC_{Jones}$) and the abnormal operational cash flow ratios (OCF_{disc}). The strength of these negatively correlated compounds accounted for 67% in food companies and 64% in enterprises belonging to the plastics sector.

Table 1. Relationships between individual *AEM* and *REM* indicators estimated for industrial listed companies in the period 2003–2017

Branch of industry	<i>AEM</i> indicators	<i>REM</i> indicators			
		OCF_{disc}	$PROD_{disc}$	$DISX_{disc}$	TOT_REM
Total industrial companies	$DACC_{Jones}$	-0.44*	-0.08	-0.05	0.20
	$DACC_{Kang}$	-0.12	-0.05	-0.02	0.04
Chemical industry	$DACC_{Jones}$	-0.09	0.03	-0.04	0.09
	$DACC_{Kang}$	0.00	-0.09	-0.02	-0.04
Wood industry	$DACC_{Jones}$	-0.29	-0.23	-0.05	0.07
	$DACC_{Kang}$	-0.08	-0.09	-0.07	0.02
Electromechanical industry	$DACC_{Jones}$	-0.71	-0.19	-0.23	0.54
	$DACC_{Kang}$	-0.12	-0.18	-0.02	0.03
Pharmaceutical industry	$DACC_{Jones}$	-0.30	-0.16	0.18	0.09
	$DACC_{Kang}$	-0.29	-0.03	0.14	0.17
Light industry	$DACC_{Jones}$	-0.56	-0.14	-0.10	0.46
	$DACC_{Kang}$	-0.53	-0.17	-0.02	0.41
Building materials industry	$DACC_{Jones}$	-0.42	0.16	-0.33	0.39
	$DACC_{Kang}$	0.10	0.00	0.12	-0.08
Metal industry	$DACC_{Jones}$	-0.21	-0.19	0.21	-0.04
	$DACC_{Kang}$	-0.13	-0.05	-0.05	0.05
Automotive industry	$DACC_{Jones}$	-0.49	0.15	-0.29	0.40
	$DACC_{Kang}$	-0.09	-0.14	-0.16	0.08
Fuel industry	$DACC_{Jones}$	-0.18	-0.08	-0.21	0.10
	$DACC_{Kang}$	-0.10	0.06	-0.31	0.22
Food industry	$DACC_{Jones}$	-0.67	-0.17	0.03	0.31
	$DACC_{Kang}$	-0.13	0.03	0.13	0.06
Raw materials industry	$DACC_{Jones}$	0.13	0.38	-0.14	0.11
	$DACC_{Kang}$	-0.23	0.10	-0.44	0.32
Plastics industry	$DACC_{Jones}$	-0.64	-0.17	-0.13	0.35
	$DACC_{Kang}$	-0.12	-0.10	0.08	0.01

* Significant correlation at p-value = 0.05.

Source: own study.

4. Results of empirical research on the cross-sectoral relationships between *AEM* and *REM* in industrial listed companies using a regression analysis

Another part of the research on the relationship between *AEM* and *REM* practices in industrial companies (using the linear regression, OLS) implies the previous recall of A.Y. Zang (2011) that managers prefer the implementation of real earnings management activities, and only then “adjusts” to them the optimal range of accounting practices of earnings management (*AEM*).

For the purposes of the article, the following model describing the formation of discretionary accruals was developed:

$$DACC_{Jones\ i,t} = \alpha_0 + \alpha_1 TOT\_REM_{i,t} + \alpha_2 LEV_{i,t} + \alpha_3 NOA_{i,t} + \alpha_4 ROA_{i,t} + \alpha_5 SIZE_{i,t} + \alpha_6 SG_{i,t} + \varepsilon_{i,t} \quad (12)$$

where: $LEV_{i,t}$ – the debt-to-equity ratio of company i in year t ; $NOA_{i,t}$ – the average value of net operational assets of company i in year t ; $ROA_{i,t}$ – the Return on Assets ratio of company i in year t ; $SIZE_{i,t}$ – the size of company i in year t ; $SG_{i,t}$ – sales growth of company i in year t ; other designations – as above.

As exogenous variables, the described model includes: TOT_REM indicator, extracted by the Roychowdhury method (a positive assessment of the parameter is expected), financial leverage (the expected sign at the LEV variable for *AEM* is negative), the value of net operating assets NOA (scaled by the value of the balance sheet; the expected sign for *AEM* is negative), ROA coefficient (the expected sign is also negative), company’s size ($SIZE$ variable, calculated as a natural logarithm of a firm’s total assets) and the absolute increase of sales revenues (SG). In turn, the endogenous variable is the coefficient of discretionary accruals estimated using the computational formula of the Jones model ($DACC_{Jones}$).

The analysis of empirical research shows that, with reference to the total of analyzed industrial enterprises, the tested model is characterized by an average degree of matching with empirical data (adjusted R^2 at the level of 40%) (Table 2). Taking the value of the Durbin-Watson test into account (1.917) it can be noticed, that there is no first-order autocorrelation among residuals within the model. The obtained parameter evaluations confirmed the positive correlation of the endogenous $DACC_{Jones}$ variable with the total real earnings management activities (TOT_REM). Beside this the values of discretionary accruals estimated by the Jones model are statistically significantly shaped by such exogenous variables as: net operating assets (NOA), ROA coefficient and the size of an enterprise ($SIZE$). Interestingly, in the course of the

conducted analyzes it turned out that the expected negative assessment of the *NOA* parameter was confirmed. However, the assumption regarding the negative correlation between *AEM* practices and *ROA* coefficients has become erroneous.

Table 2. Statistics for the goodness-of-fit of the tested discretionary accruals model computed by OLS regression (with reference to all of the tested companies)

Model parameters							Goodness-of-fit				
const	α_1	α_2	α_3	α_4	α_5	α_6	R ²	Adj. R ²	F	sign. F	Durbin-Watson
0.044*	0.198	0.001	-0.086	0.484	-0.010	-0.001	0.403	0.399	113.2	0.000	1.917

* Significant correlation at p-value = 0.05.

Source: own study.

Table 3. Statistics for the goodness-of-fit of the tested discretionary accruals model computed by OLS regression (cross-sectional analysis)

Model parameters/ Goodness-of-fit	Branch of industry											
	chemical industry	wood industry	electromechanical industry	pharmaceutical industry	light industry	building materials industry	metal industry	automotive industry	fuel industry	food industry	raw materials industry	plastics industry
const	0.044	0.188	-0.043	0.024	0.078	0.035	-0.041	0.137	-0.062	0.208	-0.343	-0.085
α_1	0.198	0.369	0.505	0.369	0.622	0.185	0.259	0.465	0.037	0.260	0.483	0.314
α_2	0.001	0.024	-0.011	0.003	-0.102	-0.110	0.026	-0.036	-0.039	0.078	0.167	-0.101
α_3	-0.086	-0.075	-0.076	-0.140	-0.192	-0.102	-0.018	-0.090	0.018	0.009	-0.119	-0.192
α_4	0.484	0.666	0.318	0.696	0.659	0.227	0.786	0.479	0.770	0.517	0.767	0.462
α_5	-0.010	-0.033	0.011	0.002	-0.011	0.005	0.002	-0.024	0.005	-0.042	0.075	0.029
α_6	-0.001	-0.040	-0.015	0.004	-0.001	-0.006	-0.013	-0.012	0.001	-0.042	-0.337	-0.018
R ²	0.633	0.578	0.383	0.806	0.654	0.374	0.604	0.609	0.645	0.346	0.873	0.471
Adj. R ²	0.589	0.540	0.360	0.773	0.622	0.342	0.589	0.561	0.553	0.316	0.777	0.419
F	14.37	15.09	31.46	24.72	20.787	11.844	39.194	12.696	6.973	13.830	9.126	9.046
sign.F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Durbin-Watson	1.673	1.849	1.847	2.145	2.059	1.706	1.347	1.757	2.081	1.851	1.821	1.819
n	56	72	166	41	72	126	160	55	30	155	15	67

Source: own study.

In-depth empirical studies have been aimed at answering the question of whether the character of business activity undertaken by industrial listed companies affects the character of the relationship between two considered types of earnings management. Looking more closely at the tested regression models describing the formation of the $DACC_{Jones}$ variable it should be noted that these models were characterized by varying goodness-of-fit to empirical data (adjusted R^2 for food companies is on the level of 31.6% whereas for firms belonging to the raw material industry its value increases to 77.7%) (Table 3). In each case, parameter evaluations with the TOT_REM variable were positive and – with nine of the twelve models used in a cross-sectoral analysis – being statistically significant. It should be emphasized, however, that based on Durbin-Watson test statistics, the model developed for metal industry companies is characterized by occurrence which is a positive autocorrelation of residual components. While in the case of models used to estimate $DACC_{Jones}$ coefficients in enterprises conducting business activity in the sectors of: chemical, building materials, automotive, fuel and raw materials industries, Durbin-Watson test statistics were characterized by a lack of conclusiveness.

Conclusions

The two-dimensional approach to assessing an earnings management phenomenon in an enterprise (involved in *AEM* and *REM* practices) includes diversified options: the choice of different techniques to influence the reported profit (loss) in the company, the use of estimation methods of implemented earnings management operations, and recognizing the nature of earnings management activities for the present and future value of the business entity.

The analysis of empirical research using Pearson's linear correlation coefficient shows that the discretionary accruals extracted by the Jones model ($DACC_{Jones}$) are closely related to the measures of the total real earnings management (TOT_REM , calculated by means of Roychowdhury methodology), than the discretionary accruals separated by the Kang-Sivaramakrishnan model ($DACC_{Kang}$). It should be also underlined that the analysis of the relationships between *AEM* and *REM* practices referred to all of the surveyed companies showed the existence of two statistically significant relationships: between $DACC_{Jones}$ and OCF_{disc} coefficients (negative correlation with average strength), as well as between $DACC_{Jones}$ and TOT_REM indicators (positive, weak correlation). Likewise, the regression model describing the formation of discretionary accruals using selected exogenous variables, allows confirms the existence of a positive correlation between *AEM* and *REM* practices in industrial listed companies.

However, the cross-sectional analysis allowed showing that there is noticeably considerable industry variation in the strength of the relationship between these variables. On the other hand, it seems reasonable to suppose that the adopted methods for the extraction of discretionary accruals and the calculation of individual indicators illustrating the extent of real earnings management may have a very large impact on the indicated directions and strength of the relationships between *AEM* and *REM* practices in the tested sample.

The presented research results do not aspire to generalize. They contain partial results, which in the longer term should be extended to a wider group of examined enterprises.

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