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Earnings Management amid the COVID-19 Financial Crisis: The Experience of Poland*

Zarządzanie zyskami w czasie kryzysu finansowego COVID-19: doświadczenia Polski

Abstract

This study examines the consequences of the COVID-19 turbulence on the informativeness of financial reporting. Using data from non-financial public companies in Poland, our evidence documents the evolution of accrual and real earnings management during the pandemic period. We estimate earnings quality with cross-sectional models, observing abnormal accruals, abnormal cash flow from operations, abnormal discretionary expenditures and abnormal production costs. We contribute to the debate on earnings management during financial crises. Specifically, discretionary accruals declined significantly during the crisis. This suggests companies were less eager to inflate earnings via accruals. Polish firms also seemed to be more inclined to adopt the 'big bath' strategy to inflate future income. Additionally, the research provides support for predictions that real earnings management gained importance during the turbulence when the total effect of boosting income through real transactions was significant. It suggests that during the COVID-19 crisis companies based their strategies more on the probability of being detected, rather than on the cost of such activities. The study adds to the debate on the qualitative characteristics of earnings as key accounting information and its importance in corporate finance, issues that cannot be overestimated from the perspective of company stakeholders.

Streszczenie

Niniejsze badanie dotyczy oceny konsekwencji zawirowań na rynku wywołanych pandemią COVID-19 dla informacyjności sprawozdawczości finansowej. Jakość zysków została oszacowana za pomocą modeli przekrojowych, umożliwiających ocenę dyskrecjonalnych korekt memoriałowych, dyskrecjonalnych operacyjnych przepływów pieniężnych, dyskrecjonalnych kosztów uznaniowych i dyskrecjonalnych kosztów produkcji. Na podstawie danych dotyczących niefinansowych spółek publicznych w Polsce wykazano ewolucję zarządzania zyskiem typu memoriałowego oraz poprzez rzeczywiste transakcje w czasie kryzysu finansowego, co

istotnie poszerza dotychczasowy stan wiedzy w tej dziedzinie. W szczególności w czasie kryzysu istotny był spadek korekt memoriałowych. Można to interpretować jako osłabienie skłonności do zawyżania zysków poprzez ingerencję w proces raportowania finansowego. Spółki wydawały się również bardziej skłonne do przyjęcia strategii *big bath*, aby zwiększyć swoje możliwości zawyżania dochodów w przyszłości. Ponadto badania potwierdziły, że na znaczeniu zyskało zarządzanie zyskami poprzez oddziaływanie na transakcje. Sugeruje to, że w czasie kryzysu COVID-19 firmy kształtowały swoje strategie, opierając się w większym stopniu na prawdopodobieństwie wykrycia niż na kosztach takich działań. Badanie stanowi głos w dyskusji nad jakością zysków jako kluczowego elementu raportowania i nad jej znaczeniem w finansach przedsiębiorstw, które to elementy dla interesariuszy firmy są nie do przecenienia.

Introduction

Earnings play a vital role in the assessment of corporate financial performance and future prospects. As reported income is closely monitored by stakeholders, high-quality financial reports are essential for accounting information users to make proper decisions. As the importance of income is hard to overestimate, companies sometimes have incentives to influence its level to meet certain profit targets. Considering the discretion of managers in decision making in the area of corporate finance management and the reporting process, the natural question arises whether these possibilities are used to make financial statements more informative or the reverse. The informativeness of financial reports during financial distress is not a new issue in the literature (e.g. **Arthur et al.** [**2015**], **Campa** [**2019**]). However, the worldwide COVID-19 pandemic induced market turbulence that seemed very different from previous crises [**Reinhart, 2022**; **Stiglitz et al., 2020**]. The pandemic's impact on the global economy was undoubtedly visible from the very beginning. This fuelled our motivation to examine the impact of the COVID-19 market downturn on the quality of financial reporting. An additional possible contribution stems from the fact that the results of the existing literature on information transparency during previous crises remain inconclusive. The aim of this research is to examine the informativeness of financial reports at a time when the overall economy suffered turbulence induced by the COVID-19 health crisis.

Earnings quality is unobservable directly, which inevitably leads to the application of proxies of earnings management, a process that weakens the informativeness of financial reports. To put it concisely, earnings management can be defined as "the practice of distorting the true financial performance of the company" [**Klein, 2002**]. Hence, we apply inverse proxies for earnings quality, and so the lower the extent of misleading accounting practices, the better the quality of earnings.

The first area of contribution is connected with examining the quality of financial reports when the overall economy is down. There are several alternative directions of its evolution. First, crisis periods could be accompanied by pressures to constrain earnings management activities to reduce information asymmetry. On the other hand, companies may be more inclined to boost earnings aggressively as their financial situation deteriorates to conceal financial troubles through earnings management activities. Third, there is a possibility of "taking a big bath" during unfavourable times and making poor earnings even worse to enhance profits in the future. Our expectations about the change of earnings management activities during the COVID-19 pandemic are mixed as some companies or even industries could suffer the devastating consequences of the health crisis, whereas other companies have opened up unprecedented opportunities. The existing research on the relationship between current market downturns and the transparency of financial reports in other countries remains inconclusive.

An additional potential contribution of this research stems from the fact that we discuss a set of earnings management tools as companies can use a mix of alternatives. Hence, the question about changes in earnings

quality during crises relates not only to the extent of profit opacity but is also connected with trading off possible strategies. Basically, the literature distinguishes two types of earnings management tools that influence the quality of financial reports, aimed at either decreasing or increasing earnings. The first is based on accruals. This influences income in financial reports but has no direct consequences for cash flow. The second, namely real earnings management, occurs when companies change transactions and it influences cash flow, as well as takes place throughout the reporting period [**Roychowdhury, 2006**]. The existing literature highlights the fact that accrual manipulation is more easily detectable by external auditing or regulatory bodies. It is also expected to be cheaper and easier to implement than influencing real activities. On the other hand, activities that impact a company's cash flow appear to have lower probability of being detected but may be costlier for companies. Hence, companies can trade off accrual- and real-based earnings management tools, regarding the cost and detectability of both strategies [**Campa, 2019**; **Zang, 2012**]. The choice between accrual- and real-based earnings management may be especially important during crisis periods. This was the incentive for us to examine both accrual and real activities in our research.

An important additional argument for the contribution of this paper is connected with focusing the research on Poland. First, it gives us the possibility to discuss country-specific factors. Based on prior academic discussion, we posit that earnings quality in markets such as Poland may be quite different from the evidence for Chinese listed firms or findings for well-developed economies such as the United Kingdom or the United States. National factors are considered to be important drivers of earnings management [**Bao, Lewellyn, 2017**]. Earnings quality was found to vary across countries [**Bao, Lewellyn, 2017**]. Country-specific results on earnings management in turbulence were reported for the 1997 financial crisis by Charoenwong and **Jiraporn** [**2009**]. Another argument for the research on earnings informativeness in Poland underlines that the country combines the features of an emerging and a developed market. Hence, there is limited scope for the generalisation of previous results on earnings management during the pandemic reported for developed countries such as the United States, the UK or G12 countries [**Ali et al., 2022**; **Hsu, Yang, 2022**; **G. Liu, Sun, 2022**], or emerging countries such as China [**Xiao, Xi, 2021**]. Finally, too little research has been carried out on earnings management among companies in Poland, even though this country generates the sixth-largest GDP in the European Union. To the best of our knowledge, there is no study focused on earnings management among companies listed on the Warsaw Stock Exchange, covering the period of the most recent global financial crises, including the COVID-19 crisis. Some of the previous studies for other countries reveal that the quality of financial reporting shows significant changes in earnings management strategies during market turbulence. However, the global evidence is inconclusive.

This study provides evidence of the impact of the COVID-19 pandemic on the qualitative characteristics of key accounting information in Poland. First, it shows that discretionary accruals significantly declined during the crisis. We also found that some companies seem to be more eager to implement the "big bath" accrual-based strategy to boost future earnings. The analysis shows that abnormal accruals tended to be more negative in the crisis year. Our evidence also suggests that real earnings management through abnormal discretionary expenditures, abnormal production costs, and abnormal cash flow from operations was significant and aimed at boosting earnings during the crisis year. Our findings give partial support to the hypothesis that accrual and real earnings management during this turbulent period was industry-specific.

This research makes several contributions to the existing literature and practice. It provides results that allow for a better understanding of earnings management strategies during turbulent periods. The study provides new evidence with respect to the impact of financial turbulence on the quality of financial reports. This issue was raised in the context of the Asian crisis [**Vichitsarawong et al., 2010**] and the 2008 global financial crisis [**Filip, Raffournier, 2014**; **Li et al., 2020**]. Empirical evidence on earnings quality during the COVID-19 downturn remains limited [**Ali et al., 2022**; **Hsu, Yang, 2022**; **G. Liu, Sun, 2022**; **Xiao, Xi, 2021**]. Considering the unprecedented COVID-19 global turmoil, it is important to examine its consequences for the quality of accounting information. Next, we add to the literature on the possible trade-off between accrual- and real-based earnings management. We discuss both methods of earnings management. This is still quite a rare approach

in the existing literature, especially in studies not involving the United States and China. The research gap is even more pronounced for literature with a crisis context. There have only been a few studies that address the problem of earnings quality during the pandemic, and none of them have examined the choice between accrual- and real-based earnings management between the pre-pandemic and pandemic years. Third, we contribute by providing country-specific results. As for now, this perspective is almost missing in the literature on the quality of reporting in crisis. Despite the growing research on the economic consequences of COVID-19, this is among the first studies to examine earnings management among European public companies during the pandemic period. The fourth contribution refers to industrial differences in earnings quality. As the COVID-19 pandemic induced both threats and opportunities to different sectors, we provide evidence on the difference in the quality of accounting information for all non-financial industries.

The rest of the paper has the following structure. The next section frames this research with regard to the existing literature and develops the hypotheses. Second, the data and methods are described. Third, the empirical results on accrual and real earnings management are detailed. The last section concludes the study, highlighting its main contributions, limitations and outlining future research directions.

Literature review

The academic discussion on earnings quality has been broad and touched on many areas. The issue has been examined immediately prior to certain corporate events (e.g. public equity offerings or debt issues, as in **Y. Liu et al., 2010**; and **Teoh et al., 1998**), in specific corporate circumstances (e.g. when specific companies suffer financial difficulties, as in **Ghazali et al.** [**2015**]), following regulatory reforms (as in the case of the SOX Act of 2002, see **Cohen et al.** [**2008**]), or in relation to other financial strategies (for example, financial flexibility, as examined by **Farinha et al.** [**2018**]). Previous research has undoubtedly demonstrated the increased appreciation of the importance of earnings quality in many areas of corporate finance management.

The issue of earnings quality during periods of financial turbulence is not absent in the literature. There has been increasing scholarly attention paid to the relationship between company reporting policies and financial crises. The most common examples include the 1997 Asian crisis, the 2008 global financial crisis, and, just recently, the COVID-19 health and financial crisis. Another stream of research examines the link between reporting quality and the financial distress of a single company without a direct connection to macroeconomic downturns. We mostly focus on the first mentioned area, and examine earnings quality under different macroeconomic conditions, leaving the issue of financial difficulties within a single firm for future research.

There is inconclusive empirical evidence on the impact of turbulent periods on the scale and direction of earnings management. The prevailing evidence is that financial crises impact company financial reporting policies, although the evidence is not unanimous. There is also no agreement on the direction of this relationship. Previous papers, focused mainly on the 2008 financial crisis, show that turbulent periods could be connected with either higher or lower financial reporting quality. Currently, only a few papers have attempted to examine the relationship between the COVID-19 turbulence and financial reporting quality. However, these empirical results are also ambiguous.

Macroeconomic market turbulence mostly involves unusual, unexpected and multifaceted events with far-reaching consequences. Periods of turbulence are expected to create higher risk and uncertainty levels. This usually results in greater information asymmetry. If companies exploit such situations and manage earnings more aggressively, stakeholders may be misled about true financial performance during a crisis. This is because managers may be willing to mitigate the negative consequences of macroeconomic crises. As a consequence, the quality of financial reports will deteriorate. This is not the only alternative. If the uncertainty occurs during a downturn, companies may be interested in reporting more conservatively to alleviate information asymmetry and limit the opaqueness of financial reports. Given the above, our expectations about reporting in the pre-pandemic and pandemic periods are multi-faceted.

First, companies may be inclined to window-dress poor financial performance during economic turbulence and feel pressure to assuage declines in earnings. This may prompt companies to inflate profits and engage in more aggressive accounting reporting to mitigate the negative impact of the crisis and convey more positive information to stakeholders. The pressure to boost earnings may be much stronger when companies experience macroeconomic crisis. Hence, a higher level of earnings management proxies would be expected, as suggested by **Smith et al.** [**2001**].

On the other hand, it is also possible that firms may be tempted to "take a big bath." Thus, they report even more severe losses in a crisis period, when many other companies also suffer from a market downturn. They hope to "make savings" so as to inflate earnings in the future. If the "big bath" scenario is driving companies' behaviour during periods of turbulence, we should observe more income decreasing activities in the pandemic year. Such a strategy has sometimes been observed during previous crises [**Chia et al., 2007**; **Jordan et al., 2021**; **Rusmin et al., 2013**].

Both situations described above are examples of more aggressive earnings manipulation during a crisis. They both result in a deterioration of the quality of financial reporting, even if they change income in the pandemic year in the opposite direction as earnings are managed up or down. However, there is also another possibility. If the performance deterioration is largely expected by investors during a crisis, there will be no additional incentive to either inflate profits during a recession or report bigger losses so as to boost income in the future. This can also be reinforced by arguments that crisis periods may induce greater auditor scrutiny and increase the risk of manipulation being detected. In consequence, the relationship between achieving targeted earnings and income-based compensation may be disturbed during crisis periods [**Arthur et al., 2015**; **Filip, Raffournier, 2014**]. Regardless, if these arguments work for the COVID-19 crisis, we should observe less earnings management leading to an enhanced quality of financial reports.

The existing research on the relationship between earnings quality and economic turbulence involves studies focused on the Asian 1997 crisis. **Chia et al.** [**2007**] report income decreasing earnings management via accruals during that crisis. They suggest that Singapore service-oriented companies applied the "big bath" strategy. A study by **Vichitsarawong et al.** [**2010**] for Hong Kong, Malaysia, Singapore, and Thailand concludes that earnings quality was low during the 1997 crisis and accounting policy moved towards a more aggressive approach. **Charoenwong and Jiraporn** [**2009**] reveal earnings management activities aimed at meeting positive income thresholds for non-financial companies in Singapore and Thailand.

Previous studies on the consequences of macroeconomic turbulence for accounting quality are inconsistent with regard to the 2008 global financial crisis. The research is much broader than in the case of the Asian crisis. Some scholars argued that companies were more willing to constrain earnings management during that financial crisis. For European companies, **Filip and Raffournier** [**2014**] show an increase in reporting quality measured with accruals. They indicate the importance of an increased risk of litigation and auditor monitoring during market downturns. This is consistent with **Arthur et al.** [**2015**]. They find that European companies tended to report more conservatively during the 2008 crisis than prior to it, as firms strove to reduce information asymmetry. **Kousenidis et al.** [**2013**] concluded that, on average, earnings quality improved during the debt crisis in the European Union. **Cimini** [**2015**] examines the effect of the financial crisis on financial reporting quality and suggests a decrease in earnings management after 2008 in a large majority of European countries. The research reveals that abnormal accruals were more negative in the post-crisis period than before the crisis.

General papers on crisis periods imply that financial distress does not have a monotonic effect on earnings quality as the relationship seems to be U-shaped [**Trombetta, Imperatore, 2014**]. They also conclude that the accrual-based quality of earnings is worse when a financial crisis becomes more extreme. **Rusmin et al.** [**2013**] revealed that transportation companies in seven Asian countries implemented "the big bath" accrual strategy and make poor earnings even worse during the downturn period in order to boost performance in the future. **Iatridis and Dimitras** [**2013**] observed that Portuguese, Irish, Italian, Greek and Spanish listed companies engaged in earnings management differently. For some countries, more earnings opaqueness was observed dur-

ing the crisis as a way to improve profitability. **Persakis and Iatridis** [**2015**] conclude that audit and reporting quality was lower during the 2008 financial crisis, particularly in countries with weak investor protection.

A series of recent scholarly works has examined earnings quality during the COVID-19 pandemic. There have been several studies on this issue in different country settings. **G. Liu and Sun** [**2022**] examined US firms and found that discretionary accruals significantly declined from 2019 to 2020. American firms engaged in more income-decreasing earnings management. The absolute value of discretionary accruals significantly increased in the pandemic year, which is in line with the claim that companies adopted "the big bath" strategy. **Ali et al.** [**2022**] showed that in G12 countries less adversely affected by the pandemic, companies engaged less in accrual-based earnings management during the COVID-19 crisis. However, companies in countries strongly hit by the pandemic did not report a significant decrease in earnings manipulation by accruals. **Xiao and Xi** [**2021**] revealed an increase in accrual-based earnings management in the most severely affected Chinese regions. They also reported a significant decline in the absolute value of real activities proxies. **Hsu and Yang** [**2022**] conclude that the quality of financial reporting in UK companies was lower when the overall economy was down as firms undertook aggressive earnings management practices through real activities.

Although there are several studies on earnings management during a crisis for the United States, the UK or China, there is a significant research gap in the literature on the quality of financial reports for European countries including Poland. The research on reporting quality for Polish companies does not cover the pandemic period. It has focused on selected industries in previous periods [**Comporek, 2018**], SMEs [**Wójtowicz, 2015**], and on income smoothing [**Piosik, 2016**], or was connected with equity offerings [**Lizińska, Czapiewski, 2019**]. The existing literature on earnings management for companies in Poland has not discussed the problem of aggressive accounting activities during market downturns, including the COVID-19 period. The only research on the consequences of the pandemic for earnings quality for Polish companies was carried out by **Lassoued and Khanchel** [**2021**] in a cross-country sample, with a small sample of 52 observations. They showed that the financial reports of European companies tended to be less reliable during the pandemic as companies inflated earnings via accruals to a greater extent than during the preceding period.

Based on the existing research gap, the theoretical framework and empirical results, we have developed the following hypotheses:

H1: Accrual earnings management changed during the COVID-19 crisis compared to the previous period.

H2: Real earnings management changed during the COVID-19 crisis compared to the previous period.

H3: The change in earnings management strategy during a turbulent period is industry-specific.

Data and methodology

Sample characteristics

The sample for this study has been drawn from the Capital IQ Database. It covers non-financial public companies listed on the Warsaw Stock Exchange in Poland. The research compares the quality of financial statements between the pre-pandemic year (2019) with results estimated for the first pandemic year (2020). Outlier observations and firm-year observations with missing data were excluded.

Non-financial industries include (in order of sector size) Industrials, Communication Services, Information Technology, Consumer Discretionary, Materials, Health Care, Consumer Staples, Real Estate, Utilities, and Energy. Figure 1 reports the industry distribution of the sample. The main part of the research summarises the results for all the sectors. However, a detailed analysis of industrial differences is delivered for five of the 10 largest sectors. These industries account for almost 77% of the total number of non-financial public firms.

Table 1 reports the median return on assets (net income to total assets) and operating cash flow (cash flow from operations scaled by total assets) along with non-parametric tests for differences between 2019 and 2020. These ratios are important for the problem of earnings quality as accrual and real management both aim to influence reported earnings directly, whereas the latter also affects cash flow. The changes from

the pre-pandemic year (2019) to the pandemic year (2020) for the five largest industries are illustrated in Figure 2 and Figure 3.

Figure 1. Percentage industrial distribution of public non-financial companies
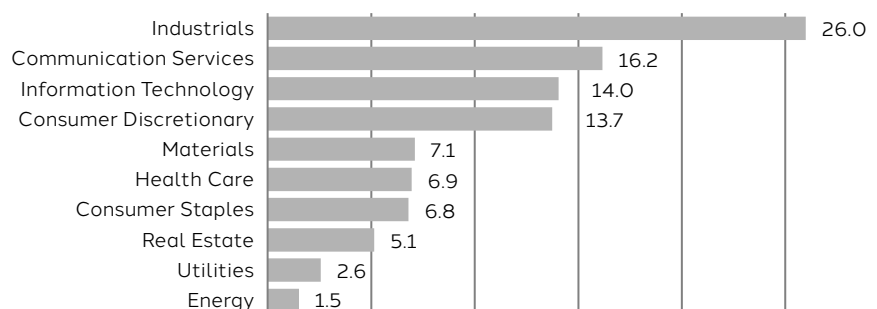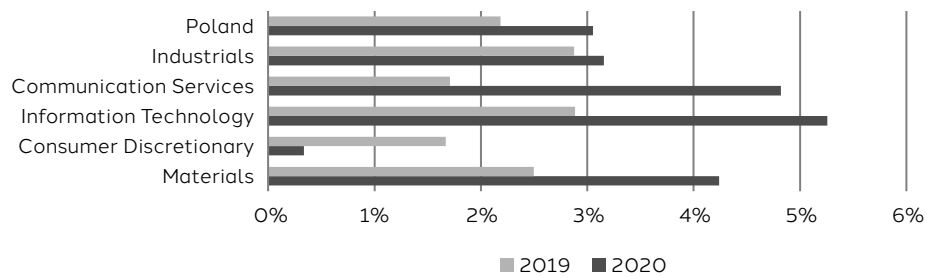

Source: Authors' own elaboration.

We also report additional key financial ratios. They reflect cash liquidity (cash and equivalents to short term liabilities), capital expenditures (CAPEX scaled by total assets), and indebtedness (liabilities scaled by total assets). Table 2 reports the median values of these performance indicators and details differences between 2019 and 2020 with non-parametric tests. The results for the five largest industries are illustrated in Figure 4, Figure 5, and Figure 6.

**Table 1. Average profitability and operating cash flow across industries**

	2019		2020		difference	
Panel A: Return on assets						
Poland	2.18%	***	3.05%	***	0.87%	
Industrials	2.88%	***	3.16%	**	0.28%	
Communication Services	1.71%		4.82%	**	3.11%	
Information Technology	2.88%	**	5.26%	***	2.37%	
Consumer Discretionary	1.67%		0.34%		−1.33%	
Materials	2.50%	***	4.24%	***	1.74%	
Health Care	−3.33%	***	0.04%		3.37%	*
Consumer Staples	0.99%		2.52%	*	1.52%	**
Real Estate	2.36%		−0.19%		− 2.55%	
Utilities	0.10%		0.13%		0.04%	
Energy	3.59%		3.87%		0.27%	
Panel B: Operating cash flow						
Poland	5.41%	***	7.00%	***	1.59%	**
Industrials	5.00%	***	8.26%	***	3.26%	*
Communication Services	6.22%		9.18%	***	2.96%	
Information Technology	7.40%	***	10.46%	***	3.06%	
Consumer Discretionary	5.83%	***	5.43%	***	−0.40%	
Materials	9.51%	***	9.92%	***	0.41%	
Health Care	0.77%		3.38%		2.62%	*
Consumer Staples	5.28%	***	4.06%	***	−1.22%	
Real Estate	0.32%		1.77%		1.45%	
Utilities	5.98%	***	6.76%	***	0.79%	
Energy	8.67%	*	9.77%		1.10%	

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: Authors' own elaboration.

Figure 2. Average return on assets across industries

Source: Authors' own elaboration.

Figure 3. Average operating cash flow across industries
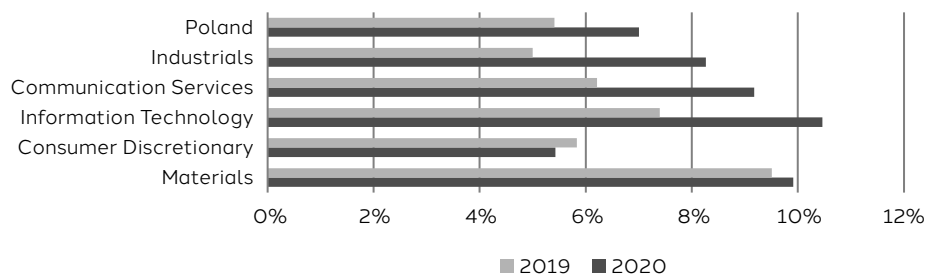
Source: Authors' own elaboration.

Table 2. Additional financial ratios across industries

	2019		2020		difference	
Panel A: Cash liquidity ratio						
Poland	15.48%	***	24.02%	***	8.54%	***
Industrials	12.43%	***	22.69%	***	10.26%	***
Communication Services	23.71%	***	40.48%	***	16.77%	
Information Technology	27.52%	***	45.48%	***	17.97%	
Consumer Discretionary	11.48%	***	17.29%	***	5.80%	
Materials	14.00%	***	17.59%	***	3.59%	
Health Care	23.52%	***	38.48%	***	14.96%	
Consumer Staples	5.32%	***	7.26%	***	1.93%	
Real Estate	18.85%	***	41.74%	***	22.89%	*
Utilities	30.49%	***	27.89%	***	− 2.60%	
Energy	27.13%	***	24.60%	***	− 2.53%	
Panel B: Capital expenditures						
Poland	2.20%	***	1.78%	***	− 0.43%	**
Industrials	1.33%	***	1.23%	***	− 0.10%	
Communication Services	2.64%	***	1.92%	***	− 0.72%	
Information Technology	2.39%	***	2.31%	***	− 0.08%	
Consumer Discretionary	2.12%	***	1.40%	***	− 0.72%	
Materials	4.82%	***	3.59%	***	− 1.23%	
Health Care	3.24%	***	2.36%	***	− 0.88%	
Consumer Staples	3.30%	***	3.12%	***	− 0.18%	
Real Estate	0.17%	***	0.19%	***	0.02%	
Utilities	2.80%	***	2.21%	***	− 0.60%	
Energy	2.97%	***	2.97%	***	0.00%	

Panel C: Indebtedness				
Poland	50.85%	***	49.52%	***	− 1.34%
Industrials	55.96%	***	55.24%	***	− 0.73%
Communication Services	32.26%	***	31.28%	***	− 0.98%
Information Technology	46.46%	***	44.20%	***	− 2.25%
Consumer Discretionary	57.34%	***	54.51%	***	− 2.83%
Materials	48.74%	***	50.30%	***	1.56%
Health Care	51.03%	***	46.81%	***	− 4.22%
Consumer Staples	61.97%	***	55.84%	***	− 6.13%
Real Estate	54.75%	***	49.84%	***	− 4.91%
Utilities	48.75%	***	50.32%	***	1.57%
Energy	46.03%	***	48.25%	***	2.21%

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
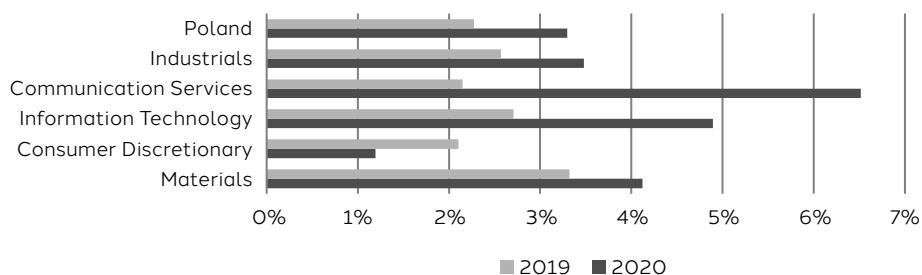
Source: Authors' own elaboration.
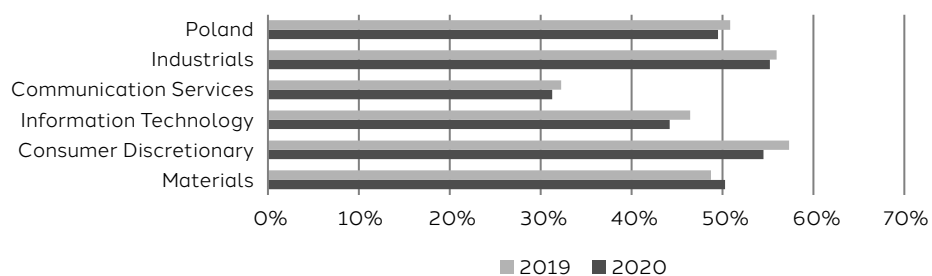
Figure 4. Average liquidity across industries
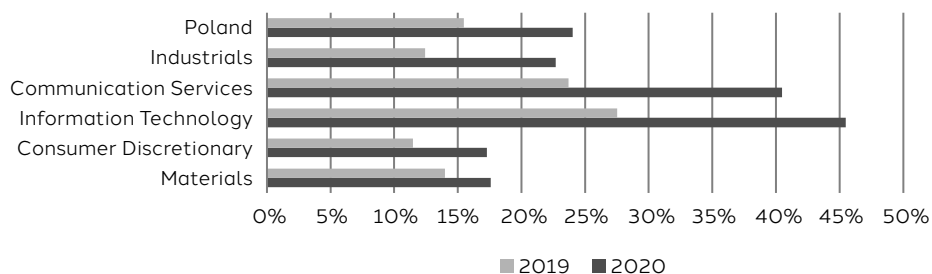
Source: Authors' own elaboration.

Figure 5. Average capital expenditures across industries

Source: Authors' own elaboration.

Figure 6. Average indebtedness across industries

Source: Authors' own elaboration.

The COVID-19 pandemic evoked sudden changes in business activity, including devastating consequences for some business models, and huge growth opportunities for other sectors. The results of the pandemic on the financial performance of non-financial public companies listed in Poland were industry-specific to some extent, as summarised by the main profitability, operating activity, liquidity, investment and indebtedness ratios. These results provide the background for the discussion of accounting transparency. The effects of financial turbulence on company earnings management may be different due to changes in operating performance between the pre-crisis and crisis periods.

Measures of accrual earnings management

The research is based on a set of measures of accounting opacity. First, we apply the concept of accruals derived from prior research [**Ball, Shivakumar, 2005**, **2006**; **Dechow, Dichev, 2002**; **Jones, 1991**; **McNichols, 2002**]. Accruals represent the difference between earnings and operating cash flow. They are decomposed into non-discretionary and discretionary accruals. The first represent the non-manipulated (normal) part of accruals. The latter are manageable and voluntary. Hence, discretionary accruals can be deliberately used to influence earnings and proxy for accounting manipulation in the financial reporting process:

$$ACC_{i,t} = NDACC_{i,t} + DACC_{i,t}, \tag{1}$$

Where $ACC_{i,t}$ – total accruals, $NDACC_{i,t}$ – non-discretionary accruals, $DACC_{i,t}$ – discretionary accruals; all components are scaled by lagged assets to mitigate heteroskedasticity. Total accruals for each company could be calculated as a difference between earnings and cash flow from operations (see the discussion in **Comporek** [**2021**]). However, we follow the proposition of **Jones** [**1991**]:

$$ACC_{i,t} = \left(\Delta CA_{i,t} - \Delta Cash_{i,t} \right) - \Delta CL_{i,t} - Depr_{i,t}, \tag{2}$$

where: $ACC_{i,t}$ – total accruals, $\Delta CA_{i,t}$ – change in current assets, $\Delta Cash_{i,t}$ – change in cash, $\Delta CL_{i,t}$ – change in current liabilities excluding debt, $Depr_{i,t}$ – depreciation.

For each year and each industry, we run cross-sectional models to estimate non-discretionary accruals. These models allow us to check for industry-wide economic differentiation of accruals as well as changes in the regression coefficient over time. Models for normal accruals include intercepts [**Kothari et al., 2005**; **Yoon et al., 2022**; **Zang, 2012**]. Non-discretionary accruals are estimated according to the Jones model [**Jones, 1991**]:

$$NDACC_{i,t}^{J} = \alpha_{i,1}\left(\frac{1}{A_{i,t}} \right) + \alpha_{i,2}\left(\Delta REV_{i,t} \right) + \alpha_{i,3} PPE_{i,t} + \varepsilon_{i,t}, \tag{3}$$

where: $A_{i,t-1}$ – lagged total assets, $\Delta REV_{i,t}$ – change in revenues, $PPE_{i,t}$ – property, plant and equipment. We also implement a modified Jones model [Dechow et al., 1995] to check robustness:

$$NDACC_{i,t}^{mJ} = \alpha_{i,1}\left(\frac{1}{A_{i,t}} \right) + \alpha_{i,2}\left(\Delta REV_{i,t} - \Delta REC_{i,t} \right) + \alpha_{i,3} PPE_{i,t} + \varepsilon_{i,t}, \tag{4}$$

where: $\Delta REC_{i,t}$ – change in receivables.

The more companies boost their earnings, the higher the discretionary accruals. On the other hand, activities aimed at decreasing earnings result in lower discretionary accruals. Following the existing literature, we also proxy for earnings management activities using absolute discretionary accruals (absDACC). This proxy captures two kinds of action for misleading accounting practices aimed at either increasing or decreasing income [**Garcia-Teruel et al., 2009**; **Trombetta, Imperatore, 2014**]. The more aggressive earnings management, the higher the value of absDACC, which results in lower earnings quality.

Then, accrual-based proxies allow us to examine the possibility of the "big bath" strategy during the crisis. This is based on suggestions in the previous literature on the behaviour of financially distressed companies [**Arthur et al., 2015**; **Chia et al., 2007**; **Jordan, Clark, 2004**; **G. Liu, Sun, 2022**]. We analyse income-increasing and income-decreasing accruals separately. This is because managers can influence financial reports to meet different earnings targets. The partition of estimated abnormal accruals into positive and negative discretionary accruals (DACC+ and DACC- respectively) allows us to observe the differences in earnings management aimed at inflating earnings or the "big bath" strategy [**Cohen et al., 2008**]. Table 3 summarises accrual-based earnings management proxies.

Table 3. Summary of proxies for accrual earnings management

Abbreviation	Definition
DACC	Discretionary accruals
absDACC	Absolute discretionary accruals
DACC+	Positive discretionary accruals
DACC-	Negative discretionary accruals

Source: Authors' own elaboration.

Measures of real earnings management

Real earnings management can be implemented through an abnormal cash flow from operations, abnormal production costs, and abnormal discretionary expenses [**Cohen et al., 2008**; **Dechow et al., 1998**; **Roychowdhury, 2006**]. These individual estimates are combined into three aggregate proxies (RM1, RM2, and RM3) to detect different strategies of earnings management via influencing real transactions [**Cohen, Zarowin, 2010**; **Zang, 2012**].

The first individual metrics, abnormal cash flow from operations (ACFO), encompass the consequences of an acceleration of the timing of sales through increased price discounts or more lenient credit terms. Temporary increases in sales volumes are aimed at boosting earnings in the current period, and thus lead to lower cash flow from operations. The actual level of CFO less its expected level gives ACFO. We multiply the difference by negative one so that the higher level of ACFO, the lower earnings quality [**Kim, An, 2018**]. A normal level of cash flow from operations is estimated according to a cross-sectional regression for each year and industry and it is the linear function of the change in sales:

$$\frac{CFO_{i,t}}{A_{i,t-1}} = \alpha_{i1}\left(\frac{1}{A_{i,t-1}}\right) + \alpha_{i2}\frac{REV_{i,t}}{A_{i,t-1}} + \alpha_{i3}\frac{\Delta REV_{i,t}}{A_{i,t-1}} + \varepsilon_{i,t}, \tag{5}$$

The second individual measure of real activities reveals the cutting of the costs of goods sold by increasing production. Producing more units of a product makes it possible to spread fixed costs over a larger number of products. This results in higher operating margins. The actual level of production costs minus their expected level proxies for abnormal production costs (APROD). The higher the level of APROD, the more likely it is that a firm is decreasing fixed costs per unit to inflate earnings. The actual level of production costs is the sum of the costs of goods sold and the change in inventory. We model the normal level of production costs as:

$$\frac{PROD_{i,t}}{A_{i,t-1}} = \alpha_{i1}\left(\frac{1}{A_{i,t-1}}\right) + \alpha_{i2}\frac{REV_{i,t}}{A_{i,t-1}} + \frac{\Delta REV_{i,t}}{A_{i,t-1}} + \frac{\Delta REV_{i,t-1}}{A_{i,t-1}} + \varepsilon_{i,t}, \tag{6}$$

The third individual proxy for real earnings management, abnormal discretionary expenses, enables us to proxy for deliberately decreasing discretionary expenses to inflate current period profits. The actual level of discretionary expenses less the expected level of discretionary expenses gives us the abnormal discretionary

expenses (ADISX). We multiply the result by negative one so that the higher the level of ADISX, the greater the extent of real activities manipulation and lower earnings quality. The actual level of DISX is connected with the level of advertising expenses, research and development expenses, as well as sales, general, and administrative expenses. The normal level of discretionary expenses is estimated according to a cross-sectional regression for each year and industry and it is the linear function of the lagged sales:

$$\frac{DISX_{i,t}}{A_{i,t-1}} = \alpha_{i1}\left(\frac{1}{A_{i,t-1}}\right) + \alpha_{i2}\frac{REV_{i,t-1}}{A_{i,t-1}} + \varepsilon_{i,t}, \tag{7}$$

Three comprehensive measures of real earnings management capture the combined effect of real activities [**Cohen et al., 2008**; **Eng et al., 2019**; **Kim, An, 2018**; **Zang, 2012**]. The first comprehensive measure (RM1) is the aggregate of standardised abnormal discretionary expenses multiplied by negative one and standardised abnormal level of abnormal production costs. A higher RM1 indicates lower earnings quality as a consequence of either cutting discretionary expenses or reducing fixed costs per unit. The second comprehensive measure (RM2) summarises the effect of real earnings management via artificial sales volume increases and savings on discretionary expenses. It aggregates standardised abnormal cash flow from operations and abnormal discretionary expenses multiplied by negative one. The third aggregated measure of real earnings management is the sum of three standardised metrics. It reflects real earnings management implemented by either cutting discretionary expenses and production costs per unit or accelerating the timing of sales. The higher the level of the aggregated measure (RM1, RM2, and RM3), the more likely it is that a company is engaging in real earnings management aimed at increasing earnings and reducing reporting quality. Table 4 summarises real earnings management proxies.

Table 4. Summary of proxies for real earnings management

Abbreviation	Definition
ACFO	Abnormal cash flow from operations
APROD	Abnormal production costs
ADISX	Abnormal discretionary expenses
RM1	Aggregate of standardised ADISX multiplied by negative one and standardised APROD
RM2	Aggregate of standardised ADISX multiplied by negative one and standardised ACFO multiplied by negative one
RM3	Aggregate of standardised ACFO multiplied by negative one, standardised ADISX multiplied by negative one and standardised APROD

Source: Authors' own elaboration.

Empirical results

Accrual earnings management

Table 5 reports the differences in discretionary accruals (DACC) based on the Jones model, absolute value of discretionary accruals (absDACC), positive discretionary accruals (DACC⁺), and negative discretionary accruals (DACC⁻) between the pre-crisis year (2019) and the crisis year (2020). The median proxies of accrual earnings management are presented in Figure 7.

Table 5. Accrual earnings management. Estimates of discretionary accruals based on the Jones model (1)–(4)

	2019		2020		difference	
Panel A: Discretionary accruals						
Mean	0.033	***	−0.047	***	−0.080	***
p-value (parametric test)	0.001		0.000		0.000	

Median	0.024	***	−0.010	***	−0.034	***
p-value (non-parametric test)	0.001		0.007		0.000	
N	457		384		841	
Panel B: Absolute discretionary accruals						
Mean	0.142	***	0.155	***	0.013	
p-value (parametric test)	0.000		0.000		0.336	
Median	0.084	***	0.084	***	−0.000	
p-value (non-parametric test)	0.000		0.000		0.925	
N	457		384		841	
Panel C: Positive discretionary accruals						
Mean	0.150	***	0.118	***	−0.032	**
p-value (parametric test)	0.000		0.000		0.045	
Median	0.085	***	0.072	***	−0.013	
p-value (non-parametric test)	0.000		0.000		0.109	
N	267		176		443	
Panel D: Negative discretionary accruals						
Mean	−0.131	***	−0.186	***	−0.055	***
p-value (parametric test)	0.000		0.000		0.006	
Median	−0.083	***	−0.097	***	−0.014	
p-value (non-parametric test)	0.000		0.000		0.135	
N	190		208		398	

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: Authors' own elaboration.

Figure 7. Average accrual earnings management
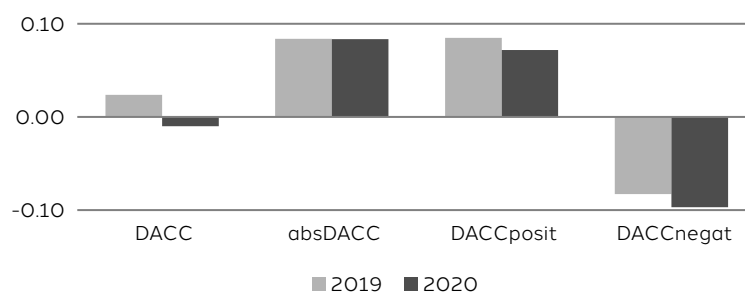
Source: Authors' own elaboration.

The discretionary accruals reported for non-financial firms listed on the Warsaw Stock Exchange significantly declined from 2019 to 2020, while the absolute value of discretionary accruals increased over that period. Companies on average boosted their profits before the pandemic as both mean and median discretionary accruals were positive and statistically significant in 2019. On the other hand, these proxies were negative and statistically significant during the pandemic. The difference according to both the t-test and the Wilcoxon signed rank test was also statistically significant. The level of the unsigned measure of accrual-earnings management was similar in 2019 and 2020. The results for positive and negative DACCs suggest that Polish companies were on average less inclined to boost earnings but more eager to manage earnings downward during the pandemic year. More than 58 percent of Polish companies boosted profits via discretionary accruals before the pandemic, in comparison to less than 46 percent in 2020. The reverse results were observed for income-decreasing aggressive accounting. This seems to be consistent with the "big bath strategy" during financial turbulence. More firms were inclined to manage abnormal accruals to make them more negative in the crisis year. Such conclusions were robust to the alternative measure of accrual earnings management, as checked with the modified Jones model. The overall findings on accrual earnings management are consistent with H1.

Real earnings management

The differences in real earnings management for the pre-pandemic (2019) and the pandemic (2020) years are detailed in Table 6 and illustrated in Figure 8. RM1 shows manipulation with abnormal discretionary expenditures and abnormal production costs. RM2 is the sum of earnings management via an abnormal cash flow from operations and abnormal discretionary expenditures. RM3 aggregates all the possibilities of influencing real transactions to achieve targeted profits: ACFO, APROD, and ADISX.
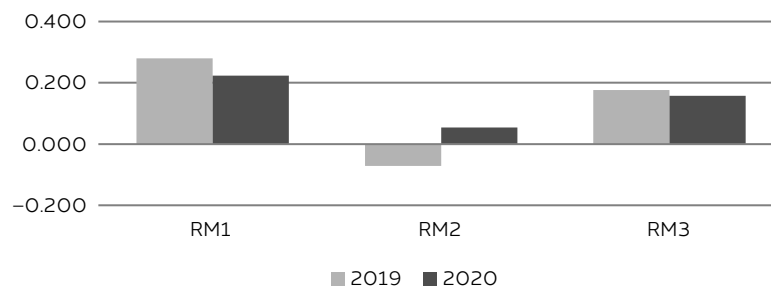
Table 6. Real earnings management

	2019		2020		difference	
Panel A: RM1						
Mean	0.163	***	0.114	**	−0.049	
p-value (parametric test)	0.006		0.042		0.546	
Median	0.280	***	0.223	***	−0.057	
p-value (non-parametric test)	0.000		0.000		0.483	
N	443		437		880	
Panel B: RM2						
Mean	−0.328	***	0.111		0.440	***
p-value (parametric test)	0.000		0.140		0.000	
Median	−0.072	***	0.054		0.125	***
p-value (non-parametric test)	0.000		0.288		0.000	
N	589		581		1 170	
Panel A: RM3						
Mean	−0.007		0.149	*	0.156	
p-value (parametric test)	0.926		0.092		0.176	
Median	0.176		0.158	**	−0.019	
p-value (non-parametric test)	0.118		0.014		0.731	
N	440		431		871	

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; RM1 = manipulation with abnormal discretionary expenditures and abnormal production costs, RM2 = earnings management via an abnormal cash flow from operations and abnormal discretionary expenditures, RM3 = aggregate of all the possibilities of influencing real transactions to achieve targeted profits.
Source: Authors' own elaboration.

Figure 8. Average real earnings management

Source: Authors' own elaboration.

There are several findings on real earnings management around the crisis. First, we found evidence that in the first year of the COVID-19 turbulence, Polish companies inflated earnings via a mix of real earnings management possibilities, namely abnormal discretionary expenditures, abnormal production costs, and an abnormal cash flow from operations. This suggests a change compared to the pre-pandemic year, when the combined proxy for real earnings management, based on cutting discretionary expenses and production costs

per unit or accelerating the timing of sales, was not statistically significant. Second, companies used a mix of abnormal production costs and abnormal discretionary expenditures to increase earnings in both the pre-crisis and pandemic years. The averages of RM1 are statistically significant for both periods. Although the RM1 proxy suggests that companies slightly restricted activities aimed at boosting earnings via cutting discretionary expenses and production costs per unit during the turbulence, the differences were insignificant with either parametric or non-parametric tests. Third, there were significant differences between 2019 and 2020 in the mix of real earnings management strategies based on cutting discretionary expenses and accelerating the timing of sales. These real earnings management activities evolved into more aggressive income-increasing strategies during the crisis. An explanation for this could be connected with the fact that real earnings management is perceived as being less detectable. Hence, on average, companies appear to resort to safer solutions based on real earnings management in an attempt to boost income during market downturns.

Summarising the results for RM1, RM2, and RM3 shows that public companies in Poland did not make full use of real earnings management possibilities to move earnings into the desired direction. This seems reasonable considering it was a time of sudden changes and huge uncertainty about future financial prospects. Another explanation could be connected with the fact that real earnings management occurs when companies alter transactions throughout the financial year. Considering that the COVID-19 pandemic induced unexpected and profound changes throughout 2020 and companies had to react flexibly to the turbulence, real earnings management activities could have fluctuated across the pandemic year. Taking all findings on real-based reporting quality together, we find support for the predictions of H2.

Industrial differences in earnings management

The differences in the proxies of accrual (DACC) and total real earnings management (RM3) for the five largest sectors for the pre-pandemic (2019) and pandemic (2020) years are detailed in Table 7 and Table 8 respectively. The median values are illustrated in Figure 9 and Figure 10.

Table 7. Accrual earnings management across industries. Proxy of accrual (DACC) earnings management for five largest sectors
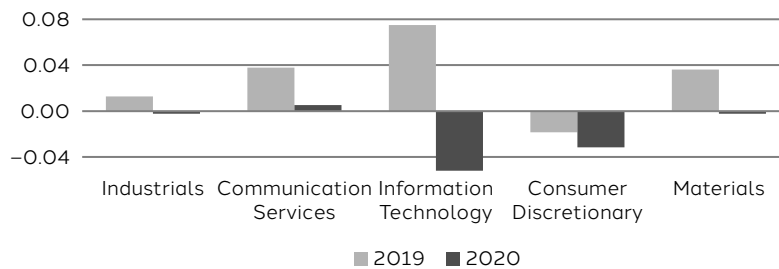
	2019		2020		difference	
Panel A: Industrials						
Mean	0.029		−0.030	*	−0.058	**
p-value (parametric test)	0.125		0.067		0.018	
Median	0.013		−0.002		−0.015	
p-value (non-parametric test)	0.238		0.360		0.154	
N	127		107		234	
Panel B: Communication Services						
Mean	0.085	***	0.028		−0.058	
p-value (parametric test)	0.010		0.560		0.317	
Median	0.038	***	0.005		−0.032	
p-value (non-parametric test)	0.006		0.423		0.193	
N	65		51		116	
Panel C: Information Technology						
Mean	0.115	***	−0.089	**	−0.205	***
p-value (parametric test)	0.003		0.027		0.000	
Median	0.075	***	−0.052	**	−0.127	***
p-value (non-parametric test)	0.002		0.030		0.000	
N	57		51		108	
Panel D: Consumer Discretionary						
Mean	−0.087	***	−0.103	**	−0.016	

p-value (parametric test)	0.001		0.039	0.774
Median	−0.018	***	−0.031	−0.013
p-value (non-parametric test)	0.008		0.183	0.553
N	63		50	113
Panel E: Materials				
Mean	0.024	*	0.012	−0.011
p-value (parametric test)	0.081		0.638	0.705
Median	0.036	*	−0.002	−0.038
p-value (non-parametric test)	0.063		1.000	0.221
N	41		33	74

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01

Source: Authors' own elaboration.

Figure 9. Average accrual earnings management across industries

Source: Authors' own elaboration.

Table 8. Total real earnings management across industries. Proxy of total real earnings management (RM3) for the five largest sectors

	2019		2020		difference	
Panel A: Industrials						
Mean	0.420	***	0.327	***	−0.093	
p-value (parametric test)	0.001		0.001		0.551	
Median	0.345	***	0.393	***	0.048	
p-value (non-parametric test)	0.001		0.000		0.911	
N	122		124		246	
Panel B: Communication Services						
Mean	−1.013	***	0.602		1.616	***
p-value (parametric test)	0.001		0.231		0.006	
Median	−0.410	***	−0.290		0.119	*
p-value (non-parametric test)	0.009		0.628		0.060	
N	41		43		84	
Panel C: Information Technology						
Mean	−0.204		0.242		0.446	
p-value (parametric test)	0.416		0.538		0.338	
Median	0.083		0.376		0.292	
p-value (non-parametric test)	0.854		0.151		0.191	
N	47		46		93	
Panel D: Consumer Discretionary						
Mean	0.219		−0.054		−0.273	
p-value (parametric test)	0.196		0.748		0.251	

Median	0.494	−0.049	−0.543
p-value (non-parametric test)	0.128	0.906	0.261
N	72	65	137
Panel E: Materials			
Mean	−0.025	−0.047	−0.022
p-value (parametric test)	0.886	0.768	0.924
Median	0.202	0.089	−0.112
p-value (non-parametric test)	0.733	0.939	0.878
N	44	41	85

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01

Source: Authors' own elaboration.

Figure 10. Average real earnings management across industries
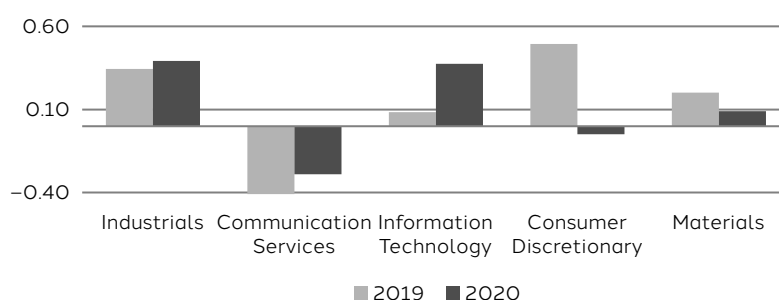
Source: Authors' own elaboration.

The effects of the financial turbulence induced by the COVID-19 pandemic on company earnings management seem to be different across industries. The most pronounced and statistically significant changes in accrual-based accounting transparency were observed for the Information Technology sector, where the "big bath" strategy seemed to be dominant. However, negative discretionary accruals during the COVID-19 crisis were also observed for Industrials and Consumer Discretionary. Income-increasing activities via a mix of real earnings management tools were reported for Industrials, both pre-crisis and during the pandemic year. The strategy of real activities was significantly different in the Communication Services sector considering the shift in proxies between the periods. Our findings provide partial support for H3.

Discussion and conclusions

This research contributes to the literature by providing results that allow for a better understanding of earnings management strategies during crisis periods. Specifically, this research aimed to examine how the market turbulence induced by the COVID-19 pandemic influenced accrual- and real-based earnings quality in non-financial public companies listed on the Warsaw Stock Exchange in Poland. Our evidence suggests that there were significant changes in accrual- and real-based earnings management among Polish companies, comparing the pre-crisis and pandemic periods.

Accrual-based earnings management significantly changed during the crisis period. Accrual activities among Polish companies were used in two ways. First, they were aimed at making poor earnings even worse during the unfavourable time to enhance future profits. Second, companies tried to move earnings closer to targets to avoid losses or income declines. However, it seems that at least some companies stopped boosting profits through manipulation of the accrual component during the pandemic. At the same time, financial reporting did not become more conservative, as our empirical results reveal that companies more eagerly tended to adopt "big bath" activities. This stands in line with prior studies such as **Chia et al. [2007]** for the Asian 1997 crisis and **G. Liu and Sun [2022]** for US companies during the pandemic.

Our research also reports on real earnings management during the pandemic in Poland. Our results indicate that Polish companies decided their earnings management strategies considering the lower probability of real activities being detected. The aggregated proxies of real earnings management also suggest that firms did not make the full use of inflating earnings via real transactions. It could be related to the relatively high cost of such activities, or higher monitoring during the crisis. Such conclusions corroborate the evidence from **Hsu and Yang** [**2022**], who showed that UK companies engaged in more earnings management through real activities during the pandemic. Our findings are not in line with the conclusions of **Xiao and Xi** [**2021**] during the COVID-19 pandemic in China.

Additionally, we provide unique evidence on sectoral differences in earnings management through accruals and real activities during the financial turbulence. Company strategies to influence financial reports and to change real transactions during the pandemic seem to be industry-specific to some extent. The most significant changes were observed for sectors such as Information Technology, Industrials and Consumer Discretionary. Taken as a whole, our findings make incremental contributions beyond the existing evidence on the consequences of financial crises and financial reporting quality.

There are a number of limitations of this study that create potential for future research. First, we examine only the COVID-19 financial crisis. It would be useful to continue this research and compare the effects of different market downturns. However, we believe that our evidence on the informativeness of financial reports extends the understanding of corporate decisions during periods of turbulence. Second, examining earnings quality is a multifaceted problem that could be related to other areas of corporate finance. Such evidence partly exists for huge markets but is highly limited or almost non-existent for countries such as Poland. **Lin et al.** [**2014**] examine the consequences of earnings quality during the 2008 crisis on liquidity on the equity market. **Habib et al.** [**2013**] examine earnings quality during the global financial crisis regarding financial distress experienced by firms. **Cui et al.** [**2021**] address the problem of the relationship between stock returns and financial reporting quality for Chinese companies during the crisis. There is a lot of scope to develop our empirical research for Poland to include future directions. The third area of limitations, and possible future research, focuses on earnings quality proxies that could be expanded, even if this paper uses multiple proxies. Examples include **Jordan et al.** [**2021**], who observed earnings management during an economic downturn checking the demonstration of Benford's Law [**Benford, 1938**]. **Šušak** [**2020**] investigates the relationship between regulatory changes and financial reporting timeliness during the pandemic in Croatia. Finally, we would also strongly encourage adding to the literature by providing evidence for the post-crisis period once the relevant data is available. All these areas create additional possibilities for continuing research on understanding the relationship between financial crises and financial reporting quality for Poland.

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