Surviving Covid-19: impact of the pandemic on earnings management – the case of European countries

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Three years after the severe contagious pandemic, Covid-19, hit Europe, its repercussions are still being assessed. This study provides an overview of the Covid-19 pandemic's impact on companies' earnings manipulation activities in Europe.
Our results confirm the impact of Covid-19 on earnings management practices in European countries. We confirm that companies reduced their earnings management activities during the pandemic. Moreover, a detailed analysis of the Covid-19 period revealed a higher magnitude of manipulation in 2021 than in 2020.
Second, our results confirm the existing differences in earnings management among European countries. Companies from different countries responded differently to the crisis to survive the negative effects of Covid-19. The highest levels of manipulation during the pandemic were observed in France, Germany, and Sweden, whereas the lowest were found in Italy, Austria, and Poland.
Third, the complete lockdown in European countries due to the Covid-19 outbreak affected the adequacy of the value of accounting figures. Finally, firms reporting losses had higher levels of earnings management, and listed companies engaged more in earnings manipulation during the Covid-19 period.
The development of single-industry towns is one of the most important aspects of improving infrastructure and preventing brain drain as the first priority.

Keywords:
Covid-19,
earnings management,
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Introduction

The Covid-19 outbreak in 2020 shocked the entire global economy, triggering an unprecedented sudden economic halt (Arfah et al. 2020). Various effects have been observed, such as lockdowns, a decline in product demand, increased uncertainty for companies, disrupted trade, extreme volatility affecting firms worldwide, the rapid disappearance of investors, the collapse of supply chains, poor forecasts, widespread unemployment, bankruptcy in many firms, and increased poverty. Hence, companies were unexpectedly forced to face a new crisis and survive the Covid-19 pandemic.

Previous earnings management literature has shown that firms manipulate their reported earnings in response to negative market conditions (see, for example, recent studies by Filip–Raffournier 2014, Lisboa–Kacharava 2018, Callao et al. 2020). Consequently, companies use accounting discretion to adjust their expectations.

In this context, this study examines how European companies have survived the negative impact of the global disease outbreak in terms of earnings manipulation. To this end, we first investigate whether firms changed their earnings management strategies in response to the pandemic. In other words, we examine how companies manage their earnings in response to the negative circumstances caused by the worst crisis in recent history, which has exposed various weaknesses in worldwide economies.

Second, the pandemic had a large impact on companies, but it did not affect all of them in the same way. This study also analyses cross-country differences in earnings management practices and discusses the roles of country- and firm-specific economic and institutional factors. Therefore, we measured whether managers' behaviours differ across European countries.

Finally, we introduce a variable which measures the impact of the lockdowns imposed by European governments in 2020 in response to the spread of the virus. The lockdowns in European countries paralysed their business activities for weeks. Such a situation has never occurred in recent history.

These results confirm the impact of Covid-19 on the earnings management activities of European companies. These companies reduced their earnings management activities during the Covid-19 period compared to the period before Covid-19. Nevertheless, when analysing the pandemic period separately, we observed a higher magnitude of manipulation in 2021 than in 2020. In other words, first, in response to the surge of the pandemic in 2020, earnings management activity decreased because of restrictions; nevertheless, in 2021, in the second pandemic year, earnings management increased in response to the extended negative conditions of Covid-19.

Third, our results confirm the existing differences in earnings management among European countries in response to the pandemic. The highest earnings manipulation during the Covid-19 pandemic was observed in France, Germany, and Sweden. The

lowest earnings manipulation was found in Italy, Austria, and Poland. To some extent, this situation can be explained by our sample's industry composition. In countries with higher earnings management, the percentage of the four main industries – services, transportation, manufacturing, and retail trade – is higher than in other countries. Moreover, these industries were significantly more affected by Covid-19 than others. Hence, the impact of the pandemic on these industries led to more earnings manipulation in the European countries in question.

Additionally, these results are in accordance with the regression model, as we find an unpredictable positive correlation between earnings management and a country's economic conditions. However, our positive sign can be explained by the collapse of the European economy reflected by the Gross Domestic Product (GDP) in 2020 and the response of companies to the increasing GDP resulting from the adoption of different measures by European countries. Amid 'improved' macroeconomic conditions, managers' perception of the 'rising' economy did not reflect positive expectations for investors' perceptions; therefore, companies responded with more earnings management.

Moreover, we confirmed that the Covid-19 lockdowns in European countries had a significant effect on earnings management. According to our results, in countries with the longest shutdowns of activities in 2020, such as Spain, Italy, and Austria, companies engaged in less earnings management. However, in Sweden and Iceland, where lockdowns did not occur, as well as in Germany, Norway, and Finland, where strict restrictions were applied only for short periods, companies were more motivated to engage in earnings management to cope with the pandemic, business difficulties, investors' expectations, and possible negative forecast predictions.

In addition, we confirm that firms that report losses have higher levels of earnings management. Finally, listed companies engaged in more earnings manipulation during the Covid-19 period.

We contribute to the earnings management literature in several ways. First, this study provided a cross-country analysis of the impact of Covid-19 on earnings management. Despite existing literature on earnings management and Covid-19 (Susak 2020, Usheva–Vagner 2020, Aljawaheri et al. 2021, He–Jianqun 2021, Duc et al. 2021, Buitink 2022, Ali et al. 2022), this is one of the few studies, if not the first, to examine earnings management practices in the framework of a comparative study of European countries. Considering the importance of the European market and the significant impact of Covid-19 on European companies, this study is important for practitioners, regulators, and investors.

Second, previous investigations focused on the impact of Covid-19 using one-year observations (2020) as the pandemic period. However, Covid-19 impacted the world for more than just one year. Therefore, previous studies have not fully reflected the impact of the pandemic. Our study employs two-year observations covering 2020 and 2021 to fully measure the impact of Covid-19. Additionally, we directly tested earnings

management during the pandemic. In other words, we compared earnings manipulation between 2020 and 2021 to evaluate managers' reactions to the changing conditions of Covid-19. This has not been done previously in earnings management literature; therefore, our study fills this research gap.

Third, during the Covid-19 period, almost all European countries introduced strict restrictions in the form of lockdowns to cope with the pandemic effects. A large body of the literature confirms the negative and significant impact of this measure on business activities in European countries. Hence, our study addresses this challenge by measuring the effects of lockdowns on earnings management in various European countries. Until now, this issue has not been investigated in earnings management literature. Our study is pioneering in this regard.

The remainder of this paper proceeds as follows. First, we present a literature review of earnings management during the Covid-19 pandemic and develop two research hypotheses. Then we describe the sample and the methodology. Following the results are shown. Finally, we present our conclusions.

Literature review and research hypotheses

The Covid-19 pandemic began in 2020 as an unprecedented event with a sudden and intense impact on economic activity and financial markets worldwide (Susak 2020). This impact led to an immediate economic crisis; nevertheless, this economic crisis cannot be compared to any of the crises in the last few decades. Susak (2020) commented that it came suddenly and was caused by non-economic reasons that had intense economic and social effects worldwide. This study investigates the effect of the pandemic on earnings management.

Earnings management is a complex process that has been a subject of interest in empirical research. A growing body of literature has investigated the impact of earnings management on the quality of accounting information and the decision-making process, as inappropriate accounting practices have reduced the confidence of investors, harmed the image of firms, and influenced whether a firm meets or falls short of expectations, among others.

There is no consensus in term of the definition of earnings management, as in the literature, we can find many different definitions. The definition most commonly used in the literature is that proposed by Healy–Wahlen (1998), who explain the term as the use of judgment in financial reporting to alter financial reports either to mislead some stakeholders about the underlying economic performance of company or to influence contractual outcomes that depend on reported accounting numbers. Earnings management has received considerable attention in academic research because of its complexity and importance. Therefore, the spotlight of the literature now focuses on the impact of Covid-19 on earnings management. We present the existing studies and their main conclusions in the following paragraphs.

Susak (2020) examined the impact of Covid-19 in Croatia. His empirical findings support the hypothesis that in the exceptional pandemic situation, the aforementioned changes in the regulatory framework had a statistically significant positive impact on earnings management; in other words, more earnings manipulation can be observed due to Covid-19.

Usheva–Vagner (2020) focused on the impact of Covid-19 on Slovak companies. They confirmed that companies were building earnings reserves, making it easier for them to negotiate under more critical conditions, such as Covid-19, and thus avoid bankruptcy.

He–Jianqun (2021) examined the relationship between the Covid-19 outbreak and listed Chinese companies. Their results also suggest an increase in accrual-based earnings management (i.e. more earnings management) due to the negative impact of the coronavirus.

Lassoued–Khanchel (2021) investigated the impact of the Covid-19 pandemic on earnings management practices in 15 European countries. Their results indicate that the sample firms tended to manage more earnings during the pandemic period than during the preceding period. This finding implies reduced reliability of financial reports during the Covid-19 pandemic.

Ryu–Chae (2022) examined whether distribution and service companies maintained the quality of their accounting information and provided reliable information despite the economic changes that occurred after the Covid-19 outbreak in Korea. The analysis revealed that distribution and service companies managed more earnings in the post Covid-19 period than in the pre Covid-19 period, suggesting that they became aware of the uncertainty of future business performance as the pandemic continued.

Lizinska–Czapiewski (2023) analysed a sample of Polish companies and confirmed that there were statistically significant differences in earnings management between non-distressed and distressed companies. Additionally, they found that financially healthy companies as well as those with conservative net working capital strategies and a good ability to pay interest were more likely to manage earnings.

Taylor et al. (2023) investigated the effects of the Covid-19 pandemic on European banks' financial reporting quality. Again, the results indicate that earnings management increased significantly during the pandemic.

Buitink (2022) examined the relationship between the Covid-19 pandemic and the accrual-based earnings management activities of 2,908 companies from 17 countries: Taiwan, the United States, South Korea, China, Turkey, Sweden, Canada, Israel, Germany, Denmark, Finland, the United Kingdom, the Netherlands, Ireland, Brazil, Switzerland, and France. His results contradict those of the previous studies. He confirmed that firms engaged in less earnings management during the pandemic than before, but this was not the case in all countries (exceptions were the USA and Taiwan).

Ali et al. (2022), based on a sample of 12 countries (Australia, Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Spain, Sweden, Switzerland, the UK, and the USA), also found that firms tended to engage less in earnings management during the pandemic period.

Hsu–Yang (2022) investigated whether Covid-19 affects the quality of financial reporting by UK companies by focusing on the quality of the board of directors. They find that a larger board helps mitigate the negative effects of Covid-19 on financial reporting quality.

On the other hand, Duc et al. (2021), using a sample of firms from Vietnam, confirmed that Covid-19 has no effect on firms' financial performance and that Covid-19 reduces fraudulent behaviour in financial statements.

Aljawaheri et al. (2021) studied companies in Iraq and found similar results: companies times series maintained earnings management practices over the selected time series, indicating no specific negative impact of Covid-19 on earnings manipulation.

Finally, Azizah et al. (2021) focused on the case of Covid-19 in Indonesia. They also found evidence of no difference in accrual-based earnings management before and during the Covid-19 pandemic.

There are a limited number of studies, and the results are mixed, inconclusive, and conditioned by different country samples, the scope of each analysis (one-country or cross-country analysis), and existing trends in how managers manipulate earnings. In addition, considering that the pandemic has turned the world upside down, every aspect of business has undergone unprecedented change; thus, in the same way, we assume that we may expect a change in earnings management activity in our sample countries in response to Covid-19. Therefore, our first hypothesis was as follows:

Research hypothesis 1: earnings management activity changed during Covid-19 period in response to the pandemic. In other words, we expected a significant difference in manipulation between the pre-pandemic and pandemic periods.

Second, there is a stream of studies that consistently demonstrate a potential association between the macroeconomic environment and managers' earnings management behaviour using a cross-country design, such as Kousenidis et al. (2013), Filip–Raffournier (2014), Trombetta–Imperatore (2014), Arthur et al. (2015), and Cimini (2015). These studies explain that macroeconomic conditions are critical to shaping managers' accounting choices.

Moreover, the literature widely confirms differences among countries in terms of the institutional, legal, cultural background, including level of economic activity in each country, which determines the level of earnings quality, including industry dominance in different European countries (e.g. La Porta et al. 1997, Ball et al. 2000, Leuz et al. 2003, Haw et al. 2004, Enomoto et al. 2015).

Covid-19 has had a worldwide impact, and by the end of 2022, Europe was the continent with the most cases of Covid-19, deaths, and tests performed, although it accounts for only 9.4% of the world's population (ECB 2023). The globalised context of Covid-19 requires that the quality of responses to the crisis be focused on severe global reactions. Therefore, we observed that the landscape of European countries in terms of response to the pandemic was somewhat similar in general terms: lockdowns, restrictions, movement restrictions, regulation of business activities, and government assistance to subsidiaries, among other measures, were observed in almost all European countries. Consequently, managers' earnings management in response to Covid-19 may be similar.

Nevertheless, previous earnings management literature shows that amid the global characteristics of the Covid-19 crisis, different European countries have responded differently to the pandemic. Buitink (2022) confirmed that companies from different countries respond to Covid-19 differently in terms of earnings management.

Taylor et al. (2023) found that governance quality limits the incidence of earnings management and emphasises how the strength of country-level governance and institutional frameworks affects the quality of financial reporting.

Therefore, cross-country differences in responses to the pandemic remain a key aspect for understanding the effects of Covid-19 in different European countries. Consequently, a stream of literature has focused on different variables that may explain such differences among countries. Some studies have connected earnings management with the effect of variations in gross domestic product (GDP) (e.g. Filip−Raffournier 2014, Dimitras et al. 2015, Paulo−Mota 2019). We believe that this aspect is important for analysing the differences among countries' responses to the pandemic. Buitink (2022) introduced this variable to measure the impact of Covid-19.

Another aspect to be considered in the pandemic period that may explain the possible differences among countries, if they exist, could be the approach to managing the lockdowns applied by different countries. This has not yet been investigated in earnings management literature. Our study is pioneering in this regard.

Another variable is the capital market's (listed companies) response to investor confidence in terms of the impact of Covid-19. The earnings management results suggest that the main concern of listed firms that manipulate results is the influence of financial investors' perceptions. This is due to the fact that when a listed company falls into financial difficulty, its earnings may fall short of investors' expectations, resulting in the decline of its share price and company value (Campa 2015), among other reasons.

Lassoued–Khanchel (2021) surveyed listed companies from 15 European countries and found that the sample enterprises were more likely to manage earnings during the pandemic than during the preceding period.

Additionally, the financial and economic situation of firms in each country was directly influenced by Covid-19. Economic and financial vulnerabilities are not the

same in all European countries; therefore, the impact of the pandemic is expected to be different in different countries.

Based on this, our second research hypothesis analyses cross-country differences in earnings management practices and discusses the roles of country- and firm-specific economic and institutional factors. Therefore, we formulated the second hypothesis as follows:

Research hypothesis 2: we may observe differences in earnings management among European countries because of the particularities of each country and different response to Covid-19 crisis.

Sample selection and analysis period

We used Bureau Van Dijk's Amadeus database[1] to collect accounting and financial data, which contain up to ten years of historical financial data from the annual reports of European companies.

The aim of the article is to examine the earnings management phenomenon in the context of European countries. The choice of a European sample was motivated by the huge effect of the Covid-19 pandemic in this region, as mentioned previously.

The initial sample included the European Union (EU) (27 countries), European Free Trade Association (EFTA) (Iceland, Liechtenstein, Norway, and Switzerland), and the European Economic Area (EEA) (Liechtenstein, Iceland, and Norway). Thus, we wanted to cover the entire integrated, free, internal European market for businesses.[2]

First, banks and financial institutions are excluded from the empirical analysis. Second, to ensure the comparability of financial statement reporting, we selected only firms that reported consolidated financial statements. Therefore, the original sample included only companies that provide consolidated financial statements. Thus, we excluded all samples of Bulgarian, Danish, Irish, and Romanian companies (no supported data could be found for companies with consolidated financial statements).

In addition, we excluded companies for which observations for one year were missing for important accounting variables such as total assets, sales, net income, and operating income (in general, we excluded small countries for which the database does not contain sufficient data, such as the Cyprus, Estonia, Latvia, Lithuania, Liechtenstein, Luxembourg, Malta, and Slovenia).

Finally, we discarded countries that had few available companies after eliminating outliers, namely the Czech Republic (one company left), Croatia (five companies),

[1] Analyse Major Databases from European Sources (Amadeus) is a pan-European database containing financial information on over 24 million public and private companies.

[2] Protocol 31 of the EEA Agreement confirms the integration of the 31 countries in terms of the internal European market in tangible effects on businesses, as explained in EU and EEA programmes; see https://www.efta.int/eea/eu-programmes.

Hungary (two companies), and Slovakia (two companies). This is because a small number of companies cannot be considered representative of each country.

Therefore, our final sample includes 15 European countries: Austria, Belgium, Finland, France, Germany, Greece, Iceland, Italy, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, and Switzerland.

This analysis covered the period from 2017 to 2021. The period from 2017 to 2019 was considered the pre-period Covid-19. This was the period immediately before the outbreak of the pandemic and its impact on companies. The years 2020 and 2021 were used to assess the impact of Covid-19 on companies. These were two years of the direct impact of the pandemic circumstances on the activities of companies.

Thus, our final sample includes 6,638 firms, amounting to 33,190 firm-year observations (for each firm, there are five observations: one for each of five years). For each variable, outliers were eliminated, and the mean plus/minus value was three times the standard deviation[3]. Table 1 lists the compositions of the final samples.

Table 1

Sample composition by country

Country	Initial number of companies that presented consolidated financial statements	Number of companies in our sample	Representativeness of the sample: the number of firms in the analysis as a % of the total number of firms in the country (initial analysis)	Percentage of each country of the total sample in our study (%)
Austria	441	308	69.8	4.64
Belgium	557	376	67.5	5.66
Finland	638	563	88.2	8.48
France	629	487	77.4	7.34
Germany	400	361	90.3	5.44
Greece	130	111	85.4	1.67
Iceland	47	33	70.2	0.50
Italy	2,132	1,637	76.8	24.66
Netherlands	160	83	51.9	1.25
Norway	1,308	1,278	97.7	19.25
Poland	184	166	90.2	2.50
Portugal	297	198	66.7	2.98
Spain	274	208	75.9	3.13
Sweden	930	720	77.4	10.85
Switzerland	170	109	64.1	1.64
Total	8,297	6,638	80.0	100.00

[3] Our procedure was as follows: the process of cleaning missing data +/–3 SE, excluding financial institution companies and deleting outliers after the test of normality. We used the Kolmogorov–Smirnov normality test conducted with SPSS software.

The most represented countries were Italy, Norway, and Sweden followed by Finland and France. The least represented countries were Iceland and Switzerland. In the Annex (Table A1), the company sizes are shown in the study. Our sample includes mostly large or very large companies with a significant effect on the economics of each country. A similar sample of large companies was used by Susak (2020), whose research sample comprised large companies in Croatia. Lizinska–Czapiewski (2023) analysed large listed companies from Poland, and Aljughaiman et al. (2023) focused on large Chinese listed companies.

Consequently, as a drawback, the conclusions of this research cannot be generalised to companies of different sizes or in other countries, as we had to drop a significant number of European countries, including most Eastern European countries.

Finally, in the Annex (Table A2) as well, the industry structures are presented in different European countries. The service sector is the industry most represented in our sample in nearly all European countries. Transportation is the predominant industry represented in our sample only in Greece and Norway. The second most represented industry in our sample was transportation/communication, followed by manufacturing in general lines. Nevertheless, we can again observe the particularities of each European country. Germany, Italy, Poland, Greece, and Iceland, for example, have 22% to 28% of the sample composed of companies from the manufacturing industry (a very significant percentage of the sample). In Sweden, as another example, we observe a very important percentage of companies from the sector: retail trade at 17.5%. For more details on the industry structure, refer to the Annex (Table A2).

Methodology

Estimating the discretionary portion of accruals

Various methods for measuring earnings management (EM) can be found in the literature, including McNichols (2000), Ye (2007), and Callao et al. (2014). They explain different proxies for measuring discretionary accruals. Our study uses an accruals-based methodology to identify and estimate the discretionary proportions of accruals.[4] Accruals are defined as a portion of revenue and expenses, excluding receipts and payments, and are calculated directly as the difference between profit and operating cash flow.

Total accruals are composed of non-discretionary accruals *(NDA),* which are the portion of accruals that are difficult to manipulate, and discretionary accruals *(DA),* which are easier to manipulate; hence $TA = NDA + DA$. To calculate the discretionary and non-discretionary components of accruals, we apply the model of

[4] This is the most commonly used methodology pointed out by the earnings management literature.

Dechow et al. (1995), which is most frequently used in the literature (see studies evaluating the power of earnings management models, such as Kothari et al. 2005, Ye 2007, and Callao et al. 2017.)

Other recent studies evaluating the impact of Covid-19 on earnings management also use the model of Dechow et al. (1995), such as Susak (2020), He–Jianqun (2021), and Azizah et al. (2021).

Therefore, this model is used in a cross-sectional version to estimate *DA*:

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

where TA_{it} represents the total accruals of firm *i* in period *t*, calculated based on the difference between earnings (E) and cash flow from operations (CFO): $TA_{it} = E_{it} - CFO_{it}$; ΔREV_{it} represents the change in revenue of firm *i* in period *t* compared to *t–1*; ΔREC_{it} represents the change in receivables of firm *i* in period *t* compared to *t–1*; PPE_{it} represents the property, plants, and equipment of firm *i* in period *t*; A_{it-1} represents the total assets of firm *i* in period *t–1* and is used as a deflator to avoid heteroscedasticity problems; e_{it} is the error term for firm *i* in period *t*.

After estimating the parameters of *equation (1)*, we use the obtained values to predict discretionary accruals. The prediction error is interpreted as the discretionary portion of accruals, which is defined in equation (2):

$$\frac{DA_{it}}{A_{it-1}} = \frac{TA_{it}}{A_{it-1}} - (\alpha_0 \frac{1}{A_{it-1}} + \alpha_1 \frac{\Delta REV_{it} - \Delta REC_{it}}{A_{it-1}} + \alpha_2 \frac{PPE_{it}}{A_{it-1}} + \varepsilon_{it}) \quad (2)$$

where DA_{it} are discretionary accruals for firm *i* in period *t*, and a_0, a_1, and a_2 are the estimated values of *ai*. We use the estimated discretionary portion of accruals for the following estimates.

The impact of Covid-19 on earnings management

This study evaluates the impact of the Covid-19 pandemic on earnings management. To this end, we performed a three-fold analysis. First, we conducted two statistical tests: the Wilcoxon rank test and the Kruskal–Wallis test.

The Wilcoxon rank test is used to determine whether there is a significant difference in earnings management between the periods before and during Covid-19 and to test whether there is a significant difference in managing earnings between 2020 and 2021, both considered as Covid-19 periods. In other words, the second analysis tests whether we can observe a change in manipulations during the pandemic period from one year to another. The Wilcoxon test is a non-parametric test that compares whether there is a significant difference between two dependent samples (see, for example, Wilcoxon 1945).

Second, we applied the Kruskal–Wallis test for the Covid-19 period to look for significant differences between European countries. The Kruskal–Wallis test is a

rank-based non-parametric test that can be used to determine the difference between two or more groups of independent variables (Kruskal 1952). Both tests are widely used in earnings management literature, providing complementary statistically powerful tools to pair with regression analysis, as both tests offer additional analyses of the sample.

Finally, we built a regression analysis model with the independent variable *COVIDPERIOD* indicating the period of Covid-19, as shown in *equation (2)*. We also introduce other independent variables that describe the impact of the pandemic on earnings manipulation. Therefore, we run a linear regression of the following model to test the potential impact of the pandemic on earnings management practices:

$$absDA_{it} = \beta_0 + \beta_1 COVIDPERIOD + \beta_2 GDP_{it} + \beta_3 SIGN + \beta_4 LOCKDOWN_{it} + \beta_5 LOSS + \beta_6 LISTED + \beta_7 LIQ_{it} + \beta_8 SOL_{it} + \beta_9 ROA_{it} \quad (3)$$

Below, we explain the variables.[5]

The dependent variable, $absDA_{it}$, is the absolute value of discretionary accruals for firm *i* in period *t* and is used as a proxy for EM. The absolute value of discretionary accruals captures their extent Warfield et al. (1995) point out that the absolute value of (unsigned) discretionary accruals is a good proxy for the combined effect of income-increasing and income-decreasing earnings management. Ample literature indicates the use of unsigned discretionary accruals; for example, see Becker et al. (1998), Bartov et al. (2000), Klein (2002), Lin–Paananen (2005), and Callao et al. (2021).

The independent variables are as follows:

- *COVIDPERIOD* is a dichotomous variable that takes a value of 1 if the company's fiscal year is 2020 or 2021, the Covid-19 period, and a value of 0 if the observation is from the period prior to Covid-19 (2017–2019). This variable has also been used in other studies examining the impact of Covid-19 on earnings management (to refute our first hypothesis). Duc et al. (2021), Aljawaheri et al. (2021), and Buitink (2022) used a similar methodology.
- *GDP variable.* We introduce this macroeconomic variable to consider European countries' characteristics. Ben Naceur et al. (2007) explained that GDP is the most comprehensive measure reflecting the real state of the economic environment. Moreover, the macroeconomic performance of countries is an institutional factor (GDP) whose relationship with earnings management has been considered by many authors, such as Leuz et al. (2003), Jin (2005), Tylsch (2009), Broadstock et al. (2011), and Callao et al. (2020). We are exploring differences in earnings management among European countries; therefore, by introducing the variable, we can capture the differences in earnings

[5] Source of the data for the variables: Bureau Van Dijk's Amadeus database.

management among European countries in response to Covid-19 due to the different economic situations of each European country. Buitink (2022) introduced this variable to measure the impact of Covid-19. In our model, we define variable as the natural logarithm of each country's GDP per capita.

– *SIGN* is a dichotomous variable that takes a value of 1 if firm *i* reports an earnings increase (a positive sign of discretionary accruals) in period *t* and 0 otherwise (a negative sign of discretionary accruals). The introduction of these variables tests the nature of the manipulation, that is, increasing or decreasing earnings in the periods before and during Covid-19. We introduce the variable to evaluate whether the nature of manipulation is a significant variable, as indicated by the literature; a positive sign of means of earnings management, for example, may indicate aggressive earnings management reacting to negative implications (see, for example, studies of Pustylnick et al. 2017, Lo et al. 2017, and Putri et al. 2018), such as the effect of Covid-19 in our case.
– *LOCKDOWN* was used to measure the impact of the lockdowns imposed by European governments in 2020 in response to the spread of the virus related to earnings management. The Covid-19 lockdowns in Europe had a severe impact on all industries and corporate activities and put companies in a challenging situation in which they had to make difficult decisions, including earnings management decisions. To measure the effect of lockdowns in each country, we include a variable which captures the number of lockdown days in 2020 in two situations: lockdown for the population, meaning days of restricted movement of people in public areas, and closure (lockdown) of all non-essential establishments. These two restrictions halted activities in European countries (we summarised both lockdown days).

  Based on official information, Sweden and Iceland were two unique European countries that adopted different strategies against Covid-19. Unlike other European countries, these two countries avoided freezing their corporate activities in 2020. Sweden's resistance to lockdown was based on the idea that economic factors had a primary effect on all other aspects of public life. In Iceland, this factor accounted for a relatively low percentage of Covid-19 cases. Even during the worst phase of the pandemic – the critical outbreak of Covid-19 in 2020 – companies remained open in both countries.

  On the other hand, lockdowns in European countries have paralysed consumption, corporate activity, and business operations for weeks. Such a situation has never occurred in recent history. However, among these countries, some applied longer lockdowns than others. Poland, Germany, and Norway had 26, 27, and 28 days of lockdown, respectively. On the other hand, Spain, Italy, Austria, and France introduced the longest lockdowns with 100, 81, 76, and 74 days of closure, correspondingly. These lockdowns may have lasted only one to three months, but they had a 'devastating effect' on

economies, as confirmed in the literature (Spiegel−Tookes 2021, Kepp−Bjornskov 2021, Herby et al. 2023). Herby et al. (2023), for example, found that lockdowns in Europe only reduced Covid-19 mortality by 0.2% on average; however, they imposed enormous economic costs where they were adopted. Today, these costs are perceived in many industries. Therefore, we measure the effect of lockdowns on earnings management activity.

– The *LOSS* variable is given a value of 1 if the company suffered a net loss in the first year of Covid-19 (in 2020) and 0 otherwise. This variable was included to measure how managers dealt with the negative results caused by the pandemic. The literature confirms that companies facing profitability problems are perceived as risky (Che et al. 2008). In addition, firms that suffer losses tend to disclose financial information later than more successful firms and, consequently, have more opportunities for earnings management (Begley−Fischer 1998, Chan et al. 2016). Susak (2020) and Ryu–Chae (2022) introduced this variable to measure the impact of Covid-19 on Croatian and Chinese companies.
– ***The LISTED variable is included to assess*** the differences in the extent of earnings management between listed and unlisted companies in European countries during the Covid-19 period. Previous studies suggest that listed and unlisted firms differ in earnings management (e.g. Degeorge et al. 1999, Vander Bauwhede–Willekens 2003, Ball–Shivakumar 2006, Burgstahler et al. 2006, Givoly et al. 2010). We introduce a variable to measure the potential impact of investor pressure, market pressure, and shareholder influence on managers of listed companies. For example, Givoly et al. (2010) confirmed the opportunistic behaviour of listed companies. Their results suggest that short-term pressure on listed companies leads them to manage their earnings more than unlisted companies. Degeorge et al. (1999) also demonstrated that managers of listed companies are more motivated to manage their earnings to meet analysts' forecasts and are under constant pressure from investors to meet performance targets. To capture the impact of Covid-19 on listed companies, we introduce a dichotomous variable that takes a value of 1 if a firm is listed and if the period is the Covid-19 period (2020 and 2021) and 0 otherwise.

Finally, three **control variables** were included: liquidity ratio, solvency ratio, and return on assets. These variables reflect the economic and financial situations of companies and their overall performance, showing their resilience to the negative situation caused by Covid-19.

We define these three variables as follows:

– *LIQU* is the liquidity coefficient of firm i in period t, defined as the ratio of current assets to current liabilities.
– *SOLV* is the solvency ratio of firm i in period t, defined as the ratio of total assets to total liabilities.

– *ROA* is the return-on-assets ratio for company *i* in period *t*, defined as the ratio of operating profits to total assets.

Empirical results

First, we present the results of the coefficients estimated from equation 1 of the model proposed by Dechow et al. (1995) (see Table 2, Panel A). This step is important because the obtained coefficients estimate the discretionary part of accruals. For this reason, we also performed some preliminary analyses of the model and sample selection (see Annex, Table A3).

Finally, to apply our model, we used the entire period of 2017–2021, as the literature confirms the importance of the ampleness of the number of observations to obtain a consistent regression estimation. Consequently, we may observe that the model is reliable for estimating the discretionary portion of accruals, as the adjusted R-squared presents consistent results and the standard errors are in the framework of the earnings management literature.

Table 2

Results of the Dechow, Sloan, and Sweeney model (1995)

Variable	Coefficient	Standard error	t-statistic	Probability
Panel A: Period of five years, 2017–2021				
Intercept	–0.02301	0.00188	–12.20601	3.41854E–34
(ΔREV-ΔREC)/Assets it–1	–0.01482	0.00013	–116.40007	0
PPE/Assets it–1	–0.04459	0.00018	–247.58483	0
R-squared	0.780232		observations	33190
Adjusted R-squared	0.780218		F-value	58911.002
Standard error	0.342817		crit. F-value	0
Panel B: Period of three years, 2017–2019				
Intercept	–0.02047	0.003055	–6.69948	2.14747E–11
(ΔREV-ΔREC)/Assets it–1	–0.01425	0.000174	–82.07848	0
PPE/Assets it–1	–0.04898	0.000314	–155.94040	0
R-squared	0.751829		observations	19914
Adjusted R-squared	0.751804		F-value	30160.00098
Standard error	0.430366		crit. F-value	0

Nevertheless, to determine whether the obtained results of the coefficients of the model are not biased by the measurement, as the pandemic period was included in the estimation of discretionary accruals (both years were included: 2020 and 2021), we ran the regression of the model again, this time using the period of 2017–2019. This is because the Covid-19 period could have had an impact on the coefficients in equation 1. The results are shown in Table 2B. The coefficients are almost the same, the adjusted R-squared decreases slightly, and the standard errors show similar magnitude. Therefore, we can disregard the risk of biased results.

The impact of Covid-19 on earnings management (response to hypothesis 1)

We ran a Wilcoxon test to examine the significant differences in earnings management between the periods before and during Covid-19. Table 3 presents the results of the Wilcoxon test. In general, we confirm the significant differences between the period before Covid-19 and that during Covid-19 in European countries, as we observe the significance of the test for a general sample of European countries (when tested countries as a block of European countries) and in almost all countries of the European Union when companies from different countries are tested separately. We could not confirm the significance of these two periods for companies from Poland, Portugal, and Sweden. Our results are also inconclusive for firms from countries outside the EU that belong to the EFTA and EEA.

To confirm our results, European Union countries and EFTA and EEA countries were tested separately. As expected, for the sample of EU countries a significant difference can be confirmed between these two periods, but for the three non-EU countries, we cannot confirm existing differences in managing earnings between the periods before and during Covid-19.

Additionally, the results of ranks confirm that in companies of European Union countries, a decrease in earnings management can be observed during the Covid-19 period compared to the pre-crisis period, as the ranks of means are higher before the pandemic period than during Covid-19. We detected a higher magnitude of manipulation in response to the crisis caused by the disease only in Italy.

In the following step, we tested the manipulation directly during the Covid-19 period (two years after the pandemic). We confirmed that if Covid-19 (2020–2021) is considered a unique period, we detected a decrease in earnings management during the pandemic. Therefore, we subsequently investigate companies' behaviour in terms of earnings management practices in a straightforward manner during Covid-19. To this end, we run the Wilcoxon test again to compare the earnings manipulations in 2020 and 2021. The results are summarised in Table 4.

We may confirm that all European companies, with the exception of Belgium, show a significant difference in earnings management between 2020 and 2021. This indicates that European companies have changed their earnings management activity in response to the changing pandemic situation. In 2020, many health restrictions were introduced to stop the spread of the disease, which directly affected economic activity; however, in 2021, economic activity had not become normal, but the restrictions were not as strict. Therefore, companies have been adapting their earnings management activity to the changes in the pandemic (e.g. lockdowns) and the general market conditions of each country.

Additionally, according to the results of the ranks, we observe a higher magnitude of manipulation in 2021 compared to 2020, in other words, an increase in earnings

management in response to negative conditions. This is because Covid-19 shocked the entire European economy, provoking an unprecedented sudden economic pause and leading to unexpected earnings management activities. Hence, we first observed a sudden decrease in manipulation in our sample of countries, followed by an increase.

Table 3

Results of the Wilcoxon test: earnings management before and during Covid-19

Country	During Covid-19-before	N	Mean rank	Sum of ranks	Z	Asymptotic significance (2-tailed)
All European countries	negative ranks	3494[a)]	3366.52	1,1762,606	–4.773	0.000*
	positive ranks	3144[b)]	3267.25	10,272,235		
EU countries	negative ranks	2788[a)]	2660.65	7,417,879	–5.603	0.000*
	positive ranks	2430[b)]	2550.82	6,198,492		
EFTA and EEA countries	negative ranks	706[a)]	707.87	499,753	–0.304	0.761
	positive ranks	714[b)]	713.11	509,157		
Austria	negative ranks	176[a)]	157.00	27,632	–2.454	0.014*
	positive ranks	132[b)]	151.17	19,954		
Belgium	negative ranks	210[a)]	201.22	42,256	–3.233	0.001*
	positive ranks	166[b)]	172.41	28,620		
Finland	negative ranks	308[a)]	285.43	87,911	–2.208	0.027*
	positive ranks	255[b)]	277.86	70,855		
France	negative ranks	326[a)]	252.57	82,337	–7.377	0.000*
	positive ranks	161[b)]	226.65	36,491		
Germany	negative ranks	218[a)]	190.74	41,582	–4.491	0.000*
	positive ranks	143[b)]	166.15	23,759		
Greece	negative ranks	78[a)]	61.50	4,797	–4.969	0.000*
	positive ranks	33[b)]	43.00	1,419		
Iceland	negative ranks	20[a)]	18.00	360	–1.420	0.155
	positive ranks	13[b)]	15.46	201		
Italy	negative ranks	725[a)]	775.14	561,977	–5.666	0.000*
	positive ranks	912[b)]	853.87	778,726		
Netherlands	negative ranks	50[a)]	45.78	2,289	–2.479	0.013*
	positive ranks	33[b)]	36.27	1,197		
Norway	negative ranks	630[a)]	636.35	400,898	–0.587	0.557
	positive ranks	648[b)]	642.57	416,383		
Poland	negative ranks	95[a)]	79.86	7,587	–1.059	0.290
	positive ranks	71[b)]	88.37	6,274		
Portugal	negative ranks	114[a)]	97.27	11,089	–1.534	0.125
	positive ranks	84[b)]	102.52	8,612		
Spain	negative ranks	123[a)]	112.45	13,831	–3.409	0.001*
	positive ranks	85[b)]	93.00	7,905		
Sweden	negative ranks	365[a)]	370.17	135,111	–0.955	0.340
	positive ranks	355[b)]	350.56	124,449		
Switzerland	negative ranks	56[a)]	54.86	3,072	–0.225	0.822
	positive ranks	53[b)]	55.15	2,923		

a) During Covid-19 < before. b) During Covid-19 > before. * Significance at 1%.

Table 4

Results of the Wilcoxon test: earnings management in the Covid-19 period

Country	DA 2020 vs. 2021	N	Mean rank	Sum of ranks	Z	Asymptotic significance (2-tailed)
All European countries	negative ranks	2541[a)]	3092.84	7,858,907	–20.229	0.000*
	positive ranks	4097[b)]	3460.08	14,175,934		
EU countries	negative ranks	1980[a)]	2410.15	4,772,105	–18.710	0.000*
	positive ranks	3238[b)]	2731.40	8,844,266		
EFTA and EEA countries	negative ranks	561[a)]	680.91	381,988	–7.924	0.000*
	positive ranks	859[b)]	729.83	626,922		
Austria	negative ranks	105[a)]	119.84	12,583	–7.167	0.000*
	positive ranks	203[b)]	172.43	35,003		
Belgium	negative ranks	192[a)]	200.92	38,577	–1.488	0.137
	positive ranks	184[b)]	175.54	32,299		
Finland	negative ranks	218[a)]	241.01	52,540	–6.952	0.000*
	positive ranks	345[b)]	307.90	106,226		
France	negative ranks	155[a)]	222.01	34,412	–8.046	0.000*
	positive ranks	332[b)]	254.27	84,416		
Germany	negative ranks	130[a)]	175.31	22,790	–4.980	0.000*
	positive ranks	231[b]	184.20	42,551		
Greece	negative ranks	36[a)]	46.67	1,680	–4.202	0.000*
	positive ranks	75[b)]	60.48	4,536		
Iceland	negative ranks	11[a)]	13.18	145	–2.421	0.015**
	positive ranks	22[b)]	18.91	416		
Italy	negative ranks	617[a)]	767.43	473,503	–10.291	0.000*
	positive ranks	1020[b)]	850.20	867,200		
Netherlands	negative ranks	30[a)]	40.20	1,206	–2.438	0.015**
	positive ranks	53[b)]	43.02	2,280		
Norway	negative ranks	516[a)]	621.92	320,913	–6.648	0.000*
	positive ranks	762[b)]	651.40	496,368		
Poland	negative ranks	66[a)]	85.29	5,629	–2.099	0.036**
	positive ranks	100[b)]	82.32	8,232		
Portugal	negative ranks	63[a)]	97.19	6,123	–4.617	0.000*
	positive ranks	135[b)]	100.58	13,578		
Spain	negative ranks	69[a)]	93.42	6,446	–5.088	0.000*
	positive ranks	139[b)]	110.00	15,290		
Sweden	negative ranks	299[a)]	333.85	99,822	–5.366	0.000*
	positive ranks	421[b)]	379.43	159,738		
Switzerland	negative ranks	34[a)]	44.12	1,500	–4.527	0.000*
	positive ranks	75[b)]	59.93	4,495		

a) DA2021 < DA2020. b) DA2021 > DA2020. * Significance at 1%. ** Significance at 5%.

These results can also be explained by the industry structure of the sample. According to the literature, the industries most affected by Covid-19 were in the service sector. As indicated by the European Commission (2021), because of the nature of containment measures, the service sector has suffered a disproportionate impact on its activities. Our sample is mainly composed of firms from the service sector (in some countries, more than half of the companies are in this sector);

therefore, the obtained results are in line with our results. First, in 2020, there is a decline in earnings management in response to the shutdown of this sector, and then in 2021, because of the loosening of restrictions (although a deep crisis is still perceived), the service sector responded with increased activity. At the same time, managers engage in more earnings management, as the literature explains. Companies manipulate more in times of crisis (see, for example, Ahmad-Zaluki et al. 2011, Jahmani et al. 2016, Flores et al. 2016, and Callao et al. 2020).

Therefore, according to the obtained results, in the following section, the effect of the lockdown is evaluated, general macroeconomic conditions of European countries, the economic and financial situation of firms, and other variables to weigh the impact of different outcomes on earnings manipulation (regression analysis).

Differences in earnings management among European countries (response to hypothesis 2)

We run the Kruskal–Wallis test for the Covid-19 period, looking for significant differences among European countries in earnings management activity caused by the disease. The results are summarised in Table 5. The p-value of the Kruskal–Wallis test reveals statistically significant differences in earnings manipulation among countries. When the p-value is zero, there is a strong indication of significant differences in earnings management between countries.

Table 5

Results of the Kruskal–Wallis test for the Covid-19 period

Country	Mean rank
France	3816.59
Germany	3730.94
Sweden	3611.55
Finland	3555.94
Poland	3497.49
Iceland	3477.73
Norway	3473.00
Belgium	3299.88
Greece	3275.56
Switzerland	3227.57
Netherlands	3208.57
Spain	3018.36
Italy	2965.59
Austria	2777.26
Portugal	2690.90
Test statistics	
Chi-square	192.115
Df	14
Asymptotic significance	0.000*

* Significance at 1%.

The mean ranks show that companies from France, Germany, Sweden, and Finland exhibited the greatest earnings management activity during the Covid-19 period. The lowest levels of manipulation were detected in Portugal, Austria, and Italy. These results can be explained to some extent by the industry structure of the sample. As previously mentioned, three sectors stand out in the composition of the sample in almost all European countries: services, transportation, and manufacturing. However, Table 6 shows that in countries with the highest manipulation, the percentage of the fourth sector, the retail trade sector, is significantly higher than in countries with lower earnings management. The European Commission (2021) indicated that the retail industry's business processes were other sectors that were particularly affected by Covid-19. Therefore, in countries where the percentage of this sector is important, not marginal, we detect higher manipulation of earnings. Thus, it seems that, to some extent, the industry structure plays a role in explaining the impact of the pandemic on managers' earnings management activity.

Table 6

Industry structure of selected countries: explanation of the Kruskal–Wallis test*

(%)

Country	Agri-culture, forestry, and fishing	Mining	Const-ruction	Manu-facturing	Trans-porta-tion, com-munica-tion, gas, electric, sanitary	Whole-sale trade	Retail trade	Services	Admi-nistra-tion
Austria	0.32	1.95	1.30	12.99	19.16	0.00	3.25	58.77	2.27
Finland	1.07	2.49	2.84	22.20	25.58	0.36	12.43	32.50	0.53
France	1.23	2.05	0.82	11.29	20.12	0.21	13.14	50.10	1.03
Germany	0.83	3.88	0.28	26.04	11.08	3.32	15.26	37.37	1.94
Italy	1.11	7.25	1.91	27.78	14.51	1.23	4.00	41.79	0.43
Portugal	4.04	6.57	2.02	12.63	23.23	1.52	5.05	44.95	0.00
Sweden	0.83	0.56	1.53	10.14	18.47	0.83	17.50	49.17	0.97

* Companies from the sector of finance have been excluded from our sample.

Regression analysis (response to both hypotheses)

Descriptive statistics

Table 7 presents descriptive statistics of the variables included in the regression. We separate data for the pre Covid and Covid-19 periods. This allows us to observe the evolution of the statistics and perceive the impact of Covid-19. Table 8 presents the frequency statistics for the dichotomous variables.

The descriptive statistics show that the highest value of discretionary accruals is 2.634, whereas the lowest value is 0.0000017. Additionally, we observe a decrease in

discretionary accruals during the pandemic. As for liquidity, solvency, and the ratio of return on assets, the descriptive statistics reflect the impact of Covid-19, showing a decrease in all ratios, indicating an unfavourable situation for companies affected by the pandemic.

The descriptive statistics of GDP refer to the mean value of the logarithm of GDP per capita, where 11.4453 refers to Switzerland, with the highest GDP per capita, and 10.7194 corresponds to Poland, with the lowest GDP per capita. The variable LOCKDOWN represents the number of days with complete restrictions as explained in the methodology. Sweden and Iceland have a minimum value of 0 days. These two countries did not introduce lockdowns. The maximum value of 100 days of lockdown corresponds to Spain.

Table 7

Descriptive statistics

Variable	Mean	Max.	Min.	Standard deviation
Pre Covid-19 period (2017–2019)				
AbsDA	0.0274516	2.6347032	0.0000017	0.0375998
GDP	10.7099	11.3666	9.5371	0.3934
LOCKDOWN	0	0	0	0
LIQU	2.0912	6.9991	0.0004	1.2431
SOLV	2.0398	6.9776	0.0072	0.9885
ROA	0.1812	0.7473	0.0001	0.0962
Covid-19 period (2020–2021)				
AbsDA	0.0216558	1.3001150	0.0000007	0.0337126
GDP	10.7334	11.4453	9.6641	0.3976
LOCKDOWN (2020)	52.87	100	0	28.85
LOCKDOWN (2021)	0	0	0	0
LIQU	1.6610	5.4927	0.0001	1.3319
SOLV	1.8718	5.8324	0.0054	1.0534
ROA	0.0988	0.3431	-0.0505	0.1121

Table 8 presents frequency statistics. The sample is composed of 40% observations from the Covid-19 period (2020–2021) and 60% observations before the pandemic (2017–2019).

Table 8

Frequency statistics for dichotomous variables

Variable		Percent affirmative, %
COVIDPERIOD	2020–2021	40.00
	2017–2019	60.00
SIGN	earnings-increasing	60.13
	earnings-decreasing	39.87
LISTED	listed companies during Covid-19 (2020–2021)	16.07
	unlisted/ delisted during Covid-19 (2020–2021)	83.93
	2017–2019	0.00
LOSS	year with loss during Covid-19	85.64
	no loss	14.36

A total of 60.13% of the firms have a positive sign for discretionary accruals, indicating that they manage earnings upward, and almost 40% of firms are involved in decreasing earnings (negative sign of the estimated discretionary portion of accruals).

In addition, our sample comprised 16.07% listed companies. Finally, 85.64% of the firms reported a loss in the first year of Covid-19.

Correlation analysis

Table 9 presents the correlation matrix between the variables included in the regression model used to estimate the impact of Covid-19 on earnings management.

Table 9

Correlation analysis

Variable	AbsDA	COVID-PE-RIOD	SIGN	LOCK-DOWN	GDP	LOSS	LISTED	LIQU	SOLV	ROA
AbsDA	1									
COVID-PERIOD	0.0027	1								
SIGN	–0.1219	–0.0107	1							
LOCK-DOWN	–0.0183	0.5228	–0.0364	1						
GDP	0.0698	0.0274	0.0380	–0.1769	1					
LOSS	0.0508	0.2616	–0.0647	0.3980	–0.0638	1				
LISTED	0.0501	0.3210	–0.0407	0.1839	–0.0709	0.1797	1			
LIQU	0.0004	0.0001	0.0070	0.0069	0.0100	–0.0058	–0.0098	1		
SOLV	0.0059	0.0019	0.0405	–0.0028	0.0003	0.0008	0.0179	–0.0044	1	
ROA	–0.0591	0.0001	–0.0798	–0.0287	0.1001	–0.0449	–0.0939	0.0181	–0.1064	1

We found no significant or strong correlations among the variables; therefore, we did not exclude any variables from the regression.

Regression results: The impact of the Covid-19 pandemic on earnings management.

We ran an ordinary least-squares regression (OLS). Table 10 presents the regression results of the impact of Covid-19 on earnings management activities in European countries.

The coefficient of the *COVIDPERIOD* variable is negative and significant (–0.01), indicating that firms reduced their earnings management activities during the Covid-19 period compared to the period before Covid-19. Hsu–Yang (2022), Ryu–Chae (2022), Aljughaiman et al. (2023), and Lizinska–Czapiewski (2023) obtained different results, indicating that companies in the Covid-19 period engaged in more earnings management. However, Duc et al. (2021) and Ali et al. (2022) obtained results similar to ours. The authors explained that Covid-19 affected companies' operations; therefore, investors and the market understand the impact of the pandemic, and

consequently, both show higher tolerance to companies' poor performance and thus do not react negatively. Consequently, managers are less likely to engage in earnings management during the post-pandemic period compared to before the pandemic.

Table 10

Ordinary least squares regression results

Variables	Unstandardised coefficients		Standardised coefficients	T	Significance
	B	standard error	beta		
(Constant)	–0.048	0.005		–8.731	0.000
COVIDPERIOD	–0.001	0.000	–0.011	–1.709	0.087
SIGN	–0.009	0.000	–0.127	–23.314	0.000
LOCKDOWN	–4.907E–5	0.000	–0.034	–4.919	0.000
GDP	0.008	0.001	0.083	14.790	0.000
LOSS	0.009	0.001	0.053	8.930	0.000
LISTED	0.007	0.001	0.044	7.668	0.000
LIQU	2.205E–8	0.000	0.001	0.181	0.856
SOLV	4.000E–5	0.000	0.003	0.472	0.637
ROA	–0.002	0.000	–0.072	–13.014	0.000
F-value			118.014*		

* Significance at 1%.

$$absDA_{it} = \beta_0 + \beta_1 COVIDPERIOD + \beta_2 GDP_{it} + \beta_3 SIGN + \beta_4 LOCKDOWN_{it} + \beta_5 LOSS + \beta_6 LISTED + \beta_7 LIQ_{it} + \beta_8 SOL_{it} + \beta_9 ROA_{it} \quad (3)$$

Additionally, we would like to point out two more observations. First, the pandemic showed an unprecedented impact all around the world, affecting all business and non-business activities; therefore, despite having research on previous crises' impact on earnings management, the results based on samples from different countries still provide diverse outcomes on the effect of the Covid-19 pandemic and earnings manipulation activity, indicating the unpredictable behaviour of companies.

Second, previous studies considered the Covid-19 period as a one-year period, that is, 2020. However, we included two-year observations during the pandemic (2020 and 2021). Our results confirm the decrease in earnings management during the Covid-19 period when considering 2020 and 2021 as a single pandemic period, and both the regression and Wilcoxon tests provide the same results. Nevertheless, when comparing earnings manipulation in both years, we observed a higher magnitude of manipulation in 2021 than in 2020, which indicates an increase in earnings management in response to negative conditions. This is in accordance with most earnings management studies in times of crisis (see the literature review).

The coefficient for the *SIGN* is negative and significant (–0.09). This indicates that the type of manipulation – that is, the method of earnings manipulation, namely increasing or decreasing earnings – has an impact on the level of earnings management in absolute values. The results show that companies that managed earnings upward reduced their manipulation during the Covid-19 period. On the

other hand, firms involved in decreasing earnings increased their manipulation; in other words, companies reacted with more aggressive earnings management in response to the pandemic.

Susak (2020) also tested the effect of the separation of income-increasing and income-decreasing accruals. However, using different methodologies, he confirmed the moderated effect of the direction of manipulation (sign), as the results were significant and negative only in the case of income-decreasing accruals, suggesting that companies adjusted their financial information in accordance with pessimistic economic forecasts to mitigate probable profitability deterioration in future periods.

However, Aljughaiman et al. (2023) found contrary results for Chinese companies. They showed that firms were more in favour of income-increasing practices during the pandemic period, which can be explained by the argument that businesses tried to show acceptable levels of losses and thus mitigate the impact of the pandemic in the eyes of investors and stakeholders. This is also consistent with the findings of Lassoued–Khanchel (2021), who confirmed that companies manage earnings upward by mitigating the reported loss level to rebuild the confidence of stakeholders and thus support economic recovery.

The coefficient of the GDP variable is significant (at the 1% level) and positive (0.008), indicating that the economic development of European countries influences managers' decisions to manage earnings over time. The positive sign suggests that firms from better and stronger local markets are more involved in earnings management than are firms from weaker economies. Initially, these results were inconsistent with earnings management literature. Recent work by Callao et al. (2020) suggested that strong local markets constrain earnings management. Other studies have confirmed the negative signs. For example, Shen–Chih (2005) and Chih et al. (2007) confirmed that a higher GDP per capita reduces the extent of earnings management. In other words, firms in richer countries are generally less likely to manage their earnings. Our regression confirmed our previous results using the Kruskal–Wallis test. We observe higher manipulation in France, Germany, Sweden, and Finland, which represent strong economies.

However, if we observe the evolution of GDP in different European countries (see Table 11), it should be noted that in the first year of Covid-19, GDP decreased significantly in almost all European countries. Later, in 2021, the GDP bounced back strongly after a severe decline in 2020 caused by the Covid-19 outbreak. This was because the gradual easing of restrictions throughout the first year allowed the GDP to surpass its pre-crisis level.

Additionally, the increase in GDP in 2021 does not reflect actual improvements in the economic conditions of the countries; rather, this growth represented the measures adopted by European countries in response to Covid-19. Economic growth began when inflation surged in 2021, particularly during the second half of the year, as explained by the European Commission (2022). This occurred because in 2021,

many government assistance payments in the form of forgivable loans to businesses, grants to state and local governments, and social benefits to households were still being applied. As explained in the literature, GDP always operates between real and potential GDP. In general, an economy operates close to its potential. One possible reason may be the difference between real and potential GDP levels. This is referred to as the output gap. When the output gap is positive and the GDP is higher than the potential, the economy operates above its sustainable capacity and is likely to generate inflation. This is because too much government spending can produce a surge in demand that exceeds the economy's capacity to produce and triggers inflation (see Gordon 2014, Rosnick 2016).

Consequently, our positive sign in the regression of GDP can be explained partly by the collapse of the European economy reflected by the GDP in 2020 and companies' response to rising inflation resulting from the adoption of different measures by European countries. Hence, amid 'improved' macroeconomic conditions, managers were under pressure to maintain positive expectations for investors' perceptions of the 'rising' economy and, consequently, our results confirm that the companies responded with more earnings management.

Table 11

Gross domestic product per capita in European countries

Country	Before Covid-19			During Covid-19	
	2017	2018	2019	2020	2021
Austria	47,429.16	51,486.58	50,114.40	48,588.66	53,267.93
Belgium	44,198.48	47,549.21	46,599.11	45,189.37	51,767.79
Switzerland	83,352.09	86,388.40	85,334.52	87,100.41	93,457.44
Germany	44,652.59	47,973.61	46,794.90	46,252.69	50,801.79
Spain	28,170.17	30,364.58	29,554.49	27,056.42	30,115.71
Finland	46,412.14	49,988.91	48,628.64	49,160.84	53,982.61
France	38,781.05	41,592.80	40,578.64	39,037.12	43,518.54
Greece	18,582.09	19,756.99	19,133.76	17,647.23	20,276.54
Iceland	72,010.15	74,469.80	68,941.46	59,264.03	68,383.77
Italy	32,406.72	34,622.17	33,673.48	31,834.97	35,551.28
Netherlands	48,675.22	53,044.53	52,476.27	52,396.03	58,061.00
Norway	75,496.75	82,267.81	75,719.75	67,329.68	89,202.75
Poland	13,864.68	15,468.48	15,732.20	15,742.45	17,840.92
Portugal	21,490.43	23,562.55	23,330.82	22,194.57	24,262.18
Sweden	53,791.51	54,589.06	51,939.43	52,300.21	60,238.99

Source: World Development Indicators (2022).

We also confirm the significance of our next variable, *LOCKDOWN,* (–0.00005). We introduce this variable to measure the effect of the lockdown in European countries. As expected, the complete shutdown of European companies affected managers' earnings management decisions. This lockdown policy has hurt economies. Economic turbulence in Europe triggered by the Covid-19 pandemic has created uncertainty in European markets and affected investor confidence.

A negative sign indicates that countries with more lockdown days were less involved in earnings manipulation. Spain, Italy, and Austria, which introduced the longest lockdowns, engaged less in earnings management, as business activities in these countries were paralysed for weeks. Sweden and Iceland are two unique European countries that did not apply a strict lockdown strategy, which helped firms conduct their normal business to some extent. Other European countries such as Germany, Norway, and Finland froze their economies but for relatively short periods. We detected higher earnings management activity in all of these European countries. This situation can be explained by the fact that companies struggled with the effects of both the Covid-19 pandemic and the shutdowns in other (almost all) European economies. As explained by Albitar et al. (2020), they were compelled to manipulate reported earnings to maintain investor confidence, meet debt agreements, and satisfy established targets as well as for other possible reasons.

The coefficient of the *LOSS* variable is positive and significant (0.009), suggesting that firms that report losses are associated with higher levels of earnings management. The literature agrees that firms that report losses are more likely to engage in earnings management (Alhadab−Clacher 2018). Similar results regarding the impact of Covid-19 on earnings management were also obtained by Susak (2020) and Hsu–Yang (2022).

The coefficient for *LISTED* is positive and significant (0.007), indicating that listed companies from European countries engaged in more earnings management activities during Covid-19. Rezaee (2005), Givoly et al. (2010), and others confirm that motivations for earnings management in listed companies are primarily concerned with the economic pressures and incentives associated with meeting market demands and investor expectations. As expected, the impact of the Covid-19 pandemic has created additional pressure on listed companies, so they may use earnings management activity in financial statements to disguise the true business situation, as noted by Duc et al. (2021).

Finally, the control variable *ROA* is significant with a negative sign. This indicates that companies that used their assets more efficiently were less involved in earnings management, which is in accordance with the literature (e.g. Lee et al. 2007, Edesiri–Confidence 2020, Kalbuana et al. 2021).

The other two control variables are not significant (*LIQU* and *SOLV*). This suggests that each firm's financial situation did not directly affect its earnings management activities before and during Covid-19. Our results are consistent with previous findings, showing that the pandemic had a global impact on European companies rather than the specific and unique circumstances of individual companies.

Therefore, based on these results, we confirm our first hypothesis regarding the impact of Covid-19 on European firms' earnings management activity. Companies reduced their manipulations after the pandemic. Thus, we confirm our second hypothesis. We observe differences in earnings manipulation across European countries in response to Covid-19.

Conclusion

Since the outbreak Covid-19, companies have faced growing uncertainty and deteriorating business outcomes. As a result, this complicated situation has made companies more susceptible to the temptation to respond to balance sheet figures with earnings management practices. This study aimed to verify the impact of Covid-19 on earnings management activities in companies from different European countries.

We posed two research questions. First, Covid-19 triggered a global economic crisis and forced companies to experience unfavourable conditions simultaneously. Therefore, our first research question focused on whether companies changed their earnings management strategies in response to the pandemic.

Second, the response of European countries to the pandemic was generally similar: lockdowns, restrictions, movement restrictions, regulation of business activities, and government support for subsidiaries. However, the general different conditions in each country have a significant effect on managers' decisions, as indicated in the literature. Therefore, we investigated whether companies from different European countries behaved differently due to the impact of the pandemic or whether we observed similar activities by managers in response to the new circumstances.

Our results demonstrate the impact of Covid-19 on European companies' earnings management activities. We confirm significant differences in earnings manipulation between the period before and that during Covid-19. In fact, a detailed analysis confirmed that companies reduced their earnings management activities in the Covid-19 period (2020–2021) compared to the period before Covid-19 (2017–2019).

Second, based on analysing the pandemic period, according to our results, we observed a higher magnitude of manipulation in 2021 than in 2020. In other words, as a result of the surging of the pandemic in 2020, earnings management activity decreased. Nevertheless, in 2021, the second pandemic year, earnings management increased in response to the extended negative conditions of Covid-19.

Third, our results confirm the existing differences in earnings management among European countries in response to the impact of coronavirus. The mean ranks show that France, Germany, and Sweden had the highest earnings manipulation during the Covid-19 period. The least earnings manipulation was detected in Portugal, Austria, and Italy. This can be explained to some extent by the sample composition. In countries with higher earnings management, the percentage of the four main industries – services, transportation, manufacturing, and retail trade – is higher than in other countries. Moreover, these industries were significantly more affected by Covid-19 than others.

Surprisingly, we find a positive relationship between earnings management and the economic situation in each country, which was not predicted. However, our

positive sign can be explained by the collapse of the European economy reflected by the GDP in 2020 and then the response of companies, to some extent, to the rising inflation resulting from the adoption of different measures by European countries. Amid 'improved' macroeconomic conditions, managers' perception of the 'rising' economy did not reflect positive expectations for investors' perceptions, so companies responded with more earnings management.

Moreover, lockdowns in European countries due to the Covid-19 outbreak have affected the adequacy of accounting figures. We confirm that in countries with the longest shutdowns of activity in 2020, such as Spain, Italy, and Austria, companies managed earnings less. However, in Sweden and Iceland, where no lockdown was introduced, and in Germany, Norway, and Finland, where short periods of strict restrictions have been applied, companies were more motivated to engage in earnings management to cope with the pandemic, business difficulties, increased uncertainty, investors' expectations, extreme volatility, the collapse of supply chains, possible negative forecast predictions, and disrupted trade, among other reasons.

Additionally, we confirm that companies reporting losses have a higher degree of earnings management. Due to the financial difficulties caused by the coronavirus, companies are more likely to manipulate their earnings.

In addition, the pressure exerted on listed companies during the Covid-19 period by investors, shareholders, and the market led them to manage their earnings more than their unlisted counterparts during this period.

Finally, we confirm that the financial situation of individual companies had no direct impact on earnings management activities during the pandemic.

Further research should be conducted to understand the characteristics of the new period after Covid and their impact on earnings management. Therefore, further studies of the post Covid-19 period are required.

Moreover, our sample was limited to companies that presented consolidated financial statements; future research could amplify this perspective by including companies that do not present consolidated financial statements.

A drawback of our study is that the conclusions cannot be generalised to companies of different sizes or those in other countries. Additionally, a significant number of European countries is excluded, including most Eastern European countries. Therefore, further research is needed on other European countries such as the United Kingdom as are samples from Eastern European countries.

Finally, future analyses could be extended to different countries examine for the specifics of different corporate and legal environments and to employ measures that capture other aspects of accounting quality.

Annex

Table A1

Descriptive statistics by country

(million euros)

Country	Mean of total assets	Mean of sales	Max. assets	Min. assets	Max. sales	Min. sales
Austria	962,897	568,073	53,798,000	15,119	35,555,000	6,914
Belgium	316,168	229,440	13,098,862	997	5,034,769	43
Finland	400,991	329,313	149,661,000	1,378	112,400,000	0
France	5,119,198	2,511,478	360,966,000	322	163,017,791	0
Germany	5,146,654	3,515,056	302,438,000	203	172,745,000	98
Greece	501,300	344,012	17,779,183	3,001	10,266,591	0
Iceland	118,989	69,483	599,361	1,596	809,801	1,243
Italy	468,240	312,571	171,426,000	61	77,366,000	0
Netherlands	191,260	365,575	1,647,203	8,197	2,201,478	3,440
Norway	101,089	53,669	25,234,576	81	16,017,700	0
Poland	293,789	188,687	22,089,628	107	15,555,120	0
Portugal	108,208	76,355	1,456,300	5,816	1,472,481	89
Spain	1,516,236	1,034,099	60,778,000	10,804	49,873,000	3,012
Sweden	112,351	75,268	12,414,734	1,531	8,752,163	0
Switzerland	5,849,622	3,031,954	124,208,172	2,619	29,748,746	398

Table A2

Industry structure within different European countries*

(%)

Country	Agri-culture, forestry, and fishing	Mining	Const-ruction	Manu-factur-ing	Tran-spor-tation, com-muni-cation, gas, electric, sanitary	Whole-sale trade	Retail trade	Services	Admi-nistra-tion	Total
Austria	0.32	1.95	1.30	12.99	19.16	0.00	3.25	58.77	2.27	100.00
Belgium	0.53	3.46	0.80	10.11	23.94	0.27	10.11	49.47	1.33	100.00
Finland	1.07	2.49	2.84	22.20	25.58	0.36	12.43	32.50	0.53	100.00
France	1.23	2.05	0.82	11.29	20.12	0.21	13.14	50.10	1.03	100.00
Germany	0.83	3.88	0.28	26.04	11.08	3.32	15.26	37.37	1.94	100.00
Greece	0.92	14.68	0.92	25.69	28.44	4.59	11.01	11.93	1.83	100.00
Iceland	6.06	15.15	0.00	15.15	15.15	0.00	12.12	33.33	3.03	100.00
Italy	1.11	7.25	1.91	27.78	14.51	1.23	4.00	41.79	0.43	100.00
Netherlands	3.61	3.61	0.00	2.41	38.55	2.41	6.02	40.96	2.41	100.00
Norway	3.91	3.68	1.49	12.68	33.18	2.97	5.48	32.79	3.83	100.00
Poland	3.01	3.61	1.20	21.08	28.92	1.81	7.83	30.12	2.41	100.00
Portugal	4.04	6.57	2.02	12.63	23.23	1.52	5.05	44.95	0.00	100.00
Spain	3.85	6.25	0.96	16.35	27.88	1.44	9.62	33.65	0.00	100.00
Sweden	0.83	0.56	1.53	10.14	18.47	0.83	17.50	49.17	0.97	100.00
Switzerland	0.00	3.67	0.00	14.68	4.59	0.92	6.42	66.06	3.67	100.00

* Companies from the sector of finance, insurance, and real estate have been excluded from our sample.

Table A3

Preliminary analyses of the model for measuring earnings management

A: Results of Dechow, Sloan, and Sweeney's model (1995) using all companies from our initial sample, including outliers

Our final procedure includes the process of cleaning missing data +/-3 SE, deleting outliers after the test of normality. Here, we present the results of the model before cleaning outliers.

Variable	Coefficient	Standard error	t-statistic	Probability
Intercept	–0.02414	0.01808	–13.221238	7.967E–33
(ΔREV-ΔREC)/Assets it–1	–0.00973	0.00023	–123.44856	0
PPE/Assets it–1	–0.04107	0.00028	–236.56623	0
R-squared	0.709542		observations	41485
Adjusted R-squared	0.709528		F-value	50667.055
Standard error	0.391311		crit. F-value	0

B: Results of Dechow, Sloan, and Sweeney's model (1995) including companies from the Czech Republik, Croatia, Hungary, and Slovakia

Our final procedure discards countries with few available companies, namely, the Czech Republic (one company left), Croatia (five companies), Hungary (two companies), and Slovakia (two companies). Here, we present the results of the model before abandonment of these countries.

Variable	Coefficient	Standard error	t-statistic	Probability
Intercept	–0.02372	0.00182	–13.00801	1.3113E–34
(ΔREV-ΔREC)/Assets it–1	–0.00992	0.00024	–110.55448	0
PPE/Assets it–1	–0.04197	0.00029	–236.79671	0
R-squared	0.709693		observations	41535
Adjusted R-squared	0.709679		F-value	50765.1881
Standard error	0.440785		crit. F-value	0

C: Results of the Jones model (1991) for our sample countries

Our final procedure chooses the Dechow, Sloan, and Sweeney (1995) model, as the literature indicates this model is widely used by the authors and is most reliable. The second model most commonly selected by the authors is the model proposed by Jones (1991). Here, we present the results of that model.

Variable	Coefficient	Standard error	t-statistic	Probability
Intercept	–0.02262	0.001897	–12.118704	9.9083E–34
(ΔREV-ΔREC)/Assets it–1	–0.01196	0.000995	–120.10311	0
PPE/Assets it–1	–0.04484	0.000197	–253.31079	0
R-squared	0.724274		observations	33190
Adjusted R-squared	0.724261		F-value	60325.8721
Standard error	0.379655		crit. F-value	0

$$\frac{DA_{it}}{A_{it-1}} = \frac{TA_{it}}{A_{it-1}} - \left(\alpha_0 \frac{1}{A_{it-1}} + \alpha_1 \frac{\Delta REV_{it}}{A_{it-1}} + \alpha_2 \frac{PPE_{it}}{A_{it-1}} + \varepsilon_{it} \right)$$

where TA_{it} represents the total accruals of firm i in period t, calculated based on the difference between earnings (E) and cash flow from operations (CFO): $TA_{it} = E_{it} - CFO_{it}$; ΔREV_{it} represents the change in revenue of firm i in period t compared to $t-1$; ΔREC_{it} represents the change in receivables of firm I in period t compared to $t-1$; PPE_{it} represents the property, plants, and equipment of firm i in period t; A_{it1} represents the total assets of firm i in period $t-1$ and is used as a deflator to avoid heteroscedasticity problems; e_{it} is the error term for firm i in period t.

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