

Empirical Paper

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Earnings quality among high-share liquidity companies: evidence from Central and Eastern European firms

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Abstract:

Paper's objectives: The main aim of the paper is to analyze the earnings quality of high-share liquidity companies from Poland, Romania, and Hungary whose activities are outside the finance sector.

Methods applied: Earnings quality, i.e., earnings persistence, predictability, and accruals quality, was assessed using the Kruskal–Wallis test, the *U* Mann–Whitney test, the Wilcoxon Signed Ranks test, and Spearman's rank correlation coefficients.

Findings: The research demonstrates that companies listed in the Bucharest Stock Exchange tend to provide higher earnings quality than other firms in the CEEplus index. In the tested sample, there was a noticeable domination of managerial practices aimed at managing the earnings downward. This also happened in 2020, the period negatively affected by the SARS-CoV-2 pandemic.

Originality/value: This study fills a gap in the literature regarding the quality of accounting data reported among listed companies from Central and Eastern Europe (CEE) countries that are characterized by high liquidity of shares.

Keywords: CEEplus index, earnings management, earnings quality, joint stock companies, share liquidity

JEL Classification: F30, M41, M42

1 Introduction

The creation of formalized stock markets in the countries of Central and Eastern Europe (CEE) dates back to the 1990s. Their emergence following the collapse of centrally planned economies was regarded as an important dimension of the ongoing systemic transformations, facilitating efficient privatization processes and enabling enterprises to acquire the necessary capital for development. However, the greatest weakness of emerging markets, including those in the CEE region, is the persistent lack of liquidity [Alderighi, 2017]. To meet these challenges, stock exchanges of the CEE region followed alternative paths by opting for operational independence or the creation of regional and global alliances [Adamska, 2019]. An important initiative to show the region's investment attractiveness was the establishment of a common stock exchange index in 2019 called CEEplus in which the most liquid public companies from the regional stock exchanges are listed. Countries belonging to the Three Seas Initiative recognized that the current fragmentation, i.e., the large number of relatively small stock exchanges in the region, was not conducive to attracting capital and the CEEplus index could become a significant stimulus for the economic development of the region.

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The paper presents a multidimensional analysis of the earnings quality of nonfinancial high-share liquidity companies from the Warsaw (WSE), Bucharest (BVB), and Budapest (BUX) stock exchanges. This study answers two research questions: (1) Does the earnings quality in high-share liquidity companies differ from other public companies in the CEE region? In principle, this makes it possible to assess whether high-share liquidity affects companies' tendencies to manage reported earnings and, if so, how. (2) Does the earnings quality of companies in the CEEplus index vary due to the regional stock exchange on which they are listed? For this purpose, the statistical relationships between the coefficients that describe the earnings quality of companies that issue shares in the stock exchanges of Warsaw, Bucharest, and Budapest were examined.

This paper contributes to the literature in some ways additionally. The vast majority of previous studies focused on the relationships that occur exclusively between share liquidity and discretionary accruals (DACC). This study broadens the research horizon and evaluates earnings quality in high-liquidity enterprises from the perspective of accrual-based earnings management, as well as earnings persistence and predictability. Assuming that the key importance of liquidity for investors is particularly evident in periods of increased uncertainty and volatility of quoted shares, this paper focuses on potential changes in accrual quality during the initial term of the SARS-CoV-2 pandemic. Therefore, the adopted research optics tested the scope and directions of accrual-based earnings management in companies in the CEEplus index in 2019 and 2020. Finally, the study examines the statistical dependencies between individual measures of earnings quality and underlines the significance of a holistic view when the subject matter is considered.

Enterprises characterized by high liquidity of shares (understood as the ease with which securities are bought and sold without affecting their price) should ensure considerable credibility and low transaction costs or slight spread, thus attracting investors' attention [Syamala et al., 2014]. Prior research provides mixed evidence of how share liquidity impacts reported earnings quality. Huang et al. [2017] showed that share liquidity influences accrual-based earnings management through its effects on takeover pressure and equity compensation. Consequently, it motivates managers to manage earnings. Similar hypotheses were put forward by Edmans [2009]. Cheng and Warfield [2005] showed that share liquidity could encourage managers to take short-term performance optics, which is related to increased use of equity compensation [Jayaraman and Milbourn, 2012]. As a result, it can create additional incentives for executives to manipulate short-term earnings to increase private trading profits from inflated stock prices. Chan et al. [2014] demonstrated that high liquidity of shares might result in earnings management, which is difficult for external stakeholders to detect. At the same time, managers may not be sufficiently encouraged to boost accrual-based earnings management activities as liquidity is associated with greater investor monitoring.

On the other hand, higher stock liquidity increases investors' ability to keep an eye on managers' moves and detect irregularities through direct interventions [Hadani et al., 2011; Huang et al., 2017]. In addition, greater share price efficiency can be viewed as an important determinant for the quick detection of intentional manipulations of reported financial data [Massa et al., 2015]. The empirical research presented above indicates the need for further research into the discussed issues.

Another area for research is the characteristics of the markets where earnings quality will be tested. Farkas [2011] argues that CEE countries have created a unique model of capitalism. Due to differences in the financial or institutional environment, past research on developed markets cannot be extrapolated to capital markets in Poland, Romania, or Hungary [Jakubowski and Wójtowicz, 2019]. Grabowski [2021] noted that in recent years, the links between English, American, or European Union (EU) countries' markets and those in the CEE region have decreased, so the processes observed in developed markets can be reflected in the characteristics of emerging markets. Filip and Raffournier [2010] proposed that the low value of accounting data in CEE countries is caused by factors such as lower market efficiency, the considerable influence of tax rules, and a small number of financial institutions that provide the essential part of a firm's capital, or a civil law legal system. They also stated that CEE countries should not be seen as a homogenous group as each country has unique features that arise from its pre-communist history and cultural peculiarities.

2 Literature review

2.1 The quality of accounting information – the essence, desired features, and typology of measurement methods

Going public is often seen as a way of getting promoted to a prestigious group of companies. If an enterprise creates credibility thanks to a well-conducted information policy, it will not only build the trust of its stakeholders but also shape its positive image in their eyes. Francis et al. [2005] stated that high-quality accounting information might provide investors with subsidiary market benefits, such as reduced cost of capital or heightened stock liquidity. Public companies in Poland, Romania, and Hungary must prepare financial statements following IFRS, which are perceived as high-quality accounting standards. Shiri et al. [2018] argued that estimation of the quality of the information in financial statements should consider how informative the reported numbers are, how comprehensive the financial disclosures are, and if the reported figures comply with accounting principles and standards.

However, as economic reality shows, the data in a company's financial statements may be distorted, reducing the quality of the accounting information provided [Healy and Wahlen, 1999; Ball and Shivakumar, 2005; Braam et al., 2015]. Their accounting practices may largely be related to fulfilling the interests of particular stakeholder groups, which can be achieved by striving to maximize profit per balance for the management and by increasing the company's book or market value. Furthermore, although these practices often comply with balance sheet regulations and their legality cannot be questioned, the ethical nature of these practices is ambiguous.

Economic data plays a major role in the overall information used by various enterprise management levels. In the light of social and economic conditions, there is a feedback loop regarding the flow of information, and often, the specific links between the firm and its environment are emphasized. As per IAS 1, the objective of financial statements is to provide information about an enterprise's financial standing, economic efficiency, and cash flow that is useful to a wide range of users in making economic decisions.

Assessing the quality of accounting information is a complex and multidimensional issue. In general, the quality of this information will be demonstrated by the degree or the extent it adds value to users in terms of the content, form, and time of its delivery [Brien, 1991]. According to the Conceptual Framework for Financial Reporting [2010], two groups of qualitative characteristics of reporting data can be distinguished. They include qualitative features of fundamental importance (such as usefulness and faithful presentation), as well as features that enrich the usefulness of the reported information (containing comparability, verifiability, timeliness, and understandability) [Taylor, 2012]. Eppler [2006] conducted the most comprehensive research and presented a list of 70 quality carriers of accounting information.

According to Leuz and Wysocki [2016], the information in the financial statements of listed companies plays two key roles in market economies. The first (ex-ante) allows investors and other capital providers to make decisions when assessing the return potential on possible investments. The second (ex-post) provides users with information to design corporate governance mechanisms and monitor the effectiveness of capital allocation. The qualitative characteristics of information in an accounting system are not merely the subject of consideration and guidance by all standards authorities. One of the research trends in information quality is research on the factors that influence the quality of accounting data. For example, Leuz and Verrecchia [2000] demonstrated that the quality of information contained in the financial statements was positively influenced by the company's size, level of financial leverage, capital requirements, and the number of auditors. In turn, Cohen [2008] noted that the quality of accounting information is negatively related to the level of competition in the sector but positively related to the size of the enterprise and its debt.

The idea of earnings quality was first introduced by Graham and Dodd [1934]. They explained the model of valuing shares of listed companies using the product of the earnings per share index and the coefficient of quality, shaped by determinants such as the implemented dividend strategy, the financial standing of the company, its reputation, the nature of the business, or market sentiment. Gibson [1998] confirmed that reporting high-quality financial results is characteristic of companies that implement a conservative

accounting approach. Financial statements, among many things, involve presenting the lowest possible value of assets and revenues while valuing liabilities and costs as high as possible, underestimating profits, and assuming that expenses will occur sooner rather than later, while the opposite is true for receipts. Kamp [2002] stated that high-quality earnings clearly indicate the ongoing costs and revenues and present the firm's core business performance unambiguously, and are directly correlated with generated cash flow in a given financial year. Dechow et al. [2010] noted that high earnings quality provides more information about a firm's performance relevant to specific decisions made by a particular group of decision-makers. Michalak et al. [2012] explained that earnings quality can be evaluated by assessing the extent to which financial statements conform to established accounting standards and do not hide any material items that, if revealed, might result in a lower grading of an entity by the users of the financial statements.

Classic methods of measuring earnings quality combine disclosure quality, earnings management, and audit quality. The most widely used proxies of high-quality earnings [Dechow et al., 2010; DeFond, 2010; Michalak et al., 2012; Chen et al., 2015] are as below:

- the persistence of earnings – defined as the degree of first-order auto-correlation in a time series of earnings numbers [Canina and Potter, 2019]. It can be understood as the ability of the enterprise to generate a positive financial result that will permanently increase in the long term.
- earnings smoothness – the purpose of earnings smoothing is to reduce the fluctuations in reported results from one period to another in such a way as to present the relative stability of reported earnings over a longer period. Hence, the management may strive to equalize periods of high revenues with periods of low revenues and (analogically) to equalize periods of high expenses (costs) with periods of low expenses (costs) [Chen et al., 2017];
- the magnitude and the quality of accruals – large differences between net profit and operating cash flows lead to poor quality earnings as they can be a sign of earnings smoothing. On the other hand, significant deviations of DACC from zero may indicate intense earnings management, i.e., managerial actions to increase (decrease) current reported earnings of the unit for which the manager is responsible without generating a corresponding increase (decrease) in the unit's long-term economic profitability [Fischer and Rozenzweig, 1995];
- timely loss recognition – also known as conditional conservatism in financial reporting [Patatoukas, 2016]. The assumption is that the higher the timeliness of loss recognition, the better the quality of earnings. Managers may realize low timely loss recognition, either because they do not fully use the information in returns, which is consistent with delayed recognition of economic losses, or because they rely on private information that contrasts with the public information in returns [Cao et al., 2021];
- abnormalities of the earnings distribution – if there is an unusual clustering in earnings distribution (e.g., more companies disclosing small profits than small losses, or many companies implementing the big bath technique), it may indicate the increased intentional shaping of financial results related to earnings management;
- earnings correlation with company valuation – a factor that enhances market efficiency and the relevance of accounting information when earnings disclosures change the company's market valuation [Michalak et al., 2012].

2.2 The relationship between earnings management, persistence, and predictability

The motives for earnings manipulation identified in the literature are based on mutually interrelated theories, such as agency, contract, signaling, and threshold theories. The incentives to manipulate earnings quality can stem from various sources and may range from motivations related to personal gain, such as getting bonuses, to broader business objectives, such as maintaining the company's competitive position or meeting the expectations of financial market analysts [Burgstahler and Dichev, 1997; Fields et al., 2001; Stolowy and Breton, 2004]. The diverse nature of earnings manipulation techniques shows different and

ambiguous goals that company executives may set concerning the reporting of economic performance. At the same time, various managerial practices to intentionally enhance (lower) the reported numbers indicate that the earnings quality should be properly estimated using different measures while simultaneously examining the relationship between the measurement tools. As an example, the income smoothing accrual-based earnings management (AEM) technique manipulates the time profile of profits or financial statements so that the stream of reported results is characterized by less volatility. Income smoothing may be carried out based on reducing and/or retaining profits in prosperous years and then using them in periods of economic downturn.

Although income smoothing entails earnings manipulation, the computed earnings persistence or predictability ratios for accounting periods in which the AEM technique was implemented may be misleading as they indicate that the business unit's financial results are highly stable and, consequently, the reported data are of high quality. Conducting a detailed analysis of reported earnings based on accruals quality and the distribution of financial results is necessary to reach a more reliable conclusion.

Regarding the relationship with individual earnings quality measures, Gul et al. [2000] and Winarno et al. [2022] noted the negative effect of DACC on earnings persistence. Winarno et al. also demonstrated the inverted influence of accrual-based and real earning management on earnings persistence. Meini and Siregar [2014] found that accrual-based earnings management does not weaken the persistence of current-year earnings to the next year's earnings. However, a negative impact of earnings management on earnings sustainability and repetition could occur in subsequent periods. Cieřlik [2016] tested the interdependencies between individual earnings quality measures in the Polish capital market. Although he did not explore the relationships between DACC and earnings persistence, Cieřlik showed high correlations between pairs of measures within the same set, particularly for persistence and predictability. He also suggested that the various measures capture different attributes or economic concepts of earnings quality. Based on the above assumptions, the first hypothesis was formulated:

H.1. In public companies characterized by high liquidity of shares, there are direct inverse correlations between earnings persistence and absolute values of discretionary accruals.

2.3 The effect of stock liquidity on earnings quality in public companies

Several studies have explored the relationship between earnings quality and market liquidity and no consensus emerged in the literature regarding the possible impact of stock liquidity on the quality of reported earnings. On the one hand, high stock liquidity can reduce information asymmetry, making it easier to form a company block and helping large shareholders to exert governance through trading [Edmans, 2009; Li and Xia, 2021]. That can constrain managers' opportunistic behaviors aimed at shaping financial results intentionally. On the other hand, high stock liquidity may increase managers' incentive to manage earnings and decrease earnings quality by influencing executive remuneration. Jayaraman and Milbourn [2012] demonstrated that stock liquidity could enhance the proportion of equity-based compensation in total executive remuneration, increasing the temptation to implement earnings management practices.

The relationship between the liquidity of shares in public companies and earnings quality relates primarily to demonstrate the relationship between earnings management and stock market liquidity. Bar-Yosef and Prencipe [2013] tested the effects of corporate governance and earnings management on market liquidity measured by bid-ask spread and found no significant relationship between the scope of earnings management practices and bid-ask spreads, suggesting that investors do not rely on financial statements alone and are more focused on other indicators of information asymmetry risk. However, they showed that earnings management is positively related to trading volume. A possible explanation for such results is that high levels of earnings management can boost information asymmetry and create disagreement among market-makers on the possible outcome of an investment.

Baghfi et al. [2014] conducted similar research and found that market liquidity decreases at the time of earnings announcement as information asymmetry increases, as does the bid-ask spread. They suggested that public disclosure may accelerate trading volume. Parallel conclusions were drawn by Amawi and Abu-Nassar [2021] and they concluded that an increase in earnings management actions results in decreased stock liquidity. They also believed that earnings management has a significant inverse relationship with trading volume.

Huang et al. [2017] found evidence that, on average, stock liquidity is positively associated with DACC and also found that stock liquidity affects accrual-based earnings management through its effects on takeover pressure and equity compensation. As a result, it encourages managers to focus on short-term performance through earnings management. Li and Xia [2021] confirmed that higher stock liquidity helps to curb earnings manipulation by changing firms' real economic activities. They showed that the impact of stock liquidity on real earnings management is more pronounced for non-dividend-paying firms that cannot signal the quality of their earnings through dividend payments. Although Li and Xia's research focuses on real earnings management, managers may use accrual-based and real earnings management practices alternately, using them as "substitutes" for the intentional manipulation of the reported profit (loss) in the enterprise [Cohen and Zarowin, 2010; Zang, 2011]. Eghbali et al. [2020] examined the impact of accruals quality and earnings smoothing phenomenon on free float stock and found an inverse and significant relationship between accrual quality and the percentage of free float stocks or the number of trading days on the Teheran Stock Market. However, they also demonstrated that the number of trading days decreases as earnings smoothing practices increase.

In literature, a lack of wider comparisons is notable regarding earnings quality in companies differentiated by share liquidity. Based on this observation and the arguments discussed above, the following hypotheses were formulated:

H.2. High-share liquidity companies are characterized by greater earnings persistence and predictability than other non-financial companies listed on the Warsaw, Bucharest, and Budapest stock exchanges.

H.3. High-share liquidity companies manage their earnings to a lesser extent than other non-financial firms listed on the regulated markets in Warsaw, Bucharest, and Budapest.

2.4 Earnings quality in CEE – comparing two or more countries

There are many studies on the quality of reported earnings in CEE countries [Wójtowicz, 2010; Bistrova and Lace, 2012; Brzeszczyński et al., 2012; Piosik and Strojek-Filus, 2013; Beslic et al., 2015; Grabiński and Vladu, 2015; Istrate et al., 2015; Grabiński, 2016; Piosik, 2016; Cherkasova and Rasadi, 2017; Svitlík and Žárová, 2019; Klietnik et al., 2020; Piosik and Genge, 2020; Valaskova et al., 2021; Lizińska and Czaplewski, 2023a] and most focus on accrual-based earnings management, wherein companies purposefully intervene in the external financial reporting process to obtain private gain [Schipper, 1989].

Callao et al. [2020] investigated the influence of macroeconomic conditions on the earnings management of enterprises from emerging CEE countries for over two decades of the 21st century. Their most important observation is that there was a considerable decrease in earnings management practices and an improvement in financial statements quality during the EU access period. Moreover, they found that CEE firms tended to upward earnings management activities during the period of financial crisis (2007–2009), and this finding can be explained by the fact that managers try to smooth the negative effect of financial fluctuations and manipulate earnings levels to fulfill the set companies' objectives.

Stojanovic and Borowiecki [2015] examined the distributions of the first two digits in quarterly earnings numbers before and after taxes and found the geographical diversity of earnings management in European

countries. They revealed that firms from the CEE region are engaged in earnings management to a lesser degree and are more likely to exhibit rounding behavior with negative earnings.

Focusing on research that directly describes the differences in earnings quality in CEE countries, Lindahl and Schädewitz [2017] analyzed the distribution of net income in post-communist countries and discovered that the earnings quality in firms operating in the CEE region during 2005–2010 was poor, which was confirmed by the observation that far more companies showed small gains than small losses. However, this trend was more observable in southern CEE countries with the lowest GDPs (Slovenia, Croatia, Romania, Bulgaria) and relatively rare in the Baltic republics.

Bistrova and Lace's [2012] empirical analysis focuses on the relationship between the quality of corporate governance and earnings quality by analyzing the accruals level versus corporate assets determination ratio and the discrepancy between the operating cash flow and the operating or net income. They conclude that Latvian, Polish, and Romanian enterprises, more often than average, reported net incomes higher than the operating cash flows. By contrast, Estonian, Lithuanian, and Slovakian firms provide more credible results as they reported higher net income less often than average. However, Bistrova and Lace demonstrated that the scope of earnings manipulation in CEE companies is quite low, making them attractive to investors.

Kliestik et al. [2020] analyzed the reported levels of earnings before deducting interest and taxes (EBIT) in enterprises from the Visegrad Four (i.e., the Czech Republic, Hungary, Poland, and Slovakia), based on the premise that the development of earnings management in these countries is not random. Focusing on the 2008–2019 period, they found that managers from Slovak, Czech, Polish, and Hungarian enterprises conduct earnings management differently and confirmed an upward trend in earnings manipulation. They also noted a specific year caused a significant mean change in earnings management in each country: 2014 in Slovak, Polish, and Hungarian companies, and 2013 in Czech companies, which implemented earnings manipulation more flexibly and sooner.

In the subsequent study, Kliestik et al. [2021] focused their attention on the issue of implementing income smoothing in firms from the Visegrad Group countries. Using the non-parametric Kruskal–Wallis test, they gathered evidence that Poland was the biggest manipulator of earnings in 2015–2017, followed by Hungary and the Czech Republic. On the other hand, the lowest level of earnings management was detected in Slovakia.

Valaskova et al. [2021] focused on demonstrating the determinants of accrual-based earnings management in public joint-stock companies in the Visegrad Group countries. They considered the NACE sectoral classification, showing that, in general terms, income-increasing earnings manipulation is practiced in the economic sectors such as construction, information and communication, financial and insurance activities, professional activities, scientific and technical activities, and administrative and support service activities. In turn, income-decreasing accrual-based earnings management is characteristic for firms in the agriculture, forestry and fishing, manufacturing, electricity, gas, steam and air conditioning supply, wholesale and retail trade, repair of motor vehicles and motorcycles, and real estate activities sectors. They also confirmed significant differences in the range of DACC separated by the Jones model across all examined countries.

Similarly, Michalkova [2021] surveyed public companies in the Czech Republic, Poland, Slovakia, and Hungary, examining the relationship between earnings quality and organizational life cycles. She evidenced that earnings management proxies in individual countries point to significant differences in applying accrual-based earnings management practices. Empirical tests show that Czech companies are the most manipulated by earnings in terms of total and short-term DACC, while Polish firms intentionally manage profit (loss) to the smallest degree. Michalkova found that, generally, companies from Central Europe implement accounting manipulations in the growth and shake-out stages. In other stages, AEM practices in the tested sample were not confirmed. Durana et al. [2021] tested the impact of bankruptcy risk on the level of earnings management in the life cycle stages of a sample of companies from the emerging economies of Central European countries. One important finding is that Slovak and Czech companies

manipulate profits downward to a similar extent, while Polish and Hungarian companies increase accounting profits.

Again, due to the unclear direction in the association between earnings quality in individual countries of CEE, the fourth hypothesis is formulated as follows:

H.4. The earnings quality in high-share liquidity companies differs statistically due to the stock exchange on which individual firms are listed.

2.5 Earnings quality amid the economic turbulence of the SARS-CoV-2 pandemic

The issue of earnings quality during periods of financial turbulence is not absent in the subject matter literature [Chia et al., 2007; Trombetta and Imperatore, 2014; Arthur et al., 2015]. However, limiting the research field only to the period after the SARS-CoV-2 outbreak, one can find a few noteworthy studies on the impact of the pandemic on the earnings quality of companies from various regions around the world.

Yan et al. [2022] discovered that the economic problems of enterprises during the SARS-CoV-2 pandemic intensified accrual-based earnings management behavior. Moreover, companies that face high financial constraints exhibited a more obvious negative effect of SARS-CoV-2 on their earnings management practices. They also found that firms with more investment opportunities sent clearer signals of earnings management than other companies. Liu and Sun [2022] noted that American companies saw a significant decrease in DACC values alongside a significant increase in the absolute value of DACC (absDACC) from 2019 to 2020. They said that US firms used income-decreasing DACC in the pandemic year to inflate earnings in subsequent periods. Based on the financial statements of listed companies from 15 European countries, Lassoued and Khanchel [2021] demonstrated that EU firms tended to present lower-quality financial reports during the SARS-CoV-2 pandemic period. The evidence suggested that the enterprises were more likely to use income-increasing DACC to manage earnings upward, and these actions could be explained by the fact that managers tend to show firms' economic performance in a better light in the eyes of their stakeholders (e.g., displaying an acceptable level of losses). Ali et al. [2022] examined public companies from the G-12 countries between 2015 and 2020. They revealed that (in the context of all surveyed enterprises) joint stock companies tended to engage less in earnings management practices during the SARS-CoV-2 pandemic. They also found that companies in countries strongly affected by the pandemic did not report a significant decrease in earnings manipulation by accruals.

Lizińska and Czaplewski [2023] showed the evolution of accrual-based- and real earnings management during the financial crisis caused by the SARS-CoV-2 pandemic in Poland. They proved that in 2020 (compared to the previous year), there was a noticeable change in DACC among nonfinancial public companies and interpreted this phenomenon as a weakening of the tendency of companies to overstate profits by interfering in the financial reporting process. In addition, they showed that listed companies seemed more likely to adopt a big bath strategy to increase their ability to overstate their earnings in the future.

However, there remains a significant research gap in the literature on earnings quality during the SARS-CoV-2 pandemic concerning other CEE companies. Hence, by verifying the following hypotheses, this paper makes a valuable contribution to the discussion:

H.5. The absolute values of discretionary accruals in CEEplus index companies in 2020 were statistically higher than in 2019, which proves the greater range of earnings manipulation due to the SARS-CoV-2 turbulences.

H.6. In the tested sample, the average values of discretionary accruals were positive in 2020, which reflects the use of income-increasing discretionary accruals to manage earnings upward.

3 Research methodology

The research sample used in this paper consisted of two separate groups. The basic research sample comprised 80 high-shares liquidity companies from the Warsaw, Bucharest, and Budapest stock exchanges. To satisfy the primary qualification criteria for the research, which requires high liquidity of traded shares, individual enterprises were selected based on their inclusion in the CEEplus index. This index comprises companies from the region whose average turnover per session over 6 months exceeds EUR 90,000. So that Polish companies do not dominate the CEEplus index, a limit was set: the weight of companies from one country could not exceed 50%. Additionally, the weight of the largest company was reduced to 10%, and the sum of companies over 5% was reduced to 40%. Due to the differences in the templates of financial statements, public enterprises in the following sectors were excluded from the research: banks, insurance, capital market, real estate, leasing and factoring, receivables, financial intermediation, and investment activities. The set research sample includes 96.4% of all nonfinancial joint-stock firms from the CEEplus index.

The second research sample consisted of the 291 remaining nonfinancial public companies from the Warsaw, Bucharest, and Budapest stock exchanges that were characterized by lower liquidity of shares. Recognizing those firms as benchmarks for companies with highly liquid shares in assessing earnings quality could be explained by the fact that Poland, Romania, and Hungary are the largest markets in the CEE region. Additionally, the Warsaw Stock Exchange (WSE) is responsible for calculating and publishing the CEEplus index. The research period covered was 2012–2020 for all investigated companies. Financial data used in the study were taken from the EMIS database. A full description of the selection of individual enterprises for the research is shown in Table 1.

The quality of reported earnings was assessed using three measures: persistence, predictability, and accrual quality. Earnings persistence (PERS) measures the extent that current earnings remain or recur in future periods. This situation is desirable in the eyes of investors, as it may indicate the effective allocation of capital in the shares of a given company. The following model was used to measure earnings persistence [Sloan, 1996; Perotti and Wagenhofer, 2014]:

$$\text{NIBE}_{t+1} = \alpha_1 + \beta_1 \text{NIBE}_t + \varepsilon_t \quad (1)$$

Where: NIBE_t – net income scaled by total assets at the beginning of period t ; α_1 – constant (in the regression model); β_1 – a parameter (in the regression model); ε_t – a random error.

It is assumed that the value of the parameter β_1 determines the company's earnings persistence. For calculation purposes, the estimated value of parameter β_1 has been denoted as the PERS ratio.

The second earnings quality measure used in this investigation is predictability (PRED). As with persistence, predictability is considered an advisable attribute of earnings because it enhances the

Table 1. The characteristics of the research sample

Basic sample – non-financial companies from the WSE, BVB, and BUX; indexed in CEEplus (high-share liquidity firms)	Additional sample – remaining nonfinancial firms from the regular markets of WSE, BVB, and BUX (lower share liquidity companies)
Verified hypothesis: H1, H4, H5, H6	
Verified hypothesis: H2, H3	
Total sample – 80	Total sample – 291
Companies from the WSE – 59	Companies from the WSE – 215
Companies from the BVB – 9	Companies from the BVB – 45
Companies from the BUX – 12	Companies from the BUX – 31

BUX, Budapest Stock Exchange; BVB, Bucharest Stock Exchange; CEE, Central and Eastern Europe; WSE, Warsaw Stock Exchange.

Source: own elaborations.

precision of future earnings forecasts. Predictability is computed as the R^2 of the Sloan regression model (Eq. 1).

The third aspect of analyzing the earnings quality of public companies listed in the CEEplus index was estimating DACC, which were separated by the Jones model [1991]. DACC are evaluated based on the difference between the empirical and theoretical values of the total accruals, wherein endogenous variables were calculated using the balance-sheet approach. Estimations were conducted separately for each enterprise. The research assumes that the implemented scheme of accrual-based earnings management might be highly specific for each company and depends largely on internal circumstances and motives that prompt the managers to manipulate earnings. The Jones model adopts the following analytical formula:

$$\frac{TACC_t}{TA_{t-1}} = \alpha_1 \left(\frac{1}{TA_{t-1}} \right) + \alpha_2 \left(\frac{\Delta REV_t}{TA_{t-1}} \right) + \alpha_3 \left(\frac{PPE_t}{TA_{t-1}} \right) + \varepsilon_t \quad (2)$$

Where: $TACC_t$ – total accruals in period t (determined by the balance sheet approach); TA_t – total assets in year t ; REV_t – revenues from sales in year t ; PPE_t – gross property, plant, and equipment in year t ; other designations – as above.

As mentioned earlier, the value of DACC is equal to the value of the random error in the regression model. When DACC deviate significantly from zero, it suggests a higher degree of accounting-based earnings manipulation in the company. It simultaneously demonstrates the lower quality of the reported earnings.

The empirical investigation also used the following research methods: the Kruskal–Wallis test, the U Mann–Whitney test, the Wilcoxon Signed Ranks test, statistics of variable distribution, statistical significance tests, and Spearman's rank correlation coefficients.

4 Results of the empirical research

The first step of the empirical research evaluated the descriptive statistics of the earnings quality measures (Table 2). The results indicate that in the public companies included in the CEEplus index, the mean values of the PERS and PRED ratios were 0.337 and 0.210, respectively. Other cells in Table 2 show that the strategies of intentionally lowering the financial result prevailed. This observation is evidenced by the negative average values of DACC separated by the Jones model. In addition, among

Table 2. Descriptive statistics and tests of normality for individual earnings quality measures

Earnings quality measure	Descriptive statistics				
	Minimum	Maximum	Mean	SD	Variance
DACC	−0.160	0.060	−0.004	0.026	0.001
PERS	−0.910	2.120	0.337	0.525	0.275
PRED	0.000	0.940	0.210	0.228	0.052
Earnings quality measure	Tests of normality				
	df	Kolmogorov–Smirnov	Shapiro–Wilk		
DACC	80	0.337	0.000	0.612	0.000
PERS		0.044	0.200	0.990	0.751
PRED		0.203	0.000	0.837	0.000

DACC, discretionary accruals; PERS, persistence; PRED, predictability; SD, standard deviation.

Significant at the 0.05 level.

Source: own elaborations.

Table 3. Relationship between individual earnings quality measures outlined by Spearman's rho coefficients

Variables	DACC	absDACC	PERS	PRED
DACC	1.000	0.006	-0.067	-0.063
absDACC	0.006	1.000	-0.257*	-0.189
PERS	-0.067	-0.257*	1.000	0.719**
PRED	-0.063	-0.189	0.719**	1.000

absDACC, absolute values of DACC; DACC, discretionary accruals; PERS, persistence; PRED, predictability.

*Significant at the 0.05 level.

**Significant at the 0.01 level.

Source: own elaborations.

all the earnings quality indicators examined in this study, the earnings persistence ratio (PERS) was by far the smallest cluster around the arithmetic mean. This is proven by the computed values of classic dispersion measures, such as standard deviation (SD) or variance. However, in the case of the PERS ratio, the normality tests showed that the variable has a distribution close to normal. Therefore, a simultaneous analysis of correlations between earnings quality measures was conducted using Spearman's rank correlation coefficients.

The subsequent step of the empirical research assessed the relationship between the individual earnings quality measures used in the investigation. From Table 3, one can infer that statistically significant dependences occurred only with two relationships. The first is the inverse relationship between absDACC extracted by the Jones model and earning persistence (PERS). The second is the strong positive correlation between earning persistence (PERS) and predictability (PRED). Thus, the research positively verified the first hypotheses.

The analyses using the *U* Mann–Whitney test showed that the values of earnings persistence and predictability ratios calculated for companies included in the CEEplus index do not differ statistically from those of the remaining nonfinancial enterprises listed on the Warsaw, Bucharest, or Budapest stock exchanges (Table 4). Slightly different conclusions could be drawn from the research on the factors that shape the values of DACC on the investigated markets (indices). Comparing companies included in the CEEplus index and the other nonfinancial firms listed on the regulated market of the Bucharest (BVB) and Budapest (BUX) stock exchanges shows statistical differences in the values of the DACC and absDACC ratios. However, the results mean that it is not possible to verify the second or third research hypotheses and also reveal that the earnings quality of companies with high-share liquidity does not differ from that of other public enterprises listed on the regulated markets in Poland, Romania, and Hungary.

Extensive empirical research revealed that earnings quality among companies on the CEEplus index might vary depending on the market on which the firm's shares were listed. For clarification, this study used the Kruskal–Wallis test, where the null hypothesis is that the mean ranks of the groups are the same. The results of the empirical research presented in Table 5 enable us to reject the hypothesis for earnings persistence (PERS) and predictability (PRED). Further, multiple comparisons were necessary to determine the subpopulations in which statistically significant differences existed in shaping the DACC variables, as revealed by the Kruskal–Wallis test results. The results of the *U* Mann–Whitney tests underlined that the values of PERS and PRED ratios calculated for companies listed on the BVB differed statistically from the values of these measures calculated for enterprises listed on the WSE or the BUX (Table 6). Precisely, the quality of reported earnings by companies listed on the BVB stock exchange was higher in both cases. On the other hand, no statistical differences in the medians of earnings persistence and predictability ratios between enterprises from the WSE and BUX stock exchanges. Nevertheless, the research enables us to positively verify the fourth research hypothesis, i.e., that earnings quality varies significantly due to the stock exchange in which individual firms are listed.

Table 4. Results of the *U* Mann–Whitney test concerning earnings quality of CEEplus index companies and other nonfinancial enterprises listed on the WSE, BVB, and BUX stock exchanges

Earnings quality measures	Market comparison	Mean rank	Test statistics Mann–Whitney <i>U</i>	<i>Z</i>	<i>p</i> -value
Comparison with Prime Market of WSE					
DACC	CEEplus	151.23	8.632.50	−0.280	0.781
	WSE	148.15			
absDACC	CEEplus	146.07	8.575.00	−0.363	0.717
	WSE	150.12			
PERS	CEEplus	153.39	8.455.00	−0.544	0.586
	WSE	147.33			
PRED	CEEplus	154.84	8.336.00	−0.724	0.471
	WSE	146.77			
Comparison with BVB					
DACC	CEEplus	63.83	1.174.00	−1.990	0.046
	BVB	50.39			
absDACC	CEEplus	56.19	1.255.00	−1.536	0.127
	BVB	66.47			
PERS	CEEplus	60.40	1.448.00	−0.412	0.678
	BVB	57.61			
PRED	CEEplus	58.22	1.422.00	−0.562	0.572
	BVB	62.08			
Comparison with BUX					
DACC	CEEplus	49.43	714.00	−0.409	0.683
	BUX	52.42			
absDACC	CEEplus	47.10	528.00	−2.061	0.039
	BUX	62.21			
PERS	CEEplus	50.80	696.00	−0.596	0.571
	BUX	46.63			
PRED	CEEplus	49.53	722.00	−0.338	0.736
	BUX	52.00			

absDACC, absolute values of DACC; BUX, Budapest; BVB, Bucharest; CEE, Central and Eastern Europe; DACC, discretionary accruals; WSE, Warsaw; PERS, persistence; PRED, predictability.

Significant at the 0.05 level.

Source: own elaborations.

The subsequent step determined whether there are statistically significant differences between DACC values computed for 2019 and 2020. The fifth research hypothesis, i.e., that the range of accrual-based earnings management in the CEEplus companies in 2020 was higher than the previous year was confirmed by the Wilcoxon Signed Ranks Test results (Table 7). The mean absDACC extracted by the Jones model in 2020 were statistically higher than in 2019. However, the results demonstrated that the scope of earnings management in 2020 (assessed by absDACC) was very similar to two periods earlier (2018).

On the other hand, the sixth research hypothesis, i.e., that during the SARS-CoV-2 pandemic economic turbulences, strategies of intentionally shaping earnings upward prevailed was not confirmed (Table 8). The analyses show that the average values of DACC in 2020 were negative. Moreover, during this period, the percentage of enterprises with negative DACC ratios distinctly increased (compared to 2018 and 2019).

Table 5. Results of the Kruskal–Wallis test concerning earnings quality among the CEEplus index companies listed on the regular markets of the BVB, BUX, and WSE

Earnings quality measure	Market	Mean Rank	Test statistics Kruskal–Wallis H	p-value
DACC	BVB	39.88	1.400	0.496
	BUX	48.42		
	WSE	39.69		
absDACC	BVB	31.50	5.315	0.070
	BUX	54.25		
	WSE	39.64		
PERS	BVB	61.38	6.662	0.036
	BUX	39.17		
	WSE	38.69		
PRED	BVB	61.50	6.743	0.034
	BUX	38.42		
	WSE	38.82		

absDACC, absolute values of DACC; BVB, Bucharest Stock Exchange; BET, Budapest Stock Exchange; CEE, Central and Eastern Europe; DACC, discretionary accruals; WSE, Warsaw Stock Exchange; PERS, persistence; PRED, predictability.

Significant at the 0.05 level.

Source: own elaborations.

Table 6. Earnings quality in companies listed in individual stock exchanges from the CEE – a pairwise comparison using the *U* Mann–Whitney test

Examined variable - earnings persistence				
Sample 1–Sample 2	Mean rank	Test statistics Mann–Whitney <i>U</i>	<i>Z</i>	<i>p</i> -value
BVB–BUX	14.13	19.00	–2.238	0.025
	8.08			
BVB–WSE	51.75	110.00	–2.51	0.012
	32.80			
BUX–WSE	37.58	359.00	–0.104	0.917
	36.89			
Examined variable – earnings predictability				
Sample 1–Sample 2	Mean rank	Test statistics Mann–Whitney <i>U</i>	<i>Z</i>	<i>p</i> -value
BVB–BUX	14.00	20.00	–2.161	0.030
	8.17			
BVB–WSE	52.00	108.00	–2.549	0.010
	32.77			
BUX–WSE	36.75	363.00	–0.045	0.964
	37.05			

BUX, Budapest Stock Exchange; BVB, Bucharest Stock Exchange; CEE, Central and Eastern Europe; WSE, Warsaw Stock Exchange.

Significant at the 0.05 level.

Source: own elaborations.

Table 7. Descriptive statistics and the Wilcoxon Signed Ranks Test results measuring the absDACC in CEEplus index companies, 2018-2020

Year	Minimum	Maximum	Mean	SD	Variance
2018	0.000	1.361	0.091	0.161	0.026
2019	0.000	0.468	0.059	0.079	0.006
2020	0.000	0.803	0.094	0.134	0.018
Ranks				Wilcoxon signed ranks test statistics	
Comparison		Mean rank	Sum of ranks	Z	p-value
2020–2018	Negative ranks	38.34	1,687.00	–0.067	0.947
	Positive ranks	45.16	1,716.00		
2020–2019	Negative ranks	30.74	1,168.00	–2.466	0.014
	Positive ranks	50.80	2,235.00		
2019–2018	Negative ranks	47.76	2,340.00	–2.952	0.003
	Positive ranks	32.21	1,063.00		

absDACC, absolute values of DACC; CEE, Central and Eastern Europe; DACC, discretionary accruals; SD, standard deviation. Significant at the 0.05 level.

Source: own elaborations.

Table 8. Descriptive statistics and frequency of positive/negative DACC in the CEEplus index companies, 2018–2020

Year	% of observations		Minimum	Maximum	Mean	SD	Variance
2018	<0	45.12	–0.293	1.361	0.024	0.183	0.034
	>0	54.88					
2019	<0	50.00	–0.468	0.346	–0.005	0.098	0.010
	>0	50.00					
2020	<0	56.10	–0.803	0.495	–0.007	0.165	0.027
	>0	43.90					

CEE, Central and Eastern Europe; DACC: discretionary accruals; SD, standard deviation.

Source: own elaborations.

5 Conclusions and limitations

The contents of reported earnings include various financial variables such as income, profits, costs, money, financial capital, loans, and receivables. These classes reflect the results of the company's business performance in its various sections/divisions to achieve specific effects, for example, an increase in the value of the enterprise, maximization of benefits for the owners, or strengthening the company's financial security. Thanks to appropriate accounting instruments and operational activities, it is possible to present the company's financial standing in a better light in the eyes of selected groups of company stakeholders, contributing to lower earnings quality.

The results of the empirical research include significant several findings. First, they emphasize that although the general nature of earnings quality in companies characterized by a high degree of share liquidity is similar to the quality of reported results in other nonfinancial public companies of CEE, some local differences can be observed. Second, companies listed on the Bucharest Stock Exchange tend to provide higher earnings quality than other enterprises in the CEEplus index. This applies, in particular,

to earnings persistence and predictability. Third, the empirical analysis shows that in the tested sample in 2012–2020, there was a noticeable domination of managerial practices aimed at lowering the financial results. Interestingly, similar activities prevailed in 2020, i.e., when there were negative economic effects due to the SARS-CoV-2 pandemic.

The main problem encountered during the empirical investigation was the lack of disclosure of operating cash flows in the financial statements obtained using the EMIS database. This limited the potential research field, which meant that alternative measures of earnings quality, such as earnings smoothness [Perotti and Wagenhofer, 2014], real earnings management coefficients [Roychowdhury, 2006], or degree of conservatism [Ball and Shivakumar, 2005], were not considered in this study. In addition, it was not possible to calculate total accruals using the cash flow approach for all tested companies.

The empirical research does not meet the generalization conditions for at least two reasons. One is the relatively short reference period of nine consecutive years. The second limitation is the research methods used. For example, the use of a single regression model to extract individual subcategories of DACC while leaving others in the background [e.g. Dechow et al., 1995; Dechow and Dichev, 2002; McNichols, 2002; Ball and Shivakumar, 2005] may have influenced the character of the empirical results.

Despite this, this study has drawn attention to the literature gap regarding the relationship between earnings quality and share liquidity. It also points out the need to continue scientific research on the issues of measuring the quality of reported accounting data, especially in the context of companies from CEE.

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