ISSN: 2029-4913 / eISSN: 2029-4921

VILNIUS TECH
Vilnius Gediminas Technical University

TECHNOLOGICAL and ECONOMIC DEVELOPMENT of ECONOMY

2025
Volume 31
Issue 2
Pages 364–387
https://doi.org/10.3846/tede.2025.23117

EARNINGS MANAGEMENT AMONG INDUSTRIES: BETWEEN THE OLD AND NEW ECONOMIES

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Article History:
- received 27 September 2024
- accepted 02 December 2024

Abstract. This paper investigates sectoral prevalence and patterns of accrual-based earnings management in public companies listed on the Warsaw Stock Exchange. This research introduces a novel perspective by analysing differences in discretionary accruals proxies among industries, with particular emphasis on statistical variation of the earnings management through accruals in the old and new economies companies. Moreover, this paper fills a research gap in the literature regarding a shortfall of broader analyses on the industry-specific attributes explaining earnings management behaviours.

Our findings confirmed that the extent of accrual-based earnings management in public companies varies significantly depending on the industry in which they operate. We demonstrated that companies from the new economy industries and those operating in less concentrated markets engaged in accrual-based earnings management practices more than others. On the other hand, we did not find a statistically significant relationship between the accounting-type earnings management and company-specific product market power from the perspective of the pooled sample and subsamples characterized by the specific directions of earnings games.

Keywords: earnings management, new economy, old economy, market concentration, product market power.

JEL Classification: G30, M40.

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1. Introduction

The increasing demand for information when deciding on capital allocation encourages investors to constantly search for reliable data on the economic efficiency of public companies. Reported earnings are one of the most important parameters that illustrate a company's performance in the capital market. However, due to the accrual nature and complexity, financial results are susceptible to intentional shaping in line with management goals. Earnings management (EM), defined as practices aimed at using judgment in financial reporting and structuring economic transactions to alter reported data (Healy & Wahlen, 1999), decreases the quality of financial statements and misleads outsiders regarding the company's current and future growth forecasts (Wasiuzzaman, 2018). However, EM should not be identified

and confused with illegal practices that go beyond the scope of the law and coincide with fraudulent accounting.

Durana et al. (2022) highlighted that EM has been a significant focus for researchers in recent decades. This focus is not only a result of the numerous recent accounting scandals but also an emphasis on the importance of EM in economic practice. Analysing EM patterns in more detail could prevent potential company collapses, enhance the quality of reported data, and harmonise financial statements with the social and managerial needs of the company. Hence, many studies on EM concern the magnitude of reporting data shaping in conjunction with specific incentives.

The second trend investigates how internal and external factors determine the extent of accrual-based or real EM across diverse economies. Within this area, previous studies (e.g., Saona et al., 2019; Valaskova et al., 2021; González Sánchez et al., 2022) focused on identifying company-specific or country-specific attributes that influence EM behaviours. However, there is a gap in research regarding industry-specific factors that explain the differences in EM patterns from an industry-level perspective (Wasiuzzaman, 2018). Moreover, even the occasional studies on capturing industry-specific features affecting the magnitude of EM through accruals concentrate on the most economically developed countries (Sun & Rath, 2009) or China and India due to their economic potential (Goel, 2012). They rarely cover less developed countries or smaller European states.

The type of economic activity a company engages in affects service and production conditions, the supply and sales markets, the company's asset base (including technical equipment), and the type of social needs the company satisfies (Belas et al., 2023). Additionally, the intensity of competition among firms that vie for similar value-creating opportunities significantly affects profitability (Grant, 2018). Therefore, sectoral diversification can heavily impact a company's ability to achieve tactical or strategic goals, including financial targets.

This paper investigates industrial variations in EM activities in public companies listed on the Warsaw Stock Exchange (WSE). This study contributes to the literature in several ways. Firstly, it presents the differences in discretionary accruals proxies calculated based on the WSE's latest sector classification. Secondly, this research incorporates new management paradigms that reflect changes in modern economies. Hence, we separate companies into new economies (companies that operate in high-technology industries and knowledge-intensive services) and old economies. We then assess the statistical relationships between the prevalence of EM in both subpopulations. Thirdly, the article investigates whether industry-level specific attributes could affect the magnitude of EM in the Polish regulated market. We demonstrate the possible impact of market power and market competition on altering data using the industry-orientated Lerner Index (Datta et al., 2011) and the Herfindahl-Hirschman Index (Calkins, 1983).

The findings will be of interest to investors and other stakeholders by documenting the role of industry-level variables on earnings quality. This, in turn, indirectly provides further guidance on efficient capital allocation and avoiding excessive investment risk (Alaminos et al., 2024). Moreover, since the fundamental issue in accounting is the search for determinants of earnings quality, this study may also be of interest to standard-setters, academics and those users of financial statements who are conscious of the importance of high-quality reporting information in the socio-economic space.

The article is organised as follows: Section 2 contains a literature review concerning previous research on industry characteristics and EM practices. It also describes and develops the hypotheses. Section 3 presents the research design and data. Section 4 includes the findings and a discussion of the empirical results. Finally, the last section contains the conclusion, limitations, and directions for future research.

2. Literature review

2.1. The earnings management concept

Market investors' decisions depend on the expected rates of return, which include dividends, an increase in the market price of equity instruments, as well as principal repayments and interest in the case of debt instruments. The conceptual framework for financial reporting assumes that investors' decisions depend on assessments of companies' transparency. Reported data is one of the most important publicly available sources of information that aids external users in formulating these assessments. However, economic practice shows that managers tend to alter accounting information to demonstrate that goals that are consistent with the expectations of selected stakeholder groups have been achieved.

By selecting favourable accounting principles and evaluations or choosing convenient operational decisions, executives strive to alter earnings in a deliberate way (Bachtijeva & Tamulevičienė, 2022). Callao et al. (2014) defined earnings management as a purposeful intervention in financial reporting designed to reach earnings targets by varying accounting practices but without violating accounting regulations (for other definitions, see, e.g., Schipper, 1989; Healy & Wahlen, 1999; Roychowdhury, 2006). This outlook is consistent with the grey (neutral) EM perspective, in which the intended intervention in reporting results from the selection and application of permitted EM methods, taking into account factors influencing the financial standing of the enterprise and its value. From a historical viewpoint, the earliest definitions of the EM phenomenon emphasised its pernicious character. Trotman (1993) pointed out that EM practices allow firms to present to investors or prospective investors financial statements passed through the filter of some techniques capable of generating a more favourable image on the market but also the illusion of more attractive results. With few exceptions, theorists and practitioners note that EM reduces the quality of reported data and misleads users of financial statements (Elliott & Shaw, 1988; Haggard et al., 2015; Vagner et al., 2021). However, a beneficial perspective on producing financial statements that present an intended view of a company's financial performance identifies EM with sensible activities that are part of a well-run business and bring value to the company's owners. These include day-to-day management processes that establish achievable budget targets, monitor market conditions, respond to unexpected opportunities and threats, and meet commitments – always or most of the time (Parfet, 2000). Regardless of the nature and intensity of EM implementation, these practices are always in compliance with applicable legal regulations and should not be identified with the manipulation of financial statements and reporting results that deviate from economic realities and violate the legal framework.

It is worth mentioning that, beyond defining EM, previous research has explored sample selection, measurement techniques, and the various incentives and factors that drive EM in contemporary economies (Callao et al., 2021)

2.2. Accrual-based earnings management patterns in inter-sector comparison

Prior research has extensively investigated earnings quality determinants at the company and country levels. Apart from intra-sector analyses (Hassan & Ahmed, 2012; Hsiao et al., 2016; Thai et al., 2021), few studies have investigated industry-specific determinants of accrual-based earnings management while also considering inter-sector comparisons. Sun and Rath (2009) explored EM patterns in Australian companies across nine GICS (Global Industry Classification Standard) industrial groups. They revealed significantly more EM activities in companies operating in the following sectors: energy, metals and mining, health care, information technology (IT) and telecommunication, and utilities. Sun and Rath (2009) also found that periphery sector companies manage earnings upward to a greater extent than core sector companies. Meanwhile, Goel (2012) demonstrated that Indian service sector companies tend to alter earnings downward, while companies from non-service sectors mostly engaged in income-increasing attempts.

In this study, the service sector includes companies that operate in infotech and telecom services, while the non-service sectors include oil and gas, metals, FMCG (Fast Moving Consumer Goods), capital goods, automobiles, steel, and cement production industries. Goel explained variations in accrual-based EM activities by the degree of environmental uncertainty, opportunity structures or market power. However, he did not provide statistical evidence for the influence of the above variables on the estimated discretionary accruals.

Durana et al. (2022) estimated the magnitude of EM in Visegrad Group companies by considering 19 sectors classified by NACE (fr. *Nomenclature générale des Activitiés économiques dans les Communautés Européennes*). They highlighted homogeneous approaches between EM practices in the tested industries. They revealed that companies from the cultural, entertainment and recreational industries (sector R) and those conducting other service activities (sector S) are characterised by unique EM behaviours. They also detected homogenous earnings-altering approaches between companies from J and M; K and L; N, O, P, and Q sectors. Similar strong ties were observed among companies from A, B, C, G, E, and I; D, F, and H sectors extracted based on the NACE categorisation.

Lizińska and Czapiewski (2023) examined the impact of the financial turmoil induced by the COVID-19 pandemic on EM behaviours of companies from the Warsaw Stock Exchange. They found that during the economic downturn, companies from the IT sector implemented a big bath strategy with a higher frequency compared to others. Moreover, the public companies from the industrial and consumer goods sectors also demonstrated statistically significant changes in accrual-based accounting transparency, i.e., they tended to practice income-decreasing EM between 2019 and 2020. By contrast, De Almeida et al. (2005) rejected the industry factor as a significant variable that explains the variation of EM activities in Brazilian companies.

The results of previous studies are inclusive and encourage further exploration. Based on the arguments discussed above, we formulate the following hypothesis:

H1: *The magnitude and directions of accrual-based earnings management in the tested sample vary significantly due to the economic sector in which the company operates.*

2.3. Earnings quality in the old and new economy companies

The term "new economy" emerged in the USA in the 1990s. While some economists perceived it as a practice used in highly developed countries to ensure long-term economic growth, for others, it was a new paradigm, referring to economic postmodernism (Nonaka & Takeuchi, 1995; Tapscott, 1997). Distinguishing between companies from the new and old economies is difficult due to the ambiguity of defining both terms (Van Ark, 2002; Kay, 2002). According to Chiang (2008), we perceive the term 'old economy' in the context of traditional, blue-collar production industries based on mechanisation, dispersed employment, and job-specific skills. By contrast, the term "new economy" is understood as a system driven by the growing importance of modern technologies and the globalisation of world markets in the structural changes of contemporary economies. Atkinson and Court (1999) stated that the new economy is knowledge-based, with innovations, ideas and modern technologies driving the generation of new jobs and higher living standards. The concept of the new economy revolves around the growing importance of modern technologies (especially IT), innovations, network effects, and the globalisation of world markets.

The literature review revealed a gap in research on EM among companies that represent the old and new economies. Only a few authors have examined how companies operating in the new and old economies engage in EM. In addition, limited research concerns the degree of EM in connection with specific incentives or incentives. This group includes the study by Hsu and Jan (2023), which documented different accounting-type EM practices in companies classified into the new and old economies in pre-COVID-19 pandemic, transitional, and post-pandemic recovery years (2019–2021). They confirmed that, in general, companies in the new and old economies adopt various patterns of accrual-based EM, although public companies in the technology industry (i.e., new economy companies) did not appear to alter earnings in the research period. On the other hand, old economy companies strove to implement more conservative accounting in the pandemic year (2020) and more aggressive accounting in the recovery year (2021).

A more frequently explored research area that indirectly relates to the discussed issues is innovation and earnings quality. Assessments of innovation levels were either based on the percentage of scientific and research employees working in research and development (R&D) departments in total employment or the capitalisation and expenditures of costs incurred for R&D activities (Le et al., 2021). Less commonly used proxies for innovation included the number of patents and new product releases (Holthausen et al., 1995; Ittner et al., 1997).

Kothari et al. (2002) and Srivastava (2014) found that innovative companies that acquire above-average intangible assets provide lower earnings quality. They explain this insight by the fact that accounting treatment requires immediate expensing of intangible assets, which could lead to more volatility in reported earnings. Lobo et al. (2018) and Le et al. (2021) presented similar findings. They highlighted that the non-transparent information environment in innovative companies and the uncertainty surrounding innovation could be factors that encourage management to engage in EM practices. Jeppson and Salerno (2017) evidenced that innovative companies tend to smooth income and use discretionary accruals to meet earnings thresholds to a greater degree than other companies.

Hence, by verifying the above observations concerning the Polish capital market, this paper makes a valuable contribution to the discussion:

H2: *Companies operating in the new economy industries engage in accrual-based earnings management practices more than companies from the old economy industries.*

2.4. Market power, competition, and earnings management

In parallel to studies that assess the extent of EM in particular industries, the literature explores the variables that explain variation in these activities across industries, including market power and competition. Bagnoli and Watts (2010) argued that a company could be motivated to manage earnings if it believes that its competitors will do the same. This scenario can be exacerbated with increased competition. However, they did not provide empirical evidence for their arguments. Kallunki and Martikainen (1999) argued that investors compare the economic performance of companies within an industry. Consequently, the scope of EM practices in an individual company should stay within the industry-wide average in the long run (Callao et al., 2021).

Datta et al. (2013) examined the impact of competition on EM for over 600 companies that traded on the NYSE, AMEX, and NASDAQ exchanges. They used the modified Lerner Index, the inverse of the number of companies from the industry, as well as the industry concentration ratio, as three metrics of industry-specific attributes in their sample. They demonstrated that greater competition in a sector leads to more accrual-based EM for the average joint-stock company. This finding held true across all three competition metrics they used. Karuna et al. (2015) investigated the relationship between industry product market competition and EM patterns in American companies. By utilizing product substitutability, market size, and entry costs to capture competition nuances, they found evidence of a robust positive relationship between competition level and EM level, proxied for both by the magnitude of abnormal accretions and the frequency of accounting irregularities.

Wasiuzzaman (2018) confirmed the industry effect on biased financial results on the example of Malaysian public companies. While he found that capital intensity, volatility and profitability explain the EM behaviours across industries, a deeper analysis showed that volatility only affects earnings smoothing, and profitability influences discretion in reported earnings. In contrast to other studies, Wasiuzzaman (2018) did not find a statistically significant connection between product market competition and EM patterns for individual industries.

Tang and Chen (2020) found that Taiwanese companies with low market power and those faced with intense market competition are more likely to engage in EM *via* discretions in financial reporting.

We assume that competition within the industry plays a crucial role in disciplining managers from implementing EM practices (Sanusi et al., 2023), and earnings expectation management is more prevalent among firms in low-competition industries than those in high-competition industries. On the other hand we argue that a firm with higher product market pricing power is characterized by greater opportunity to maintain expected profit margins, increased ability to absorb production cost shocks (Datta et al., 2013) and greater resistance to temporary cash shortages. Hence, the managerial propensity to manage earnings in the case of

firms with greater product market pricing power is lower than in the others. Consequently, we formulated the following hypotheses:

H3: *Accrual-based earnings management is significantly affected by the level of market concentration in a particular industry.*

H4: *Public companies with greater product market pricing power alter earnings less than other companies.*

3. Research methodology

3.1. Data collection

The research sample used in this paper comprises 230 companies whose shares were traded in the Main Market of the WSE from 2012 to 2021. Companies in the banking and insurance industries (WSE codes 110 and 120) were excluded. Additionally, all companies have a fiscal year ending on 31 December, and their financial data is publicly available.

3.2. Classification of industries: Old vs new economy industries

Companies were classified into individual industries based on the WSE's sectoral classification for issuers. The 3-digit level classification system categorises companies into eight main groups (state administration was excluded from the sample) with further subsectors (Figure 1). This categorisation relies on the division of recipients of products and services. Following previous research, we divided industries into the old and new economies by aggregating the manufacturing industry according to the technological intensity using NACE Rev. 2. Similarly, the separation of services on knowledge-intensive services and less knowledge-intensive services followed Eurostat's classification (Eurostat, 2008).

The statistical assessment of the extent of accrual-based EM across industries is based on the Kruskal-Wallis test, a non-parametric equivalent of one-factor analysis of variance between groups. In turn, analysis of the variance of accrual-based EM indicators within the old and new economy industries was carried out using the non-parametric U Mann-Whitney test, which is used to determine the differences between two independent populations. The empirical investigation also used the following research methods: statistics of variable distribution, statistical significance tests, and *post-hoc* tests. All calculations were performed using PS IMAGO PRO software. All financial data and necessary information enabling the assignment of a given company to certain WSE sector were taken from the Notoria Serwis dataset.

3.3. Accrual-based earnings management measure

The magnitude and direction of accrual-based EM activities are estimated using the Modified Jones model (Dechow et al., 1995). The dependent variable (total accruals) was regressed on key variables expected to influence it. We estimate individual subcategories of accruals from cross-sectional regression for each industry. The Modified Jones model assumes that total accruals are a function of the change in cash-accompanying revenue (ΔREV-ΔREC), reflecting changes in current accruals and depreciation expenses (PPE), controlling for any non-discre-

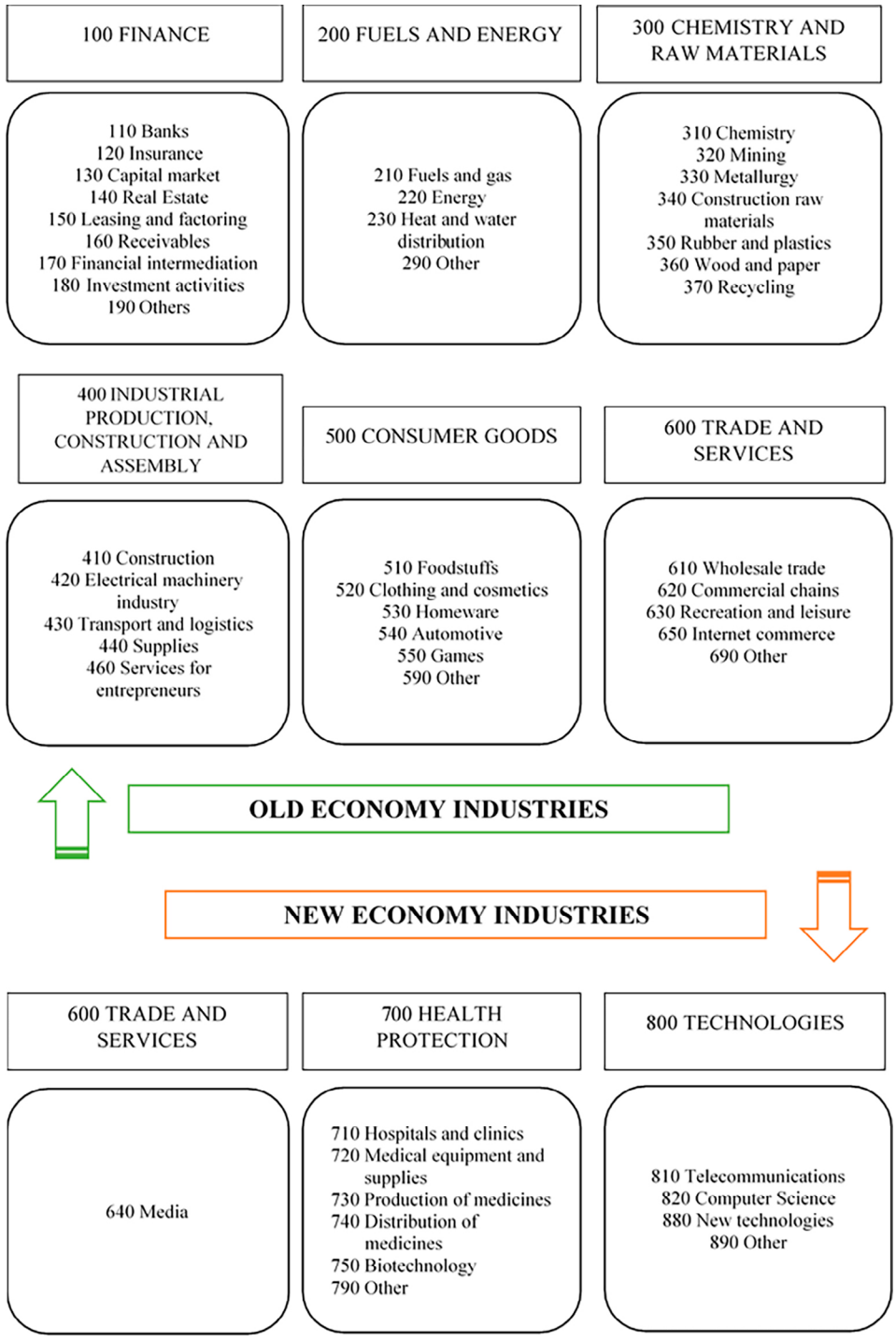

Figure 1. Classification of industries according to the WSE division and NACE Rev 2 (source: own elaboration)

tionary accruals changes related to depreciation expenses. The Modified Jones model adopts the following formula (Eq. (1)):

$$\frac{TACC_t}{TA_{t-1}} = \alpha_1\left(\frac{1}{TA_{t-1}}\right) + \alpha_2\left(\frac{\Delta REV_t - \Delta REC_t}{TA_{t-1}}\right) + \alpha_3\left(\frac{PPE_t}{TA_{t-1}}\right) + \varepsilon_t, \quad (1)$$

where: $TACC_t$ – total accruals in period t (calculated as the difference between earnings after taxes and cash flows from operations); TA_t – total assets in year t; REV_t – revenues from sales in year t; REC_t – net receivables in year t; PPE_t – gross property, plant, and equipment in year t; α_1, α_2, α_3 – a company-specific parameter (in the regression model); ε_t – a random error.

The value of a random error serves as the basis for assessing accounting-type EM through discretionary accruals, which represent the residual component in regression models (Eq. (2)). Significant deviations of discretionary accruals from zero suggest a higher degree of EM in the company.

$$DACC_t = \frac{TACC_t}{TA_{t-1}} - \left[\alpha_1\left(\frac{1}{TA_{t-1}}\right) + \alpha_2\left(\frac{REV_t - REC_t}{TA_{t-1}}\right) + \alpha_3\left(\frac{PPE_t}{TA_{t-1}}\right)\right], \quad (2)$$

where: $DACC_t$ – discretionary accruals in year t; other designations – as above.

3.4. Industry-specific attributes and control variables

Following Datta et al. (2011) and Chang et al. (2019), we used the industry-adjusted Lerner Index (*adLI*) to capture the firm product market power within a considered sector. The original Lerner Index (*LI*) measures the percentage markup of price above marginal cost. In this paper, we adopted the modified Lerner Index (Datta et al., 2013), which includes sales revenues, costs of goods sold, and general and administrative expenses as variables (Eq. (3)).

$$LI = \frac{REV_t - COGS_t - SG\&A_t}{REV_t}, \quad (3)$$

where: $COGS_t$ – costs of goods sold in year t; $SG\&A_t$ – general and administrative expenses in year t; other designation – as above.

However, in contrast to previous studies (Datta et al., 2011; Chang et al., 2019), we assumed that the minimum value of a company's Lerner Index (LI) is 0. This should eliminate high negative values of the *adLI* indicator in companies with significant operational losses. At the same time, higher *adLI* values indicate greater market power for a company.

In conceptual terms, the *adLI* is calculated as the difference between a company's LI and the sales-weighted LI of all public companies within an industry (Eq. (4)). As suggested by Datta et al. (2013), this measure acknowledges that different industries have structurally different profit margins due to factors unrelated to intra-industry differences in companies' market power. Its formula is described by the following Equation:

$$adLI = LI_t - \sum_{i=1}^{n} \omega LI_t, \quad (4)$$

where: LI_t – the modified Lerner Index (defined in Equation 5) in year t; ω_t – the share of the company's sales in the sales of all public companies in its industry; n – the total number of public companies in that industry.

To measure the level of market concentration, we used the Herfindahl-Hirschman Index (HHI) (Calkins, 1983). The HHI index is calculated by summing the squares of the sales shares of all companies operating in an industry (Eq. (5)). A decrease in the HHI index implies a decrease in the company's market power and an increase in competitiveness, and *vice versa*. The HHI index takes the following analytical form:

$$HHI = \sum_{i=1}^{n} u_i^2, \tag{5}$$

where: u_i – the share of company i in total sales of the considered industry; other designations – as above.

We used the company size (*SIZE*), company profitability (*PROF*), assets structure (*TANG*), leverage (*LEV*), long-term liabilities (*LTL*), and retained earnings (*RET*) as control variables to describe company-specific attributes that influence the magnitude of accrual-based EM in the tested sample. The calculation methodology for the control variables is provided in Table 1.

Table 1. Calculation methodology for the control variables (source: own elaboration)

Variable	Definition
SIZE	The share of the company's sales in the sales of all public companies in the sector in year *t*
PROF	Return on assets (ROA) in year *t*
TANG	The share of property, plant and equipment in total assets in year *t*
LEV	The ratio of the company's interest-bearing debt to total assets in year *t*
LTL	The share of long-term liabilities to total assets in year *t*
RET	The sum of supplementary capital and retained earnings to total assets in year *t*

4. Results

4.1. Earnings management patterns among industries

The first step of the empirical investigation examined EM behaviours across all industries distinguished on the basis of the WSE classification. Between 2012 and 2021, only companies operating in sector 400 (industrial production, construction and assembly) exhibited positive mean *DACC* values. In contrast, negative discretionary accruals were above average for the technologies industry (800). In general, Table 2 shows that managing earnings downward

Table 2. Descriptive statistics for discretionary accruals calculated for individual industries (source: own elaboration)

Measure	Industry							
	100	200	400	500	600	700	800	900
Mean	–0.0030	–0.0079	–0.0016	0.0001	–0.0034	–0.0036	–0.0206	–0.0564
I Quartile	–0.0843	–0.0441	–0.0427	–0.0477	–0.0400	–0.0547	–0.0731	–0.1453
Median	–0.0122	0.0067	–0.0034	0.0026	0.0009	0.0060	–0.0216	–0.0331
II Quartile	0.0507	0.0578	0.0425	0.0580	0.0429	0.0547	0.0236	0.0170
St. Dev.	0.2556	0.1455	0.1352	0.1659	0.1477	0.1200	0.1455	0.2126

prevailed in the sample. Notably, the finance industry (100) had a large standard deviation of the DACC variable, indicating high variability around the mean.

In the next phase, we analysed the variance of discretionary accruals among eight industries. The null hypothesis assumed that the distribution of *DACC* is the same across all WSE sectors. However, the results in Table 3 reject this hypothesis. As the result of the Kruskal-Wallis test required multiple comparisons, the Dunn test (including the Bonferonni-corrected version) was used.

Table 3. Results of tests describing the variance of discretionary accruals across industries (source: own elaboration)

Test for the pooled sample					
Observations (N)		Kruskal-Wallis test statistic	Degree of freedom		Asymptotic Sig.
2300		37.205	7		<0.001
Pairwise comparisons					
Sample 1 – Sample 2	Test statistic	Std. error	Std. test statistic	Sig.	Adj. Sig.*
800–700	91.814	77.436	1.186	0.236	1.000
800–100	140.271	59.007	2.377	0.017	0.488
800–300	238.023	63.916	3.724	0.000	**0.005**
800–600	251.978	61.984	4.065	0.000	**0.001**
800–500	258.091	61.573	4.192	0.000	**0.001**
800–400	270.591	54.866	4.932	0.000	**0.000**
800–200	286.255	75.589	3.787	0.000	**0.004**
700–100	48.457	69.540	0.697	0.486	1.000
700–300	146.209	73.752	1.982	0.047	1.000
700–600	160.164	72.083	2.222	0.026	0.736
700–500	166.277	71.731	2.318	0.020	0.572
700–400	178.777	66.063	2.706	0.007	0.191
700–200	194.441	84.070	2.313	0.021	0.580
100–300	–97.752	54.080	–1.808	0.071	1.000
100–600	–111.71	51.782	–2.157	0.031	0.868
100–500	–117.82	51.290	–2.297	0.022	0.605
100–400	–130.32	43.008	–3.030	0.002	0.068
100–200	–145.98	67.477	–2.163	0.031	0.854
300–600	–13.955	57.314	–0.243	0.808	1.000
300–500	–20.067	56.870	–0.353	0.724	1.000
300–400	–32.568	49.530	–0.658	0.511	1.000
300–200	48.232	71.809	0.672	0.502	1.000
600–500	6.112	54.689	0.112	0.911	1.000
600–400	18.613	47.009	0.396	0.692	1.000
600–200	34.277	70.095	0.489	0.625	1.000
500–400	12.500	46.467	0.269	0.788	1.000
500–200	28.164	69.732	0.404	0.686	1.000
400–200	15.664	63.887	0.245	0.806	1.000

Note: Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same Asymptotic significances (2-sided tests) are displayed. The significance level is 0.050; * Significance values have been adjusted by the Bonferroni correction for multiple tests.

The empirical research shows that only five out of the twenty-eight intergroup comparisons reveal statistically significant variation in the *DACC* variable within industries. Specifically, companies in the technology sector (800) exhibited statistically different EM patterns compared to companies from the fuels and energy (200), chemistry and raw materials (300), industrial production, construction, and assembly (400), consumer goods (500), and trade and services (600) sectors. These outcomes are graphically illustrated in Figure 2.

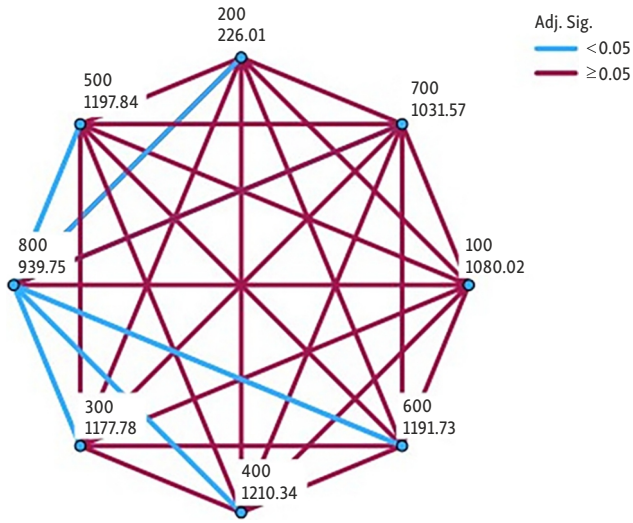

Figure 2. Results of intergroup comparisons on the diversification of discretionary accruals across industries (source: own elaboration)

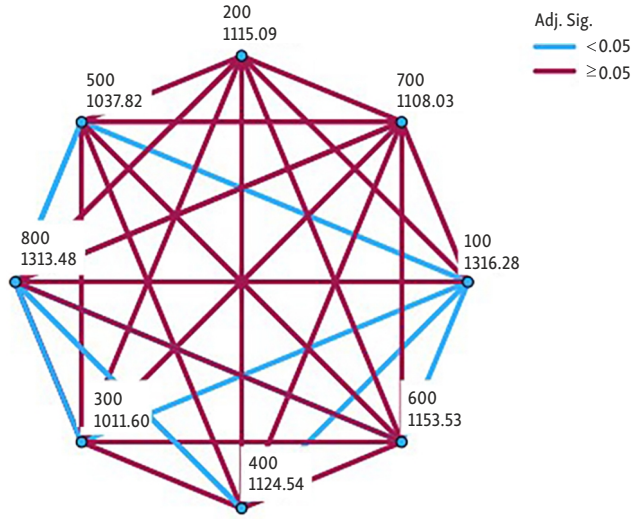

Figure 3. Results of intergroup comparisons on the diversification of absolute values of discretionary accruals across industries (source: own elaboration)

Similar research was carried out concerning the absolute values of discretionary accruals (|*DACC*|), which illustrate the magnitude of EM but without indicating the directions of its influence. The investigation allows us to reject the null hypothesis that the distribution of the |*DACC*| variable is the same across tested subpopulations (Table 4).

In-depth analysis through *post-hoc* tests revealed statistical differences in the absolute values of abnormal accruals in seven pairwise comparisons (Figure 3). We thus confirmed the assumption that the magnitude and directions of accrual-based EM in the tested sample vary significantly depending on the economic sector.

Table 4. Results of tests describing the variance of absolute values of discretionary accruals across tested industries (source: own elaboration)

Test for the pooled sample					
Observations (N)	Kruskal-Wallis test statistic		Degree of freedom	Asymptotic Sig.	
2300	56.543		7	<0.001	
Pairwise comparisons					
Sample 1 – Sample 2	Test statistic	Std. error	Std. test statistic	Sig.	Adj. Sig.
300–500	–26.227	56.87	–0.461	0.645	1.000
300–700	–96.429	73.752	–1.307	0.191	1.000
300–200	103.496	71.809	1.441	0.150	1.000
300–400	–112.945	49.53	–2.28	0.023	0.632
300–600	–141.935	57.314	–2.476	0.013	0.372
300–800	–301.888	63.916	–4.723	0.000	**0.000**
300–100	304.686	54.08	5.634	0.000	**0.000**
500–700	–70.202	71.731	–0.979	0.328	1.000
500–200	77.269	69.732	1.108	0.268	1.000
500–400	86.717	46.467	1.866	0.062	1.000
500–600	–115.708	54.689	–2.116	0.034	0.962
500–800	–275.661	61.573	–4.477	0.000	**0.000**
500–100	278.458	51.29	5.429	0.000	**0.000**
700–200	7.067	84.07	0.084	0.933	1.000
700–400	16.516	66.063	0.25	0.803	1.000
700–600	45.506	72.083	0.631	0.528	1.000
700–800	–205.459	77.436	–2.653	0.008	0.223
700–100	208.257	69.54	2.995	0.003	0.077
200–400	–9.448	63.887	–0.148	0.882	1.000
200–600	–38.439	70.095	–0.548	0.583	1.000
200–800	–198.392	75.589	–2.625	0.009	0.243
200–100	201.189	67.477	2.982	0.003	0.080
400–600	–28.99	47.009	–0.617	0.537	1.000
400–800	–188.944	54.866	–3.444	0.000	**0.016**
400–100	191.741	43.008	4.458	0.000	**0.000**
600–800	–159.953	61.984	–2.581	0.010	0.276
600–100	162.751	51.782	3.143	0.002	**0.047**
800–100	2.797	59.007	0.047	0.962	1.000

4.2. Accrual-based earnings management among the new and old economy industries

The next step determined whether there are statistically significant differences between the direction and magnitude of EM in the new and old economy industries. Descriptive statistics of abnormal accruals (*DACC*) calculated for companies from the new and old economies indicate that those from the first group tend to alter earnings downward to a greater degree than those in the old economy (Table 5).

Table 5. Descriptive statistics for discretionary accruals calculated for the new and old economy industries (source: own elaboration)

Measure	New economy industries	Old economy industries
Mean	–0.037	–0.002
I Quartile	–0.088	–0.054
Median	–0.021	0.000
II Quartile	0.027	0.051
St. Dev.	0.179	0.176

We used the U Mann-Whitney test to investigate potential differences in earnings management (EM) between the new and old economy industries. The null hypothesis assumed that the distribution of the tested variable is the same across the two examined groups. The results were ambiguous, however. On the one hand, it allows us to reject the null hypothesis that the distribution of the *DACC* variable is equal between the subpopulations (Table 6). On the other hand, at the adopted significance level of $\alpha = 0.05$, there were no statistical differences in the medians of the absolute values of discretionary accruals (|*DACC*|) between companies from the new and old economy industries. However, our findings demonstrate that the nature of accounting-type EM differs depending on the magnitude of the EM practices. At the same time, we positively verified the second research hypothesis that companies that operate in the new economy industries engage in accrual-based EM practices more than companies from the old economy industries.

Table 6. Results of tests describing the variance of earnings management indicators in the new and old economy industries (source: own elaboration)

Test summary	Tested variable	
	DACC	|DACC|
Mann-Whitney U	308580.00	386433.00
Wilcoxon W	380970.00	458823.00
Standard error	11827.97	11827.97
Standardised test statistic	–4.753	1.829
Asymptotic Sig.	<**0.001**	0.067

4.3. The impact of market competition and concentration on earnings management patterns

To identify the correlations between accrual-based EM and the industry-specific variables, we used ordinary least squares (OLS) regression models to estimate the following Equations:

$$DACC_t = \alpha_0 + \alpha_1 adLI + \alpha_2 HHI + \alpha_3 SIZE + \alpha_4 PROF + \alpha_5 TANG + \alpha_6 LEV + \alpha_7 LTL + \alpha_8 RET + \varepsilon_t; \quad (6)$$

$$|DACC_t| = \alpha_0 + \alpha_1 adLI + \alpha_2 HHI + \alpha_3 SIZE + \alpha_4 PROF + \alpha_5 TANG + \alpha_6 LEV + \alpha_7 LTL + \alpha_8 RET + \varepsilon_t; \quad (7)$$

$$DACC_t^+ = \alpha_0 + \alpha_1 adLI + \alpha_2 HHI + \alpha_3 SIZE + \alpha_4 PROF + \alpha_5 TANG + \alpha_6 LEV + \alpha_7 LTL + \alpha_8 RET + \varepsilon_t; \quad (8)$$

$$DACC_t^- = \alpha_0 + \alpha_1 adLI + \alpha_2 HHI + \alpha_3 SIZE + \alpha_4 PROF + \alpha_5 TANG + \alpha_6 LEV + \alpha_7 LTL + \alpha_8 RET + \varepsilon_t. \quad (9)$$

The assessment of the accounting-type EM in the pooled sample takes into account normal (*DACC*), absolute (|*DACC*|), positive (*DACC*+) and negative (*DACC*−) values of discretionary accruals. The data meet the test assumptions (normality of errors, heteroscedasticity, and multicollinearity) for the OLS model. Table 7 presents the correlation matrix for the research variables, revealing no problems of multicollinearity among them.

Table 7. The correlation matrix between tested variables (source: own elaboration)

Variables	adLI	HHI	SIZE	PROF	TANG	LEV	LTL	RET
adLI	1.000	0.051	0.053	–0.085	0.048	0.004	–0.001	0.014
HHI	0.051	1.000	–0.114	0.022	–0.096	–0.001	–0.005	0.012
SIZE	0.053	–0.114	1.000	–0.044	–0.010	–0.048	–0.030	–0.007
PROF	–0.085	0.022	–0.044	1.000	–0.027	–0.003	0.496	–0.218
TANG	0.048	–0.096	–0.010	–0.027	1.000	–0.008	0.012	–0.011
LEV	0.004	–0.001	–0.048	–0.003	–0.008	1.000	0.003	–0.003
LTL	–0.001	–0.005	–0.030	0.496	0.012	0.003	1.000	0.065
RET	0.014	0.012	–0.007	–0.218	–0.011	–0.003	0.065	1.000

The regression results of industry-specific variables on the scope of accrual-based EM are presented in Table 8. When we use the discretionary accruals (*DACC*) as the dependent variable in Eq. (6), after controlling the factors that potentially influence the magnitude and link of accrual-based EM, we found a negative association between the *DACC* variable and market concentration (*HHI*). This suggests that companies in less concentrated sectors tend to manage earnings more than others, supporting our third research hypothesis. On the other hand, we did not find a statistically significant relationship between *DACC* and product market power within the industry (*adLI*). This rejects our fourth research hypothesis that public companies with greater product market pricing power alter earnings to a lesser degree than other companies.

Our in-depth examination of factors that influence the absolute value of abnormal accruals (|*DACC*|) yielded slightly different results. Both the market concentration (*HHI*) and market competition (*adLI*) positively affect the absolute values of abnormal accruals, which describe the magnitude of accrual-based EM without indicating the direction (upward or downward

manipulation). Finally, we showed that the impact of industry-specific attributes depends on the type of EM practices. Companies that engaged in income-increasing EM exhibited a statistically negative influence between market concentration (*HHI*) and the extent of EM. However, for companies that engaged in downward EM, we found no statistical relationships between industry-specific variables and EM via discretions.

The last step of the analytical procedure assessed the impact of industry-specific variables on discretionary accruals (DACC) within each industry. Table 9 shows that the statistical usefulness of our model varied among industries. The degree of goodness-of-fit to the empirical data differs depending on the WSE sector in which the companies operate. However, in seven out of eight cases, the tested regression model was statistically significant (with the exception being sector 800, technologies). For five industries, we confirmed a statistically negative correlation between the company's product market power (*adLI*) and the directions and scale of accrual-based EM. On the other hand, the cross-sectoral regression revealed a statistically significant relationship between market concentration (*HHI*) and the DACC variable only for the finance sector (100).

Table 8. Structural parameters and statistics for the goodness-of-fit of regression models calculated for the pooled sample (source: own elaboration)

DACC	**Model Summary**						**Collinearity**	
	R	R Square	Ad. R Square	Std. Error of the Estim.	Durbin-Watson		Condition Index	
	0.295	0.087	0.084	0.169	2.009		6.195	
	ANOVA							
	N = 2300	Sum of squares	df	Mean square	F		Sig.	
	Regression	6.249	8	0.781	27.226		**<0.001**	
	Residual	65.729	2291	0.029				
	Model	Unstandardised coefficients	Standardised coefficients	t	Sig.		Collinearity statistics	
		B	Std. Error	Beta			Tolerance	VIF
	(Constant)	0.021	0.010		2.182	**0.029**		
	adLI	–0.028	0.027	–0.022	–1.070	0.285	0.982	1.019
	HHI	–0.059	0.029	–0.041	–2.011	**0.044**	0.972	1.028
	SIZE	–0.026	0.037	–0.014	–0.706	0.480	0.979	1.022
	PROF	0.033	0.010	0.079	3.257	**0.001**	0.679	1.473
	TANG	–0.010	0.018	–0.011	–0.561	0.575	0.986	1.015
	LEV	0.001	0.000	0.002	0.103	0.918	0.997	1.003
	LTL	–0.020	0.002	–0.224	–9.508	**0.000**	0.721	1.387
	RET	0.001	0.000	0.053	2.518	**0.012**	0.909	1.100

Continue of Table 8

|DACC|	**Model summary**							**Collinearity**
	R	R Square	Adjusted R Square		Std. Error of the estimate	Durbin-Watson		Condition Index
	0.384	0.148	0.145		0.143	2.010		6.195
	ANOVA							
	N = 2300	Sum of squares	df		Mean square	F		Sig.
	Regression	8.122	8		1.015	49.602		**<0.001**
	Residual	65.729	2291		0.029			
	Model	Unstandardised coefficients	Standardised coefficients		t	Sig.		Collinearity statistics
		B	Std. Error	Beta			Tolerance	VIF
	(Constant)	0.085	0.008		10.465	**0.000**		
	adLI	0.077	0.022	0.066	3.409	**0.001**	0.982	1.019
	HHI	0.049	0.025	0.039	1.975	**0.048**	0.972	1.028
	SIZE	–0.120	0.031	–0.075	–3.843	**0.000**	0.979	1.022
	PROF	0.058	0.009	0.159	6.780	**0.000**	0.679	1.473
	TANG	–0.107	0.015	–0.139	–7.156	**0.000**	0.986	1.015
	LEV	0.000	0.000	0.011	0.585	0.558	0.997	1.003
	LTL	0.027	0.002	0.351	15.433	**0.000**	0.721	1.387
	RET	–0.001	0.000	–0.140	–6.927	**0.000**	0.909	1.100
DACC+	**Model summary**							**Collinearity**
	R	R square	Adjusted R square		Std. Error of the estimate	Durbin-Watson		Condition Index
	0.467	0.218	0.212		0.135	2.043		6.042
	ANOVA							
	N = 1195	Sum of squares	df		Mean square	F		Sig.
	Regression	6.029	8		0.754	41.255		**<0.001**
	Residual	21.667	1186		0.018			
	Model	Unstandardised coefficients	Standardised coefficients		t	Sig.		Collinearity statistics
		B	Std. Error	Beta			Tolerance	VIF
	(Constant)	–0.095	0.010		–9.188	**0.000**		
	adLI	–0.023	0.029	–0.021	–0.812	0.417	0.978	1.022
	HHI	–0.065	0.031	–0.054	–2.065	**0.039**	0.951	1.052
	SIZE	0.093	0.035	0.069	2.644	**0.008**	0.966	1.035
	PROF	–0.027	0.009	–0.097	–3.062	**0.002**	0.662	1.510
	TANG	0.112	0.019	0.150	5.760	**0.000**	0.969	1.032
	LEV	0.000	0.000	–0.013	–0.493	0.622	0.997	1.003
	LTL	–0.024	0.002	–0.437	–14.268	**0.000**	0.704	1.420
	RET	0.001	0.000	0.124	4.634	**0.000**	0.916	1.092

End of Table 8

DACC⁻	Model summary					Collinearity
	R	R square	Adjusted R square	Std. error of the estimate	Durbin-Watson	Condition Index
	0.353	0.125	0.118	0.135	2.051	7.672
	ANOVA					
	N = 1105	Sum of squares	df	Mean square	F	Sig.
	Regression	2.839	8	0.355	19.469	**<0.001**
	Residual	19.596	1096	0.018		
	Model	Unstandardised coefficients	Standardised coefficients	t	Sig.	Collinearity statistics
		B	Std. Error	Beta		Tolerance	VIF
	(Constant)	0.117	0.013		9.194	**0.000**		
	adLI	–0.030	0.032	–0.028	–0.943	0.346	0.934	1.070
	HHI	–0.041	0.035	–0.034	–1.183	0.237	0.992	1.008
	SIZE	–0.110	0.058	–0.056	–1.883	0.060	0.905	1.104
	PROF	0.250	0.024	0.344	10.585	**0.000**	0.757	1.321
	TANG	–0.119	0.021	–0.165	–5.810	**0.000**	0.993	1.007
	LEV	0.000	0.000	–0.021	–0.723	0.470	0.991	1.009
	LTL	–0.004	0.021	–0.011	–0.185	0.854	0.220	4.541
	RET	–0.006	0.002	–0.205	–3.276	**0.001**	0.205	4.887

Table 9. Structural parameters and statistics for the goodness-of-fit of regression models calculated for individual industries (source: own elaboration)

Industry			**100**	**200**	**300**	**400**	**500**	**600**	**700**	**800**
No. of observations			380	130	250	640	300	290	120	190
Test summary			**B**							
DACC	*Coefficients*	(*Constant*)	**0.272***	–0.037	0.091	0.049	0.064	–0.013	0.844	–0.021
		adLI	–0.088	–0.045	**–0.181**	**0.232**	**–0.572**	**–0.096**	**–0.418**	–0.128
		HHI	**–1.437**	0.289	–0.159	–0.057	–0.378	0.045	–1.369	0.024
		SIZE	–0.178	0.035	–0.007	–0.054	**–0.208**	0.072	–0.107	–0.078
		PROF	0.282	**0.675**	**0.846**	**–0.045**	**0.872**	**0.569**	**0.534**	–0.104
		TANG	–0.215	–0.008	**–0.092**	**–0.109**	**–0.060**	0.000	0.070	0.031
		LEV	–0.001	–0.005	**0.009**	0.000	**0.005**	0.002	–0.001	0.003
		LTL	–0.064	**–0.277**	**–0.152**	**–0.029**	**–0.058**	**–0.088**	0.078	–0.117
		RET	–0.012	**–0.086**	**–0.083**	0.001	0.012	**0.020**	0.058	0.001
	Goodness-of-fit	*R*	0.336	0.768	0.787	0.591	0.834	0.564	0.541	0.267
		R^2	0.113	0.589	0.619	0.349	0.696	0.319	0.293	0.071
		Adj. R^2	0.094	0.563	0.606	0.341	0.688	0.299	0.242	0.030
		Std. Error	0.243	0.096	0.084	0.134	0.082	0.100	0.126	0.209
		Durbin-Watson	2.099	2.093	1.972	1.955	1.936	2.106	2.176	1.894
		Sig.	**<0.000**	**<0.000**	**<0.000**	**<0.000**	**<0.000**	**<0.000**	**<0.000**	0.092

Note: * statistically significant parameters (α = 0.05) are marked in bold.

The cross-industry analysis of discretionary accruals confirmed earlier observations by Sun and Rath (2009) and Goel (2012) regarding statistical variances in the magnitude and direction of accrual-based EM in individual WSE sectors. Following Lizińska and Czapiewski (2023), we showed that companies from the technology industry managed earnings downward not only during the COVID-19 pandemic but also in the pre-pandemic years, starting from 2012. On the other hand, industrial pairwise comparisons of the equality of the distributions of abnormal accruals demonstrated that EM patterns in some sectors are similar. This suggests possible homogeneity in EM approaches. Moreover, like Hsu and Jan (2023), we evidenced various scopes of EM through accruals in companies from the new and old economy industries. However, we acknowledge that the adopted industry classification could affect the final results. Employing 2-digit SicCodes or the Fama-French industry classification (Li, 2022) could yield different outcomes.

In contrast to Datta et al. (2013), Karuna et al. (2015), Tang and Chen (2020), we found no clear evidence of a robust relationship between industry competition, market concentration, and the extent of accrual-based EM. The results of our regression analysis are ambiguous, showing variability depending on the adopted explanatory variable that represents EM activities and the specific samples tested (the pooled sample vs samples including companies in individual industries).

As before, the research procedure used in selecting the model to extract individual subcategories of accruals and calculate total accruals (as a dependent variable) might have influenced our research. Following Datta et al. (2013), Parada et al. (2020), Costa and Soares (2021), we used the Modified Jones model as the primary tool for estimating discretionary accruals due to its universality and global comparability. Utilizing the cash flow approach to capture non-discretionary and abnormal accruals was motivated by its advantages, as highlighted in the prior literature (Bartov et al., 2001; Hribar & Collins, 2002).

In conclusion, in contrast to prior studies (e.g., Datta et al., 2011; Wasiuzzaman, 2018, Chang et al., 2019; Durana et al., 2022; Lizińska & Czapiewski, 2023), our research covers both issues and introduces a novel perspective by analysing EM patterns in new and old economy industries.

This research paves the way for several future studies in the field of EM determinants in the Polish capital market. First of all, we recommend modelling the impact of industry-specific factors on EM behaviour while considering control variables that refer not only to the characteristics of the companies but also to economic cycles and institutional factors. Specifically, we suggest that including empirical analyses on altering reported data of variables that illustrate fluctuations in the economy (Conrad et al., 2002), investor protection (Leuz et al., 2003; Shen & Chih, 2005) or legal enforcement (Ewert & Wagenhofer, 2005) could strengthen the current findings and provide more useful information for capital market participants.

5. Conclusions

Decisions made on the capital market are based on information from diverse sources, with a company's financial statements being considered essential. Therefore, effective financial reporting and auditing is crucial and is a subject of interest for public company stakeholders, as well as the general public. The scope, timeliness, and quality of disclosed data are key parameters that affect financial markets' informational and allocational efficiency.

This paper examined industrial variations in accrual-based EM activities in public companies listed on the WSE. We present the differences in discretionary accruals proxies among industries, and statistical relationships between the prevalence of EM in the old and new economies companies. Finally, we investigate whether market power and market competition could affect the magnitude of EM in the Polish regulated market. Thus, this paper fills a gap in the literature regarding the assessment of earnings quality across economic sectors and the capturing of industry-specific attributes that affect the magnitude of EM through accruals.

The results support the first hypothesis (H.1.) that the magnitude and directions of accrual-based EM in WSE-listed companies vary significantly depending on the industry in which they operate. However, industrial pairwise comparisons of the equality of the distributions of abnormal accruals demonstrated possible homogeneity in EM approaches in some sectors. Our findings confirmed the second hypothesis (H.2) that between 2012 and 2021, companies from the new economy industries, as well as those that operate in less concentrated markets, engaged in accrual-based EM practices more than others. We also found a negative association between the DACC variable and market concentration (HHI). This finding suggests that companies in less concentrated sectors tend to alter earnings more than others, supporting our third research hypothesis (H.3). Moreover, we demonstrated that market concentration statistically affects the absolute values of abnormal accruals and the magnitude of accrual-based EM for companies engaging in income-increasing EM. On the other hand, we did not find a statistically significant relationship between the extent of accounting-type EM and company-specific product market power within the investigated industries. Therefore, we rejected the fourth research hypothesis (H.4) that public companies with greater product market pricing power alter earnings less than other companies.

In Poland, as in other civil law jurisdictions, there is a relatively low level of protection for participants in the stock market game, and expenses on auditing financial statements are lower than in common law jurisdictions. Hence, our findings will be valuable to external users, auditing committees, and institutions responsible for establishing accounting regulations. Our study also has academic value because it fits into the trend of popular capital market research in accounting, which focuses on assessing the information efficiency of capital markets from the perspective of reported balance sheet data and emphasizing the role of accounting in concluding social contracts.

However, this study is not without limitations. The research design, such as the method of distinguishing individual subcategories of accruals, the sector classification, and the sample itself, which included only stable public companies whose shares have been traded on the stock exchange for a long time, may influence the generalizability of the results. Therefore, the conclusions should not be directly applied to all public companies from the Polish capital market.

Funding

This work was supported by the UiT The Arctic University of Norway.

Author contributions

Per Engelseth: part of the results, discussion, and conclusions. Michał Comporek: the design of the study, introduction, part of literature review, part of the results. Magdalena Osińska: part of the research methodology, part of the results. Adam Sadowski: part of the research methodology, part of the discussion. Ewa Walińska: part of literature review, part of conclusions.

Disclosure statement

The authors declare not to have any conflicts of interest.

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