How did specific aspects of national culture, uncertainty avoidance, and long-term orientation moderate the effect of Covid-19 on earnings management?

László Szívós
Eötvös Loránd University,
Budapest, Hungary
E-mail: szivos.laszlo@gtk.elte.hu

Jenő Fáró
Eötvös Loránd University,
Budapest, Hungary
E-mail: faro.jeno@gtk.elte.hu

This study investigates the conditional effects of Covid-19 on earnings management. We posit that the cultural factors of uncertainty avoidance and long-term orientation moderated the effect of Covid-19. We examine the effects of two specific cultural dimensions – uncertainty avoidance and long-term orientation – on the impact of the Covid-19 pandemic on earnings management practices among firms in the four Visegrad countries between 2018 and 2021. A total of 16 estimations (4 countries × 4 periods) are made using the modified Jones model as a baseline model, followed by 32 further estimations using the Jones and Kothari models to test the robustness of our results. After obtaining the residuals of the model, we use their absolute values to determine how the variables of interest influence the magnitude of earnings management. We test our hypotheses with ordinary least squares (OLS) estimations (i.e., a pooled OLS model is estimated). Our analysis shows negative associations between country-specific Covid-19 effects and both uncertainty avoidance and long-term orientation. Thus, the higher the long-term orientation or uncertainty avoidance of a country, the weaker the effect of Covid-19 on the magnitude of earnings management. These conditional Covid-19 effects are found to be significantly negative in each country studied, except for Poland. Our results support the diverging findings of previous studies, as they show that how companies react to an external shock such as a pandemic depends on their country of origin.

Keywords:
earnings management,
national culture,
Covid-19,
Visegrad countries,
discretionary accruals

Introduction

Extensive research has focused on earnings management in developed capital markets in various contexts. This remains an active area of investigation because of the significant impact of earnings management on the quality of financial statements. Earnings management obscures the transparency of reported financial data, leading to distortions in investment, lending, and business decision-making. Although not a complete list, research streams in the earnings management literature include (1) review articles on real earnings management (REM) (Habib et al. 2022) and accrual-based earnings management (AEM) (Greusard 2022), (2) studies investigating the relationship between earnings management and corporate social responsibility (Ehsan et al. 2020, Velte 2020, 2024, Deng et al. 2024), and (3) research on the association between earnings management and corporate governance (García-Meca–Sánchez-Ballesta 2009, Man–Wong 2013). Motives for earnings management (Callao et al. 2021, Wagener 2024) and methodological issues have also been considered in the literature (McNichols 2000, Höglund 2012, Collins et al. 2017).

National culture plays a pivotal role in shaping firms' earnings management practices by influencing society's values, norms, behaviours, and expectations. Early research by Gray (1988) laid the foundation for studying cultural influences on accounting practices and linking accounting value dimensions to Hofstede's (1984 and 2011) cultural dimensions. Despite criticisms (further detailed below in 'Literature review and research hypotheses') of Hofstede's model of cultural dimensions, it continues to serve as a foundational framework in this area. In the context of this study, our objective is to explore the impact of two of Hofstede's six cultural dimensions – uncertainty avoidance and long-term orientation – on the influence of the Covid-19 pandemic on earnings management practices in the Visegrad 4 (V4) countries (i.e., Czech Republic, Hungary, Poland, and Slovakia). We contend that the abrupt and profound disruption caused by the Covid-19 pandemic, coupled with heightened uncertainty, made uncertainty avoidance and long-term orientation pivotal in shaping the pandemic's impact on prevailing earnings management practices.

By choosing the V4 countries for this study, we aim to contribute to the accounting and finance field. During the investigation period of this study (2018–2021), the V4 countries collectively clearly demonstrated their economic importance, based on gross domestic product, with a growing share of the EU27's economic performance (between 6.9% and 7.3% [Eurostat 2023]). Further analysis of the main GDP aggregates shows that these economies were seriously affected by the Covid-19 pandemic in 2020, resulting in a 2.0–5.5% drop in their economic performance. Mateus et al. (2022) found that the Covid-19 pandemic and ensuing lockdowns exerted a substantial influence on the reported financial performance of businesses in V4 countries. Notably, the pandemic significantly affected the profitability and liquidity of these firms. We posit that significant changes in profitability levels, whether upward or downward, could similarly influence how managers manage their firms' earnings. Furthermore, each V4 country has a distinct economic and political background. These countries transitioned from centrally planned to market-based economies at different times and in different ways, which could have created variations in the development of corporate practices and regulations (see Inotai–Sass 2016, Ivanova–Čepel 2018, Zygmunt 2018 and Chetverikova 2020). Ivanova–Masárová (2018) examined the economic development of the V4 countries and discovered notable differences in economic performance caused by their divergent economic and political backgrounds. They further observed that the gap between the countries persists despite gradually narrowing. We argue that diverging political, economic, and historical backgrounds may have resulted in differences in how attitudes toward earnings management were shaped across the V4 countries. Furthermore, cultural norms and institutional factors significantly affect corporate behaviour and, thus, attitudes toward earnings management. Thus, exploring the cultural factors of V4 countries can deepen our understanding of how nation-specific non-financial factors impact financial reporting.

This study contributes to the literature in two ways. First, we investigate whether dimensions of national culture moderated the impact of the Covid-19 pandemic on earnings management as an immediate external shock, focusing on long-term orientation and uncertainty avoidance. The selection of these cultural dimensions is supported by Wenzel et al. (2021), who identified them as important in addressing crisis-induced turbulence. Our investigation aims to shed light on how the cultural dimensions of uncertainty avoidance and long-term orientation have shaped and potentially moderated the pandemic's influence on earnings management practices, particularly in countries where prior research is not as extensive, thus making our study a valuable addition to the literature. Second, our findings quantify the conditional effect of the Covid-19 pandemic on earnings management in the V4 countries. Notably, although a growing body of literature explores the effects of the Covid-19 pandemic on earnings management (e.g., Lassoued–Khanchel 2021, Yan et al. 2022, da Silva Flores et al. 2023 or Taylor et al. 2023), many of these studies focus on companies geographically distant from V4 countries or primarily deal with financial institutions, limiting the generalizability of their findings to the V4 context. Thus, our study aims to narrow this gap in the literature by specifically addressing the conditional effects of the Covid-19 pandemic in the V4 countries.

Overall, we attempt to connect two areas of earnings management research (i.e., the effects of Covid-19 and cultural effects as moderators), which, to the best of our knowledge, have not yet been studied in the V4 context, despite numerous international studies on the effects of crises on earnings management. Kliestik et al. (2021) highlighted that cultural, social, and legal circumstances may explain the differences in these countries' earnings management patterns. The novelty of our study lies in the connections it makes between these areas.

Literature review and research hypotheses

Our literature review is designed to successfully support the development of the current study hypotheses and help identify a pertinent research gap. This literature review is divided into three parts. First, we explore and summarize prior research findings on the impact of crises on the intensity and direction of firms' earnings management activities, with a special focus on the economic downturn caused by Covid-19. Subsequently, to place the issue in a regional context, we outline the key findings of prior earnings management studies conducted in the V4 countries. Finally, we provide an in-depth overview of prior studies investigating the relationship between earnings management and national cultural dimensions.

Earnings management practices amid economic or financial crises, emphasizing the economic downturn caused by Covid-19

Several intuitive factors would suggest a heightened propensity for managers to engage in more extensive earnings management during economic crises, such as that induced by the Covid-19 pandemic. However, the research findings of the past couple of decades have been inconsistent. Some studies have concluded that economic or financial crises can enhance the intensity of earnings management (e.g., Habib et al. 2013, Dimitras et al. 2015, Ntokozi et al. 2022, Yan et al. 2022, da Silva Flores et al. 2023), whereas others have found the opposite (e.g., Filip–Raffournier 2014, Arthur et al. 2015, Kumar–Vij 2017, Brannan et al. 2023). The direction of manipulation (i.e., upward or downward) and underlying motives are not always straightforward. Managers may adopt different earnings management strategies during economic downturns. They may choose to inflate a firm's earnings to mitigate the negative impact of a crisis, or take an alternative approach that involves engaging in downward earnings management to record substantial losses in the current year, potentially setting the stage for inflated profits in subsequent years (i.e., "big bath accounting").

The occurrence of a similar ambiguity becomes evident when analysing the influence of the Covid-19 pandemic on firms' earnings management. Consequently, a comprehensive review of the existing literature is essential to formulate our hypotheses. A substantial body of literature supports that earnings management during the pandemic was predominantly characterized by income-reducing practices. Liu–Sun (2022) examined the earnings of US firms for the years prior to and following the onset of the Covid-19 and found a notable decrease in the extent of discretionary accruals from 2019 to 2020. Thus, they concluded that throughout the Covid-19 period, managers were more engaged in income-decreasing earnings management, often referred to as the "big bath", with the intention of reporting greater declines in profit during the pandemic. In a sample of 41 listed Tunisian companies, Garfatta et al. (2023) found that the observed entities implemented a strategy to reduce discretionary accruals during the pandemic. Lizińska–Czapiewski (2023) investigated

Polish non-financial public companies, finding that the examined firms displayed a decreased propensity to artificially inflate their income throughout the pandemic. Instead, it became more prevalent for these companies to embrace the "big bath" strategy, deliberately recognizing notably higher losses during the Covid-19 pandemic to subsequently enhance their future profitability. Additionally, research has revealed a greater inclination among companies toward engaging in REM as opposed to relying predominantly on AEM.

Contrary to the abovementioned findings, several studies have reached different conclusions (e.g., Lassoued–Khanchel 2021, Elaoud et al. 2022, Aljughaiman et al. 2023). For example, Aljughaiman et al. (2023) explored the responses of Chinese listed companies to the pandemic and determined that these entities exhibited a higher propensity toward earnings management during the pandemic than in the preceding period. Notably, their research revealed a preference for AEM over REM, with a tendency toward income-increasing strategies. Similarly, Lassoued–Khanchel (2021) investigated the financial data of 2,031 listed firms from 15 European countries, revealing a more intense emphasis on earnings management among companies during the pandemic than in the preceding period. Furthermore, their research highlighted the prevalence of income-increasing earnings management practices throughout 2020. Finally, Yan et al. (2022) identified a significant change in earnings management practices (both AEM and REM) among China's A-share listed firms in response to the Covid-19 shock. They also found that in regions where Covid-19 was more intensive, managers were more likely to use AEM than REM.

Thus, the results of investigations into the impact of the Covid-19 pandemic on earnings management practices differ significantly when considering firms' location, sector, size, or other traits (e.g., listing status). Thus, we conclude that the generalization of prior research findings is complicated and supports the need to customize models for analyses in distinct regions and sectors to yield a comprehensive understanding of observed phenomena.

Earnings management research in V4 countries

Although several studies have investigated earnings management in the V4 countries since 2020, a noticeable research gap persists regarding the effects of the Covid-19 shock on earnings management practices among firms in the V4 nations. Thus, we argue that this study has the potential to make a significant and valuable contribution to the existing literature on earnings management in the V4 countries.

Kliestik et al. (2020, 2022), and Kovacova et al. (2022) have examined trends and patterns of the V4 countries' earnings management practices. Kliestik et al. (2020) analysed the earnings management practices firms in the V4 countries adopted from 2009 to 2018, and found that they followed an increasing trend. Kovacova et al. (2022) comprehensively examined a substantial cohort of 8,134 companies in the

V4 countries from 2016 to 2020 and revealed that positive discretionary accruals consistently outweighed negative ones, indicating a prevalent inclination among observed firms to engage primarily in upward earnings management. Kliestik et al. (2022) analysed the financial data of transportation firms from the V4 countries for 2010–2019 and showed that changes in earnings management practices can explain the non-stationarity in EBITDA (earnings before interest, taxes, depreciation and amortization) figures.

Several studies (Siekelova et al. 2020, Gregova et al. 2021, Nagy et al. 2022) have investigated the association between firms' earnings management practices and firm- and country-level variables. Siekelova et al. (2020) investigated companies from the Czech Republic, Slovakia, Poland, and Hungary and confirmed the presence of earnings management practices among the observed firms. Furthermore, they identified a strong relationship between earnings management, firm size, country, and business sector. Gregova et al. (2021) established a distinctive inverse relationship between debt levels and earnings management practices, suggesting that stricter debt monitoring effectively mitigates earnings management. Notably, these findings diverge from those of previous international research, demonstrating a positive association between debt and earnings management practices. Nagy et al. (2022) rigorously examined the financial statements of 35 listed entities originating from the V4 countries from 2018 to 2020 and found a statistically significant correlation between firms' environmental, social, and governance scores and their propensity to engage in earnings management practices.

Some prior studies (Durana et al. 2021a, Gajdosikova et al. 2022) have considered only one country or a specific geographical region. Durana et al. (2021a) performed a comparative analysis of earnings management trends among companies in the V4 countries and the Baltics, finding a notable increase in earnings management practices in 2014 and 2016, respectively. Gajdosikova et al. (2022) used a comprehensive sample of 15,716 enterprises from various business sectors in Slovakia to demonstrate that firm size negatively correlates with the magnitude of earnings management, identifying significant differences across sectors.

Durana et al. (2021b) analysed earnings management practices among firms in the V4 countries, emphasizing the patterns exhibited by financially distressed entities. The outcomes indicated that financially distressed firms, attempting to satisfy banking requirements and covenants, exhibited a comparatively lower reduction in profits during the *introduction* and *decline* stages of their business life cycle than during the *growth* stage.

Regarding the applicability and appropriateness of earnings management models, Kovacova et al. (2022) examined a diverse array to reveal that the Hribar and Collins model was the most efficacious in identifying instances of earnings management. However, Kliestik et al. (2021) found that the modified Jones model was the most appropriate in the context of the V4 countries.

Thus, although earnings management research focusing on the V4 countries has increased in the past few years, studies examining how the Covid-19 pandemic affected firms' earnings management practices remain scarce. For example, Lizińska–Czapiewski's (2023) research was limited to Poland. The pandemic brought about serious changes in V4 companies' operations, and had a significant impact on their profitability (Mateus et al. 2022). This may have resulted in changes in earnings management patterns, which we aim to reveal in our study. Accordingly, we propose the following hypothesis:

H_1: The Covid-19 pandemic and the resulting economic consequences increased the magnitude of firms' earnings management in the V4 countries.

Furthermore, relevant studies on the effects of the Covid-19 on earnings management have reported inconclusive results. Thus, we posit that the effects of the pandemic may depend on country-specific factors. We are particularly interested in whether and to what extent country-specific cultural factors moderate the effects of the pandemic on earnings management practices.

Impact of culture on earnings management practices

National culture plays a pivotal role in forming firms' earnings management practices because of its influence on society's values, norms, behaviour, and expectations. Early research by Gray (1988) made a substantial theoretical contribution and laid the foundation for empirical research on cultural influences on accounting practices by establishing the value dimensions of the accounting subculture (professionalism, uniformity, conservatism, and secrecy) and linking them to the six cultural dimensions (power distance, individualism, masculinity, uncertainty avoidance, long-term orientation, and indulgence) established by Hofstede (1980, 1984, 1991, 2011) and Hofstede–Hofstede (2005). Gray (1988) highlighted that of the dimensions in Hofstede's cultural model, only individualism and uncertainty avoidance are fully connected to all four accounting values, making them effective proxies for these values. Although Gray's hypotheses were not operationalized in this study, they have provided a sound basis for several empirical studies on the relationship between national culture and earnings management. Similarly, Hope (2003) observed that these two dimensions within Hofstede's cultural framework are likely to have the most direct influence on managers' accounting decision-making behaviours.

Some studies (Schwartz 1994, McSweeney 2002, Myers–Tan 2002, Baskerville 2003) have heavily criticized Hofstede's model of cultural dimensions for its assumed shortcomings. Schwartz (1994) argued that Hofstede's national cultural values are limited to IBM employees, the population used to conduct the original survey. Schwartz also criticized the model's survey design, noting that it was not specifically tailored to measure cultural values. Furthermore, Hofstede's dimensions are often considered static and unable to account for the dynamic nature of cultural evolution. Critics such as McSweeney (2002) and Myers–Tan (2002) have suggested that cultures are not monolithic or unchanging, but constantly adapt to social, economic and technological developments. Finally, Baskerville (2003) highlighted that Hofstede's findings are frequently interpreted without sufficient consideration of local contexts and may reflect IBM's corporate culture rather than broader national cultures, leading to potential misapplications.

Despite these criticisms, several factors drive the continued widespread use of Hofstede's cultural model in earnings management and related fields. First, Gray (1988) extended Hofstede's framework by linking cultural dimensions to accounting values (e.g., professionalism, conservatism and secrecy), offering a direct theoretical foundation for understanding cultural influences on accounting practices. Second, although alternative models such as the GLOBE study exist, they have their own limitations, with no single framework emerging as a definitive replacement for Hofstede's model, thus ensuring its continued prominence in cross-cultural research. Third, even when considering the critiques, the model captures the fundamental cultural traits that remain relevant in globalized business environments, including power dynamics, risk preferences, and individual versus collective orientations. Finally, much of the existing research on the impact of cultural dimensions on earnings management relies on Hofstede's framework, which makes it easier to compare the findings of new studies with those of previous research.

Therefore, although Hofstede's model faces valid critiques regarding its methodology, representativeness, and adaptability, its ability to link culture to accounting behaviours, along with its accessibility and widespread empirical support, ensures its continued relevance and use in earnings management studies. Below, we introduce and review Hofstede's six cultural dimensions and their influence on firms' earnings management practices, as discussed in prior research.

Power distance measures the extent to which less powerful members of society accept that power is unequally distributed (Hofstede et al. 2010). In cultures with high power distance, hierarchies are emphasized, and subordinates are less likely to question the decisions made by those in power. Furthermore, these cultures tend to lack transparency and effective communication. Managers have greater autonomy and face less oversight, potentially leading to higher levels of opportunistic earnings management (Doupnik 2008, Gray et al. 2015, Ugrin et al. 2017, Pacheco Paredes–Wheatley 2017). In contrast, cultures with low power distance exhibit greater transparency and accountability, leading to a lower intensity of earnings manipulation. However, other studies have reported contradictory results. Geiger et al. (2006) observed that individuals from high-power distance countries perceive operating manipulation less favourably than those from low-power distance countries. They found that individuals from high-power distance countries tend to view power as being more appropriately distributed and, as such, may be less likely to engage in earnings manipulation that would result in an unrealistic presentation of a company's performance.

The dimension of **individualism versus collectivism** reflects the degree to which individuals prioritize personal over group achievements (Hofstede et al. 2010). Managers in individualistic societies may engage in earnings management to achieve personal goals, such as bonuses or recognition (Guan et al. 2005, Han et al. 2010). Gray's (1988) model suggests that individualism promotes professionalism, giving accountants greater flexibility, which may increase earnings discretion. However, in collectivist societies, earnings management may also occur to protect the interests of the group, such as presenting stable financial performance to benefit employees or stakeholders (Desender et al. 2011).

Masculinity relates to a society's emphasis on achievement, assertiveness, and material success, whereas **femininity** emphasizes quality of life and interpersonal relationships. Hofstede–Hofstede (2005) highlighted that more masculine societies prioritize the achievement of financial goals. This focus aligns with the frequent use of earnings discretion to meet specific objectives, making such practices more prevalent in countries with high levels of masculinity. Competitive and success-driven cultures encourage managers to engage in earnings management to meet performance targets and achieve material success (Doupnik 2008, Pacheco Paredes–Wheatley 2017). However, these cultures value ethical behaviour and may discourage manipulative practices, thereby reducing the prevalence of earnings management (Swaidan 2012).

The cultural dimension of **indulgence versus restraint** measures the extent to which societies allow individuals to fulfil their desires by pursuing hedonistic goals. Indulgent societies are characterized by relatively weak controls, granting individuals greater freedom, whereas restrained societies impose stricter rules and societal norms, creating stronger behavioural limitations (Hofstede et al. 2010). As a recent addition to Hofstede's cultural framework, this dimension has been relatively underexplored in the context of earnings management. According to Ugrin et al. (2017), companies in indulgent cultures with fewer restrictions are more likely to engage in opportunistic earnings management practices because greater freedom allows for actions driven by self-interest. In contrast, for companies in restrained cultures, where stricter laws and societal norms are prevalent, earnings management tends to be less intense, as these constraints naturally reduce such practices.

The dimension of **uncertainty avoidance** is one of the most frequently researched aspects of Hofstede's cultural model in the earnings management literature. However, its relationship with earnings management remains less clearly defined. Gray's (1988) model provides one interpretation of this dimension, suggesting that highly uncertainty-avoidant countries demand greater uniformity from accountants, characterized by numerous rules and limited self-governance, in regulating the accounting profession (statutory control) and determining the content of financial reports (uniformity). In these countries, the regulatory framework typically promotes a conservative approach to earnings management (conservatism), often accompanied by limited transparency (secrecy). Several studies have supported this view, such as Han et al. (2010), Pacheco Paredes–Wheatley (2017), and Viana et al. (2022). Another interpretation of the uncertainty avoidance dimension in Hofstede's cultural model suggests that, in highly uncertainty-avoidant cultures, individuals are more likely to prioritize predictability in future profits and earnings. Consequently, they may be tempted to secure future performance through profit smoothing. This perspective is supported by several studies, including Doupnik (2008), Ugrin et al. (2017), and Whelan–Humphries (2022).

Long-term orientation refers to a cultural perspective that prioritizes future rewards over immediate gratification. Societies with a long-term orientation anticipate future challenges, value perseverance, thrift, and efforts to prepare for the future, whereas short-term oriented cultures emphasize immediate results, focusing on present stability and current gratification (Hofstede 1991, Hofstede et al. 2010). From a business perspective, this dimension reflects the operational time horizon of companies, with long-term oriented firms aiming to establish strong market positions and achieve sustainable outcomes, as opposed to short-term oriented firms that prioritize quick financial gains. The dichotomy between long- and short-term orientations pertains to the expected temporal horizon of earnings rewards concerning decisions and undertakings. Several prior studies (e.g., Parboteeah et al. 2012, Lewellyn–Bao 2017, Ugrin et al. 2017, Soschinski et al. 2021) have shown that cultural environments in which short-termism is prevalent are more inclined to engage in earnings management than those with a more intensive long-term orientation. However, other studies (e.g., Freedman–Jaggi 2009, Gray et al. 2015) have presented a contrasting perspective regarding the effects of short- and long-term oriented cultures on the inclination toward earnings management. Managers may also employ techniques such as earnings smoothing to ensure sustained profitability in the future, in line with their long-term objectives.

By reviewing the literature, we find that among the 12 studies that specifically examined the relationship between earnings management and cultural dimensions, only four incorporated all six of Hofstede's dimensions in their analysis (Ugrin et al. 2017, Soschinski et al. 2021, Whelan–Humphries 2022, Viana et al. 2022). Four other studies (Guan et al. 2005, Geiger et al. 2006, Doupnik 2008) limited their analysis to four dimensions. Doupnik (2008) and Guan et al. (2005) focused on uncertainty avoidance, long-term orientation, individualism, and power distance, whereas Geiger et al. (2006) used masculinity rather than long-term orientation in their analyses. Pacheco Paredes–Wheatley (2017) included only three dimensions in their analysis: individualism, masculinity, and uncertainty avoidance. Gray et al. (2015) and Han et al. (2010) included only two dimensions in relation to earnings management: individualism and uncertainty avoidance. Notably, Desender et al. (2011) combined one dimension from Hofstede's cultural model (individualism) with one from the GLOBE model (egalitarianism) in their analysis. Lewellyn–Bao (2017) based their research entirely on four aspects of the GLOBE model: power distance, institutional collectivism, uncertainty avoidance, and future orientation.

Previous studies have also investigated the moderating effects of cultural dimensions. Whelan–Humphries (2022) and Geiger et al. (2006) explored how certain cultural factors moderate the impact of adopting international financial reporting standards (IFRS) on earnings management. Pacheco Paredes–Wheatley (2017) examined the moderating role of culture on the effects of corruption on firms' earnings management practices. Soschinski et al. (2021) investigated culture as a moderator in the relationship between corporate governance and earnings management.

Thus, studies that exclude certain dimensions of Hofstede's model and focus only on a subset of the six are not uncommon in the literature. Notably, using cultural dimensions as moderating factors in analysing the variables impact on earnings management remains a less-explored area.

The Covid-19 pandemic created unprecedented organizational uncertainties, disrupting decision-making processes and compelling businesses to adopt strategies to balance short-term responses and long-term goals. This heightened ambiguity brought cultural dimensions, such as **uncertainty avoidance** and **long-term orientation,** into sharper focus, as they directly influenced managerial behaviour and financial practices, including earnings management. Wenzel et al. (2021) identified how firms adopt strategies such as retrenchment and innovation to address crisis-induced turbulence, often guided by cultural tendencies, to cope with uncertainty and plan for the future.

Uncertainty avoidance measures a culture's discomfort with ambiguity and is particularly relevant in the context of the Covid-19 pandemic. Cultures with high uncertainty avoidance often aim to minimize risks through strict rules and structures. During the pandemic, this tendency likely translated into the increased use of earnings management to stabilize financial outcomes and create an illusion of control over volatile environments. For example, Knight–Paroutis (2021) illustrated how firms in high-uncertainty contexts balance immediate liquidity concerns with the need for organizational stability, reflecting cultural preferences for predictability in financial reporting.

Long-term orientation measures a culture's prioritization of future rewards over immediate gains. Seetharaman (2020) has highlighted how the pandemic forced firms to rethink their operational priorities, with long-term oriented cultures likely emphasizing transparency and sustainability in their financial strategies to maintain market trust. Amankwah-Amoah et al. (2021) further demonstrated how the crisis accelerated digital transformation, a trend aligned with the focus in cultures with a long-term orientation toward future-proofing operations rather than pursuing short-term opportunistic gains.

Considering the dynamics described above, our study focuses on the dimensions of uncertainty avoidance (UID and also referred to UA) and long-term orientation (LTO) in Hofstede's cultural model, as they are particularly relevant for understanding the effects of the Covid-19 pandemic on earnings management. We posit that in cultures with a higher long-term orientation, organizations are more likely to prioritize future sustainability and transparency over short-term financial manipulation, thereby reducing the pandemic's influence on earnings management practices. As companies operating in cultures characterized by a long-term orientation are assumed to show greater concern about the quality of their earnings, we posit that they tended to engage in less earnings management during the Covid-19 pandemic. Thus, we propose the following hypothesis:

H_2a: The level of a country's long-term orientation negatively moderated the effect of the Covid-19 pandemic on the magnitude of earnings management.

Cultures with higher uncertainty avoidance tend to rely on structured frameworks and risk-averse behaviours, thus reducing the need to use opportunistic earnings manipulation as a coping mechanism. By prioritizing stability and minimizing ambiguity, cultures with high uncertainty avoidance likely mitigated the disruptive financial effects of the pandemic, further moderating the extent of earnings management. Thus, we propose the following hypothesis:

H_2b: The level of a country's uncertainty avoidance negatively moderated the effect of the Covid-19 pandemic on the magnitude of earnings management.

By examining long-term orientation and uncertainty avoidance, this study explores the role of cultural dimensions as moderators in the relationship between Covid-19 and earnings management, offering a focused and relevant analysis of these dynamics.

Data and methods

Sample selection and operationalization

Testing our hypotheses required the estimation of a moderated multiple regression model (i.e., a model containing interaction terms), which we describe in detail later. However, we first needed to collect data on firms in the V4 countries. To establish our dataset, we used the Crefoport database to obtain data on companies from 2018 to 2021, complying with several criteria frequently used in the literature (e.g., Kliestik et al. 2020, 2021, Durana et al. 2021a, 2022, Gregova et al. 2021):

- total assets of at least EUR 3 M each year from 2018 to 2021, and
- net sales of at least EUR 2 M each year from 2018 to 2021, and
- profits before tax of at least EUR 0.1 M each year from 2018 to 2021, and
- an active status.

Regarding the length of the investigation period, our aim was to include both pre- and post-pandemic years. In the studies included in our literature review, the duration of the investigations ranged from 2 to 23 years. Except for studies examining multiple crisis periods, which analysed significantly longer time frames, most comparable studies covered only 2–7 years. In our case, we consider that the years before 2018 exhibited economic conditions similar to those in 2018 and 2019, particularly in terms of GDP growth. Consequently, including data before 2018 in our analysis is unlikely to provide additional insights. Therefore, we selected the four-year period from 2018 to 2021.

Table 1 summarizes the data cleaning steps taken that reduced our original sample and the effects of each on the sample size (in terms of firm-year observations).

Table 1

Sample selection and data cleaning

Number of firm-year observations	Czech Republic	Hungary	Poland	Slovakia	Total
Initial sample	4,900	13,116	22,208	5,900	46,124
After filtering out missing data or data inconsistencies[a)]	4,004	12,916	12,688	5,288	34,896
After dropping financial institutions and others with no industrial classification[b)]	3,956	12,720	12,516	5,228	34,420
After dropping outliers identified during winsorization[c)]	3,093	10,634	10,822	4,397	28,946
After dropping all firms with less than three observations[d)]	2,901	10,154	10,505	4,215	27,775

a) We dropped all companies for which data are not been available for the calculation of total accruals based on equation (1); the observations for which data are inconsistent with the entry criteria have been identified; observations where negative equity have been found and observations where variables were inconsistent with each other (i.e., where the summed values of variables did not equal the value of another variable when this should have been the case based of accounting logic).

b) We dropped companies we could not classify into one of the industries determined by 2-digit NACE-codes and companies whose main activities had NACE-codes of 64, 65, or 66 (financial institutions).

c) We performed winsorization before each step, (i.e., we dropped 1–1% from each tail of the distribution of continuous variables and proceeded with complete observations only).

d) We retained only those firms with time series that contained at least three observations.

As a result of the steps detailed above, we compiled an unbalanced panel (i.e., the length of the time series belonging to a given company might vary between 3 and 4) of 27,775 firm-year observations.

From our data, we can calculate the amount of total accruals (TA_{it}) based on the following formula, in line with Kliestik et al. (2021, 2022):

$$TA_{it} = \Delta REC_{it} + \Delta INV_{it} + \Delta PAY_{it} - DEP_{it} \quad (1)$$

In equation (1), REC_{it} stands for the annual change in receiveables, INV_{it} for the annual change in inventories, PAY_{it} for the annual change in payables, and DEP_{it} for the amout of depreciation. Total accruals can also be calculated as the difference between certain measures of earnings (e.g., net income before extraordinary items as in Lassoued–Khanchel 2021, or operating profit as in Yan et al. 2022) and operating cash flows. However, the lack of cash flow data in the Crefoport database prevents us from applying this approach.

Total accruals consist of discretionary and nondiscretionary accruals, which we separate using earnings management models (hereinafter "EM models") to estimate the nondiscretionary parts using different methods. The existing literature offers several EM models. Jones (1991) proposed a model that incorporates changes in revenue and property, plants, and equipment as explanatory factors for non-discretionary accruals. Her methodological contribution to the field is indicated by later models considering it as a starting point and modifying it by either adding more explanatory variables or modifying the variable definitions. Dechow et al. (1995) highlighted that the original Jones model might provide biased estimates of discretionary accruals (i.e., underestimates) when management exercises its discretion through revenues, and recommended adjusting the change in the revenue component of the original model by the change in receivables as a solution. Kothari et al. (2005) recommended that discretionary accrual measures be adapted to firm performance, which has given rise to the Kothari model, which also includes a measure of financial performance (current or last-year ROA [for abbreviation see Table 3]). For other EM models and, most importantly, their evolution, refer to Callao et al. (2014).

Our literature review indicates that these three EM models are among the most frequently used in previous studies. The formulas for each model are summarized in Table 2.

As Table 2 shows, all models are scaled by lagged total assets to address heteroscedasticity. Given the separation of total accruals, we estimate discretionary accruals by taking the residuals of the models. A different estimation is made for each country-year combination because the patterns of earnings management (for which the magnitude is assumed to be a linear function of some explanatory variables) may vary over time and across countries. Thus, we obtain 48 estimations, with 16 (4 countries × 4 periods) from each of the three EM models (e.g., Han et al. 2010, Gray et al. 2015, Ugrin et al. 2017, Halibi et al. 2019, Lassoued–Khanchel 2021, Soschinski et al. 2021). After obtaining the residuals of the models, we take their absolute values because we are interested in how our variables of interest influence the magnitude of earnings management (e.g., Han et al. 2010, Gray et al. 2015, Lewellyn–Bao 2017, Chen et al. 2018, Soschinski et al. 2021, Aljughaiman et al. 2023). Our baseline model is the modified Jones model, whereas the other two models are used in the robustness tests to determine whether our results depend on the choice of EM model. Our choice is supported by the observed frequency of model applications in the earnings management literature on the V4 countries (Table 2, right column), and the findings of Kliestik et al. (2021). Specifically, Kliestik et al.

(2021) revealed that the modified Jones model is the most appropriate for detecting earnings management in this group of countries.

Table 2

Summary of earnings management models

Model	Equation	Frequency of application in the reviewed V4 studies
Jones	$\frac{TA_{it}}{A_{i(t-1)}} = \alpha_1 \frac{1}{A_{i(t-1)}} + \alpha_2 \frac{\Delta REV_{it}}{A_{i(t-1)}} + \alpha_3 \frac{PPE_{it}}{A_{i(t-1)}} + \varepsilon_{it}$	3
Modified Jones	$\frac{TA_{it}}{A_{i(t-1)}} = \alpha_1 \frac{1}{A_{i(t-1)}} + \alpha_2 \frac{\Delta REV_{it} - \Delta REC_{it}}{A_{i(t-1)}} + \alpha_3 \frac{PPE_{it}}{A_{i(t-1)}} + \varepsilon_{it}$	9
Kothari	$\frac{TA_{it}}{A_{i(t-1)}} = \alpha_1 \frac{1}{A_{i(t-1)}} + \alpha_2 \frac{\Delta REV_{it} - \Delta REC_{it}}{A_{i(t-1)}} + \alpha_3 \frac{PPE_{it}}{A_{i(t-1)}} + \alpha_4 \frac{ROA_{it}}{A_{i(t-1)}} + \varepsilon_{it}$	3

Notes: TA_{it} denotes total accruals; ΔREV_{it} changes in revenues; PPE_{it} Property, plants, and equipment; ΔREC_{it} changes in receivables; ROA_{it} return-on-assets; $A_{i(t-1)}$ lagged total assets.

Source: the frequency of application column was prepared by reviewing Kliestik et al. (2020, 2021, 2022), Siekelova et al. (2020), Durana et al. (2021a, 2021b, 2022), Gregova et al. (2021), Gajdasikova et al. (2022), Kovacova et al. (2022), Nagy et al. (2022), and Lizińska–Czapiewski (2023).

Criticism related to their linear nature can be made against any of the models used in this study to measure earnings management. Although nonlinear relationships may exist between total accruals and the variables applied in the models (e.g., Höglund 2012, Collins et al. 2017, Kliestik et al. 2021), their utilization remains common in the field despite this criticism.

As the regression techniques are quite sensitive to outliers, we winsorized (e.g., Lassoued–Khanchel 2021, Yan et al. 2022, Taylor et al. 2023) all variables before the modeling steps by removing 1–1% of the observations from the tails of the distributions. The calculations were performed in Microsoft Excel and using R statistical software.

As highlighted earlier, our variable of interest is Covid-19, defined in equation (2) as follows:

$$Covid19 = \begin{cases} 1 \; in \; 2020 \\ 0 \; otherwise \end{cases} \tag{2}$$

The definition in equation (2) is fully in line with Lassoued–Khanchel (2021), Hsu–Yang (2022), Yan et al. (2022), and Aljughaiman et al. (2023), and partially in line with Taylor et al. (2023) and Al-Begali–Phua (2023), who also considered FY2021 as part of the Covid-19 period and its interaction with two of Hofstede' six cultural variables: uncertainty avoidance and long-term orientation. However, previous research has suggested the need to control for several other variables. Thus, we include these two cultural factors as separate variables in our model, following Guan et al. (2005), Han et al. (2010), Parboteeah et al. (2012), Lewellyn–Bao (2015), Paredes–Wheatley (2017), Ugrin et al. (2017), Soschinski et al. (2021), and Viana et al.

(2022). Beyond these, our control variables can be categorized according to whether they are measured at the firm or country level.

As country-level control variables, we include GDP growth to reflect the general trend of the economy in which firms operate, following Chen et al. (2018) and Lassoued–Khanchel (2021). According to Filip–Raffournier (2014), a positive association exists between economic growth and earnings manipulation; therefore, we expect a positive sign for this variable's estimated coefficient.

Incorporating measures of regulatory quality is also a common practice (e.g., Han et al. 2010, Gray et al. 2015, Lewellyn–Bao 2017, Ugrin et al. 2017, Lassoued–Khanchel 2021). Thus, we include a composite index created by averaging three World Bank (2023) governance indicators, which we refer to as "GOVC" (for abbreviation see Table 3). More precisely, we take the average of the *rule of law*, *control of corruption*, and *regulatory quality* indices, each ranging from –2.5 to 2.5, with higher values indicating stronger control. We expect that a country with a high level of control will discourage companies operating within its borders from practicing earnings management; thus, the association between GOVC and earnings management will be negative.

We also include firm-level control variables. SIZE (see Table 3) is intended to measure how large a firm is and, as such, how strictly it might be monitored. Consequently, we expect this variable to be negatively related to earnings management. We calculate SIZE as the natural logarithm of total assets. Han et al. (2010), Ugrin et al. (2017), Chen et al. (2018), Lassoued–Khanchel (2021), Soschinski et al. (2021), and Yan et al. (2022) also applied this variable.

Leverage is calculated as total liabilities divided by total assets. This variable is included following Han et al. (2010), Gray et al. (2015), Ugrin et al. (2017), Chen et al. (2018), Soschinski et al. (2021), and Yan et al. (2022), and is intended to measure the extent to which a firm is exposed to external financiers. We expect this to be positively related to the magnitude of earnings management because more indebted companies might have to comply with financial covenants.

We also control for firm performance, measured as last-year ROA following Ugrin et al. (2017), Chen et al. (2018), Lassoued–Khanchel (2021), and Soschinski et al. (2021). We expect that the more profitable a company was previously, the more inclined it will be to manage earnings to meet current expectations.

The last firm-level control variable is sales growth. We expect higher growth to be accompanied by higher earnings volatility, which may require more earnings management to smooth earnings. Lassoued–Khanchel (2021) also applied this variable.

Table 3 summarizes the study variables.

Table 3

Summary of variables

Variable name	Abbre-viation	Definition/ calculation	Variable category	Expected sign of its coefficient	Source
abs_EM_Jones	EMJ	Absolute value of the EM proxy calculated with the Jones model	Response variable	NR	EM models as in Table 2
abs_EM_ Modified Jones	EMMJ	Absolute value of the EM proxy calculated with the modified Jones model	Response variable	NR	
abs_EM_ Kothari	EMK	Absolute value of the EM proxy calculated with the Kothari model	Response variable	NR	
Covid_19	Covid_19	Indicator of Covid-19; 1 in 2020 and 0 otherwise	Variable of interest	+	Defined by the authors
Leverage	LEV	Ratio of total liabilities to total assets	Control variable_firm characteristics	+	Crefoport database
Size	SIZE	Natural logarithm of total assets	Control variable_firm characteristics	–	
Growth	GR	Annual change in revenue	Control variable_firm characteristics	+	
Last-year ROA	ROA	Last-year profit after tax divided by last-year total assets	Control variable_firm characteristics	+	
GDP growth	GDP_GR	GDP-growth of the country of operation in a given year	Control variable_country characteristics	+	Eurostat
Government control	GOVC	The arithmetic average of three indicators: rule of law, control of corruption, and regulatory quality	Control variable_country characteristics	–	World Bank
Uncertainty avoidance	UID	Cultural dimensions	Control variable_country characteristics	–	theculture factor.com
Long-term orientation	LTO		Control variable_country characteristics	–	

Table 4 summarizes the values of the country-level control variables.

Table 4

Values of country-level control variables

Country	Cultural variables		GDP growth				Government control			
	UID	LTO	2018	2019	2020	2021	2018	2019	2020	2021
Czech Republic	74	70	3.2	3.0	–5.5	3.6	0.9532	0.9503	0.9592	1.0385
Hungary	82	58	5.4	4.9	–4.5	7.2	0.4109	0.3929	0.3613	0.3542
Poland	93	38	5.9	4.5	–2.0	6.9	0.6446	0.6911	0.6786	0.6189
Slovakia	51	77	4.0	2.5	–3.3	4.9	0.5199	0.5807	0.6335	0.6051

Sources: theculturefactor.com (2023), Eurostat (2023), World Bank (2023).

As shown in Table 4, Poland is the most uncertainty-avoidant country, with Hungary and the Czech Republic also strongly opposed to uncertainty. However, Slovakia is less concerned with uncertainty. Thus, in the first three countries, people seek stricter regulations, which may indicate opposition to earnings manipulation. The Czech Republic and Slovakia are long-term oriented, whereas short-termism is more prevalent in Hungary and Poland, which may have resulted in a more abrupt response to the pandemic in the latter two countries.

All four countries exhibited relatively stable positive GDP growth before the pandemic. However, the pandemic caused significant declines in 2020, which may have prompted companies to engage in greater earnings management. In 2021, all countries showed signs of recovery, which may have reduced the extent of earnings management.

The measure of regulatory quality is relatively stable in each country. However, the decreasing trend in Hungary might indicate more room for earnings management, whereas tightening regulations in the Czech Republic in 2021 may have discouraged firms from earnings management practices.

Equation (3) is estimated using three different response variables to test the robustness of the findings, as follows:

$$\begin{aligned}|DA| = {} & \beta_0 + \beta_1 * Covid19 + \beta_2 * LTO * Covid19 + \beta_3 * UID * Covid19 \\ & + \sum_{j=4}^{l} \beta_j * Country\ control_j + \sum_{j=l+1}^{k} \beta_j * Firm\ control_j \\ & + Industry\ fixed\ effects + Year\ fixed\ effects + \varepsilon\end{aligned} \tag{3}$$

As our hypotheses indicate, we intend to estimate an interaction model that incorporates the constitutive terms of the interaction (i.e., cultural factors) as different variables. Therefore, at this point, distinguishing between the two effects of these cultural factors is very important. They have a clear direct effect on earnings management, as demonstrated by the findings of several previous studies (e.g., Han et al. 2010, Gray et al. 2015, Ugrin et al. 2017). However, they may also have a moderating effect, as culture could modify how members of a society react to certain events. We must also theoretically rule out the existence of a reverse interaction, in line with Andersson et al. (2014). Specifically, as culture is a permanent part of society, an external shock modifying its effect on earnings management is not plausible, whereas cultural factors could plausibly moderate the effect of the Covid-19 pandemic on earnings management.

The above model allows us to test our hypotheses, as it controls for important determinants of earnings management and contains the variables operationalizing our hypotheses. Specifically, $H2a$ and $H2b$ can be tested using a significance test of the β_2 and β_3 parameters. If they are significantly different from 0, we can assume that an interaction exists between the Covid-19 pandemic and the investigated cultural dimensions, as the latter influences the effect of the pandemic on the magnitude of earnings management.

Testing $H1$ is equivalent to testing the significance of the quantity, which is the effect of the Covid-19 pandemic on earnings management, expressed as a function of the cultural variables. In equation 4, we expect the quantity to be positive based on $H1$, and β_2 and β_3 to be negative based on $H2a$ and $H2b$.

$$\beta_1 + \beta_2 * LTO + \beta_3 * UID \qquad (4)$$

In the following, we use the terms "total effect" and "conditional effect" interchangeably and refer to the above quantity.

We estimate the above model using ordinary least squares (OLS) estimation (i.e., a pooled OLS model is estimated). This approach is frequently used in the field (e.g., Hope 2003, Han et al. 2010, Gray et al. 2015, Ugrin et al. 2017, Chen et al. 2018, and Soschinski et al. 2021), and moreover, the concurrent panel models (i.e., the fixed effect and random effect models) are ruled out for different reasons. Based on the Hausman test ($p < 2.2 * 10^{-16}$), the random effect model provides inconsistent estimations, whereas the fixed effect model does not allow us to estimate the effects of variables that remain constant over time. Consequently, we use the pooled OLS model and control for several firm- and country-level variables. Furthermore, best practices in the field suggest controlling for industry-fixed effects (assumed to be constant over time but varying across industry) and year-fixed effects (assumed to be the same for each firm but changing over time) (e.g., Hope 2003, Han et al. 2010, Ugrin et al. 2017, Chen et al. 2018, Soschinski et al. 2021). To balance the uneven distribution of the sample between countries (see Table 1), we use a weighting scheme that assigns weights to each observation, which is inversely proportional to the number of firms in the country of origin (Han et al. 2010, Chen et al. 2018).

Descriptive statistics

Table 5 shows the ratios of companies in each country and year that engaged in upward/downward earnings manipulation. The applied EM models generally show an increasing trend in the ratio of the occurrence of upward manipulators based on the total. This trend can also be observed at the country level, with the Czech Republic having the highest relative frequency of upward manipulators in almost every year, according to almost all models.

Table 5

Distribution of firms in the sample of four countries with upward (downward) manipulation in each year and country

(%)

Country	2018	2019	2020	2021
Panel A: percentage of upward (and downward) manipulators based on the modified Jones model				
Czech Republic	42.79 (57.21)	46.76 (53.24)	49.48 (50.52)	49.44 (50.56)
Hungary	40.12 (59.88)	43.61 (56.39)	45.04 (54.96)	45.87 (54.13)
Poland	40.91 (59.09)	44.31 (55.69)	43.28 (56.72)	46.81 (53.19)
Slovakia	40.93 (59.07)	45.50 (54.50)	46.37 (53.63)	47.88 (52.12)
Total	40.82 (59.18)	44.49 (55.51)	45.06 (54.94)	46.90 (53.10)
Panel B: percentage of upward (and downward) manipulators based on the Jones model				
Czech Republic	43.23 (56.77)	48.11 (51.89)	49.35 (50.65)	46.61 (53.39)
Hungary	42.39 (57.61)	44.27 (55.73)	44.26 (55.74)	46.79 (53.21)
Poland	41.86 (58.14)	46.09 (53.91)	44.1 (55.9)	47.16 (52.84)
Slovakia	41.43 (58.57)	46.61 (53.39)	45.63 (54.37)	49.2 (50.8)
Total	42.13 (57.87)	45.72 (54.28)	44.96 (55.04)	47.28 (52.72)
Panel C: percentage of upward (and downward) manipulators based on the Kothari model				
Czech Republic	43.52 (56.48)	46.76 (53.24)	50.13 (49.87)	49.72 (50.28)
Hungary	40.16 (59.84)	43.69 (56.31)	45.31 (54.69)	45.71 (54.29)
Poland	40.83 (59.17)	44.65 (55.35)	43.28 (56.72)	46.89 (53.11)
Slovakia	41.53 (58.47)	45.78 (54.22)	46.55 (53.45)	47.88 (52.12)
Total	40.96 (59.04)	44.69 (55.31)	45.25 (54.75)	46.90 (53.10)

Table 6 presents descriptive statistics for the numerical variables (including the outcome and explanatory variables).

Table 6

Descriptive statistics for the entire sample of companies and four subsamples corresponding to each country

	Mean	SD	Min.	1st quartile	Median	3rd quartile	Max.
Panel A: descriptive statistics for the entire sample							
abs_modified_Jones	13.4930	13.5514	0.0001	3.4657	9.1760	18.9248	82.8749
abs_Jones	12.5936	12.6714	0.0001	3.2096	8.5121	17.7876	77.6432
abs_Kothari	13.4507	13.5441	0.0001	3.4450	9.0837	18.8944	82.6970
LEV	41.3215	22.0655	2.1101	22.8040	40.2255	58.7440	91.9046
SIZE	16.2972	0.9245	14.9805	15.5843	16.1000	16.8166	19.6871
GR	6.4721	19.6206	–46.3720	–3.1461	3.2797	14.8384	132.3668
ROA	10.0902	7.7883	0.0000	4.3367	8.0628	13.7841	49.5971
GDP_GR	2.5438	4.0661	–5.5000	1.3750	3.8000	5.0250	7.2000
GOVC	0.6496	0.2237	0.3542	0.4927	0.6262	0.7559	1.0385
UID	75.0000	17.7951	51.0000	68.2500	78.0000	84.7500	93.0000
LTO	60.7500	17.0758	38.0000	53.0000	64.0000	71.7500	77.0000
Panel B: descriptive statistics for the subsample of companies from the Czech Republic							
abs_modified_Jones	13.8295	13.2664	0.0001	4.3619	9.7567	18.9004	82.8749
abs_Jones	13.0491	12.6040	0.0001	3.9893	9.1805	17.8974	77.5859
abs_Kothari	13.7842	13.2767	0.0001	4.2801	9.6218	19.0473	82.3851
LEV	39.0415	22.2944	2.6123	19.4729	36.5811	56.2654	91.7467
SIZE	16.6116	1.0935	14.9830	15.7337	16.3780	17.2972	19.6871
GR	7.0782	18.2458	–43.6904	–3.3962	4.6698	14.9402	112.5672
ROA	9.1604	6.9666	0.0000	4.0502	7.4251	12.4630	44.7982
Panel C: descriptive statistics for the subsample of companies from Hungary							
abs_modified_Jones	14.9745	13.7342	0.0022	4.9141	10.9997	20.7956	82.7070
abs_Jones	13.9806	12.8644	0.0009	4.5433	9.9922	19.5719	77.6432
abs_Kothari	14.9104	13.7215	0.0006	4.8854	10.8666	20.7055	82.5931
LEV	36.0984	20.4209	2.1101	19.1799	34.1831	51.0462	91.9046
SIZE	16.2143	0.9222	14.9818	15.5151	15.9819	16.7041	19.6767
GR	7.2531	20.8939	–46.3315	–4.5455	4.7679	16.0897	132.3668
ROA	10.9799	8.0196	0.0537	5.0141	8.9788	14.8010	49.5971
Panel D: descriptive statistics for the subsample of companies from Poland							
abs_modified_Jones	11.5360	13.1062	0.0002	2.1716	6.6887	16.3203	82.0876
abs_Jones	10.7387	12.1962	0.0002	2.0064	6.1785	15.2821	77.0686
abs_Kothari	11.5023	13.0943	0.0005	2.1691	6.6487	16.2397	82.6970
LEV	43.8815	22.1360	2.1102	25.1996	43.6757	61.6986	91.8502
SIZE	16.2899	0.8681	14.9805	15.6276	16.1277	16.7726	19.6185
GR	5.3847	18.5799	–46.3720	–2.7142	–0.7048	13.2226	126.1610
ROA	10.1569	7.8565	0.1048	4.2729	8.1534	13.9650	49.1391
Panel E: descriptive statistics for the subsample of companies from Slovakia							
abs_modified_Jones	14.5700	13.8032	0.0001	4.5297	10.1208	20.1707	80.8994
abs_Jones	13.5620	12.8509	0.0023	4.1325	9.3824	18.8416	77.2452
abs_Kothari	14.5606	13.8134	0.0014	4.5256	10.1172	20.2026	82.4427
LEV	49.0933	22.2432	2.3332	31.4033	49.7367	67.2623	91.8672
SIZE	16.2989	0.8933	14.9832	15.5865	16.1313	16.8802	19.2962
GR	6.8835	19.7750	–44.8295	–4.1578	4.7935	15.1496	132.0711
ROA	8.4204	7.2301	0.0278	3.4153	6.3460	11.2006	48.3003

Notes: for convenience and ease of interpretation, all variables except for SIZE and GOVC are multiplied by 100 (i.e., expressed as percentages), while the cultural variables are originally measured on a 0–100 scale. Note that the country-level variable descriptives are calculated at the country level (i.e., not weighted based on the number of firms per country), as contained in Table 4, and are only presented in Panel A, as at the country level they only have 4 (GDP growth and GOVC) or 1 different value.

Panel A of Table 6 shows considerable similarities between the distributions of the different earnings management proxies. On average, the investigated period can be characterized by growth at both the firm (average growth of 6.47%) and country (average growth of 2.54%) levels. The countries presented in the sample are characterized by relatively high uncertainty avoidance and moderate long-term orientation, which vary over a relatively wide range.

The distribution of the earnings management proxies also demonstrates similarities within the country subsamples. Furthermore, the results suggest a relatively high level of earnings manipulation. Based on the grand mean of the absolute values of discretionary accruals estimated from the modified Jones model, firms' earnings discretion corresponds to 13.49% of their lagged total assets. This is higher in the Czech Republic (13.83%), Hungary (14.97%), and Slovakia (14.57%) and lower in Poland (11.54%). These values vary widely, from nearly zero (in line with the analysis of absolute values) to 80–83%.

Based on leverage, Slovak firms are the most indebted, with 49.09% of their total assets financed from external sources, on average. In contrast, Hungarian firms are, on average, less indebted, as external sources comprise only 36.1% of their total assets.

Regarding growth, the grand mean of 6.47% is exceeded by the country averages for the Czech Republic, Hungary, and Slovakia, whereas it is lower in Poland, with an average growth of 5.38%. On average, Hungarian firms exhibited the fastest growth. Significant variability can be observed in the growth values of the entire sample and the subsamples corresponding to individual countries.

The averages of the size variables do not show high variation across countries. Furthermore, the values are relatively stable within countries, which is attributable to the first sample-selection criterion for total assets.

Based on ROA, the most profitable companies in the entire sample operate in Hungary, with an average value of 10.98%, whereas Slovak companies are the least profitable, on average (8.42%). The variation in profitability is not very high but may again be attributable to the sample selection criteria regarding minimal profitability.

Further analysis of the descriptive statistics shows the effects of the pandemic in our sample, as the mean growth rate of firms' sales dropped in 2020 to –3.49% from +7.76% in the preceding year. Average ROA was also the lowest in 2020, although by only a few percentage points.

Table 7 presents the Pearson's correlation coefficients for each pair of variables.

Table 7

Correlation matrix

Pearson's correlation coefficient	abs_ modified_ Jones	abs_Jones	abs_Kothari	LEV	SIZE	GR
abs_modified_Jones	1	NA	NA	NA	NA	NA
abs_Jones	0.9512***	1	NA	NA	NA	NA
abs_Kothari	0.9956***	0.9471***	1	NA	NA	NA
LEV	0.1783***	0.1819***	0.1768***	1	NA	NA
SIZE	–0.0334***	–0.0338***	–0.0318***	0.0889***	1	NA
GR	0.1748***	0.1687***	0.1744***	0.0595***	0.0262***	1
ROA	0.0515***	0.0463***	0.0563***	–0.2454***	–0.1641***	–0.0268***
GDP_GR	–0.0114.	–0.0242***	–0.0115.	0.0099	–0.0078	0.3069***
GOVC	–0.0566***	–0.0538***	–0.0558***	0.0896***	0.1084***	–0.0272***
UID	–0.071***	–0.0713***	–0.0717***	–0.0776***	–0.0232***	–0.0253***
LTO	0.0935***	0.0949***	0.0937***	0.0006	0.0339***	0.0358***

	ROA	GDP_GR	GOVC	UID	LTO
abs_modified_Jones	NA	NA	NA	NA	NA
abs_Jones	NA	NA	NA	NA	NA
abs_Kothari	NA	NA	NA	NA	NA
LEV	NA	NA	NA	NA	NA
SIZE	NA	NA	NA	NA	NA
GR	NA	NA	NA	NA	NA
ROA	1	NA	NA	NA	NA
GDP_GR	0.0355***	1	NA	NA	NA
GOVC	–0.0755***	–0.1287***	1	NA	NA
UID	0.0816***	0.1734***	–0.0127*	1	NA
LTO	–0.0575***	–0.1958***	–0.0327***	–0.9239***	1

Note: ***: $p < 0.001$; **: $p < 0.01$; *: $p < 0.05$; .: $p < 0.1$.

The similarity among the three earnings management proxies is also visible through the high correlation between their values. All explanatory variables are significantly correlated with the earnings management proxies, although this might be misleading because it does not consider the interdependence with other variables that we control for in our regression models, and as such, the significance might change.

Multivariate analysis results

To test our hypotheses, we use our data to estimate equation (3). As the homoscedasticity of the residuals could be rejected based on the White test ($p = 5.87 * 10^{-246}$), Table 8 contains heteroscedasticity-robust standard errors, so that the statistical significance of the parameters can be judged reliably based on the p-values.

Table 8

OLS regression results on the relationship between the Covid-19 pandemic and earnings management*

	Estimate	Standard error	t value	Pr(>|t|)
(Intercept)	–12.7556	3.1735	–4.0194	5.85E–05
Covid-19	32.2444	5.9632	5.4073	6.45E–08
LTO	0.2833	0.0178	15.9274	7.33E–57
UID	0.2260	0.0195	11.5639	7.39E–31
GOVC	–5.5814	0.6747	–8.2730	1.36E–16
LEV	0.1195	0.0045	26.4963	8.61E–153
SIZE	–0.5452	0.1018	–5.3537	8.68E–08
ROA	0.1384	0.0130	10.6397	2.19E–26
GR	0.0942	0.0060	15.6697	4.21E–55
GDP_GR	–0.6199	0.2250	–2.7551	0.005871555
Covid19*LTO	–0.3397	0.0549	–6.1843	6.32E–10
Covid19*UID	–0.2442	0.0578	–4.2210	2.44E–05
Industry-fixed effects	Included			
Year-fixed effects	Included			
N	27,775			
F-statistics (p-value)	43.26 ($<2.2 * 10^{-16}$)			
Adjusted R^2	0.1205			

* The impact the cultural dimensions of uncertainty avoidance and long-term orientation have on this relationship, and the effects of control variables on the magnitude of earnings management.

Notes: calculations were performed using R statistical software. The t-statistics are based on heteroscedasticity-robust standard errors.

Notably, the model is subject to multicollinearity, which is unsurprising based on model specification. The interactions and their components are strongly collinear, resulting in variance inflation factor (VIF) values well above 10. This problem is natural, to some extent, in the presence of interactions. However, following Brambor et al. (2006) and Andersson et al. (2014), we include the terms presented in the interactions as separate variables. Furthermore, the impact on multicollinearity does not change the unbiased property of the estimations, and the standard errors correctly reflect the uncertainty with which the parameters can be estimated, although they are inflated, as suggested by the high VIF values (Brambor et al. 2006).

Below, we interpret the results in light and order of our hypotheses.

To test the conditional effects of the Covid-19 pandemic on earnings management, we must go beyond the content in Table 8 to test our first hypothesis and calculate the effects of the pandemic on the magnitude of earnings management in each country after considering the moderating impact of the cultural dimensions of uncertainty avoidance and long-term orientation. The conditional effect of the Covid-19 pandemic can be expressed as follows:

$$\widehat{\beta_1} + \widehat{\beta_2} * LTO + \widehat{\beta_3} * UID = 32.2444 - 0.3397 * \mathrm{LTO} - 0.2442 * \mathrm{UID} \quad (5)$$

If we plug the long-term orientation and uncertainty avoidance values of the countries into equation (5), we obtain country-specific Covid-19 effects, showing that after considering the long-term orientation and uncertainty avoidance of the countries (summarized in Table 9), the total effect is negative. Thus, earnings discretion was more weakly exercised, and the signed earnings management values varied within a narrower range. Furthermore, the coefficients of the cultural variables are statistically significant and positive. Putting this into context, we might argue that if a society has a strong long-term orientation and uncertainty avoidance, it will attempt to prepare for the future. Most firms in the sample engaging in negative earnings management provide evidence for this. This phenomenon, together with the cultural variables' positive effects on the absolute value of earnings management, indicates that most firms created higher reserves for the future in years generally characterized by growth (the years before Covid-19 and 2021). However, following the onset of the Covid-19 pandemic and its serious economic consequences, firms needed to react. Accordingly, this reaction was dependent on the level of uncertainty avoidance and long-term orientation. If these were sufficiently high, they changed the direction of the total Covid-19 effect to be negative.

Table 9

Total effect of the Covid-19 pandemic in each country

Country	LTO	UID	Total effect of Covid-19	Standard error	CI(95%)
Czech Republic	70	74	–9.6066	2.6086	(–14.7196; –4.4935)
Hungary	58	82	–7.4832	2.4420	(–12.2696; –2.6968)
Poland	38	93	–3.3744	2.0838	(–7.4586; 0.7099)
Slovakia	77	51	–6.3686	1.8705	(–10.0348; –2.7024)

To test H_1 and the significance of the total effect Covid-19 had on the magnitude of earnings management in each country, we calculate the standard errors of the quantity in equation (5) for each country and construct 95% confidence intervals. The confidence intervals indicate that the total Covid-19 effect was statistically significant in each country, except Poland. In Poland, given the low long-term orientation and its moderating effect, the total Covid-19 effect was not significantly different from the 0. Thus, the evidence does not support H_1, as the pandemic's total effect on the magnitude of earnings management was negative in three of the four countries, excluding Poland.

The significance of the parameters of the interaction terms and their negative signs can be considered evidence supporting $H2a$ and $H2b$. Thus, cultural factors negatively moderated the effects of Covid-19 on the magnitude of earnings management. This means that the higher the long-term orientation of a culture, the lower the effect of the pandemic on the magnitude of earnings management, and the higher the uncertainty avoidance of a culture, the lower the effect of the pandemic on the magnitude of earnings management. Thus, how firms reacted to the pandemic depended on their country of origin's long-term orientation and uncertainty avoidance.

The control variables are also significant. SIZE, GOVC, and GDP growth are found to have negative effects, whereas leverage, ROA, and growth have positive effects. A detailed discussion of the results is provided below. We compare our findings to those of studies that investigated the absolute value of earnings management.

The effect of leverage on the magnitude of earnings management is significantly positive, indicating that more indebted firms tend to manage their earnings to a greater extent. This aligns with our expectations and might be attributable to the aim of complying with the financial covenants imposed by financial institutions. These findings are in line with those of Chen et al. (2018) but not with those of Han et al. (2010) and Gray et al. (2015), who revealed a negative effect. This variable was insignificant in Soschinski et al. (2021).

The coefficient of SIZE is significantly negative, which aligns with our expectations and supports the hypothesis that larger firms tend to manage their earnings to a lower extent as they are more visible and exposed to greater market monitoring. These findings are in line with those of Han et al. (2010), Gray et al. (2015), Lassoued–Khanchel (2021), and Soschiski et al. (2021), who, after excluding US and Japanese firms from their sample, also estimated a negative coefficient for firm size. However, Chen et al. (2018) reported opposing findings.

The coefficient of past profitability, measured by last year's ROA, is positive, indicating that the more profitable a firm was previously, the greater the extent to which it will manage its earnings in the present. This may be explained by higher expectations based on past performance. These findings are consistent with those of Chen et al. (2018) and Lassoued–Khanchel (2021). However, these results conflict with those of Soschiski et al. (2021), who found that the effect of this variable was not significant.

Regarding growth, our estimation shows a positive effect, indicating that firms that demonstrate faster growth will manage their earnings to a greater extent. This could be a sign of earnings smoothing, because sales growth may be accompanied by higher earnings volatility. These findings are consistent with those of Lassoued–Khanchel (2021).

The effect of GDP growth on the magnitude of earnings management is negative, indicating that the better the economic conditions, the lower the magnitude of earnings management. These results are consistent with those of Lassoued–Khanchel (2021); however, Chen et al. (2018) reported opposing findings.

GOVC negatively affects the magnitude of earnings management. Thus, the stricter the regulations, the lower the extent of earnings management. However, these results are not comparable to those of other studies that used different methods to develop proxies for regulatory quality.

As our robustness check indicates, the above results are not dependent on the choice of EM models or inclusion of industry-fixed effects (for the corresponding tables, please refer to Table A1 and A2 in Appendix).

Discussion and conclusions

To the best of our knowledge, this study is the first to investigate the effects of the Covid-19 pandemic on earnings management in the V4 countries. However, the number of reference points with which we can compare our results is rather limited.

Regarding the effect of Covid-19, similar to prior studies reported in the literature, the results are inconclusive. In particular, our study shows that the effect of the Covid-19 pandemic is moderated by the cultural dimensions of long-term orientation and uncertainty avoidance. After considering these moderators, the Covid-19 pandemic is found to have a negative impact on the magnitude of earnings management in all countries except Poland. These findings are not in line with those of Lizińska–Czapiewski (2023), who argued that companies in Poland engaged in "big bath" strategies (i.e., recognizing higher losses and forming reserves for the future accordingly). This contradiction might be explained by Lizińska–Czapiewski's (2023) exclusive focus on public firms, which differs from the composition of our Polish subsample. Lassoued–Khanchel (2021) and Aljughaiman et al. (2023) find evidence of intensified earnings management, which might be explained by the cultural differences between the countries in our sample and those in their sample.

Methodologically, we join an increasing group of authors who have investigated hypotheses that may be operationalized by applying interactions in multiple regression models (e.g., Han et al. 2010, Gray et al. 2015, Lewellyn−Bao 2017, Ugrin et al. 2017, Soschinski et al. 2021).

The descriptive statistics in our study indicate that most firms engaged in income-decreasing earnings management during the study period, although their proportion decreased gradually over time. These findings are not in line with those of Kliestik et al. (2020) and Kovacova et al. (2022), although our findings do align with the theory that, under good economic circumstances (generally characterizing the investigated period except for 2020), reserves for the future are advisable to be created and income smoothing should be performed.

In conclusion, we contribute to the existing literature by highlighting the importance of culture in how firms respond to crises with serious economic consequences, such as a pandemic. Our findings show that the cultural dimensions of long-term orientation and uncertainty avoidance moderate the pandemic's effects on the magnitude of earnings management. After expressing the effect of the Covid-19 pandemic from our estimated model as a function of uncertainty avoidance and long-term orientation, we found that the total effect was negative in most countries, which did not support $H1$. Considering the relatively high values for long-term orientation and uncertainty avoidance, our results provide an explanation for the conflicting results found in previous studies on the effects of Covid-19 on earnings management. These effects may depend on country characteristics, and our findings show that these characteristics include the cultural dimensions of long-term orientation and uncertainty avoidance. We did find evidence to support $H2a$ and $H2b$, and these results were confirmed by robustness checks. Specifically, the results obtained using other EM models were consistent with the baseline findings. The robustness check also indicates that the results are not dependent on the inclusion of industry-fixed effects. These findings are in line with those of Kliestik et al. (2021), who found that cross-country differences within the V4 countries might be attributable to cultural, social, and legal differences. Cross-country differences in earnings management patterns may also be explained by different government reactions to crises; however, analysing this possibility is beyond the scope of our study.

As culture cannot be changed intentionally, especially during a short period of time, such as during a pandemic, we cannot provide advice to policymakers. However, our study offers valuable insights for academic researchers and practitioners in the auditing field as it highlights that the effects of a pandemic on the magnitude of earnings management might depend on the cultural dimensions of a firm's country of origin.

One limitation of this study is its heavy reliance on the culture of the firm's country of origin, whereas managers who conduct accounting tasks may come from a different culture. Furthermore, only a small number of countries were included in our analysis, which may explain the strong collinearity among the variables. Thus, future research should repeat this study in a broader geographical context.

Another future research direction relates to the applied sample selection criteria. The minimum amount of profit before taxes was set to EUR 100 k, which originally excluded loss-making firms. Thus, we did not include an interesting subsample of firms whose importance was highlighted by the LOSS indicator that other studies applied as a control variable (e.g., Han et al. 2010, Gray et al. 2015, Ugrin et al. 2017, Chen et al. 2018). In the future, we plan to relax the minimal profitability criteria to also include lossmaking firm in the sample.

In this study, we focused only on AEM because the database we used did not contain sufficient information for REM modeling. However, previous studies on EM in the V4 countries show a research gap regarding whether REM or AEM is more prevalent, which we also plan to address in the future.

Appendix

Table A1

Robustness check with industry-fixed effects

	Modified Jones	Jones	Kothari
(Intercept)	–12.7556 (3.1735) ***	–13.441 (3.0059) ***	–13.0096 (3.1721) ***
Covid19	32.2444 (5.9632) ***	28.5632 (5.7077) ***	33.1375 (5.9511) ***
LTO	0.2833 (0.0178) ***	0.2747 (0.0169) ***	0.2811 (0.0178) ***
UID	0.226 (0.0195) ***	0.2179 (0.0181) ***	0.2238 (0.0196) ***
GOVC	–5.5814 (0.6747) ***	–4.8632 (0.6493) ***	–5.5838 (0.6728) ***
LEV	0.1195 (0.0045) ***	0.1128 (0.0042) ***	0.1195 (0.0045) ***
SIZE	–0.5452 (0.1018) ***	–0.5445 (0.096) ***	–0.5132 (0.1019) ***
ROA	0.1384 (0.013) ***	0.1259 (0.0123) ***	0.1446 (0.013) ***
GR	0.0942 (0.006) ***	0.0868 (0.0053) ***	0.0941 (0.006) ***
GDP_GR	–0.6199 (0.225) **	–0.5009 (0.2115) *	–0.6345 (0.2248) **
Covid19*LTO	–0.3397 (0.0549) ***	–0.2926 (0.0525) ***	–0.3483 (0.0548) ***
Covid19*UID	–0.2442 (0.0578) ***	–0.2097 (0.055) ***	–0.2512 (0.0578) ***
Industry-fixed effects	Included	Included	Included
Year-fixed effects	Included	Included	Included
N	27,775	27,775	27,775
F-statistics (p-value)	43.26 ($<2.2 * 10^{-16}$)	42.09 ($<2.2 * 10^{-16}$)	43.27 ($<2.2 * 10^{-16}$)
Adjusted R^2	0.1205	0.1175	0.1205

Notes: standard errors are in parentheses. ***: $p < 0.001$; **: $p < 0.01$; *: $p < 0.05$; .: $p < 0.1$.

Country	Modified Jones	Jones	Kothari
	Total effect of Covid-19		
Czech Republic	–9.6066	–7.4300	–9.8290
Hungary	–7.4832	–5.5966	–7.6586
Poland	–3.3744	–2.0516	–3.4554
Slovakia	–6.3686	–4.6560	–6.4904
	Standard error		
Czech Republic	2.6086	2.4582	2.6060
Hungary	2.4420	2.2981	2.4398
Poland	2.0838	1.9557	2.0824
Slovakia	1.8705	1.7587	1.8691
	CI(95%)		
Czech Republic	(–14.7196; –4.4935)	(–12.2483; –2.6118)	(–14.9368; –4.7212)
Hungary	(–12.2696; –2.6968)	(–10.1009; –1.0922)	(–12.4408; –2.8765)
Poland	(–7.4586; 0.7099)	(–5.8848; 1.7817)	(–7.5371; 0.6262)
Slovakia	(–10.0348; –2.7024)	(–8.1032; –1.2087)	(–10.154; –2.8268)

Table A2

Robustness check without industry-fixed effects

	Modified Jones	Jones	Kothari
(Intercept)	–5.1173 (3.1281)	–6.3143 (2.9647) *	–5.3433 (3.1268).
Covid19	32.0835 (6.0555) ***	28.4136 (5.8071) ***	32.9663 (6.0433) ***
LTO	0.2812 (0.0177) ***	0.2714 (0.0168) ***	0.279 (0.0178) ***
UID	0.2197 (0.0195) ***	0.2112 (0.0182) ***	0.2171 (0.0195) ***
GOVC	–5.4226 (0.6754) ***	–4.7317 (0.6523) ***	–5.4123 (0.6736) ***
LEV	0.1316 (0.0044) ***	0.1239 (0.0041) ***	0.1314 (0.0044) ***
SIZE	–0.8446 (0.0983) ***	–0.8133 (0.0926) ***	–0.8117 (0.0983) ***
ROA	0.1775 (0.0126) ***	0.1596 (0.0119) ***	0.1834 (0.0125) ***
GR	0.0976 (0.0061) ***	0.0897 (0.0054) ***	0.0975 (0.0061) ***
GDP_GR	–0.6088 (0.2279) **	–0.4911 (0.2148) *	–0.6232 (0.2276) **
Covid19*LTO	–0.3375 (0.0557) ***	–0.2905 (0.0534) ***	–0.346 (0.0556) ***
Covid19*UID	–0.2416 (0.0587) ***	–0.2074 (0.056) ***	–0.2485 (0.0586) ***
Industry-fixed effects	Not included	Not included	Not included
Year-fixed effects	Included	Included	Included
N	27,775	27,775	27,775
F-statistics (p-value)	234 ($<2.2 * 10^{-16}$)	225.5 ($<2.2 * 10^{-16}$)	234.3 ($<2.2 * 10^{-16}$)
Adjusted R^2	0.0983	0.0951	0.0985

Notes: standard errors are in parentheses. ***: $p < 0.001$; **: $p < 0.01$; *: $p < 0.05$; .: $p < 0.1$.

Country	Modified Jones	Jones	Kothari
	Total effect of Covid-19		
Czech Republic	–9.4254	–7.2690	–9.6455
Hungary	–7.3081	–5.4422	–7.4815
Poland	–3.2153	–1.9136	–3.2949
Slovakia	–6.2305	–4.5323	–6.3516
	Standard error		
Czech Republic	2.6412	2.4966	2.6383
Hungary	2.4724	2.3336	2.4700
Poland	2.1097	1.9853	2.1083
Slovakia	1.8936	1.7854	1.8921
	CI(95%)		
Czech Republic	(–14.6023; –4.2486)	(–12.1624; –2.3756)	(–14.8168; –4.4743)
Hungary	(–12.154; –2.4621)	(–10.0162; –0.8682)	(–12.3228; –2.6402)
Poland	(–7.3505; 0.9198)	(–5.805; 1.9778)	(–7.4272; 0.8374)
Slovakia	(–9.9421; –2.5189)	(–8.0318; –1.0328)	(–10.0603; –2.6429)

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