EMPIRICAL EVIDENCE ABOUT EARNINGS MANAGEMENT BEHAVIOUR UNDER THE COVID-19 PERIOD IN ALGERIAN COMPANIES

Bilal Kimouche[1]✉, Hemza Boussenna[2]

[1] *University of 20 August 1955, Skikda, Algeria*
[2] *University of Oum El Bouaghi, Algeria*

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ABSTRACT

This study explores the influence of the Covid-19 period on earnings management behaviour (EM) for 150 Algerian companies. The period of study (2018 to 2021) was divided into the pre-pandemic period (2018 and 2019) and the pandemic period (2020 and 2021). The study used two measures for earnings management: discretionary accruals (accounting EM) and abnormal cash flows (real EM). The results indicate that accounting EM decreased during Covid-19 compared to pre-Covid-19. But for real EM, it was the opposite; it has seen an increase during Covid-19. These results have many implications regarding the commitments of various contributors to preparing financial information and other related parties to ensure the accuracy of financial reporting during periods of crisis. More specifically, accounting standards setters should issue additional explanations regarding the accounting for some items, and auditors should extend the range of verification when certifying financial statements.

KEY WORDS

earnings management, discretionary accounting accruals, abnormal cash flows, Covid-19 period

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1 INTRODUCTION

For a long time, the years 2020 and 2021 have been the most difficult for economies and businesses around the world due to the Covid-19 outbreak, which required many procedures to be put in place, including closure and social distancing as mechanisms to limit the spread of the Coronavirus disease. As a result, many industries and activities have been paralysed or restricted, and the operations of many companies have been disrupted, which has deteriorated the financial performance of companies and threatened their sustainability (Aljawaheri et al., 2021).

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Algeria is not isolated from the outside world; the Ministry of Health, Population and Hospital Reform reported the first cases of infection since February 2020. Therefore, Algerian authorities imposed quarantine measures and a long period of total closure in 2020, followed by short periods of partial closure in 2021, to limit the pandemic outbreak. The challenge for companies was the government requirement to keep only 50% of employees, with exceptional paid leave for the rest, which increased their working capital requirements. These measures have created unfavourable circumstances for companies due to restricting their activities and disrupting several industries. Consequently, many Algerian companies experienced difficult times regarding solvency and liquidity, which menaced their going concern. The macroeconomic situation was not much better, with declines in all economic indicators exacerbated by lower oil prices.

The Algerian government has introduced many incentive measures to reduce the consequences of the limitation measures against the Covid-19 outbreak. However, the difficult economic situation known by Algeria since 2015 due to the volatility in oil prices prevented any direct intervention, which confined some monetary and tax measures. On its side, the tax administration delayed the filing date for income taxes and deferred tax obligation payments by companies until the containment period, so companies will not be subject to sanctions or penalties. Regarding the fulfilment of work and services according to the contracts, the government required cancelling the contractual deadlines and not applying financial penalties for delays (KPMG, 2020).

The Bank of Algeria has reduced the legal reserve ratio for banks from 10% to 8% and the minimum liquidity threshold from 100% to 60%. It was also imposed on banks and financial institutions to defer or renew the maturities of loans due at the end of 2020 or after. Furthermore, the Bank of Algeria gave instructions for extending the deadlines for the use of appropriations, delaying the due payments, and cancelling the late penalties for receivables due at the end of 2020 or after, in addition to maintaining or renewing operating credit lines (KPMG, 2020).

Covid-19 had a substantial negative influence on companies' results due to lower demand and difficulties in doing business, which directly impacted profitability, liquidity, credit quality, and the supply chain. Accordingly, companies might want to develop their reporting strategies under the uncertainties relating to these effects (Hidayat et al., 2022). The Covid-19 pandemic has severely impacted all countries, leading to a global recession that has been described as the worst since the 1930s (Nazmul and Sayma, 2022).

According to Hassan (2023), the nature of the business and institutional environment in which companies operate affects their financial reporting choices. He indicated that Saudi companies' accounting choices towards aggressiveness or conservatism during the pandemic were consistent with political cost theory and transaction cost theory. Nazmul and Sayma (2022) estimated that 46% of companies were probably manipulating earnings during the Covid-19 period. Overall, most studies agree that managers become more involved in earnings management during troubled periods. However, their goals tend to be controversial (Lassoued and Khanchel, 2021).

Earnings management includes all managers' accounting decisions to select and apply accounting policies and estimates (accounting EM), in addition to their real resource allocation decisions (real EM), including those that relate to operating, financing, and investment activities (Kimouche, 2022). Due to the different properties of the two earnings manipulation techniques, managers can use them alternatively or simultaneously. In this context, Yan et al. (2022) pointed that in periods of lockdown, managers assess the cost-benefit relationship regarding each earnings management technique before adopting an accounting decision.

The literature identifies three perspectives for the choice of accounting policies by managers. The first perspective concerns managerial opportunism, where managers adopt accounting policies that maximise their private interests (bonus plans, reputation, etc.). The second

depends on the contractual perspective, where managers tend to select accounting policies that reduce contractual costs. The third perspective concerns the informational view, where accounting policies are used to transmit private information or send signals to related parties about the company's future performance (Kimouche, 2021; Hassan, 2023). However, crisis periods can add additional dimensions or change managers' preferences towards these perspectives (Hassan, 2023).

Yan et al. (2022) proposed three incentives for earnings management during the Covid-19 period. First, financial pressures arising from deteriorating working capital are causing companies to manipulate earnings to meet their financing needs. Second, managers can rely on earnings management consistent with the signal theory to convey good news to stakeholders about the company's prospects. According to Filipović et al. (2022), the economic turmoil generated by Covid-19 represents a motivation for companies to engage in accounting manipulation by increasing income to achieve a certain level of dividends. Third, uncertainty has serious influences on managers' financial policies, leading them to change their strategies, for example, by delaying or reducing investment projects.

Poor performance can create incentives for earnings management. When companies perform poorly during difficult times, managers may want to signal recovery and improvement by manipulating earnings (Yassin et al., 2022; Jordan et al., 2021). Moreover, managers seek to increase earnings in order to hide losses and thus avoid negative perceptions from stakeholders or meet their expectations as a way to facilitate access to financing and avoid liquidity risks (Rusmianto and Makhsun, 2021; Hariadi and Kristanto, 2022; Hidayat et al., 2022).

According to Usheva and Vagner (2020), unexpected environmental changes lead managers to reconsider their resource allocation. Therefore, manipulating accounts to create savings is a strategy to maintain business continuity during difficult times and obviate bankruptcy. The effects of Covid-19 require directors to respond instantly to achieve a habitual level of performance or at least maintain the going concern of the company (Hariadi and Kristanto, 2022; Hidayat et al., 2022).

Some studies have found that companies are expected to excessively manipulate their earnings during downturns and financial distress to avoid institutional supervision and government monitoring (Xiao and Xi, 2021). According to Flores et al. (2021), companies in emerging economies have a tendency to exercise more earnings management in the Covid-19 crisis to reduce taxes because of the small margins for governments to adjust taxes and the structural economic fragilities. Furthermore, the Coronavirus could provide more incentives for companies to practise earnings management by reporting lower earnings to present themselves as potential recipients of government aid or to avoid regulatory attention.

Other studies have proposed potential techniques for earnings management during the Covid-19 period. Ozili (2021) expected that some techniques of accounting manipulation, such as income smoothing, loss avoidance, and big bath accounting, could mitigate the negative influence of Covid-19 on the company's financial position and performance. Hidayat et al. (2022) stated that some companies report higher quarterly earnings than they realise by reducing reported losses and deferring asset impairment charge-offs.

Contrarily, companies could manage their earnings by excessive recognition of impairment losses during the Covid-19 pandemic to write off bad assets as a tool to enhance future performance in line with the big bath accounting perspective (Flores et al., 2021; Dicken and Unger, 2021). Covid-19 may influence the amounts and timing of revenues and expenses, as well as the assumptions required to evaluate them, especially for contracts that extend over more than one period (Yassin et al., 2022).

Complementing previous research, the present study seeks to explore whether the Coronavirus crisis is changing the trend of Algerian companies towards earnings management. The study employs 150 Algerian companies during two years before the pandemic (2018 and 2019) and two years

during the pandemic (2020 and 2021). Following Kothari et al. (2005) and Roychowdhury (2006), the study uses discretionary accruals as a measure of accounting earnings management and abnormal cash flows as a measure of real earnings management, respectively.

Unlike previous studies, this study asserts that Covid-19 restricts accounting earnings management practices in Algerian companies, increasing the tendency of managers to perform more real earnings management as an alternative procedure.

The rest of this paper is organised into five sections: Section 2 develops the hypotheses starting from the literature; Section 3 displays the methodology; Section 4 summarises the results; and Section 5 presents the conclusions.

2 LITERATURE REVIEW

There is extensive empirical research about earnings management during difficult times; the most prominent are those relating to the 2008 financial crisis (Filip and Raffournier, 2014; Chintrakarn et al., 2008). Overall, these studies concluded that economic distress largely influences the tendency of directors to exercise earnings management, with conflicting interpretations. Nevertheless, this study follows the path of empirical studies on earnings management only during the Covid-19 period since early 2020. This review distinguishes four groups of studies according to the influence of the Coronavirus on earnings management.

The first group suggested that the pandemic has reduced earnings management. This group contains only the study by Rusmianto and Makhsun (2021), which measured discretionary accruals during and before the Covid-19 period and the effects of company size and gender management. The study was conducted among 15 Indonesian agricultural-listed companies during 2017–2020 and found that discretionary accruals were substantially lower in the Covid-19 period than before. Additionally, the study indicated that gender management and company size did not affect earnings management in either period.

The second group suggested that the Covid-19 influence on earnings management is limited, such as Jordan et al. (2021), who tested whether earnings management has resurfaced during the Covid-19 period in the United States. The study included 3,322 observations during 2020 and found no compelling evidence that earnings management occurred in 2020.

Ardiany el al. (2022) analysed tax avoidance and earnings management before and during the Covid-19 period for Indonesian-listed companies in the investment, trading, and services industries. The results showed that divergences between the pre- and Covid-19 periods regarding tax avoidance and earnings management were insignificant.

Azizah et al. (2022) investigated whether levels of accrual-based earnings management differed before and during the pandemic period (2019 and 2020) in Indonesian pharmaceutical companies. The findings showed that the pandemic did not affect earnings management, concluding that the pandemic does not necessarily motivate managers to manage earnings, especially for pharmaceutical companies that enjoyed relative prosperity during the Covid-19 pandemic.

The third group includes studies showing that earnings management behaviour has increased during the Covid-19 period. Starting with the investigation by Usheva and Vagner (2020), who found that the managers of Slovakian companies manipulated earnings in 2020 more than before to save amounts in the form of reserves since the consequences of the pandemic are not yet clear.

Dicken and Unger (2021) argued that European companies with negative performance manipulated earnings by reducing goodwill impairment losses during the pandemic. Ljubisavljević and Jakobsson (2022) suggested that managers of Swedish companies practised accounting earnings management to increase earnings in future periods. However, they observed no

significant change in real earnings management level due to the pandemic.

Aljawaheri et al. (2021) analysed the influence of the Covid-19 crisis on the manipulation of earnings and the sensitivity of share prices to earnings based on the financial data of 87 Iraqi-listed companies over the period 2018–2020. The results showed that with the Coronavirus outbreak, managers manipulated earnings to maintain their persistence, which decreased the quality of financial reporting.

Lassoued and Khanchel (2021) analysed the influence of the Coronavirus pandemic on earnings manipulation, using 2,031 companies listed on 15 European financial markets from 2017 to 2019 as the pre-pandemic period and from 2020 to 2020 as the pandemic period. They found that companies tended to manipulate earnings more during the Coronavirus period than before.

Flores et al. (2021) compared earnings management levels in the Covid-19 period among American and Brazilian companies, using 22,244 and 139,856 observations, respectively. They found that companies operating in emerging markets are more influenced by macroeconomic situations and tend to exercise earnings management during the Covid-19 period more than companies in developed markets.

Taylor et al. (2023) analysed the influence of the Covid-19 crisis on earnings management in 15 European countries. They used 399 quarterly observations in the pre-Covid-19 period (2019) and 768 quarterly observations in the Covid-19 period (2020–2021) for 105 listed banks. The findings showed a significant increase in earnings management during the Covid-19 period. However, they pointed that governance and audit quality limits the impact of earnings management and improves the quality of financial reporting.

Hariadi and Kristanto (2022) analysed the influence of the Coronavirus on earnings management with the moderating role of managerial capability history using 126 Indonesian-listed companies from 2018 to 2020. The results showed a positive influence of the Coronavirus on earnings management. Nevertheless, this impact can be diminished due to managerial capability history, where companies with managerial capability history tend to improve the quality of their earnings instead of engaging in earnings management behaviour.

Hidayat et al. (2022) conducted a study during and after Covid-19 and concluded that companies manipulating earnings experienced difficulties to maintain financial reporting quality and that earnings management is still being adopted to reassure stakeholders about the continuity of the company during the pandemic.

Ryu and Chae (2022) examined whether Korean service companies maintained accounting information quality during the Covid-19 crisis. The study included 580 observations during the pre-Covid-19 period (2018–2019) and 289 observations during Covid-19 (2020). The results indicated that companies practised real earnings management during the pandemic more than before, confirming the consciousness of managers about the uncertainty of future performance as the crisis continues.

Yassin et al. (2022) analysed whether managers in the United States and Jordan manipulated earnings during the Covid-19 period using a revenue standard. The study used an online survey in which 154 questionnaires were collected from US companies and 150 from Jordanian companies. The results suggested that companies in both countries manipulated earnings through the revenue standard during the pandemic.

Hsu and Yang (2022) analysed whether the Covid-19 pandemic influenced accounting quality and whether corporate governance mitigated this influence, using 3,122 observations from UK-listed companies. The findings showed that accounting quality was lower during the Covid-19 period as companies became more engaged in real earnings management. Furthermore, board size can moderate the negative influence of the pandemic on accounting quality.

Yan et al. (2022) investigated the Covid-19 crisis consequences on earnings management, employing 8,832 firm-years for Chinese-listed companies from 2018 to 2020. The findings revealed that the pandemic intensified real and accounting earnings management, especially in companies facing higher financial constraints.

The last group is distinct and includes only the study by Xiao and Xi (2021), which explored whether the pandemic has an influence on earnings management in China and the mitigating role of corporate social responsibility and external corporate mechanisms. The study included 2,029 listed companies in 2020 and suggested an expansion in accounting earnings management practices and a decrease in real earnings management. However, in companies with higher corporate social responsibility performance and higher audit quality, the levels of real and accounting earnings management were lower.

Contrary to previous studies and consistent with Xiao and Xi (2021) and Yan et al. (2022), this study tests the influence of the Coronavirus on real and accounting earnings management, since most previous studies only took into account the effect on accounting earnings management. This study was carried out in Algeria, where companies operate in a specific business and institutional environment that could affect their choices relating to financial reporting in different ways. Moreover, the impact of the disease on the Algerian economy and companies' performance has differed from that in other countries, which could affect managers' earnings management behaviour differently. Additionally, this study is among a few that included two years during the pandemic period and two years before, which may provide different evidence about the impact of downturns on earnings management.

From the literature, it appears that most studies found that periods of lockdown provide additional incentives to manipulate earnings, revealing different interpretations in harmony with the previously mentioned perspectives. Consequently, Covid-19 is expected to intensify earnings management practices in Algerian companies. Consistent with Anagnostopoulou and Tsekrekos (2017), this study expects a simultaneous employment of real and accounting earnings management during the Coronavirus period. For that, the study hypotheses can be formulated as follows:

Hypothesis 1: Covid-19 intensifies accounting earnings management in Algerian companies.

Hypothesis 2: Covid-19 intensifies real earnings management in Algerian companies.

3 METHODOLOGY AND DATA

3.1 Data Collection

The study used the financial data of 150 Algerian companies from 2018 to 2021, including 600 firm-year observations. The sample did not include financial companies due to their specificities concerning accruals and cash flow calculation. The random selection of companies depended on the financial statements' accessibility and the availability of all required information during all the studied periods due to the scarcity of databases containing financial data on Algerian companies, besides the smaller number of listed companies.

Moreover, most Algerian companies are public or family-owned; therefore, they do not face many disclosure requirements. Overall, Algerian companies suffer from high levels of secrecy and caution by managers regarding information disclosure, contravening corporate governance principles. We collected the required financial data from the National Centre for Commercial Register database (CNRC portal: `https://sidjilcom.cnrc.dz`), which is the sole database providing financial statements of companies operating in Algeria consistent with commercial law.

The sample selection considered large companies with sales of 2 billion DZD or more throughout the study, consistent with the investigation by the National Statistics Office (ONS, 2012). The initial sample included 1057 companies, divided into 515 state-owned, 451 privately owned, and 91 mixed-owned. All these companies prepare their financial statements under the National Accounting Plan (SCF), inspired by the 2003 version of IFRS. The rules of SCF require companies to apply all account-

ing policies of that IFRS version, including impairment tests, provisions, revaluation, etc., except for micro-enterprises employing no more than nine full-time employees, which apply simple accounting (cash accounting).

The only criterion used to select companies comprising the sample is the availability of their financial statements in the CNRC portal during all the study's periods without considering financial companies. It is worth mentioning that the CNRC requires companies to publish the balance sheet and income statement, while providing the cash flow statement is voluntary. Consequently, we excluded companies that did not publish their cash flow statement, which is necessary to estimate real earnings management. Additionally, the financial statements of all selected companies are subject to auditing since commercial law in Algeria obligates the majority of companies to appoint a financial auditor at least. Tab. 1 summarises the characteristics of the sample.

3.2 Model Specification

This study used two models by running Panel Data Regression. Model (1) studies the association of accounting earnings management as a dependent variable with the Covid-19 pandemic as an independent variable and financial leverage, company size, return on equity, and capital intensity as control variables, as shown in Equation (1):

$$\begin{aligned} \mathrm{AEM}_{it} = {} & \alpha_0 + \alpha_1\,\mathrm{COV}_{it} + \\ & + \alpha_2\,\mathrm{SIZE}_{it} + \alpha_3\,\mathrm{LEV}_{it} + \\ & + \alpha_4\,\mathrm{ROE}_{it} + \alpha_5\,\mathrm{CAP}_{it} + \\ & + \alpha_6\,\mathrm{COV} \times \mathrm{SIZE}_{it} + \\ & + \alpha_7\,\mathrm{COV} \times \mathrm{LEV}_{it} + \\ & + \alpha_8\,\mathrm{COV} \times \mathrm{ROE}_{it} + \\ & + \alpha_9\,\mathrm{COV} \times \mathrm{CAP}_{it} + \varepsilon_{it}, \end{aligned} \tag{1}$$

where AEM represents the accounting earning management level for the year; COV is a dummy variable, taking the value 1 for the Covid-19 period, otherwise 0; SIZE is the size of the company at the beginning of the fiscal year; LEV is the level of financial leverage at the fiscal year's end; ROE is the return on equity for the year; CAP is the capital intensity for the fiscal year; α_0 is the constant; $\alpha_1, \ldots, \alpha_9$ are the coefficients of regression; ε_{it} is the error term.

Model (2) studies the association of real earnings management as a dependent variable with the previously independent and control variables mentioned in Model (1), as shown in Equation (2):

$$\begin{aligned} \mathrm{REM}_{it} = {} & \beta_0 + \beta_1\,\mathrm{COV}_{it} + \\ & + \beta_2\,\mathrm{SIZE}_{it} + \beta_3\,\mathrm{LEV}_{it} + \\ & + \beta_4\,\mathrm{ROE}_{it} + \beta_5\,\mathrm{CAP}_{it} + \\ & + \beta_6\,\mathrm{COV} \times \mathrm{SIZE}_{it} + \\ & + \beta_7\,\mathrm{COV} \times \mathrm{LEV}_{it} + \\ & + \beta_8\,\mathrm{COV} \times \mathrm{ROE}_{it} + \\ & + \beta_9\,\mathrm{COV} \times \mathrm{CAP}_{it} + \varepsilon_{it}, \end{aligned} \tag{2}$$

where REM represents the real earning management level for the year; β_0 is a constant; $\beta_1, \ldots, \beta_9$ are the coefficients of regression; ε_{it} is the error term.

Tab. 1: Sample characteristics

Property		**Listing**		**Sector**	
State	82	Listed	4	Manufacturing	37
Non-state	68	Unlisted	146	Services	35
				Construction	31
				Transportation	24
				Infrastructure	15
				Energy	8
Total	150	Total	150	Total	150

3.3 Measuring the Variables

3.3.1 Accounting Earnings Management (AEM)

AEM was measured using discretionary accounting accruals, following the model of Kothari et al. (2005):

$$\frac{\mathrm{ACC}_{it}}{\mathrm{As}_{it-1}} = \lambda_0 + \lambda_1 \left(\frac{1}{\mathrm{As}_{it-1}}\right) + \\ + \lambda_2 \left(\frac{\Delta\mathrm{SL}_{it} - \Delta\mathrm{RC}_{it}}{\mathrm{As}_{it-1}}\right) + \\ + \lambda_3 \left(\frac{\mathrm{PPE}_{it}}{\mathrm{As}_{it-1}}\right) + \\ + \lambda_4 \,\mathrm{ROA}_{it} + \varepsilon_{it}, \tag{3}$$

where ACC_{it} is the total accruals for the fiscal year; As_{it-1} is the total assets at the opening of the fiscal year; $\Delta\mathrm{SL}_{it}$ is the variation of sales for the fiscal year; $\Delta\mathrm{RC}_{it}$ is the variation of receivables for the fiscal year; PPE_{it} is the gross property, plant, and equipment at the fiscal year end; λ_0 is a constant; $\lambda_1, \ldots, \lambda_4$ are the coefficients of regression; ε_{it} is the error term and an estimate of discretionary (abnormal) accruals.

In this paper, following previous studies, the estimated discretionary accruals as an absolute value were employed to measure accounting earnings management practices. The total accounting accruals were calculated using Equation (4):

$$\mathrm{ACC}_{it} = \Delta\mathrm{WCR}_{it} + \mathrm{NCI}_{it} - \\ - \mathrm{DOT}_{it} - \mathrm{NCE}_{it}, \tag{4}$$

where WCR is the working capital requirements for the year; NCI is the non-cash revenues for the year; DOT_{it} is the depreciation, amortisation, and impairment charges for the year; and NCE_{it} is the other non-cash expenditures for the year.

3.3.2 Real Earnings Management (REM)

Roychowdhury (2006) suggests that sales manipulation and overproduction create abnormally low operating cash flows, while the reduction of discretionary expenses creates abnormally high operating cash flows. For that, abnormal operating cash flows were employed to measure REM, which expressed as the standardised residuals of Roychowdhury's (2006) model:

$$\frac{\mathrm{OCF}_{it}}{\mathrm{As}_{it-1}} = \delta_0 + \delta_1 \frac{1}{\mathrm{As}_{it-1}} + \\ + \delta_2 \frac{\mathrm{SL}_{it}}{\mathrm{As}_{it-1}} + \\ + \delta_3 \frac{\Delta\mathrm{SL}_{it}}{\mathrm{As}_{it-1}} + \varepsilon_{it}, \tag{5}$$

where OFC_{it} represents the operating cash flows during the fiscal year; δ_0 is the constant; $\delta_1, \ldots, \delta_3$ are the coefficients of regression; ε_{it} is the residuals.

As they are unpredictable through ordinary operations, the standardised residuals of Equation (5) represent the level of real earnings management.

3.3.3 Independent Variable

The Covid-19 period (COV) was measured as a dichotomous variable, taking a value of 0 for the pre-Covid-19 period (2018–2019) and a value of 1 for the Covid-19 period (2020–2021).

3.3.4 Control Variables

The control variables were measured as follows: company size (SIZE) is the logarithm of total assets; financial leverage (LEV) is the ratio of total debt to total assets; return on equity (ROE) is the net income to total equity ratio; and capital intensity (CAP) is the ratio of average total assets to sales.

4 RESULTS AND DISCUSSION

Before presenting the results, it is worth mentioning that all study models were estimated using the method of Panel Estimated Generalised Least Squares (Panel EGLS) through EViews software (cross-section weights) due to the absence of homoscedasticity. When choosing

cross-section weights, EViews will provide a feasible GLS estimation, assuming the presence of cross-section heteroscedasticity. According to Bai et al. (2021), the FGLS is more efficient than the ordinary least squares (OLS) in the case of heteroscedasticity or serial and cross-sectional correlations. They stated that the FGLS can enhance efficiency in terms of mean squared error, providing an unbiased standard error estimator.

4.1 Accounting Earnings Management Results

Tab. 2 summarises the estimation results for Kothari et al.'s (2005) model to measure accounting earnings management (AEM) over three different periods: the pre-Covid-19 period (2018–2019), the Covid-19 period (2020–2021), and the whole study period (2018–2021). The results suggest that the model is significant at 1% for the three cases, with variation in the significance levels of the regression coefficients over the three periods. The model has high explanatory power during the Covid-19 period when compared to the other two periods with significant regression coefficients at the 1% level, except for the $\mathrm{PPE}_{it}/\mathrm{As}_{it-1}$ parameter, which is significant at 5% level, and the parameter of $(\Delta\mathrm{SL}_{it}–\Delta\mathrm{RC}_{it})/\mathrm{As}_{it-1}$, which is insignificant.

In addition, the model's explanatory power is relatively lower during the whole period compared to the Covid-19 period, although most of the regression coefficients were significant at 1%, except for the parameters of $\mathrm{PPE}_{it}/\mathrm{As}_{it-1}$ and $1/\mathrm{As}_{it-1}$, which are insignificant and significant at 5%, respectively. For pre-Covid-19, the explanatory power of was low, with insignificant regression coefficients, except for the parameters of $(\Delta\mathrm{SL}_{it}–\Delta\mathrm{RC}_{it})/\mathrm{As}_{it-1}$ and $\mathrm{PPE}_{it}/\mathrm{As}_{it-1}$, which are statistically significant at 1%.

The variables show a disparity between before and during the pandemic periods regarding their ability to explain accounting accruals. Except for the variable $(\Delta\mathrm{SL}_{it}–\Delta\mathrm{RC}_{it})/\mathrm{As}_{it-1}$, all the variables explain a part of accounting accruals during the Covid-19 period, while only the variables $(\Delta\mathrm{SL}_{it}–\Delta\mathrm{RC}_{it})/\mathrm{As}_{it-1}$ and $\mathrm{PPE}_{it}/\mathrm{As}_{it-1}$ explain accounting accruals during the pre-pandemic period. We note that the coefficient of determination (R^2) has increased in the pandemic period compared to the pre-pandemic period, which implies that the standardised residuals as a measure of accounting earnings management have decreased. Consequently, Covid-19 has negatively influenced accounting earnings management.

4.2 Real Earnings Management Results

The estimation results of real earnings management (REM) using Roychowdhury's (2006) model during the same previous three periods summarised in Tab. 3 indicate that the model is significant at 1%. The significance levels

Tab. 2: The estimation results for Kothari et al.'s (2005) model

	Pre-Covid-19		Covid-19		Whole period	
Variables	**Coeffi.**	***t*-Stati.**	**Coeffi.**	***t*-Stati.**	**Coeffi.**	***t*-Stati.**
Constant	−0.002	−0.550	−0.055	−11.36*	−0.030	−7.14**
$1/\mathrm{As}_{it-1}$	−167511	−1.27	695736	5.68**	312778	2.05*
$(\Delta\mathrm{SL}_{t}–\Delta\mathrm{RC}_{t})/\mathrm{As}_{t-1}$	−0.005	−12.16**	−0.009	−1.76	−0.014	−4.76**
$\mathrm{PPE}_{t}/\mathrm{As}_{t-1}$	−0.064	−8.50**	0.040	2.48*	−0.010	−0.572
ROA_{t}	−0.008	−0.104	0.534	24.27**	0.414	10.3**
F-Stati.	15.38**		37.43**		26.27**	
Adj. R^2	0.173		0.337		0.150	
Durbin-Watson	2.17		2.12		2.07	

Notes: Dependent variable: $\mathrm{ACC}_{it}/\mathrm{As}_{it-1}$. Estimation method: Panel EGLS (Cross-section weights). Significant at 0.05 (*) or 0.01 (**) level.

Tab. 3: The estimation results for Roychowdhury's (2006) model

Variables	Pre-Covid-19		Covid-19		Whole period	
	Coeffi.	*t*-Stati.	Coeffi.	*t*-Stati.	Coeffi.	*t*-Stati.
Constant	0.019	38.69**	0.057	18.04**	0.043	7.94**
$1/\text{As}_{it-1}$	−318324	−1.59	−703642	−9.13**	−575868	−3.24**
$\text{SL}_{it}/\text{As}_{it-1}$	0.063	7.99**	0.009	1.22	0.017	6.54**
$\Delta\text{SL}_{it}/\text{As}_{it-1}$	−0.029	−3.94**	0.017	5.46**	0.016	8.25**
F-Stati.	23.29**		16.53**		18.10**	
Adj. R^2	0.191		0.144		0.084	
Durbin-Watson	2.09		1.98		2.06	

Notes: Dependent variable: $\text{OCF}_{it}/\text{As}_{it-1}$. Estimation method: Panel EGLS (Cross-section weights). Significant at 0.05 (*) or 0.01 (**) level.

of the regression coefficients are similar over the three periods, which are significant at 1%, except for the parameter of $1/\text{As}_{it-1}$ during the pre-Covid-19 period and the parameter of $\text{SL}_{it}/\text{As}_{it-1}$ during the Covid-19 period that are insignificant. The signs of the regression coefficients are also homogeneous over the periods, except for the parameter of $\Delta\text{SL}_{it}/\text{As}_{it-1}$; while there is a disparity between the three periods regarding the values of the regression coefficients.

The model presents different levels of explanatory power over the periods, which decreased during Covid-19 compared to pre-Covid-19 and was relatively lower during the whole period. This is due to the disparity between periods in terms of variables' ability to explain operating cash flows. The decline in the model's explanatory power, as reflected by the decrease in the determination coefficient during the pandemic compared to before, means that standardised residuals as a measure of real earnings management have increased, suggesting an increase in real earnings management during the Covid-19 period.

4.3 Descriptive Statistics

Tab. 4 presents the descriptive statistics for variables. The mean of accounting earnings management, measured by the absolute value of discretionary accruals, shows that Algerian companies used discretionary accruals to manage earnings with 12.90% of total assets, on average, over the study period. However, the mean of real earnings management (abnormal operating cash flows) shows that Algerian companies used sales and operating activities to manage earnings with 2% of total assets, on average, over the study period.

Tab. 4: Data descriptive statistics

	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
AEM	0.056	1.872	0.001	0.213	0.129	600
REM	0.020	−0.025	2.015	−1.691	0.275	600
COV	–	–	1	0	–	600
SIZE	8.950	9.006	11.677	6.106	1.047	600
LEV	0.605	0.496	8.047	0.000	0.691	600
ROE	0.087	0.061	4.565	−20.591	0.987	600
CAP	4.427	0.239	0.691	0.000	0.364	600
COV × SIZE	8.874	6.669	11.677	0.000	4.498	600
COV × LEV	0.521	0.000	3.889	0.000	0.510	600
COV × ROE	0.061	0.000	4.379	−0.994	0.367	600
COV × CAP	5.387	0.000	0.691	0.000	0.247	600

Tab. 5: The results of unit root test

	LLC *t*	Fisher Chi-square – PP	Fisher Chi-square – ADF
AEM	−112.77**	697.05**	597.92**
REM	−48.33**	815.83**	679.82**
COV	−7.30**	521.65**	97.33
SIZE	−28.08**	581.54**	495.84**
LEV	−26.39**	665.27**	593.26**
ROE	−4131.22**	776.94**	692.78**
CAP	−58.18**	513.76**	606.80**
COV × SIZE	−7.31**	532.19**	100.94
COV × LEV	0.89	312.12**	327.19*
COV × ROE	−129.15**	680.49**	108.46**
COV × CAP	−28.32**	513.45**	224.34**

Notes: Null hypothesis: Unit root. Lags: Automatic selection of maximum lags.
Significant at 0.05 (*) or 0.01 (**) level.

In addition, the mean of the capital intensity indicates that producing one DZD as sales requires Algerian companies to provide 4.427 DZD as total assets, on average, which increased to 5.387 DZD during the Covid-19 period. The mean of the leverage ratio suggests that the total debt of Algerian companies represented, on average, 60.50% of total assets during the study period, more than that recorded during the Covid-19 period (52.10%). Similarly, the mean of the return on equity ratio shows that Algerian companies earned 8.7% on average during the study period, more than what they earned during the Covid-19 period (6.10%). This drop in leverage and performance of Algerian companies during the Covid-19 period can be attributed to the economic downturn imposed by the closure and physical distancing, leading to a financial and liquidity crisis that limited the financing sources available for companies. Finally, by comparing the standard deviation with the range of each variable, it appears that the dispersion of the variables is adequate.

4.4 Unit Root Test

Before estimating Models (1) and (2), it is necessary to test the stationarity of the data to determine which statistical method is appropriate for estimating the models. As shown in Tab. 5, the stationarity test was based on three tests: the Phillips-Perron (PP) test, the Augmented Dickey-Fuller (ADF) test, and the Levin-Lin-Chu (LLC) test. According to the results, all variables are stable at the level, except for the variable COV × LEV (when using the LLC test) and the variables COV and COV × SIZE (when using the ADF test), which are insignificant at the level of 5%. Therefore, all variables do not contain unit roots, and thus the estimation of Models (1) and (2) does not require using dynamic methods.

4.5 Model (1)'s Results

Tab. 6 summarises the estimation outcomes of Model (1), which assesses the effect of the pandemic on accounting earnings management (AEM). The findings indicate that the model is significant at 1%, and the adjusted R^2 reached 0.36, which means that the independent variables collectively explain 36% of the variance in the dependent variable (AEM). For model validity, the Jarque-Bera statistic is insignificant and suggests that the residuals of Model (1) have a normal distribution. The Durbin-Watson statistic that reached 2.12 is close to 2, which means that the residuals of Model (1) are not autocorrelated. Finally, the variance inflation factors (VIF) are weak, indicating the absence of collinearity between independent variables.

Tab. 6: The estimation results of Model (1)

Variables	Coeffi.	*t*-Stati.	VIF	*F*-Stati.	Adj. R^2	Durbin-Watson	Jarque-Bera
Constant	0.041	1.38		3.12**	0.36	2.12	5.31
COV	−0.246	−4.38**	2.13				
SIZE	−0.007	−2.26*	2.11				
LEV	−0.003	−0.39	1.59				
ROE	0.013	4.15**	1.17				
CAP	−0.031	−2.49*	1.50				
COV × SIZE	0.030	5.24**	2.14				
COV × LEV	−0.044	−4.11**	1.89				
COV × ROE	−0.033	−2.07*	1.27				
COV × CAP	0.029	1.35	1.65				

Notes: Dependent variable: AEM. Estimation method: Panel EGLS (Cross-section weights).
Significant at 0.05 (*) or 0.01 (**) level.

The results of the coefficients show a negative influence of Covid-19 (COV) on accounting earnings management, as the parameter reached −0.246 and is significant at 1%, which means that during the pandemic, accounting earnings management levels declined compared to before. The results also show that all parameters of control variables are significant at 1%, except for SIZE, CAP, and COV × ROE, which are considered significant at 5%, and LEV and COV × CAP, which are considered insignificant. Additionally, company size (SIZE) and capital intensity (CAP) negatively affect accounting earnings management. However, these effects turn positive for company size (COV × SIZE) and insignificant for capital intensity (COV × CAP) during the Covid-19 period. Contrarily, the results show that return on equity (ROE) positively affects accounting earnings management, but this effect becomes negative (COV × ROE) during Covid-19. Furthermore, the insignificant effect of leverage (LEV) on accounting earnings management becomes negative (COV × LEV) during Covid-19.

4.6 Model (2)'s Results

Tab. 7 summarises the estimation outcomes of Model (2), which assesses the influence of the Coronavirus period on real earnings management. The findings show that the model is significant at 1%, and the adjusted R^2 reached 0.29, which means that the independent variables collectively explain 29% of the variance in the dependent variable (REM). Regarding model validity, the Jarque-Bera statistic is insignificant, suggesting the normal distribution of the residuals of Model (2). The Durbin-Watson statistic reached 2.09 and is close to 2, which demonstrates the non-autocorrelation of the residuals of Model (2). Finally, the results suggest the absence of collinearity between the independent variables in Model (2) since the variance inflation factors (VIF) are weak.

The results suggest that the pandemic (COV) has a positive impact on real earnings management, as the value of the parameter reached 0.093 and is significant at 1%, meaning that real earnings management levels were higher in the Covid-19 period than they existed before the Covid-19 period. The results also show that all parameters of control variables are significant at 1%, except for LEV, CAP, and COV × SIZE, which are significant at 5%, and COV × CAP, which is insignificant. Furthermore, the results indicate that company size (SIZE) and leverage (LEV) positively affect real earnings management, while these effects become negative (COV × SIZE and COV × LEV) when interacting with the Covid-19 pandemic. However, the negative influence of return on equity (ROE) becomes positive (COV × ROE) during the Covid-19 period, and the positive effect of capital intensity (CAP) becomes insignificant (COV × CAP) during the Covid-19 period.

Tab. 7: The estimation results of Model (2)

Variables	Coeffi.	*t*-Stati.	VIF	*F*-Stati.	Adj. R^2	Durbin-Watson	Jarque-Bera
Constant	−0.206	−7.15**		2.52**	0.29	2.09	3.96
COV	0.093	3.11**	2.13				
SIZE	0.014	4.89**	2.11				
LEV	0.008	2.03*	1.59				
ROE	−0.005	−5.50**	1.17				
CAP	0.009	2.18*	1.50				
COV × SIZE	−0.008	−2.55*	2.14				
COV × LEV	−0.013	−2.97**	1.89				
COV × ROE	0.015	3.18**	1.27				
COV × CAP	−0.003	−0.46	1.65				

Notes: Dependent variable: REM. Estimation method: Panel EGLS (Cross-section weights).
Significant at 0.05 (*) or 0.01 (**) level.

4.7 Discussion

The findings of this study suggest that the pandemic has restricted accounting earnings management in Algerian companies, which refutes hypothesis 1. This result confirms the findings of Rusmianto and Makhsun (2021), who found a significant decrease in accounting earnings management behaviour during the Covid-19 period. However, this result differs from previous studies showing no significant difference in the levels of accounting earnings management between the pre- and Covid-19 periods (e.g., Jordan et al., 2021; Ardiany et al., 2022; Azizah et al., 2022). It also differs from the results of several studies that revealed an increase in accounting earnings management due to the Covid-19 (e.g., Usheva and Vagner, 2020; Dicken and Unger, 2021; Aljawaheri et al., 2021; Lassoued and Khanchel, 2021; Flores et al., 2021; Taylor et al., 2023).

Additionally, the findings of this study indicate that the pandemic has intensified real earnings management in Algerian companies, which confirms hypothesis 2. This result is in harmony with some studies showing that companies practised more real earnings management during the Covid-19 period (e.g., Yassin et al., 2022; Hsu and Yang, 2022; Yan et al., 2022). On the contrary, this result is inconsistent with the study of Ljubisavljević and Jakobsson (2022), which showed that real earnings management levels have not changed due to the pandemic, as well as with the study of Xiao and Xi (2021), which reported a significant decrease in the levels of real earnings management during the Covid-19 period.

Tab. 8 summarises a categorisation of the results of previous studies territory, development level, and their consistency with the present study.

Although the cost of real earnings management is higher than that of accounting earnings management, the Coronavirus has forced the managers of Algerian companies to turn towards real earnings management since it is considered more difficult to discover and subject to less oversight by external auditors and regulators than accounting earnings management. Real earnings management also directly affects cash flows, which enabled companies to reduce the severity of liquidity problems imposed by the pandemic due to business restrictions. Thus, Algerian companies can simultaneously enhance their financial performance and their liquidity situation. Moreover, to deal with the low level of activity caused by the pandemic, managers of Algerian companies did not find many accounting choices to manipulate earnings, so they resorted to real earnings management to provide more alternatives.

Tab. 8: Categorisation of the results by territory and development level

Criterion	Categories	Studies
Consistent studies with the present study		
Territory	Southeast Asia	Rusmianto and Makhsun (2021), Yan et al. (2022), Ryu and Chae (2022)
	USA	Yassin et al. (2022)
	Europe	Hsu and Yang (2022)
	MENA	Yassin et al. (2022)
Development level	Developing	Yassin et al. (2022)
	Emerging	Rusmianto and Makhsun (2021), Yan et al. (2022), Ryu and Chae (2022)
	Developed	Hsu and Yang (2022), Yassin et al. (2022)
Inconsistent studies with the present study		
Territory	Southeast Asia	Xiao and Xi (2021), Azizah et al. (2022), Ardiany et al. (2022), Hariadi and Kristanto (2022)
	USA	Jordan et al. (2021), Flores et al. (2021)
	Europe	Usheva and Vagner (2020), Dicken and Unger (2021), Lassoued and Khanchel (2021), Taylor et al. (2023), Ljubisavljević and Jakobsson (2022)
	MENA	Aljawaheri et al. (2021)
Development level	Developing	Aljawaheri et al. (2021)
	Emerging	Usheva and Vagner (2020), Flores et al. (2021), Xiao and Xi (2021), Hariadi and Kristanto (2022), Azizah et al. (2022), Ardiany et al. (2022)
	Developed	Jordan et al. (2021), Dicken and Unger (2021), Lassoued and Khanchel (2021), Flores et al. (2021), Ljubisavljević and Jakobsson (2022), Taylor et al. (2023)

5 CONCLUSION

Several studies have argued that periods of economic distress prompt managers to change their tendencies towards earnings management. However, few studies have explored this trend regarding two different earnings management strategies. Therefore, this study analyses the influence of Covid-19 on real and accounting earnings management in Algerian companies. The results indicate that Algerian companies use real and accounting earnings management as substitutes. This finding was consistent with the study by Kimouche (2022). Moreover, with the outbreak of the Covid-19 pandemic, Algerian companies have changed from accounting earnings management to real earnings management. Thus, Covid-19 restricted accounting earnings management while intensifying real earnings management in Algeria.

These results can be attributed to the Covid-19 pandemic nature, which has directly influenced the real economy through restrictions on companies' activity due to preventive measures against the pandemic outbreak. On the contrary, the financial crises that occurred during the previous decades have indirectly affected the real activity of companies. Restricting the companies' activity reduces the margin of discretion available to managers regarding accruals, leading them to turn to cash flows as a means to manipulate earnings. This strategy enables managers to mitigate losses arising from underperformance and, at the same time, manage liquidity risks, both of which are consequences of the pandemic. In addition, managers have the opportunity to avoid the vigilance of auditors and regulators regarding accounting earnings management.

The study contributes to accounting research by exploring earnings management during the Covid-19 period, which has directly and globally influenced the performance of companies and their financial position through the restrictions imposed on their activity to limit the pandemic's spread. Moreover, this study is the first

in Algeria, which has very different economic and institutional characteristics compared to other environments and experienced different conditions during the pandemic with different government measures to reduce the pandemic's consequences. Methodologically, this study included two years during the pre-Covid-19 period versus two years during the Covid-19 period and measured the impact of the pandemic on earnings management behaviour based on a multiple regression model (Panel EGLS). Contrarily, the majority of previous studies have only covered 2020 as the Covid-19 period, compared to many years for the pre-Covid-19 period, and relied on the paired difference tests.

The results of the study have many implications, as they require accounting standard-setters and regulators to give more attention to the influences of crises on companies' financial situations and the quality of financial reporting. During crisis periods, accounting discretion should be constrained by more disclosure requirements and the identification of aspects that require disclosure. On the other hand, auditors should be encouraged to enhance their analytical procedures and improve audit quality during times of crisis in order to detect material misstatements in financial statements resulting from earnings manipulation. Finally, users of financial reporting should be careful when using financial information in times of crisis.

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AUTHOR'S ADDRESS

Bilal Kimouche, Start-ups Financing Lab in light of the Knowledge Economy (SFKE), University 20 Août 1955, BP 26 Road El Hadaiek, Skikda, 21000, Algeria, e-mail: b.kimouche@univ-skikda.dz (corresponding author)

Hemza Boussenna, Innovation and Financial Engineering Laboratory (INIF), University Larbi Ben M'hidi Oum El Bouaghi, BP 358 Route de Constantine, Oum El Bouaghi, 04000, Algeria, e-mail: boussenna.hemza@univ-oeb.dz