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The butterfly effect and earnings management: Analysis of long-term consequences of short-term adjustments

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Abstract
This paper investigates earnings management and its long-term consequences in the industrial sector of the MSM companies over a sample from 2011 to 2020. This study will test the effect of DAC, the most popular instrument employed in accounting practices for earnings management, on objective measures: return on assets and profit margin using Eviews 13 software. Suppose you have heard of the 'butterfly effect' from chaos theory. In that case, this will give you a grounding to understand how small financial changes can lead to massive unanticipated effects. Further, this study identifies how earning management activities are influenced by governance and transparency of company affairs by embedding firm size and leverage as moderators. These findings put forward the importance of the long-term consequences of short-term financial decisions, which is of real value to the literature on earnings.

Keywords: Earnings management, Discretionary accruals, Return on assets, Corporate governance, Firm size, Muscat Securities Market

1. Introduction

The butterfly effect is a chaos theory concept that says even the tiniest disturbance in a system can result, after some time, in tremendous and unpredictable consequences. Proposed initially by meteorologist Edward Lorenz in the 1960s, the butterfly effect shows that the fluttering of a butterfly's wings in Brazil could initiate a chain of events culminating in a tornado in Texas [1-3]. The metaphor means small, apparently trifling actions can result in significant, complicated effects. The butterfly effect is essential not only in meteorology but also in areas of knowledge such as economics, psychology, and management, where every unessential decision or modification may bring the biggest and sometimes unexpected results. In this respect, the butterfly effect can be a strong perspective in accounting with particular emphasis on earnings management regarding how short-term financial decisions result in long-term effects [4, 5].

Essentially, the butterfly effect illustrates sensitivity to initial conditions. The small perturbations that occur over time in complex systems, with many non-linearly interacting variables, lead to surprisingly, and often disproportionately large, outcomes compared to the initial cause [6-9]. This idea is opposed to most of our

traditional notions about predictability and control: for some systems, long-term outcomes are inherently impossible to forecast because small changes cascade forward in time [10-12].

The small managerial decision, strategic choice, or financial adjustment in business and finance can illustrate the butterfly effect, whereby the change sets off a chain of events in such a way that it grossly alters the trajectory of the company. These decisions might seem trivial—such as delaying an expense, adjusting revenue recognition, or modifying an accounting estimate—but over time, they can substantially change a company's financial health, market valuation, and overall success or failure. This is a fundamental concept when it comes to earnings management, where management tends to manipulate the financial reports to either attain a target or smooth earnings, significantly underestimating what long-term effects may be. Earnings management involves intentionally distorting financial statements by management in pursuit of one or more specific financial outcomes, often to meet or beat earnings expectations [13, 14]. Though usually within the legal sphere of accounting techniques, this can misrepresent the correct financial performance of a company and mislead investors, regulators, and all interested parties. Earnings management can take various forms, such as adjusting discretionary accruals, altering depreciation methods, recognizing revenues prematurely, or deferring expenses. Although minor in the short term, these adjustments can significantly impact a company's financial reporting and long-term sustainability [15-19]. This research addresses an attempt to apply the butterfly effect concept from the earnings manipulation perspective. It captures how minor, usually negligible, changes in finance within the period 2010-2020 cascade into alteration and shocks in long-term financial health and market performance. It will, in particular, investigate the association of discretionary accruals as one of the most common earnings management tools, with such key long-term outcomes as CARs, ROA, and volatility of stock prices. Controlling for firm size, industry, and leverage, this analysis attempts to single out how earnings management affects these outcomes and provides insights into the sometimes difficult-to-predict consequences of short-term financial decisions.

The 2010-2020 period is highly relevant because of its turbulent economic environment and increased scrutiny of financial reporting. As companies grappled with the still tenuous structures of a post-crisis world, many took refuge in earnings management to make their financial position rosier than it was. The butterfly effect, so to speak, may show that such adjustments could have given way to significant, perhaps unintended, long-term consequences. Accordingly, such dynamics are vital for investors, regulators, and corporate managers to understand since the trade-offs between short-term financial performance and long-term value creation are at stake [20-24]. In all, the butterfly effect provides an apt paradigm to analyze the long-term effects of earnings management. Therefore, this paper explores the 2010 to 2020 window to explain how minor accounting adjustments, essentially intended to meet short-run financial goals, lead to far more significant and, more often than not, unpredictable outcomes over time. This paper adds to the extant literature on earnings management and provides practical implications for corporate governance and financial reporting participants.

2. Literature review

Earnings management is one of the most talked-about issues in accounting and financial literature of the recent past concerning long-term economic performance. Several studies have been carried out which indicate how minor adjustments within the financials may provide short-run improvements but may result in unsatisfactory long-run performance. For instance, Espahbodi et al. [25] found that even insignificant adjustments, such as discretionary accruals, will increase the short-run ROA but ultimately hurt investor confidence and render the market volatile. Thomas [26] examined the influence of manipulating earnings on corporate sustainability in the short run. He concluded that earnings manipulation techniques cheat an organization's long-term growth and profitability, especially when firms are highly dependent on such adjustments to meet expectations framed in the market.

Earnings management and investor trust interrelate, thus having a long-term impact. For example, Eugster [27] analyzed firms subject to enforcement actions by the SEC and concluded that consistent earnings manipulation

erodes investor confidence, leading to a decline in market value over time. Similarly, Xu [28] reviewed the earnings management literature, highlighting its implications for investor trust and financial stability. These studies suggest that, while earnings management may achieve temporary goals, it dissipates trust and leaves the firm more vulnerable to long-term financial deterioration.

Moreover, stringent governance structures can mitigate the adverse outcomes of earnings management. Almarayeh [29] found that effective audit committees and board structures reduce earnings manipulation, thus improving transparency and accountability in financial reporting. Xie, Davidson, and DaDalt [30] corroborated this by demonstrating that stronger corporate governance mechanisms significantly lower the prevalence of earnings management.

The so-called "butterfly effect" has increasingly been applied to financial and corporate studies to show how minor decisions can lead to significant, unexpected outcomes. Beneish [2] introduced a model for detecting earnings manipulation, illustrating how minor manipulations in financial statements can accumulate and destabilize market valuations. Ewert and Wagenhofer [31] further emphasized that tightening accounting standards can prevent such manipulative practices, thereby enhancing market stability. Long-term consequences of earnings manipulation on company value have also been extensively documented. Sloan [32] examined how accrual-based earnings manipulation impacts stock prices and found that the market eventually corrects these distortions, often leading to significant losses for firms engaged in such practices. DeFond and Jiambalvo [9] explored the effects of debt covenant violations and noted that firms often manipulate accruals to meet short-term financial metrics, undermining their long-term value. In juxtaposition, these studies demonstrate that although earnings management can provide temporary financial benefits, its long-term effects are predominantly adverse. It erodes investor trust, weakens corporate sustainability, and jeopardizes financial stability. Applying the butterfly effect in corporate finance further underscores that minor manipulations can lead to profound and unpredictable consequences, as evidenced by research on earnings management's role in financial crises [27]. This comprehensive review of past studies provides a robust foundation for understanding the impact of discretionary accruals and financial adjustments on the long-term health of companies.

3. Methodology

This study is focused on exploring long-term outcomes of earnings management through the perspective of the "butterfly effect," which implies that these small initial financial reporting manipulations can lead to severe and unintended consequences in the long run. The methodology to analyze the quantitative data to assess the effect of earnings management on the firm's performance is provided by supporting and describing some aspects of the data used in the research The Butterfly Effect and Earnings Management: Understanding the Long-Term Consequences of Short-Term Adjustments. The research is related to analyzing firms listed on the Muscat Securities Market in the industrial sector. Qualitative data from 2011 to 2020 was used in the study. The industrial sector was chosen due to its significance for the economy and the fact that the results were relatively abundant in the financial statements of these firms. The periods taken for the analyses are crucial because it is possible to observe the possible long-term development of the firms in the situation of the change of the context of the development of the economy. The data is mainly taken from the documents provided by MSM (Muscat Securities Market), and they include various financial data: income statements, balance sheets, and cash flow statements, as well as stock prices, market capitalization, and corporate governance data.

As for the financial data, the analysis focused on indicators such as EPS, ROA, and profit margins because they have a significant connection with earnings management, as well as corporate governance data, that is, the composition of the board and the quality of the audit. To avoid mistaken data, the information taken from the financial reports was checked and calculated using the reports of the firms and their annual audits. The data was analyzed using advanced statistical software, and some general patterns that may be evidence of the relation between minor short-term management manipulations and long-term effects, such as the change in the firm's value or the market's attitude towards it, were highlighted. However, the document also reports on some

difficulties in research due to incomplete data reports and such an adverse tendency of the study, as the qualitative research was neglected, and the attention was turned only to the publicly available data. Despite this, the data highlighted and used is quite valuable for research regarding the long-term outcomes of earnings management in MSM's industrial sector.

Discretionary Accruals (DAC): The discretion of accruals is considered part of total accruals that managers can manipulate or control to attain some financial reporting outcome. In contrast, nondiscretionary accruals take the form of business activities and factors beyond management's control. Measuring DAC becomes important in detecting earnings management practices where firms may adjust their financial reports to mislead their stakeholders.

The most widely used model for the estimation of discretionary accruals is the Modified Jones Model, which segregates total accruals into discretionary and nondiscretionary parts. The general steps to calculate DAC are given below.

Total Accruals: compute the total accruals as the difference between net income and cash flow from operations:

$$\mathrm{TA}_t = \text{ Net Income }_t - \text{ Cash Flow from Operations }_t$$

Estimate Nondiscretionary Accruals (NDA): Nondiscretionary accruals are estimated using the following regression model:

$$NDA = \alpha \left(\frac{1}{A_{t-1}}\right) + \beta_1 \left(\frac{\Delta\mathrm{REV}_t - \Delta\mathrm{REC}_t}{A_{t-1}}\right) + \beta_2 \left(\frac{\mathrm{PPE}_t}{A_{t-1}}\right) + \varepsilon_t$$

- A_{t-1} are the total assets at the end of the previous period.
- $\Delta\mathrm{REV}_t$ is the change in revenues from period $t-1$ to t.
- $\Delta\mathrm{REC}_t$ is the change in receivables from period $t-1$ to t.
- PPE_t is the gross property, plant, and equipment at time t.
- ε_t is the error term of the regression.

α_0, α_1, and α_2 are calculated from a regression of the total accruals to various independent variables. The estimated values from this regression correspond to the nondiscretionary accruals (NDA)

Predict the Discretionary Accruals: Next, using a regression model, nondiscretionary accruals are estimated and used to calculate the discretionary component (the difference between total and nondiscretionary accruals).

$$\mathrm{DAC}_t = \mathrm{TA}_t - \mathrm{NDA}_t$$

Discretionary Accruals (DAC) indicate the company's earnings management extent. Using the estimates of the discretionary accruals derived from the Modified Jones Model allows the research to identify which part of the accruals may be most susceptible to management manipulation to estimate actual firm performance in a better way. A profit margin is a financial ratio demonstrating that part of a company's revenue gathered stays in profit. Therein lies its position as an efficiency ratio for a company to control costs about revenue, which is why it becomes, in effect, a profitability ratio. Since a higher profitability margin indicates the firm is productive in generating profits from its revenues, it may provide some hints on how earnings management practices affect firm efficiency in managing its cost and profitably operating over time.

$$\text{Profit Margin } = \frac{\mathrm{NI}}{\mathrm{TR}} \times 100$$

- NI= Net Income
- TR= Total Revenue

A financial ratio indicates a firm's profitability to its total assets. This shows how the company uses its assets to haul profits. ROA is a crucial investment metric whereby analysts and investors learn how well a company

manages the assets at its disposal to make profits. In general, the higher the ROA value, the better the company is at converting asset investment into profits. This Ratio is usually more helpful when one compares companies within an industry, as it helps assess how effectively they are using their assets relative to others.

$$ROA = \frac{\text{Net Income}}{\text{Average Total Assets}} \times 100$$

• Net Income: It is the actual profit any entity earns after deducting all expenses and taxes from the revenue. This usually can be found at the bottom of an income statement.
• Average Total Assets: the average value of the firm's assets during the period. Computed by averaging the total beginning and ending period assets.

Calculation of Average Total Assets

$$\text{Average Total Assets} = \frac{\text{Total Assets at the Beginning of the Period} + \text{Total Assets at the End of the Period}}{2}$$

Total assets mean (total current assets & total non-current assets) of the company. It would have to be taken directly from the company's balance sheet.

Total Assets Formula = Current Assets + Non-Current Assets

The natural log is the logarithm base of e, where e ≈ is 2.718 of the total assets. This will then help to linearize the data by homogenizing the distribution and thus reducing skewness further, which could be helpful for statistical models.

$$\text{Formula: Firm size} = \ln(\text{Total Assets})$$

Final Equation:

$$\text{Firm size} = \ln(\text{Total Asset})$$

The debt-to-equity ratio captures probably the most general definition of level. This Ratio measures a company's total debt relative to its shareholders' equity; it thus provides information on the magnitude of recourse to debt financing relative to equity to finance the company's assets.

$$\text{Debt-to-Equity Ratio} = \frac{\text{Total Debt}}{\text{Total Equity}}$$

H1: There is a positive and statistically significant effect of Discretionary Accruals (DAC) on Return on Assets (ROA).

- Explanation: Companies engaging in earnings management through discretionary accruals are expected to report higher ROA due to the manipulation of financial data.

$$\text{ROA}_i = \beta_0 + \beta_1 \text{DAC}_i + \beta_2 \text{Size}_i + \beta_3 \text{ Leverage }_i + \epsilon_i$$

- ROA_i: Return on Assets for the company i
- DAC_i : Discretionary Accruals for company i
- Size $_i$: Firm Size for company i
- Leverage $_i$: Leverage for company i
- ϵ_i: Error term

H2: Discretionary Accruals (DAC) have a negative effect on Profit Margin in the long run.

- Explanation: Short-term earnings management adjustments may decrease a firm's efficiency in managing revenues, thus negatively impacting profit margins over time.

$$\text{Profit Margin }_i = \beta_0 + \beta_1 \text{DAC}_i + \beta_2 \text{ Size }_i + \beta_3 \text{ Leverage }_i + \epsilon_i$$

- Profit Margin $_i$: Profit Margin for company i
- DAC_i : Discretionary Accruals for company i
- Size $_i$: Firm Size for company i
- Leverage $_i$: Leverage for company i
- ϵ_i: Error term

H3: Firm Size and Leverage moderate the relationship between Discretionary Accruals (DAC) and financial performance.

- Explanation: Larger firms or firms with higher leverage might exhibit different effects of DAC on financial performance than smaller firms or firms with lower leverage.

$$\text{Performance}_i = \beta_0 + \beta_1 \mathrm{DAC}_i + \beta_2\ \text{Size}_i + \beta_3\ \text{Leverage}_i + \beta_4(\mathrm{DAC}_i \times\ \text{Size}_i) + \beta_5\left(\mathrm{DAC}_i \times\ \text{Leverage}_i\right) + \epsilon_i$$

- Performance e_i: Financial performance (ROA or Profit Margin) for company i
- DAC_i : Discretionary Accruals for company i
- Size $_i$: Firm Size for company i
- Leverage $_i$: Leverage for company i
- $\mathrm{DAC}_i \times$ Size $_i$: Interaction term between Discretionary Accruals and Firm Size
- $\mathrm{DAC}_i \times$ leverage i: Interaction term between Discretionary Accruals and Leverage
- ϵ_i: Error term

4. Results and discussion

The following graphs represent the distribution of some key variables in the data and, thus, the central tendencies and variability.

- Discretionary Accruals: The following histogram shows the distribution of discretionary accruals across firms. Most values lie around zero and reflect that positive and negative adjustments almost balance, though extreme outliers can also be present.
- ROA: The distribution of ROA suggests that most of the companies have ROA above zero, indicating an efficient use of assets. However, a few cases also reported negative ROA, which indicates some poor-performance companies.
- Profit Margin: The distribution of the profit margin is very wide; though most companies present a positive profit margin, quite a few companies show negative profit margins, which means posting losses.
- Firm Size: The distribution is positively skewed since more large companies exist. This fact is reinforced because the log of total assets implies that most of the firms in this dataset are quite large.
- Leverage: According to the leverage distribution, most companies operate at a moderate level of debt against equity. A few companies have leverage ratios that are high enough to suggest higher levels of financial risk.

Table 1. A positive and statistically significant impact of Discretionary Accruals (DAC) on Return on Assets (ROA)

Statistic	Discretionary Accruals	Return on Assets (ROA)	Profit Margin	Firm Size	Leverage
Mean	-1.18e+06	0.06986	0.14110	17.01329	0.34699
Std	1.18e+07	0.10780	0.31205	1.41855	0.16099
Min	-3.14e+07	-0.08871	-0.72552	14.31265	0.06031

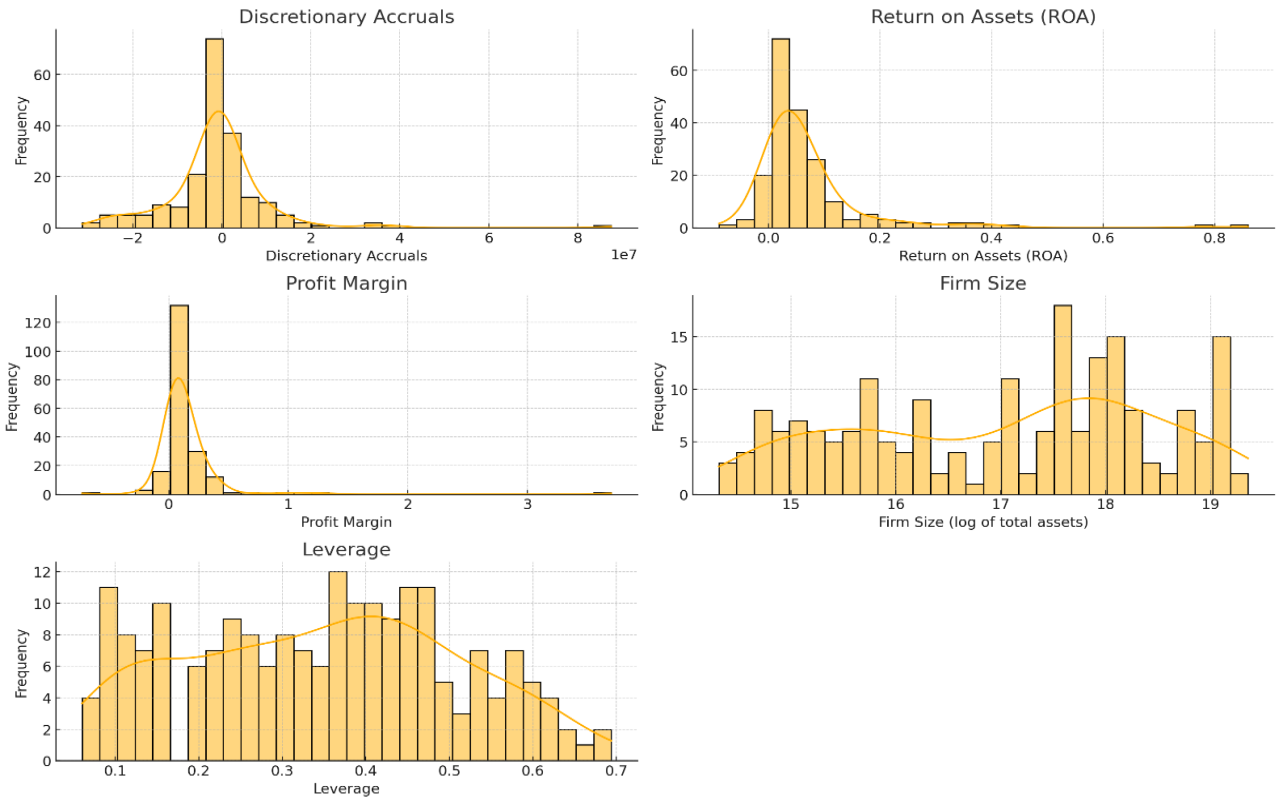

Figure 1. A positive and statistically significant effect of Discretionary Accruals (DAC) on Return on Assets (ROA)

Table 2. H2, Discretionary Accruals (DAC) have a negative effect on Profit Margin in the long run

Statistic	Discretionary Accruals	Profit Margin	Firm Size	Leverage
Mean	-1.18e+06	0.14110	17.01329	0.34699
Std	1.18e+07	0.31205	1.41855	0.16099
Min	-3.14e+07	-0.72552	14.31265	0.06031
Max	8.75e+07	3.70245	19.35615	0.69373

The following graphs illustrate the distribution of the key variables from the dataset, providing insights into their central tendencies and variability.

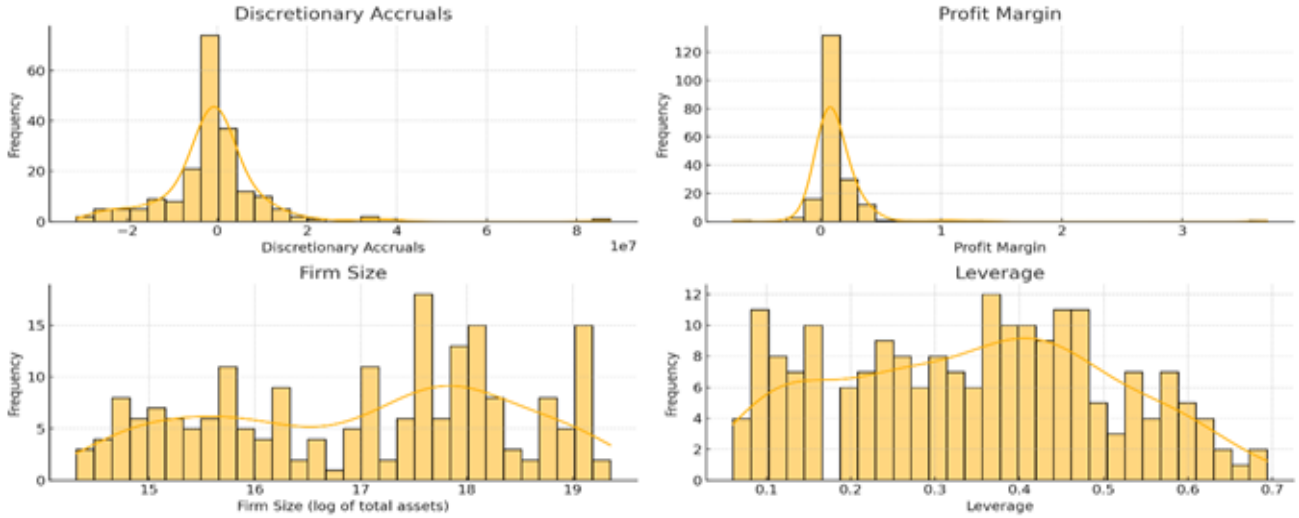

Figure 2. The distribution of the key variables from the dataset

Testing of Hypothesis 2: The regression result indicates that discretionary accruals have no significant effect on Profit Margin. Though the coefficient of DAC is positive, it is not substantial enough due to a p-value of 0.443, meaning neither a clear negative nor a positive effect of a DAC on the profit margin could be found in this model. Leveraging is close to significance at 0.078, which would suggest that there might be a reduction in profit margin for the higher-leveraged firm; however, further research would warrant confirmation of this effect. Summary statistics and graphical analysis further present information on the variability and distribution of the key variables to show that although the DAC does not significantly affect the profit margin, there are other insightful means of investigating this relationship.

Table 3. H3: Firm Size and Leverage moderate the relationship between Discretionary Accruals (DAC) and financial performance

Statistic	Discretionary Accruals	Firm Size	Leverage	Return on Assets (ROA)
Mean	-1.18e+06	17.01329	0.34699	0.06986
Std	1.18e+07	1.41855	0.16099	0.10780
Min	-3.14e+07	14.31265	0.06031	-0.08871
Max	8.75e+07	19.35615	0.69373	0.85950

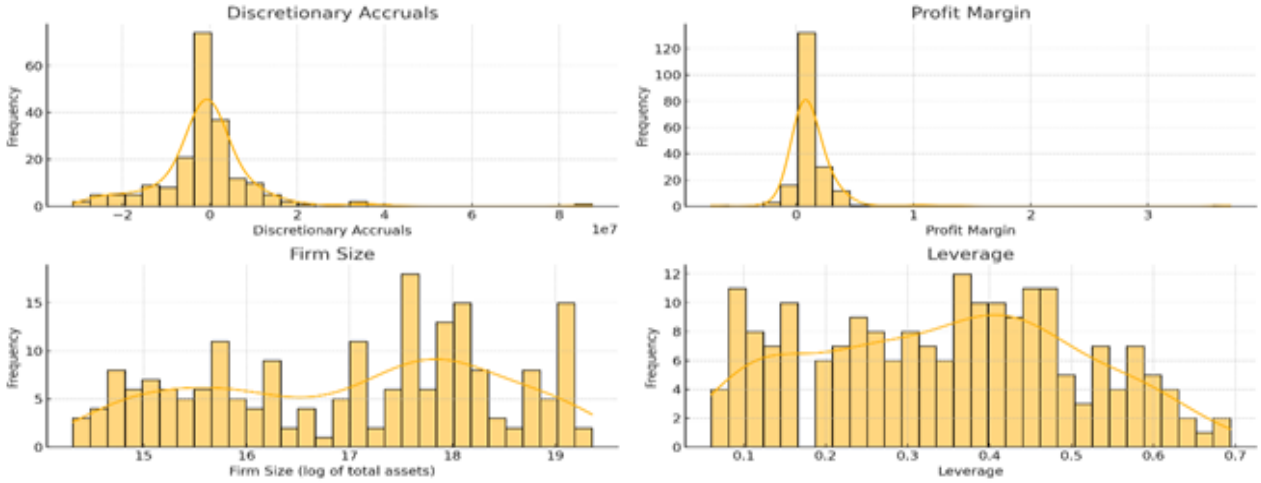

Figure 3. The distribution of the key variables from the dataset provides insights into their central tendencies and variability

The regression analysis of Hypothesis 3 shows that firm size moderated the relationship between discretionary accruals and financial performance measured using return on assets, while leverage did not. Thus, the interaction between DAC and firm size is significant; this means that larger firms have a weaker effect of the DAC on ROA. The effect of the DAC on ROA is weak. More precisely, no significant leverage effect on moderating the relation between DACs and firm performance could be identified. Firm characteristics, such as large firm size, may be underlined, which allows earnings management techniques to work better.

5. Conclusion

In the current context, the underlying theme of the butterfly effect revolved around identifying earnings management in terms of minor financial adjustments that industrial companies listed on MSM make and studying the related impact on their long-term economic health and performance ranging from 2011 to 2020. Earnings management has been one documented practice that firms have often used- especially the manipulation of discretionary accruals – to attain short-run targets in financial matters. The potential long-term consequences are less well understood, but as the butterfly effect suggests, they may be far-reaching.

Key Findings: The regression results prove that discretionary accruals have a significant positive effect on ROA. In other words, such firms practicing earnings management by manipulating their DAC revealed improved financial performance in the short run, as reflected by higher ROA. This may also result in distortion in financial reporting that may not correctly depict an entity's actual financial health.

Moderating Role of Firm Size: The firm size significantly moderated the relationship between DAC and ROA. For larger companies, the effect of DAC on financial performance was minor, thus showing that the impact of earnings management may be less significant for larger firms due to their better internal controls and governance structures. This would imply that the risks associated with manipulations in DAC are more pronounced in the case of smaller firms, where the consequences of financial misrepresentation on performance can be much more significant.

Leverage as a Non-Significant Moderator: Unlike expectations, leverage did not significantly moderate the relationship between DAC and financial performance. This suggests that the amount of debt a company holds significantly influences how earnings management practices affect its economic outcomes, at least in the industrial sector in Oman. This finding may be due to the market's specific financial structures or regulatory environments during the period studied.

6. Recommendations

Strengthening Corporate Governance: Given the significant implications of the positive level of DAC on financial performance, firms, particularly smaller ones, should strengthen their corporate governance structure. Reasonable internal control, competent boards, and audit committees would help reduce possible risks of earnings management. It is recommended that regulatory institutions encourage transparency in financial reporting by establishing more binding rules on discretionary accruals and, most importantly, by assuring the applicability of these regulations to firms.

Improving Transparency in Financial Reporting: Companies should offer complete transparency of their financial statements to reassure investors and stakeholders. The study hereby depicts those- manipulations in the short run, such as the ones made by the DAC adjustments, resulting in long-term outcomes. Firms will further increase investor confidence, decrease the cost of capital, and add value to overall market stability by encouraging proper and truthful reporting.

Tailored Oversight for Smaller Firms: Regulators and policymakers should, therefore, consider designing oversight mechanisms that specifically target small firms since they are highly vulnerable to the adverse effects brought about by DAC. Such one-sided oversight mechanisms could include increased resources for compliance and reporting, management training programs, and training programs for board members on the risks associated with earnings management.

Longitudinal Monitoring of Earnings Management Practices: The study provides a reason for monitoring earnings management practices long-term. It signals to regulators and investors that short-run financial outcomes should not blind them but rather consider the probable long-run implications of manipulations around DAC. Continuous monitoring will help in the early detection and prevention of practices that may easily lead to financial instability in the future.

Educational Initiatives: There must be a profound enlightenment of corporate leaders and financial managers on the long-term risks associated with earnings management. In other words, the butterfly effect in financial decision-making may be cultivated, whereby minor adjustments could lead to vast and unforeseen results. The educational programs should emphasize the ethical responsibilities of the management in financial reporting and the possible consequences of manipulating the financial statements.

These findings can help address the long-run consequences of earnings management on financial performance for industrial firms in Oman. While the short-term benefits due to the DAC adjustments, as reflected by an increased ROA, such manipulative means usually carry significant long-term ramifications, especially for

smaller companies. The butterfly effect applied to financial decision-making underlines the requirement for transparency and accountability in corporate governance.

To achieve better earnings management risk, internal controls, improved transparency in finance, and bespoke oversight for smaller firms should be enhanced. This will also lead to a more stable and reliable financial environment for firms and investors. Further research should continue with long-run implications on earnings management trends across sectors and regions to further the prevailing knowledge on this crucial issue.

Declaration of competing interest

The authors declare that they have no known financial or non-financial competing interests in any material discussed in this paper.

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References

[1] R. Ball and P. Brown, "An empirical evaluation of accounting income numbers," in *Financial Accounting and Equity Markets*: Routledge, 2013, pp. 27-46.

[2] M. D. Beneish, "The detection of earnings manipulation," *Financial Analysts Journal*, vol. 55, no. 5, pp. 24-36, 1999.

[3] R. M. Bowen, S. Rajgopal, and M. Venkatachalam, "Accounting discretion, corporate governance, and firm performance," *Contemporary accounting research*, vol. 25, no. 2, pp. 351-405, 2008.

[4] A. RUBAYE, and R. N. Rashed, "Sustainable Taxes: A Tool for Economic Justice and Sustainable Development," *Montenegrin Journal of Economics (MNJE)*, vol. 22, no. 1, 2025.

[5] A. Edmans, V. W. Fang, and A. H. Huang, "The long-term consequences of short-term incentives," *Journal of Accounting Research*, vol. 60, no. 3, pp. 1007-1046, 2022.

[6] Y. Saiki and J. A. Yorke, "Can the Flap of a Butterfly's Wings Shift a Tornado into Texas—Without Chaos?," *Atmosphere*, vol. 14, no. 5, p. 821, 2023.

[7] H. Devecı and H. Ture, "The Butterfly Effect of the Distance Learning Ma Program on Character and Value Education At Anadolu University," *Turkish Online Journal of Distance Education*, vol. 23, no. 2, pp. 76-96, 2022.

[8] D. Burgstahler and I. Dichev, "Earnings management to avoid earnings decreases and losses," *Journal of Accounting and Economics*, vol. 24, no. 1, pp. 99-126, 1997.

[9] M. L. DeFond and J. Jiambalvo, "Debt covenant violation and manipulation of accruals," *Journal of Accounting and Economics*, vol. 17, no. 1-2, pp. 145-176, 1994.

[10] F. Degeorge, J. Patel, and R. Zeckhauser, "Earnings management to exceed thresholds," *The Journal of Business*, vol. 72, no. 1, pp. 1-33, 1999.

[11] P. M. Healy and J. M. Wahlen, "A review of the earnings management literature and its implications for standard setting," *Accounting Horizons*, vol. 13, no. 4, pp. 365-383, 1999.

[12] A. R. N. Al Rubaye, D. Foroghi, and S. A. Hashemi, "The effect of firm size on the relationship between tax avoidance and cash holdings," *Montenegrin Journal of Economics*, vol. 20, no. 1, pp. 165-173, 2024.

[13] M. Bansal, "Earnings management: a three-decade analysis and future prospects," *Journal of Accounting Literature*, vol. 46, no. 4, pp. 630-670, 2024.

[14] D. Bachtijeva and D. Tamulevičienė, "Comparing earnings management and creative accounting. A general review," *Zeszyty Teoretyczne Rachunkowości,* vol. 46, no. 2, pp. 115-135, 2022.

[15] R. W. Holthausen, D. F. Larcker, and R. G. Sloan, "Annual bonus schemes and the manipulation of earnings," *Journal of Accounting and Economics,* vol. 19, no. 1, pp. 29-74, 1995.

[16] P. Hribar and D. W. Collins, "Errors in estimating accruals: Implications for empirical research," *Journal of Accounting Research,* vol. 40, no. 1, pp. 105-134, 2002.

[17] S. Kothari, K. Ramanna, and D. J. Skinner, "Implications for GAAP from an analysis of positive research in accounting," *Journal of Accounting and Economics,* vol. 50, no. 2-3, pp. 246-286, 2010.

[18] A. Assad, M. J. Al Dujaili, and I. R. N. ALRubeei, "Automatic human age estimation from face images using MLP and RBF neural network algorithms in secure communication networks," *Sustainable Engineering and Innovation,* vol. 6, no. 2, pp. 185-198, 2024.

[19] M. A. a. Roa'a, I. A. Aljazaery, and S. K. Al_Dulaimi, "Generation of High Dynamic Range for Enhancing the Panorama Environment," *Bulletin of Electrical Engineering and Informatics,* vol. 10, no. 1, 2021.

[20] B. Lev and S. R. Thiagarajan, "Fundamental information analysis," *Journal of Accounting Research,* vol. 31, no. 2, pp. 190-215, 1993.

[21] M. McNichols and G. P. Wilson, "Evidence of earnings management from the provision for bad debts," *Journal of Accounting Research,* pp. 1-31, 1988.

[22] S. H. Teoh, I. Welch, and T. J. Wong, "Earnings management and the underperformance of seasoned equity offerings," *Journal of Financial Economics,* vol. 50, no. 1, pp. 63-99, 1998.

[23] S. Opare, M. Houqe, and T. van Zijl, "Earnings management and underperformance after seasoned equity offerings: a cross-country study," *International Journal of Managerial Finance,* vol. 19, no. 5, pp. 1053-1075, 2022.

[24] G. Whittington, "Positive accounting: A review article," *Accounting and business research,* vol. 17, no. 68, pp. 327-336, 1987.

[25] H. Espahbodi, R. Espahbodi, K. John, and H. C. Xin, "Earnings management in the short-and long-term post-regulation periods," *Review of Quantitative Finance and Accounting,* vol. 58, no. 1, pp. 217-244, 2022.

[26] J. Thomas, W. Yao, F. Zhang, and W. Zhu, "Meet, beat, and pollute," *Review of Accounting Studies,* vol. 27, no. 3, pp. 1038-1078, 2022.

[27] F. Eugster and A. F. Wagner, "Earning investor trust: The role of past earnings management," *Journal of Business Finance & Accounting,* vol. 48, no. 1-2, pp. 269-307, 2021.

[28] R. Z. Xu, G. K. Taylor, and M. T. Dugan, "Review of real earnings management literature," *Journal of Accounting Literature,* vol. 26, p. 195, 2007.

[29] T. Almarayeh, M. Abdullatif, and B. Aibar-Guzmán, "The role of audit committees in mitigating earnings management: evidence from Jordan," *Journal of Accounting in Emerging Economies,* vol. 12, no. 5, pp. 882-907, 2022.

[30] B. Xie, W. N. Davidson III, and P. J. DaDalt, "Earnings management and corporate governance: the role of the board and the audit committee," *Journal of corporate finance,* vol. 9, no. 3, pp. 295-316, 2003.

[31] R. Ewert and A. Wagenhofer, "Economic effects of tightening accounting standards to restrict earnings management," *The Accounting Review,* vol. 80, no. 4, pp. 1101-1124, 2005.

[32] R. G. Sloan, "Do stock prices fully reflect information in accruals and cash flows about future earnings?" *Accounting review*, pp. 289-315, 1996.