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THE ROLE OF LEVERAGE ON REAL EARNINGS MANAGEMENT IN FINANCIALLY DISTRESS FIRMS BEFORE AND DURING THE COVID-19

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Abstract: *Previous research has identified poor industry performance, weak firm performance, and high leverage as significant factors contributing to financial distress, which can subsequently influence the manipulation of earnings. Therefore, this study aims to examine the role of financial leverage in shaping earnings management behaviours in distressed firms with varying leverage conditions across different time periods, both prior to and during the COVID-19 pandemic. Utilizing Roychowdhury's (2006) REM model, which includes measurements of Abnormal Cash Flow from Operations, Abnormal Production Costs, and Abnormal Discretionary Expenses, this study analyzes a sample of 672 firm-year observations from Malaysian publicly listed companies covering the years 2018 to 2021. First, the findings show a significant positive relationship between financially distressed firms and REM practices, both before and during the pandemic. Then, it also highlighted that financially distressed firms may strategically choose certain REM components, where low-leverage firms are more likely to engage in upward earnings management compared to their high-leverage counterparts both before and during the pandemic. Furthermore, we observe a significant negative relationship between leverage and REM, suggesting that higher leverage correlates with lower levels of earnings management. This study contributes to the earnings management literature by demonstrating how leverage acts as a constraining factor on earnings manipulation and by revealing patterns of managerial behaviour across different levels of financial distress.*

Keywords: *Financial Distress, Leverage Level, Earnings Manipulation, Real Earnings Management, COVID-19 pandemic*

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Introduction

Business organizations use financial reporting as a communication tool to provide internal and external users the quantitative and qualitative data for decision-making and performance measurement (Healy & Wahlen, 1999). Financial reporting may be utilised to give an inflated picture of a company's performance in cases like Sime Darby Berhad and Transmile Group Berhad, even when the real performance was worse than what the report said (Hamid et al., 2012). Moreover, companies experiencing financial difficulties may have significant motivations to manipulate earnings to portray a more favourable financial position (Campa & Miriano, 2015; Li et al., 2020). Real earnings management (REM), which involves altering real business activities such as production, sales, and discretionary expenses (Roychowdhury, 2006), has increasingly gained attention as a subtle yet impactful method for manipulating reported earnings (Tonye and Sokiri, 2020). Financial leverage, which indicates how much a company relies on debt financing, is one of the major determinants of earnings management (EM) behaviour. High leverage may put pressure on management to comply with debt covenants and avoid default (Kalbuana et al., 2022), especially in financially distressed firms where bankruptcy risk increases (Habib et al., 2020; Li et al., 2020).

Early in 2020, the COVID-19 pandemic began, causing financial turmoil in global markets and further distressing many companies. Managers were forced to make tough financial decisions because of operations disruptions, decreased revenues, and tightened financing conditions. High-leverage companies could have been more likely to participate in REM to satisfy financial requirements and keep access to capital markets under such difficult circumstances. This phenomenon is emphasised in the study by Azizah (2017), who claims that even though businesses must prepare a financial report at the end of the fiscal year, some managers choose to highlight their companies' strong performance even while they are facing challenging circumstances.

Although previous research has looked at how distressed firms practise earnings management, but few of it has investigated how leverage affects REM in a worldwide crisis such as COVID-19. Thus, this study fills the gap by investigating how REM practices influenced the financially distressed companies both before and during the COVID-19 outbreak. Next, it aims to determine whether the financially distressed firms exhibit different levels of REM depending on their leverage during the pandemic compared to the pre-pandemic period. By analyzing a sample of Malaysian publicly listed firms from 2018 to 2021, this study contributes to the EM literature by demonstrating how leverage acts as a constraining factor on earnings manipulation and by providing insights into managerial behaviour across different levels of financial leverage. Thus, the objectives of this study are:

- to examine the relationship between financial distress and real earnings management before the COVID-19 pandemic;
- to examine the relationship between financial distress and real earnings management during the COVID-19 pandemic.
- To determine how the financially distressed firms exhibit different levels of real earnings management depending on their leverage before the COVID-19 pandemic.
- To determine how the financially distressed firms exhibit different levels of real earnings management depending on their leverage during the COVID-19 pandemic.

The remainder of this paper is organized as follows. Section 2 provides evidence from prior studies on leverage, EM and financial distress. Therefore, the section also offers the conceptual framework and the creation of hypotheses based on literature. Section 3 presents the data,

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sample selection and research methodology. Section 4 provides an analysis of the results. Finally, the conclusion and suggestions for further research are presented in section 5.

Literature Review

Earnings Management and Financial Distress Firms

Positive Accounting Theory (PAT) has been developed by Watts and Zimmerman (1986) to explain and foresee the accounting choices among managers for the benefit of themselves as well as the economic incentives. It assumes that managers act for personal utility maximization and decision-making under the influence of contractual obligations and organizational pressure. The PAT outlines three hypotheses, which are the bonus plan hypothesis, the debt covenant hypothesis, and the political cost hypothesis. According to the debt covenant hypothesis, managers tend to manipulate earnings to improve compensation, avoid violating debt covenants, or reduce political scrutiny. Hence, it offers a practical framework for explaining EM approaches in the context of financial difficulties and high leverage. Recent studies (e.g. Oliveira & Diniz, 2025; Dameski & Trajkovska, 2025) also emphasized this hypothesis to support their EM research. For instance, Oliveira & Diniz (2025) used a sample of Brazilian companies to examine the impact of financial status and earnings management on the possibility of financial covenant violations. They found that insolvent companies had a greater level of earnings management in the year when they did not violate financial covenants; thus, it supported the positive accounting theory.

Academic research has shown a significant link between EM and financial distress. Firms in financial distress often use EM to avoid bankruptcy (Durana et al., 2021), loss of investor confidence (Kliestik et al., 2021) and to cover poor performance (Agustia et al., 2020). Companies in the decline stage of their life cycle are at a higher risk of bankruptcy and often manipulate earnings to appear financially stable. Agustia et al. (2020) who highlighted that Indonesian companies with high bankruptcy risk are more likely to do this. Habib et al. (2020) further explained that EM is often used as a strategic response to delay bankruptcy risks. Next, financially distressed firms often resort to EM practices due to weakening internal control systems and poor corporate governance. Li et al. (2020) found that Chinese companies often fail internal controls, thus increasing the risk of EM. Supporting this perspective, Younas et al. (2021) found that poor corporate governance increases the risk of EM during financial distress. They further claim that the strong governance practices reduce opportunistic reporting and maintain financial transparency. Furthermore, companies with poor profitability and high leverage are more likely to use EM as a coping strategy (Dirman, 2020).

In addition, previous research on the impact of financial distress on the EM approach has led to conflicting results. While Campa (2019) discovered that companies in France used the REM strategy during periods of substantial financial difficulty, the sample used was not during the COVID-19 pandemic. Lizińska and Czapiewski (2023) argued that firms in Poland used the REM approach during the pandemic. In contrast, Xiao and Xi (2021) found that firms adopted an accrual earnings management (AEM) approach during the pandemic rather than a REM approach. They further claim that real manipulation through financial, investment, and operational activities has become more costly and challenging because of the pandemic's significant financial effects. Li et al. (2020) similarly argued, using a sample of all publicly listed firms in China, that AEM practices are more common among businesses with poor financial health. Financially distressed companies usually show an ability to manipulate accrual earnings more than real earnings after considering the respective cost and risk.

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Empirical evidence on the relationship between crises like COVID-19 and REM is mixed. While some studies find a significant positive association, indicating that firms opportunistically increased REM during the pandemic, others report a significant negative relationship, suggesting that heightened constraints REM activity. In Jordan, Al-Begali and Phua (2023) document a significant positive association between COVID-19 and REM which suggesting that firms intensified real activity manipulation during the pandemic. Similar evidence from Vietnam indicates that non-financial firms significantly increased REM during COVID-19, using operational policies to bolster earnings amid financial constraints (Tuan et al., 2023). In contrast, some research documents a decline in REM attributable to heightened regulatory and institutional responses amid crises. For instance, Cimini et al. (2025) study the effect of suspending recapitalization obligations in Italy during COVID-19 and also find a decrease in earnings management following that reform. In Korea, a comparative study between public and private sector firms shows that REM decreased significantly in the public sector in the post-pandemic period, likely reflecting stronger oversight and government intervention (Kim et al., 2024).

In conclusion, some factors like poor corporate governance, low profitability, high leverage, and weak internal controls are significant variables that increase EM. Furthermore, financially distressed firms are encouraged to use EM, both through AEM and REM, as a tactic to show a more stable financial picture and lessen the negative consequences of financial instability. However, the mixed evidence from prior literature consistently supports a significant relationship between crises and REM. Therefore, the following hypothesis is proposed considering the previous discussion:

H1: There is a significant relationship between financial distress and real earnings management before the COVID-19 pandemic.
H2: There is a significant relationship between financial distress and real earnings management during the COVID-19 pandemic.

Leverage and Earnings Management

One important factor in the research of EM has been leverage, or how much a company uses borrowed funds. Several researchers have studied the impact of leverage on managerial behaviour, particularly in the context of manipulating earnings to achieve specific financial goals. According to a study done in Indonesia by Kalbuana et al. (2021), firm size and leverage have a significant effect on EM strategies. Similarly, Surjandari et al. (2021) pointed out that firm size, leverage, and effective corporate governance have significant effects on EM. They also highlighted how the processes of corporate governance and financial leverage relate to and affect managerial decisions.

However, previous research has produced inconsistent results regarding the impact of leverage on EM. First, some researchers claimed that leverage increases EM practices among companies' management. For instance, Tulcanaza-Prieto et al. (2020) provide evidence from Korea indicating that managers who have more leverage are more likely to manipulate real earnings rather than just accounting entries. Complementing this, Nguyen et al. (2021) claim that leveraged companies in Vietnam with ownership arrangements are more likely to manipulate their earnings. They further suggest that the interaction between ownership and capital structure may worsen such behaviours. Further extending this understanding, Tran and Dang (2021) also noted financial leverage has a positive impact on EM. They argue that managers in Vietnamese

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companies with high levels of debt manipulate revenue to inflate profits, as a higher debt ratio indicates a significant risk of default.

Second, other studies have explored the negative relationship between leverage and EM. Tonye and Sokiri (2020), for example, investigated financial leverage on EM in manufacturing firms in Nigeria and found that financial leverage has a negative effect on REM. Building on the idea that external factors can moderate this relationship, Adeneye and Kammoun (2022) then examined the relationship between capital structure, REM, and Environmental, Social, and Governance (ESG) performance and found that good ESG practices can operate as a mitigating factor, decreasing the likelihood of earnings manipulation, even if excessive leverage usually pushes businesses into that behaviour.

In addition to the studies that found significant relationships, other studies have found conflicting and insignificant results about how leverage impacts EM. According to Ghorbani and Salehi (2020), debt has a dual role in Iranian companies. Depending on the circumstances of the company, leverage can be used as a disciplinary tool for preventing earnings manipulation as well as an incentive for it. This suggests a more complex, context-dependent relationship. However, research by Ghofir and Yusuf (2020) and Kalbuana et al. (2022) found no significant impact of business size and leverage on EM, suggesting that leverage may not be a major factor in managerial manipulation in some situations. These conflicting results draw attention to the literature's inconsistency and imply that several moderating factors, such as firm characteristics, governance structures, or country-specific institutional environments may have an impact on the relationship between leverage and earnings management.

The following hypothesis is proposed in consideration of the mixed evidence regarding the relationship between earnings management strategies and leverage:

H3: Financially distressed firms exhibit different levels of real earnings management depending on their leverage before the COVID-19 pandemic.
H4: Financially distressed firms exhibit different levels of real earnings management depending on their leverage during the COVID-19 pandemic.

Conceptual Framework

Figure 1 illustrates the proposed conceptual model, which examines the effect of financial distress on REM within the period before and during the pandemic, while also highlighting the different levels of REM based on their leverage level in financially distressed firms. PAT was the most appropriate for this study, as debt is one of the managers incentives that influence them to act for their own interest. Thus, managers may engage in EM when faced with debt pressures. Recent studies also showed that financially distressed firms and leverage were associated with greater EM to avoid violation of debt covenants, and the results supported the PAT's debt hypothesis (Oliveira & Diniz, 2025 and Anasta & Oktris, 2024).

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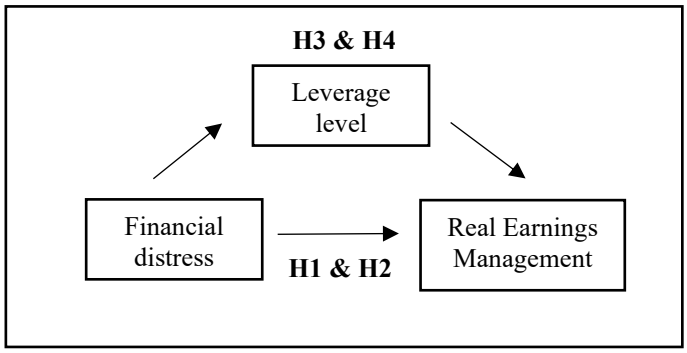

Figure 1: The Conceptual Framework of Financial Distress, Leverage Level and REM

Methodology

Research Design

This study employs some statistical methods to examine relationships among key variables under investigation. First, this study employs multiple linear regression to assess the relationships between financial distress and REM. Next, the study also conducts a robustness check to ensure the reliability and stability of our findings through the paired t-tests. Our goal is to evaluate mean differences in how the financially distressed firms exhibit different levels of REM depending on their leverage before and after COVID-19.

Sample Selection

The initial sample consists of all industry companies in Refinitiv Eikon Data Stream, except for financial and insurance companies because their capital structures are highly regulated (Ayaz et al., 2021). The data is covered between 2018 and 2021 that listed on Bursa Malaysia. Lastly, outliers and missing numbers were removed from the sample firms. The hypothesis developed in this study is tested using the final sample of 672 firm-year observations that were categorised as financially distressed firms using the modified Z-score.

Measurement of Dependent Variables

Firms facing financial difficulties employ the EM strategy, which includes the REM. Additional details on the models used to measure the EM proxies employed in this study will be covered in the following section.

Real Earnings Management

According to Roychowdhury (2006), this study defines REM as when managers act differently than what is expected of them in a typical business situation. This study uses the total of three proxies which are abnormal cash flow from operating activities (AbCFO), abnormal production costs (AbPROD), and abnormal discretionary expenses (AbDISEXP) to investigate REM in line with earlier research (Campa, 2019 & Campa & Miriano, 2015). The following models are used in the study to estimate AbCFO, AbPROD, and AbDISEXP as residuals, respectively.

Model for AbCFO

$$CFOit/Ait\text{-}1 = \beta 1\,[1/Ait\text{-}1] + \beta 2[Salesit/Ait\text{-}1] + \beta 3[\Delta Salesit/Ait\text{-}1] + \varepsilon it \quad (1)$$

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Where,
CFOit Cash flow from operation of firm i in period t;
Salesit Sales of firm i in year t ;
ΔSalesit Change in sales of firm i between year t-1 and t.
Model for AbPROD

$$PRODit/Ait\text{-}1 = \beta1\ [1/Ait\text{-}1] + \beta2[Salesit/Ait\text{-}1] + \beta3[\Delta Salesit/Ait\text{-}1] + \beta4[\Delta Salesit\text{-}1/Ait\text{-}1] + \varepsilon it \quad (2)$$

Where,
PRODit The sum of cost of goods sold and change in inventory of firm i in year t;
ΔSalesit-1 Change in sales of firm i from year t-1 to t; and all other variables are as previously defined.

Model for AbDISEXP

$$DISEXPit/Ait\text{-}1 = \beta1\ [1/Ait\text{-}1] + \beta2\ [Salesit\text{-}1/Ait\text{-}1] + \varepsilon it \quad (3)$$

Where,
DISEXPit The sum of Research and Development (R&D) expenses and Selling, General & Administrative (SG&A) expenses of firm i in year t ; and all other variables are as previously defined.

Model for REM
In accordance with Li et al. (2020), REM, a single proxy that will be utilised to test the hypothesis, is created by combining the three real activity manipulation measurements:

$$REMit = AbCFOit + AbPRODit + AbDISEXPit \quad (4)$$

Where,
REMit The sum of REM of firm i in year t, and all other variables are as previously defined

Measurement of Independent Variable

Financial Distress

In line with Zhang (2012) and Li et al. (2020), the modified Z-score is used in this study as a proxy for the financial health of businesses. The company's financial health improves with a higher Z-score. Companies with a Z-score of less than 1.81 will be categorised as being in financial distress, while those with scores greater than 1.81 but less than 2.99 may be categorised as being in the grey areas, where they are neither considered financially distressed nor healthy. If the Z-score is greater than 2.99, the companies are deemed to be financially sound. The following formula represents the Z-score:

$$ZSCOREit = 0.3x1 + 1.0x2 + 1.4x3 + 1.2x4 + 0.6x5$$

Where,
x1 the ratio of net profit to total assets
x2 the ratio of sales to total assets
x3 the ratio of retained earnings to total assets

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x4 the ratio of working capital to total assets
x5 the ratio of market value of equity to total liabilities

Measurement of Control Variables

Some of the control variables are included in this study since they offer an EM monitoring mechanism. EM is also significantly impacted by leverage (LEVERAGE), firm size (SIZE), return on assets (ROA), and liquidity (LIQUIDITY) (Lidsa & Julisar, 2022; Rakshit & Paul, 2020; Campa (2019); Ghazali et al., 2015). The following is the measurement of the control variables:

LEVERAGE the ratio of total liabilities to total assets
SIZE the log of total assets
ROA the ratio of EBIT to net assets
LIQUIDITY the ratio of current assets to current liabilities

Findings and Discussion

Descriptive Analysis

Table 1 provides the descriptive statistics for the full sample of observations comparing firms before and after the pandemic, as shown in Panels A and B. Each of Panel's A and B has 336 observations. The mean of the REM before the pandemic is 1.022 and it decreases during the pandemic to 0.944. The positive REM mean suggests that over the period, Malaysian publicly listed companies have used more income-increasing methods. A decline in the EM's proxy suggests that firms engage in fewer EM operations during the pandemic period, which is in line with previous research, including that of Ali et al. (2022) and Azizah (2021), which discovered that firms limit their earnings manipulation during difficult periods.

In addition, the pre-pandemic mean for financial distress is 0.190, meaning that 19% of the sample's firms are experiencing financial distress. However, the percentage of those experiencing financial difficulties drops to 11.6% during the pandemic. This decline can be the result of a rise in leverage during the pandemic (from 39.6% to 39.8%), which indicates that companies used debt more to fund their operations and investments. Therefore, the firm's financial health during the pandemic benefited from its reliance on leverage. While LIQUIDITY rises when compared to pre-pandemic levels, the mean for the other control variables, SIZE and ROA, falls throughout the pandemic.

Table 1: Descriptive Statistics

	Panel A: Descriptive statistics before the pandemic (2018 - 2019)					Panel B: Descriptive statistics during pandemic (2020 - 2021)				
	N	Mean	Min	Max	Std. Dev	N	Mean	Min	Max	Std. Dev
REM	336	1.022	-0.070	4.885	0.741	336	0.944	-0.090	4.070	0.692
FinDistress	336	0.190	-0.900	1.220	0.390	336	0.116	-1.990	1.160	0.423
LEVERAGE	336	0.396	0.025	0.919	0.192	336	0.398	0.053	0.926	0.199
SIZE	336	6.287	5.002	8.252	0.667	336	6.328	5.033	8.261	0.658
ROA	336	0.078	-0.321	0.595	0.090	336	0.076	-0.219	1.028	0.113
LIQUIDITY	336	2.674	0.188	31.604	3.003	336	2.732	0.215	23.81	2.651

Note: Table 1 shows the descriptive analysis of the variables. REM is Real Earnings Management for real activities of earnings management, FinDistress is the proxy for firms' financial health measured by a modified

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Z-score, LEVERAGE is the ratio of total liabilities to total assets, SIZE is the log of total assets, ROA is the ratio of EBIT to net assets, and LIQUIDITY is the ratio of current assets to current liabilities.

Regression Analysis

All variables are normally distributed, and the analysis met all the assumptions of multiple regression analysis. Panel A in Table 2 provides regression results for REM with FinDistress, LEVERAGE, and other control variables for the period before the COVID-19 pandemic, while Panel B is for the period during the pandemic. The study regressed the variables separately using the estimation model described in the methodology section, which served as a proxy for REM. The results are shown in Table 2 below.

The F-statistics show significance at the 1% level for the model that has been used to regress the data before and during the pandemic. The R-squared indicated how much the ratio of variance in the dependent variable can be explained by the independent variable. The R-squared indicates that FinDistress, LEVERAGE, SIZE, ROA, and LIQUIDITY explain 69.4% of the variance in REM for the period before the COVID-19 pandemic and 67.2% for the period during the pandemic. Campa and Miriano (2015) also found a higher R-squared value. The regression Model (4) is used to test H1 and H2. The coefficient β_1 is positively associated with REM, and both are significant at the 1% level, with a coefficient of 0.813 in Panel A and 0.907 in Panel B. Thus, H1 and H2 are accepted. This finding implies that a company with worse financial status will favour REM both before and during the pandemic. This finding aligns with the prior study by Lizińska and Czapiewski (2023), which concluded that companies engaged in increased EM through real activities during the pandemic, specifically income-increasing strategies. This effect may be attributed to the perception that REM is less detectable. In addition, there is evidence from the non-pandemic period, as clarified by Campa (2019), indicates that businesses manipulate income-increasing revenues through real activities during periods of significant financial distress. Furthermore, the positive significant result between financial distress and REM is supported by the Debt Covenant Hypothesis under Positive Accounting Theory. Managers in financially distressed firms tend to use EM in reducing the costs associated with violating debt covenants as supported in the findings by Oliveira and Diniz (2025), who claim that insolvent companies practised EM in years when they were able to avoid covenant violations.

Table 2: Regression Result of Real Earnings Management

Variables	Panel A: Regression Result before the pandemic (2018 - 2019) Real Earnings Management (REM)	Panel B: Regression Result during the pandemic (2020 - 2021) Real Earnings Management (REM)
(Constant)	0.431*	0.447*
	-1.669	-1.715
FinDistress	0.813***	0.907***
	-23.999	-23.505
LEVERAGE	-0.205***	-0.2***
	(-4.207)	(-3.576)
SIZE	0.041	0.044
	-1.092	-1.087
ROA	0.497***	0.486***

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	-14.969	-14.048
LIQUIDITY	0.003	0.115**
	-0.075	-2.293
R2	0.694	0.672
Adjusted R2	0.69	0.667
F-statistics	148.968***	134.101***
N	336	336

Note: This table shows the model summary of each Earnings Management value for a sample of 336 firm-year observations. REM is Real Earnings Management for real activities of earnings management, FinDistress is the proxy for firms' financial health measured by a modified Z-score, LEVERAGE is the ratio of total liabilities to total assets, SIZE is the log of total assets, ROA is the ratio of EBIT to net assets and LIQUIDITY is the ratio of current assets to current liabilities.

, * significant at the 0.05 and 0.01 levels respectively.

Second, some of the control variables show significant relationship with REM. First, with coefficients of -0.205 prior to the pandemic and -0.2 during the epidemic, LEVERAGE has a significant negative relationship with REM at a 1% significance level. The results align with those of Campa (2019). Earlier findings in Jensen's (1986) study for the "control hypothesis, suggested that since managers would have more control over the company's cash flow, debt might be used to reduce agency costs. The control role begins when management must pay principal and interest as the company could be forced into bankruptcy if they don't. This situation will discourage managers from exercising discretion, which will limit EM's potential. In addition, there is also a significant positive association with a coefficient of 0.486 between ROA and REM during the COVID-19 pandemic. Rakshit and Paul (2020) claim that managers of successful companies use EM to reach their target earnings level and win over investors. Finally, with a coefficient of 0.115 at a 5% significance level, the association between LIQUIDITY and REM during the pandemic is significantly positive. It also supports the finding of Rakshit and Paul (2020) that companies with high liquidity are less likely to manipulate their earnings.

The initial analysis reveals that financially distressed firms engaged in REM both before and during the COVID-19 pandemic. It highlights how firms responded to financial difficulties by adjusting their operational behaviours to influence reported earnings. Expanding on this finding, a further analysis was conducted to examine the role of financial leverage in shaping these REM practices. Specifically, to analyze whether the financially distressed firms show different levels of REM depending on their leverage before and after the COVID-19 pandemic. By incorporating leverage level into the model, this extended analysis aims to offer a more detailed understanding of how financial pressure influences managerial discretion in earnings reporting under crisis conditions. For this analysis, the initial dataset comprising 672 firm-year observations was re-examined. The data were divided into four groups based on leverage levels. Specifically, for the pre-pandemic period, 168 firm-year observations were classified as high-leverage and another 168 as low-leverage. The same classification was applied for the pandemic period, resulting in another 168 high-leverage and 168 low-leverage firm-year observations. The descriptive statistics are shown in Tables 3 and 4 below.

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Table 3: Descriptive Statistic Before Pandemic

	N	Minimum	Maximum	Mean	Std. Deviation
High Leverage Firms					
LEVPREHIGH	168	.3973	.9190	.555903	.1151244
ABCFOPREHIGH	168	-.1044	2.3408	.620910	.4971222
ABPRODPREHIGH	168	-1.2309	.3631	-.232420	.2569316
ABDISEXPPREHIGH	168	.0268	2.7066	.579491	.4284551
TOTALREMPREHIGH	168	-.0700	4.8850	.967980	.7708165
Low Leverage Firms					
LEVPRELOW	168	.0252	.3963	.236287	.0944884
ABCFOPRELOW	168	-.1942	2.2205	.685695	.5003946
ABPRODPRELOW	168	-1.2734	.4315	-.299446	.2847465
ABDISEXPPRELOW	168	.0492	2.1950	.689429	.3960310
TOTALREMPRELOW	168	.0152	3.5841	1.075679	.7077430
Valid N (listwise)	168				

Table 4: Descriptive Statistic During Pandemic

	N	Minimum	Maximum	Mean	Std. Deviation
High Leverage Firms					
LEVDURINGHIGH	168	.3926	.9260	.565568	.1248822
ABCFODURINGHIGH	168	-.2450	2.6058	.545684	.4863795
ABPRODURINGHIGH	168	-2.6445	.4880	-.168547	.3049412
ABDISEXPDURINGHIGH	168	.0654	2.2467	.544995	.3912297
TOTALREMDURINGHIGH	168	.0750	4.0698	.922131	.7250290
Low Leverage Firms					
LEVDURINGLOW	168	.0526	.3880	.230327	.0875157
ABCFODURINGLOW	168	-.1327	4.5154	.642776	.5774099
ABPRODURINGLOW	168	-3.7838	.4418	-.265835	.5170585
ABDISEXPDURINGLOW	168	.0430	1.6660	.589362	.3489669
TOTALREMDURINGLOW	168	-.0901	3.1377	.966303	.6588894
Valid N (listwise)	168				

Tables 3 and 4 show the descriptive analysis of the variables. PREHIGH refers to high leverage before the pandemic, and PRELOW refers to low leverage during the pandemic. DURINGHIGH refers to high leverage during the pandemic, and DURINGLOW refers to low leverage during the pandemic. Other variables are defined as before

Tables 3 and 4 provide the descriptive statistics for high and low-leverage financially distressed firms before and during the COVID-19 pandemic, each with 168 firm-year observations. The analysis includes key measures such as leverage, abnormal cash flow from operations (ABCFOPRE; ABCFODURING), abnormal production costs (ABPRODPRE; ABPRODDURING), abnormal discretionary expenses (ABDISEXPPRE; ABDISEXPDURING), and total real earnings management (TOTALREMPRE; TOTALREMDURING).

The average leverage for high-leverage firms for both before and during the pandemic is relatively high at 55.59% and 56.56%, respectively, indicating a significant portion of these firms' capital structure is composed of debt. The low standard deviation before the pandemic suggests that leverage levels are consistent across these firms, and the moderate standard deviation during the pandemic suggests some variability in leverage levels among the firms. Before the pandemic, high-leverage firms made relatively active use of ABCFO (mean = 0.621), ABPROD (mean = -0.232), and ABDISEXP (mean = 0.579). These figures suggest that high-leverage firms engaged in moderate EM, potentially driven by debt covenant pressures and a need to maintain financial credibility. This supports Kalbuana et al.'s (2022) argument

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that, especially for financially distressed companies, high leverage may put pressure on management to adhere to debt covenants and avoid default. During the pandemic, ABCFO and ABDISEXP declined, while ABPROD improved slightly. A shift towards ABPROD during the pandemic shows that financially distressed firms focused on production costs while reducing sales promotion and discretionary expenditures. This trend suggests a more cautious approach to EM during the crisis, possibly due to heightened financial risks and increased scrutiny from lenders.

There is, however, a low mean for the low-leverage firms, where the average leverage before the pandemic is 23.63% and the average leverage during the pandemic is 23.03%, and these are considered significantly lower than high-leverage firms. The lower standard deviation for both before and during the pandemic indicates consistent leverage levels across the firms. Before the pandemic, their ABCFO (mean = 0.686) and ABDISEXP (mean = 0.689) suggest more aggressive use of REM techniques if compared to high-leverage firms, potentially due to less external pressure and greater strategic flexibility. However, during the pandemic, both ABCFO and ABDISEXP experienced a decline, similar to the high-leverage firms, while ABPROD saw a slight increase.

In addition, the average REM that was measured by the TOTALREM before COVID-19 is significantly higher compared to the mean during COVID-19 for both high-leverage and low-leverage firms. This finding contradicts the study by El-Feel et al. (2024), which reported that REM behaviour was more prevalent during the pandemic than before; however, their sample did not account for leverage levels. During the pandemic, the decreases across all REM proxies suggest that managers adopted a more conservative EM strategy, likely in response to factors such as economic uncertainties, changing market expectations, and the need to maintain liquidity and operational stability; consequently, they engaged less in REM practices. Furthermore, the role of corporate social responsibility can also limit a company's engagement in REM during COVID-19 (El-Feel, 2024).

Based on the above result, thus, H3 and H4 are accepted. It suggests that financially distressed firms may strategically choose certain REM components within the pre-pandemic and during the pandemic. Both high-leverage and low-leverage firms participated in REM before the pandemic, with slightly greater levels of REM activity noted in low-leverage firms. During the pandemic, both groups exhibited a reduction in their REM behaviour, likely due to increased economic uncertainty and a shift in management's focus from performance manipulation to financial stability.

Paired Sample t-test

The paired sample t-test compares the mean of two matched groups of people or cases or compares the mean of a single group examined at two different points (Ross et al., 2017). Additionally, a paired sample t-test (Samuels & Gilchrist, 2020) was used to compare the means of data from two related samples. This dual approach facilitated a thorough study by encompassing both individual variability and broader population trends, hence enhancing the robustness and generalizability of the results. The paired sample t-test is conducted to examine the differences in REM activities between high-leverage and low-leverage firms before and during the COVID-19 pandemic in financially distressed firms. The analysis uses Model 1 to 4 above, which are the three individual REM proxies consisting of the abnormal cash flow from operations (ABCFO), abnormal production costs (ABPROD), and abnormal discretionary

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expenses (ABDISEXP), as well as the composite total REM score. The results are shown in Tables 5 and 6 below.

Table 5: Paired Sample t-test Before Pandemic

		Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Pair 1	LEVPREHIGH - LEVPRELOW	0.32	0.035	0.003	118.423	167	0.000
Pair 2	ABCFOPREHIGH - ABCFOPRELOW	-0.06	0.656	0.051	-1.279	167	0.203
Pair 3	ABPRODPREHIGH - ABPRODPRELOW	0.07	0.369	0.028	2.354	167	0.020
Pair 4	ABDISEXPPREHIGH - ABDISEXPPRELOW	-0.11	0.562	0.043	-2.536	167	0.012
Pair 5	TOTALREMPREHIGH - TOTALREMPRELOW	-0.11	1.004	0.077	-1.390	167	0.166

Table 6: Paired Sample t-test During Pandemic

		Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Pair 1	LEVDURINGHIGH - LEVDURINGLOW	0.34	0.044	0.003	99.475	167	0.000
Pair 2	ABCFODURINGHIGH - ABCFODURINGLOW	-0.10	0.781	0.060	-1.612	167	0.109
Pair 3	ABPRODDURINGHIGH - ABPRODDURINGLOW	0.10	0.599	0.046	2.104	167	0.037
Pair 4	ABDISEXPDURINGHIGH - ABDISEXPDURINGLOW	-0.04	0.546	0.042	-1.053	167	0.294
Pair 5	TOTALREMDURINGHIGH - TOTALREMDURINGLOW	-0.04	0.997	0.077	-0.574	167	0.567

Tables 5 and 6 show the paired sample t-test. PREHIGH refers to high leverage before the pandemic, and PRELOW refers to low leverage during the pandemic. DURINGHIGH refers to high leverage during the pandemic, and DURINGLOW refers to low leverage during the pandemic. Other variables are defined as before.

In both periods, there were significant differences between the leverage levels of high and low-leverage firms. Before the pandemic, the mean difference was 0.32 ($t = 118.423$, $p < 0.001$), and during the pandemic, it slightly increased to 0.34 ($t = 99.475$, $p < 0.001$). These results support the reliability and consistency of the leverage-level-based grouping criteria used in both periods.

Table 5 shows the period prior to the pandemic (PRE). Prior to the pandemic, REM practices differed between high and low-leverage enterprises. First, a statistically significant difference in ABPROD between the two groups ($t = 2.354$, $p = 0.020$) indicates that REM through abnormal production activities was more likely to be used by high-leverage firms to manipulate

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earnings. This is consistent with prior research by Zhang (2012), who found that restricting accrual-based EM favours production manipulation as a preferred REM technique.

Next, ABDISEXP also revealed a significant difference between the two groups (t = -2.536, p = 0.012), suggesting that low-leverage companies managed to manipulate their discretionary expenditure more aggressively than high-leverage companies. This is in line with the findings of Cohen and Zarowin (2010), who found that businesses in financial difficulties are more likely to reduce discretionary spending to control profits. However, during the pre-pandemic period, high-leverage firms did not significantly differ from low-leverage firms in the use of ABCFO (p = 0.203) and total REM (p = 0.166).

In addition, Table 6 exhibits the period during the pandemic (DURING). During the pandemic, the pattern of REM behaviour among high and low-leverage firms changed in some areas. For ABPROD, it continued to show a significant difference ($t = 2.104$, $p = 0.037$), confirming that high-leverage firms consistently used abnormal production as a tool for managing earnings, even during economic uncertainty. In contrast, there was no longer a significant difference between the groups in ABDISEXP (p = 0.294). This suggests that such practices may have been constrained by other factors like operational restrictions or government regulations. This result is consistent with Xu et al. (2020), who found that because of external support measures or a smaller operating scale, firms had less flexibility in cost-cutting during COVID-19. In addition, in a crisis, high-leverage firms did not significantly differ from low-leverage firms in the use of ABCFO (p = 0.109) and TOTALREM (p = 0.567). It suggests that that leverage level in a crisis had no significant effect on cash flow manipulation or the overall EM strategy. This confirms the results of Kalbuana et al. (2022), who found that leverage had different effects on REM depending on the method used as well as the economic circumstances.

Conclusion

This study aimed to investigate the impact of financial leverage on REM strategies in financially distressed firms before and during the COVID-19 pandemic. By analyzing a sample of 672 firm-year observations from Malaysian publicly listed companies from 2018 to 2021, we explored how leverage influences earnings manipulation practices using Roychowdhury's (2006) REM model. H1 and H2 are supported. The coefficient, β_1 in Model (4), indicated a significant positive association between financial distress and REM both before and during the COVID-19 pandemic. Hence, the finding is highlighted that financially distressed firms did engage in REM in the period before and during the pandemic. This finding aligns with the prior study by Lizińska and Czapiewski (2023), which indicated that financially distressed firms engaged in REM during the pandemic. Furthermore, this EM approach is less detectable, and managers prefer it without considering the long-term effects (Campa & Miriano, 2015). Thus, this study offers helpful information about how firms managed their earnings before and during the pandemic.

Then, as they affect the REM approach, it is possible to emphasise the significant effects of the control variables (LEVERAGE, SIZE, ROA, and LIQUIDITY) with EM. Regulators and practitioners can use this evidence to help them respond effectively to recent business failures caused by opportunistic EM, which may influence the reliability of accounting earnings.

A further analysis was conducted to highlight the role of financial leverage in shaping these REM practices. Specifically, this analysis shows how the financially distressed firms exhibit different levels of REM depending on their leverage before and after the COVID-19 pandemic.

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In this analysis, we used models (1) to (4) and concluded that we also accepted H3 and H4. Descriptive statistics reveal there is a difference in the mean of REM between high-leverage and low-leverage firms both before and during the pandemic. Both high-leverage and low-leverage firms participated in REM before the pandemic, with slightly greater levels of REM activity noted in low-leverage firms. However, during the pandemic, both groups demonstrated a reduction in REM behaviour. Even this finding contradicts the study by El-Feel et al. (2024); they suggest that other factors, such as the role of corporate social responsibility, can limit the REM during COVID-19. In addition, the paired-sample t-test confirms a clear separation between the two groups of financially distressed firms: high-leverage and low-leverage, both before and during the pandemic. During the pre-pandemic period, high-leverage firms aggressively used ABPROD while low-leverage firms used ABDISEXP; however, during the pandemic, only high-leverage firms continued to exercise production manipulation.

Thus, this study contributes to the EM literature by examining how managers choose to manipulate earnings at various levels of financial health, particularly during the period before and throughout the COVID-19 pandemic. In addition, the findings offer helpful perspectives for regulators and investors. First, regulators can use these insights by considering the leverage levels in developing policies to mitigate earnings manipulation in financially distressed firms. Then, investors also should consider the leverage levels of firms as an indicator of potential EM practices when making investment decisions.

However, this study has several limitations that need to be highlighted. First, it looks at businesses without considering the range of industries that could have unique characteristics and affect the decision to choose an EM method. Second, the data focus on the mean difference between high and low leverage instead of the cause-and-effect relationship. Thus, future study may extend to theoretical and empirical study for better understanding the effect of debt level in financially distressed firms toward REM. Lastly, future research that includes samples from other developing countries may enhance the understanding of how EM techniques are selected, thereby providing greater insight into the findings.

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