ORIGINAL ARTICLE

Katarina Valaskova
University of Zilina, Slovakia
 orcid.org/0000-0003-4223-7519

Peter Adamko
University of Zilina, Slovakia
 orcid.org/0000-0001-6256-4475

Katarina Frajtova Michalikova
University of Zilina, Slovakia
 orcid.org/0000-0002-4550-6561

Jaroslav Macek
University of Zilina, Slovakia
 orcid.org/0000-0002-1828-6321

Quo Vadis, earnings management? Analysis of manipulation determinants in Central European environment

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Abstract

Research background: The paper investigates the earnings management phenomenon in the context of Central European countries, attempting to identify the factors and incentives that can influence earnings management behavior on a sample of 8,156 enterprises from Slovakia, the Czech Republic, Hungary, and Poland.

Purpose of the article: The main purpose of the manuscript is to prove that there are significant differences in earnings management practices (measured by discretionary accruals) across the countries and to find the firm-specific features that influence the way enterprises manage their earnings.

Methods: The modified Jones model was used to calculate the discretionary accruals, which are further analyzed across the countries. The statistically significant differences were confirmed across the countries. Thus, the impact of the economic sector, firm size, firm age, legal form, and ownership structure on earnings management behavior is studied by the Kruskal-Wallis test. The Dunn-Bonferroni post hoc tests then revealed the significant differences across the categories of the investigated earnings management determinants. To find the association between the particular earnings management practice (income-increasing or income-decreasing manipulation), correspondence analysis was used to visualize the mutual relations.

Findings & value added: The results of the realized investigation revealed that the economic sector is one of the most important earnings management determinants, as its statistical significance was confirmed in each analyzed country. The correspondence analysis determined specific sectors, where income-increasing manipulation with earnings is practiced (NACE codes F, J, K, M, N), and vice versa, income-decreasing earnings management is characteristic for enterprises in sectors A, C, D, G or L. In specific economic conditions, firm size is also a relevant indicator (Hungary), or firm age and legal form and ownership structure (Poland). The recognition of crucial earnings management incentives may be helpful for authorities, policymakers, analysts and auditors when identifying various techniques and practices of earnings manipulation which could vary across the sectors and taking necessary measures to mitigate potential financial risks.

Introduction

In the process of preparing the financial statements, information about earnings achieved can be managed to some extent using a variety of accounting methods, international/national accounting standards, and estimates. Thus, the question about the reliability of financial data has arisen, as well as the opportunities to manage corporate earnings. Sosnowski (2017, pp. 693–709; 2018, pp. 689–705), noted that enterprises tend to use discretionary accounting measures to manage corporate earnings and perform earnings management. Earnings management is a process in which business management intervenes in financial statements — caused by the pressure from internal and external environments — to show the desired state of financial performance and not the real one (Siekelova *et al.*, 2021, pp. 41–56; Grofcikova, 2020, pp. 12–23). It may be understood as the usage of various accounting techniques (Durana *et al.*, 2020), the main purpose of which is to prepare financial statements so that the business activities and its financial situation, are portrayed in the most positive way. Bin *et al.* (2018) resumed that earnings management is a sound and legal way of managing and reporting business activities aimed at achieving stable and predictable financial results. In the last five decades, several earnings management models have been developed (e.g. Siekelova, 2021; Gregova *et al.*, 2021, pp. 221–244) to detect the manipulation of earnings, its direction, extent, or

magnitude. However, one of the most important and widely applied is the modified Jones model (Dechow *et al.*, 1995, pp. 193–225), which exhibits the most power in earnings management detection. This model has been very often criticized for its misspecification. However, due to the absence of relevant alternatives, the modified Jones model is still preferred by many researchers (Lee & Vetter, 2015, pp. 62–71).

The modified Jones model (MJM model) was used to analyse the earning management behaviour on a sample of 8,156 European enterprises in the 4-year period (2016–2019). However, not only the information about the manipulation of earnings was in the scope, but also potential aspects of this behaviour — economic sector, firm size, legal form and ownership structure (types of business organization) and length of operation on the market (firm age). The contribution of the paper is the proof that there are significant expected differences in earnings management across countries, which are related to different macro- and microeconomic determinants. Thus, the main aim of the paper is to analyse the factors influencing earnings management behaviour, compare the influence factors across countries, and thus reveal the critical intentions of earnings management. These findings may be conducive to state authorities, regulators, analysts, investors or business partners in monitoring the financial activities of enterprises and, thus, reduce the potential financial or market risks.

The paper is divided into four main sections. The literature review section is focused on the determination of specific predictors, aspects, or determinants that have been revealed by authors worldwide as crucial indicators of the earnings management phenomenon. This section summarizes the most relevant and latest studies devoted to the issue analysed. Research methodology focuses on the description of the data used and portrays the methodological steps of the realized investigations. Crucial findings are presented in the Results and Discussion section, where the outputs of all performed analyses are further developed and discussed.

Literature review

Authors worldwide focus on different determinants that can influence the manipulation of earnings and try to disclose the most significant incentives (Alhadab & Al-Own, 2019, pp. 244–261). Those are not only the country-level factors, but also the intra-company attributes that play an important role. According to Elias's (2002, pp. 33–45) study, long term aims and social responsibility influence the earnings management ethics positively. Chen *et al.* (2021, pp. 2995–3016) confirmed that high social trust supports

the ethical behaviour of managers and thus mitigates the likelihood of earnings management practices. Important findings linked to corporate social responsibility were revealed in a study by Palacios-Manzano *et al.* (2021, pp. 921–937), who highlighted the implications for shareholders, investors, and analysts as a consequence of ethical investing and reflection on the financial reporting quality. Lopez and Vega (2019) confirmed the role of audit quality, affirming that audits performed by enterprises with longer specialist durations are associated positively with earnings management practices. Different drivers of ethicality were tested by Montenegro and Rodrigues (2020, pp. 301–332), who observed that gender, age, accounting education and experience are significant determinants of attitudes towards earning management practices. The link between earnings manipulation and social responsibility was measured also in the research of Martinez-Martinez *et al.* (2021, pp. 399–428) on a sample of Spanish small and medium-sized enterprises. The results revealed that enterprises with regular sales levels are more socially responsible and, thus, less involved in earnings management practices. Garcia-Sanchez *et al.* (2020, pp. 1818–1833) declared a direct relation between corporate social responsibility and earnings management by analysing an international sample of enterprises in the period of 2007–2016 by meaqns of a longitudinal data analysis. Moreover, the empirical evidence also declared the importance of a life cycle stage and maturity of a sector in which an enterprise operates. Meek *et al.* (2007) identified enterprise size as an important factor in earnings manipulation, demonstrating that earnings management practices can be found in large enterprises with stock option compensation — in general, stock option worsens earnings management in highly competitive and expanding enterprises (see also Hussain *et al.,* 2020, pp. 67–89 or Postula & Raczkowski, 2020, pp. 125–144). In contrast, the findings of de Souza *et al.* (2013, pp. 38–57) declared only a weak influence of corporate size, debt, and ownership structure on earnings management, analysing the sample of Brazilian delisting enterprises. Chen *et al.* (2020) examined earnings management practices on a sample of cross-listed enterprises from 34 countries. Their results proved that more earnings management is exercised in the pre-listing period compared to the post-listing period. Cieslik (2016, pp. 103–112) assessed the mutual dependence of earnings manipulation and underpricing effects in the process of initial public offerings, which is consistent with other relevant studies, e.g. Xiao and Liu (2010, pp. 569–574); Lanier *et al.* (2019, pp. 48–70); Grimaldi *et al.* (2020) or Premti and Smith (2020).

Feng *et al.* (2009, pp. 1833–1876) stated that tax motivation is the most significant incentive, which can be mitigated only by strong corporate governance. Tax avoidance as the main incentive of earnings management was

observed also by Cappellesso and Rodrigues (2019, pp. 352–366). However-er, the fact that managerial activities influence earnings manipulation is stated in the study by Capalbo *et al.* (2018, pp. 210–226) who contended that there is a positive relationship between CEO narcissism and earnings manipulation, underlining the importance of the CEO's personal features. Cai *et al.* (2019, pp. 195–213) deepened the role of the CEO by investigating their personal religiosity. They affirmed that the religious beliefs of top executives are linked to fewer earnings management practices compared to enterprises with non-religious leaders. Gender diversity in boards of directors (Saona *et al.*, 2019, pp. 634–663), the presence of women on boards, also reduces earnings management practices (Maglio *et al.*, 2020, pp. 1108–1116), which was verified on a sample of 698 Italian non-small and medium-sized enterprises. The internationalization of enterprises seems to be pertinent, too. The study by Hooghiemstra *et al.* (2019, pp. 119–134) indicates that the presence of foreign executives and directors is linked to a higher level of earnings management in non-financial listed Nordic enterprises. Institutional ownership, vice versa, is a double-edged sword as it has no effect on real earnings management but significantly emphasizes accrual earnings management (Lemma *et al.*, 2018, pp. 151–163; Waweru & Prot, 2018, pp. 171–191). The differences in using accrual and real earnings management are further portrayed by El Diri *et al.* (2020, pp. 291–306), who observed that both forms of earnings manipulation are used in concentrated markets. However, in contrast, corporate governance in these markets forces managers to apply accrual earnings management as it is hardly detectable. The relevant associations between accrual and real earnings management measured by the modified Jones model were investigated by Hamza and Kortas (2019, pp. 1195–1227), who used simultaneous equation systems estimated with panel data. They noted that these two forms of earnings management can be used as substitutes and alternatives at the same time, which is verified also by the study on Vietnamese listed enterprises (Hoang & Phung, 2019, pp. 299–312). However, Li *et al.* (2020) found that those enterprises which are threatened by financial distress tend to provide accrual earnings management to control the internal financial processes. Corporate governance mechanism together with specific corporate attributes can be auxiliary predictors of earnings management, which was declared in the research of Wasan and Mulchandani (2020, pp. 71–92), Rowland *et al.* (2021, pp. 1–14) or Supardi and Asmara (2018, pp. 727–736) announcing that good corporate governance weakens the association between earnings management and financial distress-

Ibrani *et al.* (2019) noted how important it is to eliminate non-GAAP earnings management practices and explained the impact of this activity on

corporate value. The proper accounting system does play a crucial role. The research across 17 countries in Asia-Pacific countries confirms the reduction of earnings management practices after the IFRS standards were adopted (Wijayana & Gray, 2019, pp. 307–344). Nevertheless, the authors also observed that cultural factors and applied accounting standards significantly influence earnings management in the international context. Mongrut and Winkelried (2019, pp. 377–388) investigated the earnings management phenomenon in Latin American economies after the adoption of IFRS. Their findings show a positive effect on the degree of manipulation. Moreover, this accounting standard guarantees sufficient transparency of earnings in these emerging markets. Following the research by Amidu and Issahaku (2019, pp. 222–248), which analysed the situation in banks across 29 countries, it was proved that the adoption of IFRS standards increased the accounting information quality.

Li (2019, pp. 402–423) stated that earnings management may have a negative effect on cash flows and weaken the ability to predict cash flow, due to decreased awareness of current earnings about future cash flows. The structure of debt was also identified as an important aspect of earnings management (Thanh *et al.*, 2020). Their research on 432 non-financial Vietnamese listed enterprises proved two nonlinear effects of debt ratio on earnings management — a positive effect related to low debt regime and a negative effect in the high one. Finally, some accuracy-based financial ratios also play a significant role in the process of unintentional accounting error detection (Papik & Papikova, 2021, pp. 185–201). Despite the fact that earnings management is a pervasive phenomenon, it should be obstructed because enterprises should provide financial statements with real performance data to their creditors, business partners or authorities (Sun & Sun, 2008).

Research methodology

To analyze the factors influencing earnings management behavior, compare the influence factors across countries, the dataset of enterprises was formed using the data provided by the Amadeus database (Amadeus is a comprehensive database of comparable business and financial information about companies across Europe which is provided by Bureau van Dijk/Moody's Analytics). The main focus was on enterprises with the value of total assets exceeding 3 million euros, the volume of sales of more than 2 million euros and the net income which is at least 100,000 euros. Provided that the firm-specific features, as potential incentives for earnings manipulation, play an

important role, only those enterprises were included whose legal form and ownership structure, firm size, economic sector, and length of operation on the market (firm age) were known. The dataset (after the removal of outlying values) was finally formed of 8,156 enterprises — 1,102 Slovak, 2,429 Czech, 1,742 Hungarian and 2,883 Polish enterprises, which were analyzed in the 4-year period (2016–2019). The descriptive statistics of financial parameters which were the input variables of all calculations are presented in Table 1.

The following hypotheses were set, based on the literature review, to meet the main aim of the paper:

H1: *There are statistically significant differences in discretionary accruals across the countries.*

H2: *There is a statistically significant dependence between the levels of discretionary accruals (positive, negative, no discretion in accruals) and categories of firm-specific features (firm age, firm size, economic sector and legal form) in individual countries, whose mutual correspondence can be displayed in two-dimensional graphical form.*

The research was conducted in the following methodological steps to reveal the critical intentions of earnings management across countries:

1. The modified Jones model was applied to the dataset to calculate the discretionary accruals for each enterprise in each year by measuring the non-discretionary accruals as a part of the total accruals, Eq. (1), (2), (3).

$$\frac{NDA_{it}}{A_{t-1}} = \alpha_0 \frac{1}{A_{it-1}} + \alpha_1 \frac{\Delta REV_{it} - \Delta REC_{it}}{A_{it-1}} + \alpha_2 \frac{PPE_{it}}{A_{it-1}} + \varepsilon_{it} \quad (1)$$

$$(TA_{t-1} = NDA_{it} + DA_{it}) \quad (2)$$

$$TA_{it} = \Delta REC_{it} + \Delta INV_{it} - \Delta PAY_{it} - DEP_{it} \quad (3)$$

where:
NDA_{it} non-discretionary accrual in a year t;
DA_{it} discretionary accrual in a year t;
TA_{t-1} total accrual in a year t;
A_{it-1} total assets in a year t-1;
ΔREV_{it} annual change in revenues in a year t;
ΔREC_{it} annual change in receivables in a year t;
ΔINV_{it} annual change in inventories;
ΔPAY_{it} annual change in payable accounts;

PPE_{it}	long-term tangible assets in a year t;
DEP_{it}	depreciation in a year t;
$\alpha_0, \alpha_1, \alpha_2$	estimated parameters (coefficients);
ε_{it}	prediction error.

Firstly, the total accruals are calculated, using eq. (3). Equations (1) and (2) are then used to apply the MJM model to the dataset. After the estimation of all variables, coefficients $\alpha_0, \alpha_1, \alpha_2$ are estimated in a regression analysis. Having the values of all variables and coefficients, the discretionary accruals are calculated as a difference between the total accruals and non-discretionary accruals calculated by the MJM model. Enterprises whose discretionary accruals are not different from zero are not assumed to provide earnings management. As stated by Jackson (2017, pp. 136–153), these enterprises have no discretion in their accruals. To verify whether the mean values of discretionary accruals are different from zero, a one-sample t-test was run. In other cases, discretionary accruals are different from zero, positive (+) or negative (-) discretionary accruals are determined, which may indicate the direction of manipulation with earnings. The sign of discretionary accruals has an important effect on the probability of earnings management occurrence, which was proved in the study of French enterprises by Amara (2017, pp. 48–62) and confirmed by Trompeter *et al.* (2013, pp. 287-–21) or Perols and Lougee (2011, pp. 39–53).

2. The normality of the dataset was tested using the Kolmogorov-Smirnov test. The results indicate that the dataset does not follow the normal distribution, thus, the non-parametric tests are used to test the hypotheses.

3. Both hypotheses are tested at the 5% level of significance using the non-parametric one-way ANOVA — Kruskal-Wallis test. This test is used to verify if the earnings management practices (measured by the discretionary accruals) are different across the countries (Slovakia, Czech Republic, Hungary, and Poland) and if the firm-specific features (economic sector, legal form and ownership structure, firm size and age) influence the manipulation of earning in each analyzed country. The division of enterprises based on the specific features (analyzed in individual countries) is summarized in Table 2. The highest percentage of enterprises have a form of private limited companies (73.3% in SK, 61.5% in CZ, 98.6% in HU and 64.6% in PL), which is a type of organization owners set up to run a business, the company ownership is divided into shares owned by shareholders. In the analyzed countries, there is a strong representation of large enterprises and the most typical length of operation on the market is between 10 to 30 years. As these four countries have similar economic development in the

past, considering the economic sector of enterprises, their activities are mostly focused on manufacturing (34.3% in SK, 40.6% in CZ, 35.4% in HU, and 36.6% in PL), wholesale and retail trade (28.1% in SK, 22.9% in CZ, 27.7% in HU and 30.8% in PL).

4. After the determinants of earnings management are identified in each country, correspondence analysis (Hirschfeld, 1935; Benzécri, 1973) is used to explain the associations between the categories of analysed variables (values of discretionary accruals and categories of firm-specific features) and portray the graphical visualisation of their relationship. However, the correspondence analysis may be applied only if the mutual dependence of the analysed variables is verified by the Pearson Chi-square test. If a statistically significant association is confirmed (at a 5% significance level), the data are suitable for correspondence analysis. Subsequently, the degree of dissimilarity between the row and column categories of correspondence tables is calculated, Eq. (4).

$$D(i, i') = \sqrt{\sum_{j=1}^{s} \frac{(r_{ij} - r_{i'j})^2}{c_j}} \tag{4}$$

Where r_{ij} and $r_{i'j}$ are elements of the row profile matrix **R**, and c_j are elements of the column vector **c.** In addition, the column vector equals the average column profile — centroid (centre of gravity) of column profiles. According to Holcik and Komend (2015), the algorithm for calculating correspondence analysis uses the eigenvalues, similarly to principal component analysis. However, in the case of correspondence analysis, they represent the inertia, i.e. the relationship between row and column categories. The decomposition into singular values is used to calculate the eigenvalues, which is the first step towards forming the matrix of standardized residues **Z**. The elements of this matrix take values according to the equation (5):

$$z_{ij} = \frac{p_{ij} - p_{i+}p_{+j}}{\sqrt{p_{i1}p_{+j}}} \tag{5}$$

The matrix of standardized residues is then divided into singular values, Eq. (6):

$$\mathbf{Z} = \mathbf{U} \cdot \mathbf{\Gamma} \cdot \mathbf{V^T} \tag{6}$$

Where $\mathbf{\Gamma}$ is the diagonal matrix, and $\mathbf{U^T U = V^T V = 1}$, thus, the identity matrix. This procedure is used to calculate the eigenvalues and principal inertias, which are the powers of eigenvalues of the matrix of standardized residues. Eigenvalues and principal inertias are calculated for each dimension separately. The total inertia is then the sum of all the principal inertias. As stated by Kral *et al.* (2009), the total inertia is a measure that characterizes the quality of the transformation of points of multidimensional space into a correspondence map (using a chi-square distance measure). A good transformation is given by the value of the total inertia which is close to one. The main output of the correspondence analysis is a symmetric correspondence map, where the individual distances represent the chi-square distances that were identified between the individual objects.

Results and discussion

The results of the MJM application on the dataset of European enterprises reveal that in each country, the number of enterprises with discretionary accruals different from zero exceeds the number of enterprises where there is no discretion in accruals. These outputs indicate that earning management is a phenomenon which is known and used in each analysed country, which corresponds with the study of Enomoto *et al.* (2018, pp. 166–194). The Kruskal-Wallis test was run to find out if there were significant differences in earnings management behaviour measured by discretionary accruals across the countries (Table 3).

The p-value value (Sig.) below the significance level shows relevant differences in the value of discretionary accruals (declaring the earnings management practices) across the countries; the same result was achieved in each analysed year. As the p-value of the Kruskal-Wallis test is < 0.05, there is very strong evidence of differences between at least one pair of group. The differences in pairs of group may be identified by Dunn-Bonferroni post hoc tests. The pairwise comparison in each analysed period confirmed very strong evidence of the difference between SK-PL, HU-PL and CZ-PL (Adj. Sig. < 0.001 adjusted using the Bonferroni correction). As stated by Zyznarska-Dworczak and Mamić Sačer (2019, pp. 55–72) this may be a result of different assets and liabilities valuation principles which are applied in Polish Accounting Acts and financial reporting principles. There was no evidence of a difference between the other pairs of groups (Table 4).

Tables 3 and 4 confirmed significant differences across countries. The fact that the economic and political systems of individual countries are

important determinants of earnings manipulation is underlined also in the research of Saona *et al.* (2019, pp. 634–663), who noted the role of the country's regulatory systems. Each country has a specific level of societal trust which is closely linked to firm-level credibility and accurate information reporting (Guan *et al.*, 2020, pp. 149–184), which also confirms the importance of economic development (Chen *et al*., 2020), maturity of the financial system (Saona & Muro, 2018, pp. 2736–2764) and development of the legislation (Premti & Smith, 2020; Wasan & Mulchandani, 2020, pp. 71–92).

Based on the previous results, the analysis of earnings management determinants is provided separately in the economic conditions of each analysed country (Table 5).

Slovakia

The situation in the Slovak and Czech environments is very similar, as the results of the Kruskal-Wallis test declare that legal form and ownership structure, firm size, and age do not act as important determinants of earnings management, which is not the case of economic sectors (NACE classification). In both countries, there are significant differences in discretionary accruals across the sectors. In post hoc tests, significance values were adjusted by the Bonferroni correction for multiple tests, and specific pairs of sectors showing strong differences were determined by pairwise comparisons in each period. In Slovak conditions, the differences between NACE N and NACE L were identified in all analysed years. However, in individual periods, other pairs were also found (e.g. H-C, H-G, H-L, K-L, J-C or J-L).

The economic sector is a crucial determinant of earnings management in Slovakia. The correspondence analysis was performed (Pearson's chi-square test confirmed the dependence between variables; sig. value is 0.019) to highlight the mutual dependence between the categories of economic sectors (following the NACE classification) and values of discretionary accruals — positive (aggressive earnings management), negative (conservative earnings management) and zero (no discretion in accruals) (Amara, 2017, pp. 48–62). Table 6 summarizes the total inertias — which equal one in all of the studied categories — of row and column profiles.

Row inertia (or column inertia), expresses information about the variability, i.e. the degree of variation of individual row (column) categories. Another indicator is the contribution of point to inertia of dimension which represents the relative degree of influence of a given category on the final orientation of the individual axes. It provides information on which row (or column) categories contribute the most to the orientation of the first axis

and which categories have the highest influence on the orientation of the second axis. The last group of indicators is the Contribution of Dimension to Inertia of Point, which determines the contribution of each axis to explain the relevant row (column) category. They can be interpreted as a correlation of row (column) profiles with individual axes. Based on the calculated values, the correspondence map visualizes the association between variables (Figure 1).

It is evident that enterprises in specific economic sectors tend to use different earnings management practices and techniques; positive discretionary accruals are typical for enterprises in NACE L, C, G, or D, while conservative accounting (negative discretionary accruals) is typical, for instance, for enterprises operating in NACE M, N, R, or F, which corresponds with the results of the post hoc tests.

The Czech Republic

The results of the Kruskal-Wallis test confirm the role of the economic sector and different earnings management practices among the enterprises operating in various economic fields. The post hoc tests of individual pairs of sectors show strong differences between six pairs of groups in all the analysed periods, i.e. NACE K — NACE L, NACE J — NACE G, NACE J — NACE L, NACE H — NACE L, NACE M — NACE L, and NACE N — NACE L. However, by analysing the results in individual periods, some other pairs of the sector with significant differences were found (e.g. J-D or K-D).

Similarly to Slovak conditions, the economic sector was identified as a determinant of earnings management, and so the association between the economic sectors and discretionary accruals is again proved in the correspondence analysis (sig. value of the Pearson's chi-square test is 0.000). Table 7 presents the values of row and column profiles and other important aforementioned indicators, based on which the visualisation of relations can be displayed in the correspondence map.

According to the mass value in the column point overview, 40.4% of all Czech enterprises report negative discretionary accruals, which are typical for conservative earnings manipulation and income-decreasing earnings management (Kim & Lee, 2016, pp. 947–966). 53.8% of enterprises practice aggressive (income-increasing) earnings management, reporting positive discretionary accruals. However, the most important is the value of the total inertia affirming the quality of the transformation of points into the correspondence map (Figure 2). In all cases of row and column profiles, their values equal one, demonstrating the best possible results.

The transformation of row and column points into the multidimensional space confirms the results of the post hoc tests: income-decreasing earnings management practices are typical for enterprises operating in the sectors H, J, K, M, and N; income-increasing incentives of earnings manipulation are practised by enterprises in the D, G, and L fields of the economy (other differences may be observed).

Summarizing the situation in Slovak and Czech enterprises, it is evident, that the economic sector is an important determinant of earnings management behaviour. Moreover, the positive effect of the sector of operation on earnings management was confirmed also by the studies of Li (2010) and Carp and Georgescu (2015, pp. 2146–2158).

Hungary

The analysis of Hungarian enterprises revealed that the level of earnings management, changes in discretionary accruals, depended on the firm size and sector of operation. The Dunn-Bonferonni post-hoc tests proved that there are some significant differences in earnings management practices comparing the individual categories of economic sectors and firm size. In 2018/2017, no pairs of groups with significant differences were identified according to the sector of operation. However, in 2019/2018 and 2017/2016, there was strong evidence of differences between NACE G — NACE N, NACE N — NACE L and NACE F — NACE L (other pairs with differences were determined in individual periods, e.g. N-C, N-I, F-A, N-A or J-A). The same outputs in each period can be described considering the firm size. Significant differences in manipulation with earnings were detected between very large and large enterprises as well as between very large and medium-sized enterprises in all periods.

Both important determinants of earnings management were then analysed in the correspondence analysis, after their mutual dependence was confirmed by the Fisher's Exact test (sig. value 0.000 in both cases), as the assumption of the Pearson's chi-square test (20% of expected counts less than 5) was not met. In the case of Hungarian enterprises, two correspondence maps are portrayed to highlight the associations between the value of discretionary accruals and economic sector /firm size. The calculations of important indicators are summarized in row and column profiles (Table 8, Table 9).

The values of *Mass* columns indicate the division of enterprises in the country. As in the previous cases, the value of total inertia equals one in all categories of variables, demonstrating the necessary quality of the transformation of points into the correspondence map.

The total inertia of column points also reaches the needed values. The table portrays the proportional division of enterprises according to the level of discretionary accrual. 44% of Hungarian enterprises report negative discretionary accruals, thus performing income-decreasing earnings management; 50% of enterprises focus on aggressive accounting practices to increase their income. The rest of the enterprises belongs to the category where no discretion in accruals was detected. Figure 3a (cross-sectoral analysis) and 3b (firm size analysis) describe the associations between the analysed categories of variables.

Summarizing the results in both correspondence maps, the aggressive earnings management behaviour is typical for enterprises operating in sectors A, C, G, I (and several others as shown in Figure 3a) and in sectors F, J, K, N, or Q enterprises try to manipulate the earnings by their decrease. The results are sketched in the overall assessment of earnings management practices across the Hungarian enterprises presented by the results of the Dunn-Bonferroni post-hoc tests.

The effect of firm size on the level of discretionary accruals shows that large and very large enterprises practise income-decreasing earnings management, while income-increasing practices are characteristic of small and medium-sized Hungarian enterprises (similar results were achieved also in the post-hoc tests). These findings are affirmed in the studies by Lennox *et al.* (2013, pp. 739–778) and Lisic *et al.* (2015, pp. 1186–1195), who noted that firm size increases the likelihood of financial report manipulation. Cassell *et al.* (2014) specify the relation between the level of discretionary accruals and firm size and assert that large-sized enterprises are often engaged in earnings management due to avoidance of political costs.

Poland

The Polish environment, where there is also the highest number of studies published in the field of earnings management (Kliestik *et al.*, 2021, pp. 1452–1470) is described by different earnings management practices across sectors, legal form (ownership structure) and firm age. The post hoc analysis did not reveal any differences among the age categories of enterprises; the significant difference in discretionary accruals was detected between private limited companies and partnerships in all analysed years. Multiple post hoc tests, pairwise comparisons, across sectors show significant differences in all analysed years between NACE K — NACE P, NACE K — NACE L, NACE H — NACE P, and NACE H — NACE L in each period (also other pairs were identified in individual years, e.g. K-G, H-G, F-L, etc.).

The correspondence analysis is used to further process the identified indicators of earnings management behaviour in Polish enterprises. The mutual associations between discretionary accrual levels and economic sector (sig. value 0.000)/firm age (sig. value 0.020)/legal form (sig. value 0.000) were verified by Pearson's chi-square tests (confirming their statistically significant dependence) and analysed by calculating the values of scores in dimension, the contribution of points to inertia of dimension, the contribution of dimension to inertia of points, and total inertia. The row and column profiles of the analysed determinant are summarized in Tables 10 and 11.

The values of total inertia are equal to one in all categories of analysed variables and, thus, the important assumption of the correspondence analysis is met.

The mass value of the column profiles indicates that in the Polish environment most enterprises (61.4%) practise income-increasing earnings management, and 33.2% of all enterprises report negative discretionary accruals, which are characteristic of conservative manipulation with earnings. Row and column points are transformed into the correspondence map again, and the associations are explained in Figure 4; i.e. Figure 4a cross-sectoral analysis, 4b legal form analysis and 4c firm age analysis.

Similarly to the previous results in other analysed countries, aggressive and conservative earnings management practices may be identified in Polish enterprises based on their firm-specific features. Positive discretionary accruals (income-increasing manipulation) are characteristic of enterprises operating in the sectors G, L, P, or R, but they are also widely used also in partnerships and private limited companies. Considering the firm age, positive discretionary accruals are typical for enterprises operating in the market less than 10 years, 20–30 or 45–50 years. And vice versa, income-decreasing earnings management is preferred by enterprises operating in the F, H, K, or M sectors (and some others as depicted in Figure 4a), public limited companies, and those entities which have been on the market for 10-20 years.

Overall assessment

Our findings can be discussed in the context of other studies. Poradova and Siekelova (2020, pp. 649–659) and Saona and Muro (2018, pp. 2736–2764) analysed both macro and micro influences. They found out that dividend pay-outs and ownership structure influence the earnings manipulation positively; similar results were presented by Nguyen and Duong (2020, pp. 43–52). These findings correspond with the outputs of our research, as the correspondence map reveals a mutual dependence between positive discre-

tionary accruals and private limited enterprises and partnerships, while negative discretionary accruals are typical of public limited companies. Thus, the impact of ownership structure was confirmed in Central European conditions (particularly in the Polish context).). The importance of the mutual relationship between discretionary accruals and ownership structure was also analysed by Gonzalez and Garcia-Meca (2014, pp. 419–440), who proclaimed their non-linear relationship.

On the data of 132 non-financial enterprises (listed in the Indonesia Stock Exchange), Susanto *et al.* (2019, pp. 516–527) revealed that institutional ownership and tax aggressiveness have a positive and significant influence on earnings management, while firm size, director independence, audit quality, or managerial ownership do not play any role. The results of Supardi and Asmara (2018, pp. 727–736) show that firm size does not have any significant effect on earnings management, which was also proved on a sample of enterprises listed in the Indonesia Stock Exchange. The weak impact of firm size, debt, and ownership structure on earnings management is highlighted in the study by Souza *et al.* (2013, pp. 38–57). These findings are in contrast with the results of Cudia *et al.* (2021, pp. 77–87), who revealed that firm size is a statistically significant predictor of earnings management. The significant effect between firm size and earnings valuation describes the research of Ngo and Le (2021, pp. 135–142), Salehi and Dashtbayaz (2020, pp. 25–38) or Ajina *et al.* (2016, pp. 509–516). Our research findings confirm the importance of the firm size, which copies the aforementioned outputs, as positive discretionary accruals were found in small enterprises (Hungarian environment), declaring the income-increasing activities of enterprises, and income-decreasing earning management behaviour is typical of large and very large enterprises. However, the results of this Central European study are in contrast with those of Susanto *et al.* (2019, pp. 516–527), Supardi and Asmara (2018, pp. 727–736) or Souza *et al.* (2013, pp. 38–57) performed in the Indonesian environment. These differences may be caused by the different economic situations in the analysed countries, as it is evident that the national environment, economic development, and growth do play a significant role.

Das *et al.* (2018, pp. 1240–1260) found that opportunities for corporate growth, financial performance, institutional ownership, and firm age influence earnings management behaviour negatively in Indian enterprises. Chen *et al.* (2012, pp. 873–899) investigated the relation between pre-managed earnings and discretionary accruals and they contended that firm age and industry affected the level of discretionary accruals. The results of the research by Yasser *et al.* (2017, pp. 145–159) indicate that firm size affects the quality of financial reports, and the older the enterprise, the low-

er the quality of financial reports, and, thus, an opportunity for earnings manipulation increases. Nonetheless, our research portrayed very similar results, indicating that conservative accounting (negative discretionary accruals) is applied by enterprises with 10–20 years of business operation. Those business units which are on the market up to 50 years tend to report positive discretionary accruals and overvalue their income. The conformity of our findings with other studies affirms that firm age is a relevant predictor of earnings management in any economic conditions.

Considering the macro-level aspects, not only the tight legal and regulatory systems, but also the developed financial systems help mitigate opportunistic managerial behaviour. However, political factors and financial conditions seem to be exceedingly important as they facilitate accounting reforms and, thus, influence earnings management behaviour (Cohen *et al.*, 2019, pp. 331–348; Guan *et al.*, 2020, pp. 149–184). In addition, the higher the financial development of the country, the more restrained both types of earnings managements (Enomoto *et al.*, 2018, pp. 166–194). Li (2010) investigated the relation between enterprise-specific characteristics and managerial earnings perceptions using the logit models. The study underlines the importance of cross-sectional differences which should be considered by authorities and practitioners when analysing the earnings threshold. Specific financial and non-financial factors — sector of operation, shareholder structure, capital nationality, and audit company reputation — were also identified as significant indicators of earnings manipulation (Carp & Georgescu, 2015, pp. 2146–2158) The sector of operation was confirmed as a significant determinant of earnings management behaviour in all analysed Central European enterprises. It is a reasonable conclusion as each sector has some typical characteristics and specifications, uses different techniques or methods of manipulation, and as proved in our analysis, aggressive or conservative practices are specific in selected economic sectors.

Conclusions

The main aim of the paper was to reveal the factors which have a significant impact on earning management practices. The research was focused on the analysis of discretionary accruals calculated by the modified Jones model and the firm-specific features (determinants) which could influence their values. The analysis was performed on a sample of 8,156 enterprises operating in the Visegrad in the 4-year period. This research is one of the first studies in the Central European area which tries to name the determinants of earnings manipulation. Analysing the sample by the Kruskal-

Wallis test and applying the correspondence analysis, the crucial determinants in each country and specific differences among the enterprises were determined. The results of the Kruskal-Wallis test confirmed significant differences in discretionary accruals across the countries. Therefore, the incentives for earnings management were further investigated separately in each country. The economic sector is an important indicator of manipulation with earnings in all countries. Moreover, the correspondence analysis affirmed the association of specific sectors with particular earnings management practices in each country. However, after summarizing the individual countries' outputs, it was observed that the same industries appear to provide the same accounting practices. Positive discretionary accruals (income-increasing practices) are typical for enterprises operating in the sectors F (Construction), J (Information and communication), K (Financial and insurance activities), M (Professional, scientific and technical activities), and N (Administrative and support service activities), while in sectors A (Agriculture, forestry and fishing), C (Manufacturing), D (Electricity, gas, steam, and air conditioning supply), G (Wholesale and retail trade) and L (Real estate activities) negative discretionary accruals (income-decreasing practices) are used to manage earnings. In Hungary, it was demonstrated that firm size also plays an important role — small businesses reported positive discretionary accruals, whereas large and very large businesses engaged in income-decreasing practices. The economic sector, legal form (ownership structure) and firm age are important determinants of earnings management in the Polish conditions, as they help detect the practices enterprises use to adjust their earnings.

The importance of these differences recognition may be helpful for authorities, policymakers, analysts, and auditors when identifying various techniques and practices of earnings manipulation which could vary across the exact sectors based on their typical features, as confirmed by the results of the realized analyses. The study brings new and pioneering outcomes that may clue more researchers and academicians into the earnings management phenomenon and thus open new horizons for further investigation.

The study has some limitations, which may be mitigated in future research focused on the issue of earnings management. The firm-specific features analysed in this paper can be amended by other important measures, such as the board size, level of debt, corporate life cycle or accounting standards used by the companies. Moreover, the time horizon is also an important measure, as macroeconomic changes supported by state and government decisions in particular economic cycles influence the overall development of the market and, thus, the behaviour of enterprises. In addition, it would be interesting to apply the advanced method of corre-

spondence analysis, proposed by Greenacre (2007) and compare the find-
ings achieved. An outstanding challenge is the investigation of the earnings
management behaviour of enterprises in the pandemic and post-pandemic
time (2020 and 2021), which needs to be analysed to understand the deci-
sion-making processes related to corporate earnings policy.

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Annex

Table 1. Descriptive statistics of analyzed variables (4-year average in mil. euros)

SK	A	REV	REC	INV	PAY	PPE	DEP
mean	24.302	32.268	4.336	2.740	9.070	10.219	1.036
median	10.727	15.664	2.192	1.004	4.011	2.768	0.410
st. dev.	73.578	55.177	6.412	5.131	18.465	47.252	2.502
CV	3.028	1.710	1.478	1.873	2.036	4.624	2.415
CZ	**A**	**REV**	**REC**	**INV**	**PAY**	**PPE**	**DEP**
mean	46.582	57.422	7.378	4.628	14.695	19.429	2.010
median	13.733	17.989	2.198	1.516	3.615	3.992	0.499
st. dev.	159.474	191.123	29.639	12.553	49.258	101.092	8.156
CV	3.423	3.327	4.017	2.712	3.352	5.203	4.057
HU	**A**	**REV**	**REC**	**INV**	**PAY**	**PPE**	**DEP**
mean	33.364	42.070	3.673	4.193	12.724	14.611	1.548
median	11.121	15.054	1.364	1.276	3.825	2.870	0.354
st. dev.	91.984	96.891	8.419	12.842	36.171	61.016	5.376
CV	2.757	2.303	2.292	3.062	2.843	4.176	3.473
PL	**A**	**REV**	**REC**	**INV**	**PAY**	**PPE**	**DEP**
mean	41.033	50.089	6.745	4.302	12.679	19.352	1.620
median	11.633	16.239	2.303	1.430	3.625	3.502	0.367
st. dev.	157.881	230.122	19.230	19.461	51.430	109.608	7.886
CV	3.848	4.594	2.851	4.524	4.056	5.664	4.056

Note: st. dev. – standard deviation; CV – coefficient of variance

Table 2. Division of firm-specific features per country (in %)

COUNTRY	SK	CZ	HU	PL
LEGAL FORM AND OWNERSHIP STRUCTURE				
Private limited companies	73.3	61.5	98.6	64.6
Public limited companies	23.3	34.3	0.1	11.3
Partnerships	2.8	3.2	1.3	20.1
Other legal forms	0.6	1.0	0.0	4.0
FIRM SIZE				
Large	43.1	41.9	43.6	48.7
Medium-sized	25.3	20.6	22.9	17.7
Small	23.2	22.1	19.9	19.4
Very large	8.4	15.4	13.9	14.2
FIRM AGE (years)				
<10	6.3	4.0	5.9	8.8
10-20	45.5	31.2	29.6	35.4
20-30	45.6	62.6	59.9	42.2
30-40	0.4	0.7	2.4	2.8
40-50	1.9	1.3	0.2	2.7
50-60	0.0	0.05	0.5	1.7
60-70	0.3	0.07	1.3	2.7
>70	0.0	0.08	0.2	3.7
ECONOMIC SECTOR (NACE CLASSIFICATION)				
A. Agriculture, forestry and fishing	3.8	6.7	4.3	1.9
B. Mining and quarrying	0.5	0.7	0.5	0.6
C. Manufacturing	34.3	40.6	35.4	36.6

Table 2. Continued

COUNTRY	SK	CZ	HU	PL
D. Electricity, gas, steam and air conditioning supply	3.7	2.4	1.7	2.2
E. Water supply; sewerage, waste management, etc.	1.1	3.0	1.3	3.2
F. Construction	4.5	4.9	5.2	4.5
G. Wholesale and retail trade, repair of motor vehicles/motorcycles	28.1	22.9	27.7	30.8
H. Transportation and storage	5.4	3.6	5.9	3.8
I. Accommodation and food service activities	0.5	0.6	1.4	0.8
J. Information and communication	3.2	3.6	3.4	2.4
K. Financial and insurance activities	1.3	0.9	2.1	1.0
L. Real estate activities	2.6	2.3	2.8	4.8
M. Professional, scientific and service activities	3.8	3.7	4.0	2.6
N. Administrative and support service activities	3.2	2.3	3.0	1.3
O. Public administration and defense; compulsory social security	0.0	0.0	0.1	0.1
P. Education	0.0	0.1	0.0	1.4
Q. Human health and social work activities	2.4	1.2	0.6	1.4
R. Arts, entertainment and recreation	1.6	0.5	0.2	0.4
S. Other service activities	0.0	0.04	0.5	0.3

Table 3. Kruskal-Wallis test (cross-country analysis)

Null Hypotheses	Test	Sig	Decision
The distribution of MJM is the same across categories of country	Independent samples Kruskal-Wallis test	0.000	Reject the null hypothesis

Table 4. Pairwise comparison across countries

Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.
SK-HU	40.44	90.63	0.446	0.655	1.000
SK-CZ	173.41	85.52	2.028	0.043	0.256
SK-PL*	584.39	83.39	7.008	0.000	0.000
HU-CZ	132.96	73.93	1.779	0.072	0.432
HU-PL*	-543.94	71.45	-7.613	0.000	0.000
CZ-PL*	-410.98	64.85	-6.337	0.000	0.000

* significant difference in earnings management in the pair of countries

Table 5. Kruskal-Wallis test (intra-country analysis)

COUNTRY		SK		CZ	
Null Hypothesis	**Year**	**Sig.**	**Decision**	**Sig.**	**Decision**
The distribution of MJM	2019/2018	0.727	H0 retain	0.648	H0 retain
is the same across	2018/2017	0.720	H0 retain	0.681	H0 retain
categories of legal form	2017/2016	0.650	H0 retain	0.063	H0 retain
The distribution of MJM	2019/2018	0.792	H0 retain	0.131	H0 retain
is the same across	2018/2017	0.881	H0 retain	0.471	H0 retain
categories of firm size	2017/2016	0.367	H0 retain	0.175	H0 retain
The distribution of MJM	2019/2018	0.892	H0 retain	0.392	H0 retain
is the same across	2018/2017	0.993	H0 retain	0.108	H0 retain
categories of firm age	2017/2016	0.390	H0 retain	0.840	H0 retain
The distribution of MJM	2019/2018	**0.026**	**H0 reject**	**0.000**	**H0 reject**
is the same across	2018/2017	**0.018**	**H0 reject**	**0.000**	**H0 reject**
categories of NACE sectors	2017/2016	**0.000**	**H0 reject**	**0.000**	**H0 reject**
COUNTRY		HU		PL	
Null Hypothesis	**Year**	**Sig.**	**Decision**	**Sig.**	**Decision**
The distribution of MJM	2019/2018	0.289	H0 retain	**0.001**	**H0 reject**
is the same across	2018/2017	0.747	H0 retain	**0.000**	**H0 reject**
categories of legal form	2017/2016	0.994	H0 retain	**0.000**	**H0 reject**
The distribution of MJM	2019/2018	**0.000**	**H0 reject**	0.204	H0 retain
is the same across	2018/2017	**0.010**	**H0 reject**	0.695	H0 retain
categories of firm size	2017/2016	**0.027**	**H0 reject**	0.057	H0 retain
The distribution of MJM	2019/2018	0.322	H0 retain	**0.012**	**H0 reject**
is the same across	2018/2017	0.735	H0 retain	**0.017**	**H0 reject**
categories of firm age	2017/2016	0.925	H0 retain	**0.019**	**H0 reject**
The distribution of MJM	2019/2018	**0.000**	**H0 reject**	**0.000**	**H0 reject**
is the same across	2018/2017	**0.005**	**H0 reject**	**0.000**	**H0 reject**
categories of NACE sectors	2017/2016	**0.000**	**H0 reject**	**0.000**	**H0 reject**

Table 6. Row and column profiles (cross-sectoral analysis in Slovakia)

		Overview Row Points								
		Score in Dimension			Contribution of point to inertia of dimension		Contribution of dimension to inertia of point		
Economic sectors	Mass	1	2	Inertia	1	2	1	2	TOTAL
A. Agriculture, forestry and fishing	0.038	-0.054	-0.131	0.000	0.001	0.006	0.212	0.788	1.000
B. Mining and quarrying	0.005	-0.435	-10.326	0.001	0.006	0.094	0.146	0.854	1.000
C. Manufacturing	0.343	-0.099	0.260	0.003	0.021	0.227	0.187	0.813	1.000
D. Electricity, gas, steam and air conditioning supply	0.037	-0.593	-0.389	0.003	0.081	0.055	0.787	0.213	1.000
E. Water supply; sewerage, waste management and remediation, etc.	0.011	0.323	-0.348	0.000	0.007	0.013	0.577	0.423	1.000
F. Construction	0.045	0.455	-0.077	0.002	0.057	0.003	0.982	0.018	1.000
G. Wholesale and retail trade; repair of motor vehicles	0.281	-0.265	-0.222	0.005	0.121	0.135	0.693	0.307	1.000
H. Transportation and storage	0.054	10.194	-0.059	0.012	0.471	0.002	0.998	0.002	1.000
I. Accommodation and food service activities	0.005	-0.617	0.901	0.001	0.013	0.043	0.426	0.574	1.000
J. Information and communication	0.032	0.689	-0.438	0.003	0.093	0.060	0.797	0.203	1.000
K. Financial and insurance activities	0.013	0.388	-10.143	0.002	0.012	0.163	0.154	0.846	1.000
L. Real estate activities	0.026	-0.307	-0.058	0.000	0.015	0.001	0.978	0.022	1.000
M. Professional, scientific and technical activities	0.038	0.163	0.149	0.000	0.006	0.008	0.656	0.344	1.000
N. Administrative and support service activities	0.032	0.336	0.372	0.001	0.022	0.043	0.564	0.436	1.000
Q. Human health and social work activities	0.024	0.036	0.797	0.002	0.000	0.147	0.003	0.997	1.000
R. Arts, entertainment and recreation	0.016	0.858	-0.067	0.002	0.074	0.001	0.996	0.004	1.000
Active Total	1.000			0.037	1.000	1.000			

		Overview Column Points								
DA by MJM model									
Negative DA	0.441	0.451	0.037	0.015	0.553	0.006	0.996	0.004	1.000
No discretion in accruals	0.061	-0.199	-10.246	0.010	0.015	0.924	0.039	0.961	1.000
Positive DA	0.498	-0.375	0.120	0.012	0.432	0.070	0.940	0.060	1.000
Active Total	1.000			0.037	1.000	1.000			

Table 7. Row and column profiles (cross-sectoral analysis in the Czech Republic)

		Overview Row Points							
Economic sectors	Mass	Score in Dimension		Inertia	Con. of point to inertia of dimension		Contribution of dimension to inertia of point		TOTAL
		1	2		1	2	1	2	
A. Agriculture, forestry and fishing	0.067	-0.377	0.244	0.002	0.055	0.045	0.824	0.176	1.000
B. Mining and quarrying	0.007	-0.062	10.750	0.002	0.000	0.239	0.002	0.998	1.000
C. Manufacturing	0.406	0.005	0.046	0.000	0.000	0.009	0.022	0.978	1.000
D. Electricity, gas, steam and air conditioning supply	0.024	-0.731	-0.400	0.003	0.074	0.043	0.867	0.133	1.000
E. Water supply; sewerage, waste management, etc.	0.030	0.256	-0.098	0.000	0.011	0.003	0.930	0.070	1.000
F. Construction	0.049	0.022	-0.356	0.001	0.000	0.069	0.008	0.992	1.000
G. Wholesale and retail trade; repair of motor vehicles	0.229	-0.192	0.050	0.002	0.048	0.006	0.967	0.033	1.000
H. Transportation and storage	0.036	0.955	-0.100	0.006	0.189	0.004	0.994	0.006	1.000
I. Accommodation and food service activities	0.006	-0.811	-0.626	0.001	0.022	0.025	0.766	0.234	1.000
J. Information and communication	0.036	0.596	-0.502	0.003	0.074	0.102	0.734	0.266	1.000
K. Financial and insurance activities	0.009	10.243	-0.476	0.003	0.076	0.022	0.930	0.070	1.000
L. Real estate activities	0.023	-10.248	-0.510	0.007	0.205	0.067	0.921	0.079	1.000
M. Professional, scientific and technical activities	0.037	0.677	-0.210	0.003	0.097	0.018	0.953	0.047	1.000
N. Administrative and support service activities	0.023	0.970	0.759	0.005	0.122	0.145	0.761	0.239	1.000
P. Education	0.001	0.237	-0.904	0.000	0.000	0.008	0.118	0.882	1.000
Q. Human health and social work activities	0.012	0.045	-0.366	0.000	0.000	0.018	0.028	0.972	1.000
R. Arts, entertainment and recreation	0.005	-0.724	10.783	0.002	0.015	0.175	0.244	0.756	1.000
S. Other service activities	0.000	-20.208	-0.255	0.000	0.011	0.000	0.993	0.007	1.000
Active Total	1.000			0.039	1.000	1.000			
Overview Column Points									
DA by MJM model									
Negative DA	0.404	0.469	-0.139	0.016	0.508	0.087	0.957	0.043	1.000
No discretion in accruals	0.058	0.316	10.189	0.008	0.033	0.910	0.121	0.879	1.000
Positive DA	0.538	-0.386	-0.023	0.014	0.459	0.003	0.998	0.002	1.000
Active Total	1.000			0.039	1.000	1.000			

Table 8. Row profiles (analysis of earnings management determinants in Hungary)

		Overview Row Points								
		Score in Dimension		Inertia	Con. of point to inertia of dimension		Contribution of dimension to inertia of point		
Economic sectors	Mass	1	2	Inertia	1	2	1	2	TOTAL
A. Agriculture, forestry and fishing	0.043	-0.188	0.274	0.001	0.009	0.027	0.405	0.595	1.000
B. Mining and quarrying	0.005	-0.334	0.681	0.000	0.003	0.020	0.259	0.741	1.000
C. Manufacturing	0.354	-0.046	-0.135	0.001	0.004	0.054	0.142	0.858	1.000
D. Electricity, gas, steam and air conditioning supply	0.017	-0.182	-0.709	0.001	0.003	0.070	0.087	0.913	1.000
E. Water supply; sewerage, waste management, etc.	0.013	-0.139	0.351	0.000	0.001	0.014	0.185	0.815	1.000
F. Construction	0.052	0.182	0.038	0.000	0.010	0.001	0.970	0.030	1.000
G. Wholesale and retail trade; repair of motor vehicles	0.277	-0.234	-0.116	0.003	0.088	0.031	0.856	0.144	1.000
H. Transportation and storage	0.059	0.529	0.600	0.005	0.096	0.179	0.530	0.470	1.000
I. Accommodation and food service activities	0.014	-0.797	-0.093	0.002	0.051	0.001	0.991	0.009	1.000
J. Information and communication	0.034	0.490	-0.407	0.002	0.047	0.047	0.677	0.323	1.000
K. Financial and insurance activities	0.021	0.606	-0.180	0.001	0.045	0.006	0.943	0.057	1.000
L. Real estate activities	0.028	-0.953	10.176	0.009	0.147	0.326	0.488	0.512	1.000
M. Professional, scientific and technical activities	0.040	0.716	0.206	0.004	0.117	0.014	0.946	0.054	1.000
N. Administrative and support service activities	0.030	10.187	0.239	0.007	0.243	0.014	0.973	0.027	1.000
O. Public administration and defence, etc.	0.001	-20.387	-0.334	0.001	0.019	0.001	0.987	0.013	1.000
Q. Human health and social work activities	0.006	10.428	0.245	0.002	0.068	0.003	0.980	0.020	1.000
R. Arts, entertainment and recreation	0.002	-10.149	30.549	0.003	0.013	0.182	0.132	0.868	1.000
S. Other service activities	0.005	-10.157	-0.543	0.001	0.036	0.011	0.868	0.132	1.000
Active Total	1.000			0.044	1.000	1.000			
Firm Size									
Large	0.436	-0.578	0.120	0.077	0.276	0.089	0.994	0.006	1.000
Medium sized	0.229	0.074	-0.486	0.004	0.002	0.764	0.146	0.854	1.000
Small	0.196	10.376	0.167	0.196	0.705	0.077	0.998	0.002	1.000
Very Large	0.139	-0.254	0.188	0.005	0.017	0.069	0.931	0.069	1.000
Active Total	1.000			0.283	1.000	1.000			

Table 9. Column profiles (analysis of determinants in Hungary)

DA by MJM model	Mass	Score in Dimension		Inertia	Contribution of point to inertia of dimension		Contribution of dimension to inertia of point		
Overview Column Points		1	2		1	2	1	2	TOTAL
Negative DA	0.440	0.438	-0.140	0.016	0.488	0.072	0.934	0.066	1.000
No discretion in accruals	0.060	0.230	10.351	0.014	0.018	0.921	0.040	0.960	1.000
Positive DA	0.500	-0.413	-0.040	0.015	0.493	0.007	0.994	0.006	1.000
Active Total	1.000			0.044	1.000		1.000		

Table 10. Row profiles (analysis of earnings management determinants in Poland)

		Overview Row Points								
		Score in Dimension			Con. of point to inertia of dimension		Contribution of dimension to inertia of point			
Economic sectors	**Mass**	**1**	**2**	**Inertia**	**1**	**2**	**1**	**2**	**TOTAL**
A. Agriculture, forestry and fishing	0.019	-0.514	0.153	0.001	0.023	0.005	0.967	0.033	1.000
B. Mining and quarrying	0.006	0.587	-10.011	0.001	0.010	0.077	0.472	0.528	1.000
C. Manufacturing	0.366	0.182	0.168	0.004	0.055	0.125	0.756	0.244	1.000
D. Electricity, gas, steam and air conditioning supply	0.022	0.243	-0.182	0.000	0.006	0.009	0.824	0.176	1.000
E. Water supply; sewerage, waste management, etc.	0.032	-0.574	-0.340	0.003	0.048	0.045	0.883	0.117	1.000
F. Construction	0.045	0.414	-0.357	0.002	0.035	0.069	0.780	0.220	1.000
G. Wholesale and retail trade; repair of motor vehicles	0.308	-0.166	0.047	0.002	0.039	0.008	0.970	0.030	1.000
H. Transportation and storage	0.038	0.465	-0.261	0.002	0.037	0.031	0.893	0.107	1.000
I. Accommodation and food service activities	0.008	-10.145	0.161	0.002	0.048	0.002	0.993	0.007	1.000
J. Information and communication	0.024	0.661	-0.364	0.003	0.048	0.039	0.897	0.103	1.000
K. Financial and insurance activities	0.010	10.624	0.305	0.006	0.121	0.011	0.987	0.013	1.000
L. Real estate activities	0.048	-10.325	-0.351	0.019	0.381	0.071	0.974	0.026	1.000
M. Professional, scientific and technical activities	0.026	0.470	0.062	0.001	0.026	0.001	0.994	0.006	1.000
N. Administrative and support service activities	0.013	0.468	-0.977	0.002	0.013	0.151	0.378	0.622	1.000
O. Public administration and defence, etc.	0.001	-0.605	40.523	0.002	0.002	0.256	0.045	0.955	1.000
P. Education	0.014	-10.190	0.256	0.004	0.092	0.011	0.983	0.017	1.000
Q. Human health and social work activities	0.014	0.113	-0.076	0.000	0.001	0.001	0.853	0.147	1.000
R. Arts, entertainment and recreation	0.004	0.793	-10.069	0.001	0.011	0.053	0.592	0.408	1.000
Active Total	1.000			0.055	1.000	1.000			
Legal Forms									
Other legal forms	0.040	-0.304	-0.633	0.001	0.064	0.894	0.425	0.575	1.000
Partnerships	0.201	-0.168	0.064	0.000	0.098	0.046	0.957	0.043	1.000
Private limited companies	0.646	-0.042	0.031	0.000	0.020	0.034	0.857	0.143	1.000
Public limited companies	0.113	0.646	-0.065	0.003	0.818	0.026	0.997	0.003	1.000
Active Total	1.000			0.004	1.000	1.000			

Table 10. Continued

Overview Row Points		Score in Dimension			Con. of point to inertia of dimension		Contribution of dimension to inertia of point		
Firm age									
<10	0.088	-0.251	0.082	0.001	0.063	0.016	0.957	0.043	1.000
>70	0.037	-0.430	-0.610	0.001	0.076	0.368	0.544	0.456	1.000
10-20	0.354	0.273	-0.129	0.003	0.295	0.158	0.915	0.085	1.000
20-30	0.422	-0.011	0.137	0.000	0.001	0.214	0.014	0.986	1.000
30-40	0.028	-0.521	0.242	0.001	0.085	0.044	0.918	0.082	1.000
40-50	0.027	-0.012	-0.090	0.000	0.000	0.006	0.041	0.959	1.000
50-60	0.017	-0.376	0.475	0.000	0.027	0.103	0.602	0.398	1.000
60-70	0.027	-10.231	-0.357	0.004	0.454	0.091	0.966	0.034	1.000
Active Total	1.000			0.009	1.000	1.000			

Table 11. Column profiles (analysis of earnings management determinants in Poland)

		Overview Column Points								
		Score in Dimension			Contribution of point to inertia of dimension		Contribution of dimension to inertia of point		
DA by MJM model	Mass	1	2	Inertia	1	2	1	2	TOTAL
Negative DA	0.332	0.625	-0.137	0.029	0.592	0.076	0.982	0.018	1.000
No discretion in accruals	0.054	0.338	10.186	0.008	0.028	0.918	0.177	0.823	1.000
Positive DA	0.614	-0.368	-0.030	0.018	0.379	0.007	0.997	0.003	1.000
Active Total	1.000			0.055	1.000	1.000			

Figure 1. Correspondence map (cross-sectoral analysis in Slovakia)
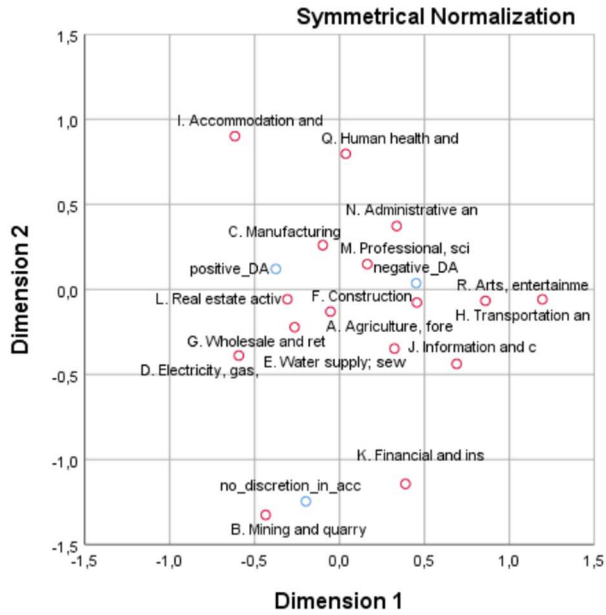
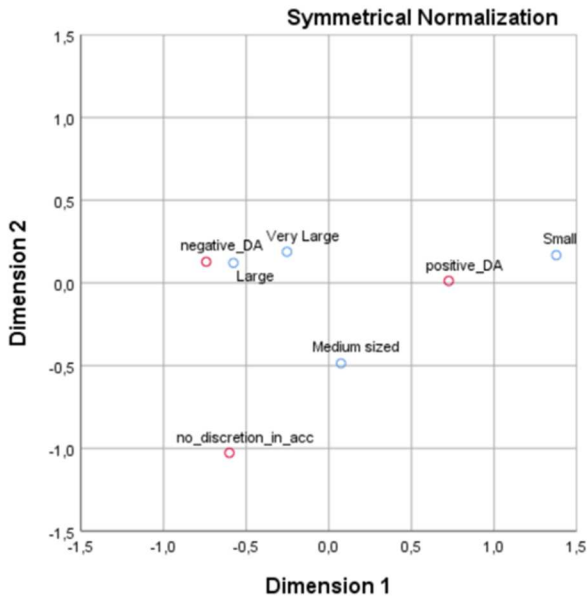**Figure 2.** Correspondence map (cross-sectoral analysis in the Czech Republic)
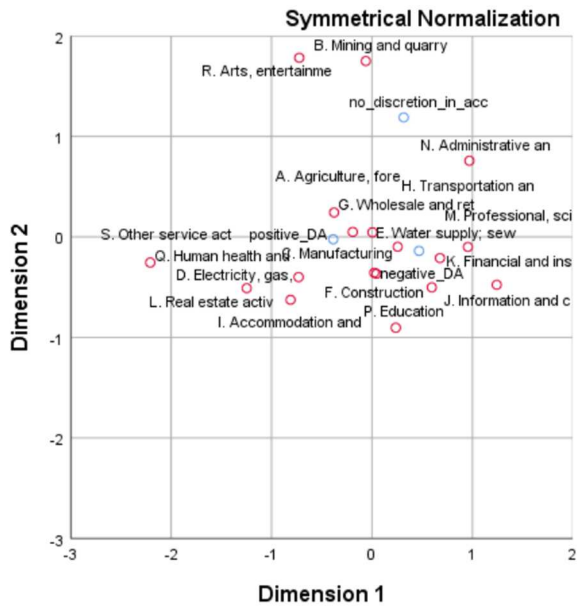
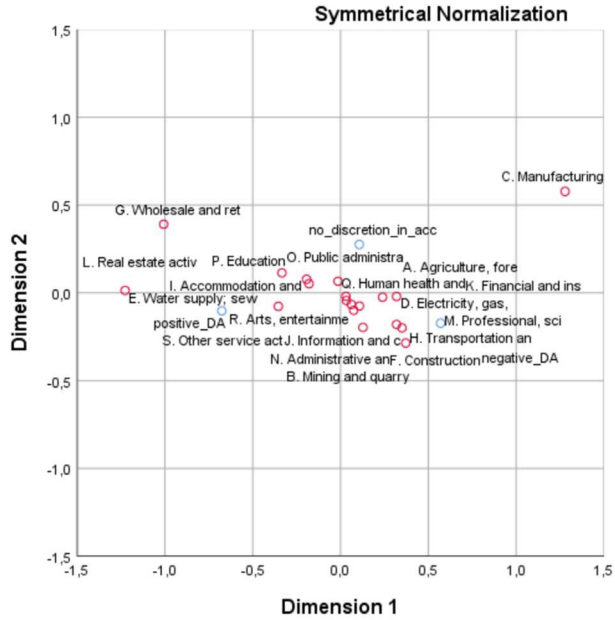**Figure 3.** Correspondence map (cross-sectoral and firm size analyses in Hungary)
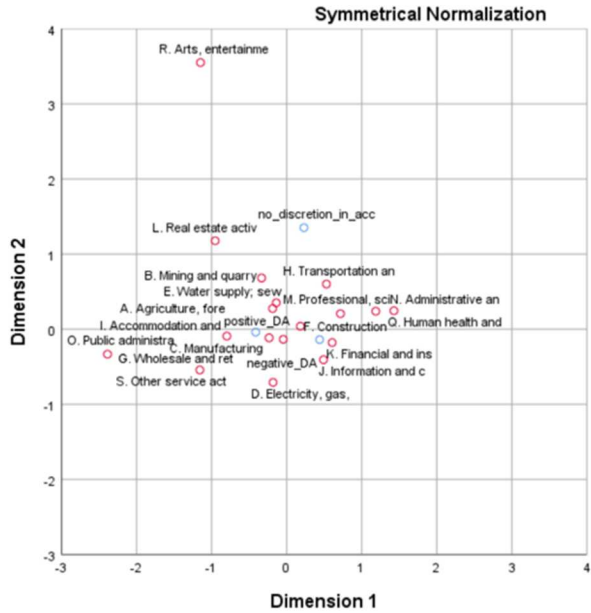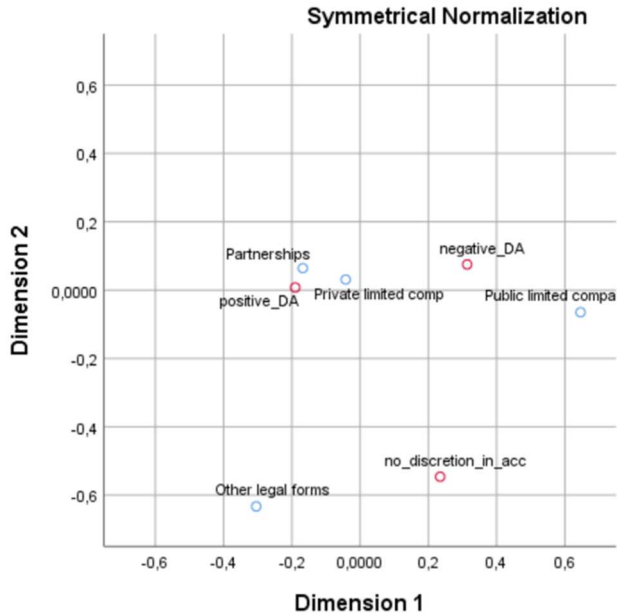

3a. Cross-sectoral analysis

3b. Firm size analysis

Figure 4. Correspondence map (cross-sectoral, firm age and legal form analyses in Poland)
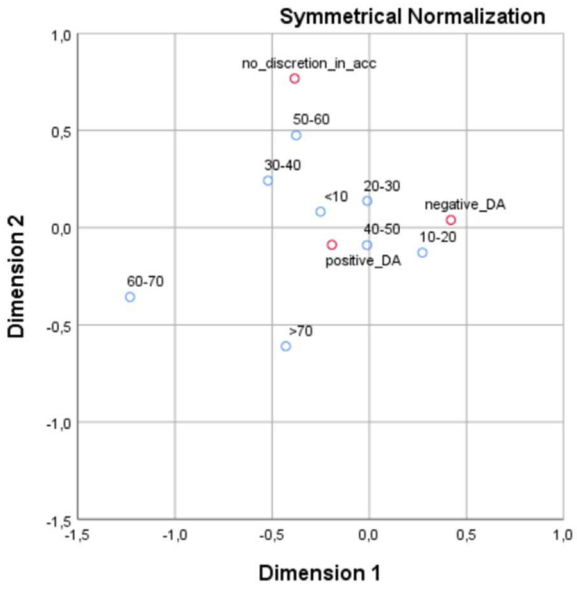

4a. Cross-sectoral analysis

4b. Legal form analysis

Figure 4. Continued

4c. Firm age analysis