American International Journal of Business Management (AIJBM)
ISSN- 2379-106X, www.aijbm.com Volume 07, Issue 12 (December- 2024), PP 145-156

The Impact of Financial Leverage on Earning Management of Vietnamese Listed Industrial Firms: The Moderating Role of COVID-19 Pandemic

Trinh Bang Nguyen[1], Anh Truc Dang[2], Anh Ky Huynh[3], Duyen Thi Ky Nguyen[4], Huyen Nhu Thanh Ho[5]
[1,2,3,4,5]*(School of Finance and Accouting, Industrial University of Hochiminh City, Vietnam)*
**Corresponding Author: Trinh Bang Nguyen[1]*

ABSTRACT: *The study was conducted based on a sample consisting of 145 listed industrial firms in Ho Chi Minh Stock Exchange (HOSE) and Hanoi Stock Exchange (HNX) of Vietnam for the period of 2017-2023, aiming to investigate the impact of financial leverage on earning management under the moderating role of the COVID-19 pandemic. Results from regression models show a negative effect of financial leverage on earning management, which is consistent to "control hypothesis" and also show the influence of COVID-19 in which the level of earnings management before and after COVID-19 is lower than those during the COVID-19 period. In addition, it was found that COVID-19 plays a role of weakening the negative effect of financial leverage on earning management. These findings are consistent with two measures of accrual earning management (Jones' discretionary accruals and Dechow's discretionary accruals). The paper provides additional empirical evidences for research on earning management, thereby drawing some implications related to the use of debt financing in connection with earning management, especially in such context of significant economic fluctuations like COVID-19 pandemic.*

KEYWORDS - *Accrual earning management (AEM), COVID-19, Earning management, Financial leverage, Vietnamese industrial listed firms.*

I. INTRODUCTION

The stock market serves as a crucial channel for businesses to raise capital, while also offering a wide range of investment opportunities for both individuals and institutions. To make decisions, investors rely on various sources of information, with the primary and critical source being external financial statements. However, the reliability of information, particularly those concerning profit figures, in these financial statements have long been a subject of concern. In reality, the presence of information asymmetry between internal management and external stakeholders provides both motivations and opportunities for managers to engage in earnings management (EM) to meet their specific goals, especially those related to securing capital.

[1] defines EM as the process by which managers manipulate various aspects of financial statements. Meanwhile, [2] refers EM as the deliberate intervention by company management in the financial statement figures disclosed to external stakeholders to meet personal or strategic gain. Regardless of the approach, this behavior results in financial statements that do not accurately reflect the company's actual business performance, but rather represent what the management intends to portray, which in turn potentially distorts information that investors and other stakeholders rely on for decision-making. Consequently, the study of EM remains a critical area of interest in accounting and finance, and has gained particular prominence during the periods marked by major financial scandals occurring.

A recent example is the Wirecard scandal, one of the most significant financial frauds in Germany. Wirecard admitted that nearly 1.9 billion euros reported in its escrow account did not exist. Furthermore, the company's receivables had a 250 million euro gap between 2012 and 2015, which had never been flagged by Ernst & Young [3]. KPMG was also unable to verify revenue between 2016 and 2018, as most transactions in Asia were fabricated. The company manipulated financial data to artificially inflate revenue and profits. In 2020, Wirecard filed for bankruptcy and its CEO faced a 15-year prison sentence [4]. In Vietnam, the Truong Thanh Wood Industry Group (stock code: TTF) was fined by the State Securities Commission of Vietnam (SSC) for publishing misleading financial statements [5]. Notably, TTF's expenses were also adjusted upwards by 65%, primarily due to a provision of over 39 billion VND for bad debts, whereas in their self-prepared report, TTF had reversed provisions of over 5 billion VND. The company's post-tax profit decreased to 2.5 billion VND, compared to 20.6 billion VND before the audit [5].

From the perspective of investment decisions, EM undermines the ability of both creditors and potential investors to evaluate a firm's prospects and assess how committed capital is being utilized by

management. Consequently, among the various streams of EM research, there is a significant portion focusing on examining the impact of financial leverage on EM. Basically, there are two opposing arguments regarding this relationship. Many studies, such as those by [6], [7] and [8], based on "debt hypothesis" of [9], argue that firms with higher debt ratios have greater incentives to engage in EM to ensure that financial metrics do not breach debt covenants, thereby avoiding potential costs associated with such violations. Conversely, other studies, relying on "control hypothesis" of [10], suggest that firms with higher debt ratios are less likely to engage in EM because creditors tend to impose stricter monitoring mechanisms on highly leveraged firms. Examples include researches by [11], [12], [13] and [14]. Although findings across these studies remain inconsistent, they collectively provide empirical evidence indicating that financial leverage does influence EM.

In Vietnam, there have been several recent studies examining the impact of financial leverage on EM and also providing inconsistent results, such as the studies by [15], [15], [17] and [18]. Most of these studies are conducted on a broad sample of companies listed on the Vietnamese stock market with a diverse range of industries and characteristics. Therefore, studies focusing on specific sectors are particularly necessary to explain the inconsistent results about the impact of financial leverage on EM. The industrial sector is the largest economic sector and makes a significant contribution to Vietnamese economy. The government has also identified industrialization as one of the long-term development strategies to enhance the competitiveness of the economy. Compared to firms in other sectors, industrial firms often need a huge capital to invest in factories, machinery, equipment, etc. For firms with high capital needs, relying solely on equity is insufficient. As a result, bank loans are common fundraising channels.

Although debt allows for quick capital mobilization, it also imposes pressure for interest and principal repayment. Especially for companies with high financial leverage, creditors tend to tighten the criteria and approval processes for loan applications to mitigate credit risks. Financial statements and profit figures are crucial indicators in loan applications, serving as the basis for banks to assess firm's ability to repay debt. Thus, the high need for loans creates an incentive for manipulating financial ratios through EM. But at the same time, high debt ratios also draw attention from creditors and drive them to create of a control mechanism to limit EM.

This relationship between financial leverage and EM became more complex in the context of COVID-19, when the global economy was severely impacted, leading to significant challenges in business operation across industries, including Vietnamese industrial companies. The sharp decline in profit forced companies to struggle to cover daily expenses as well as make capital investments. Therefore, the demand for capital during the COVID-19 period was higher than usual. The debt-to-equity ratio of industrial companies increased from 1.02 in 2019 to 1.15 in 2020 [19]. However, borrowing during this period became more challenging for companies due to an uncertainties in their ability to repay debt, making the credit approval process more cautious and time-consuming. This could lead to an increase in the likelihood of companies adjusting their financial reports, particularly profit figures.

Aware of the consequences of EM and the impact of financial leverage on EM behavior among firms with high debt ratios, as well as the lack of studies examining the moderating role of COVID-19 on the relationship between financial leverage and EM, especially in Vietnam, the authors have conducted the study with the aim of providing additional empirical evidences to the literature on EM, drawing some implications related to the use of financial leverage in the context of EM, especially during periods of significant economic volatility. Through this, both companies and stakeholders using financial statements can gain a more comprehensive understanding, helping them make more informed and accurate decisions.

The remainder of this paper is as follows: literature review and hypotheses development, research methodology, results and discussion, and conclusions.

II. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1 Theoretical background

2.1.1 Agency theory

Synthesizing different aspects from organizational theory, contract theory and asymmetric information theory, [10] builds agency theory to explain the relationships and benefit conflicts between the principal and the agent within organizations. [10] argued that the separation of ownership and control is the reason for this kind of conflicts. Both parties in the relationship aim to maximize their own interests. As a result, it is possible that the agent may not always act in the best interest of the principal, and the principal can limit the benefit disparity between the two parties by establishing suitable incentive mechanisms.

Today, firms (principal) tend to hire external managers (agent) to take advantage of their expertise and knowledge in order to maximize profits and enhance the firm's value. To ensure that managers work in the best interests of the company, owners often apply profit-based bonuses alongside fixed salaries. However, because managers tend to act in ways that maximize their own benefits, they may engage in EM by adjusting the figures in the financial statements, which are directly linked to the bonuses and benefits they receive.

Furthermore, agency theory can be applied from the perspective of debt to explain relationship in which the principal is the creditor and the agent is the firm, represented by the manager. A conflict of interest can arise when the firm uses borrowed funds in high-risk activities in search of high returns, while creditors tend to focus on safeguarding their capital and avoiding risks. To protect themselves, creditors will increase their control and tighten the loan terms, leading to higher agency costs. This, in turn, could make managers more reluctant and cautious about engaging in EM practices.

2.1.2 Signalling theory

Signalling theory was first introduced by [20] in the context of the labor market to address the issue of information asymmetry between employers and employees. Employees are fully aware of their own skills and competencies, while employers face difficulties in assessing the potential abilities of candidates. Employees send credible signals to employers to demonstrate their capabilities, such as through resumes, degrees or certifications. However, the existence of information asymmetry makes these signals not always accurate. Some candidates may have strong skills and capabilities, but the signals they send to employers may not be strong enough to reflect their true abilities. Conversely, some candidates may have lower actual competencies, yet due to their ability to present strong signals, they attract the attention of employers.

In the context of this study, the theory can be applied to explain why information in financial reports is not always reliable and relevant to external user in decision making. Indeed, managers are well aware of the company's actual situation, whereas creditors or investors hold less internal information and thus lack a comprehensive understanding of the company. One way in which companies send signals to the market is through the external financial statements, which are used by investors and creditors before making decisions. However, the information they receive often has some limitations, such as situation where managers adjust data on financial statement to be in line with the company's signalling strategies. A commonly used signal is the debt ratio. In favorable economic conditions, a high financial leverage ratio can indicate the potential for significant profit amplification. However, during economic crises, high debt ratios create risks and put pressure on managers to maintain financial stability and secure capital at lower costs. As a result, managers may engage in EM to project a positive image of the company's financial health, signaling that their firm still maintains financial stability and the ability to repay debt.

2.1.3 Fraud triangle theory

Developed by [21], the fraud triangle theory argues that fraud occurs when three conditions converge: pressure, opportunity and rationalization. "Pressure" stems from financial difficulties, unattainable work goals or expectations from superiors. "Opportunity" usually arises from environmental factors such as insufficient oversight or weak internal controls. And "rationalization" is the process by which individuals justify their fraudulent behavior, making them feel that their actions are acceptable and without guilt.

Many studies have applied this theory to explain the motivations and methods behind EM. Notably, [2] argue that "pressure" and "rationalization" are two critical factors that motivate managers to engage in EM to maintain a positive financial image and minimize negative external pressures. In his study on violations of debt covenants, [22] suggests that "pressure" from debt covenants and "opportunity" provided by flexible accounting policies are key factors that explain EM behavior in relation to debt.

In the context of this study, the "pressure" factor may arise from the need to meet debt obligations, particularly when a company has a high level of leverage in its capital structure. This pressure could be exacerbated by negative external factors such as the Covid-19 pandemic, which worsens business conditions. Additionally, pressures from owners, shareholders and investors' high expectations can compel managers to manipulate earnings to conceal the true financial position of the company, either to continue receiving salaries and bonuses or to avoid breaching debt covenants and maintaining access to debt financing. "Rationalization" factor also explains why managers might convince themselves that EM is necessary because it helps the company stabilize and survive difficult times. However, managers also consider the "opportunity" factor because, in environments where there are binding provisions in compensation contracts or loan agreements, and where accounting policies and estimates are tightly regulated with strict monitoring mechanisms, EM could pose significant risks for both the managers and the company.

2.2 Hypotheses development

2.2.1 Financial leverage and earning management

As discussed in section I, numerous empirical studies have examined the impact of financial leverage on EM with inconsistent findings. Some studies support a positive relationship between financial leverage and EM, primarily based on the "debt hypothesis" proposed by [9]. According to these authors, when firms use debt financing, they face pressure to maintain a certain level of profitability in order to meet shareholders' expectations and fulfill debt covenants in the contracts with creditors. This scenario highlights the presence of "pressure" and "opportunity" (explained from the fraud triangle theory), which together provide the conditions for EM. The opportunity for EM is explained through agency theory, which asserts that managers possess superior information about a firm's actual profits compared to external parties such as creditors or potential

investors. As a result, managers have "opportunity" to manipulate reported earnings. The higher the firm's leverage ratio, the greater the pressure to signal positive earnings (according to signaling theory) to investors and shareholders, as well as to comply with contractual covenants with creditors. Consequently, this pressure increases the likelihood of EM. Empirical studies by [6], [15] and [23] provide evidence supporting this view.

In contrast, other studies grounded in "control hypothesis" of [10] argue that financial leverage has an inverse relationship with the level of EM. Expanding on agency theory, Jensen developed this hypothesis further by explaining the role of debt in enhancing control and monitoring mechanisms that reduce EM. He argues that the conflict of interest between the firm and its creditors, in which firms tend to favor risk in exchange for higher returns, while creditors seek capital safety and steady growth, leads creditors to implement their own protective. In firms with higher levels of debt, creditors intensify control procedures in lending and impose stricter terms in debt contracts, making EM more difficult. Moreover, these control measures increase the agency costs borne by the firm. These costs are not only reflected in financial terms, such as interest expenses or transaction costs, but also in non-financial costs, including longer approval and disbursement times, or even blacklisting and the denial of credit. Therefore, firms with higher financial leverage are often less inclined, or even unable, to engage in EM. Empirical evidence from studies by [11], [12] and [16] supports this argument.

Considering the context of firms in the industrial sector from 2017 to 2023 and drawing upon relevant studies, the authors posit that the influence of the "control hypothesis" will likely outweigh that of the "debt hypothesis" within the scope of this study. Consequently, the authors propose the following hypothesis regarding the effect of financial leverage on EM as follows.

H1: *Financial leverage has an inverse effect on the level of EM among listed firms in the industrial sector in Vietnam from 2017 to 2023*.

2.2.2 Covid-19 and earning management

This study is conducted using data from 2017–2023, which is a particularly significant period covering the pre-, during- and post-Covid-19 in Vietnam. This pandemic was a major shock that fundamentally changed the structure of the economy and severely impacted the businesses. The challenges faced by firms were amplified during this crisis period, creating immense pressure on cash flows, liquidity and the ability to maintain continuous operations. In other words, Covid-19 led to a decline in revenue, an increase in costs and directly affected the profitability of firms. Several studies have highlighted the "pressure" faced by companies and demonstrated that firms increased EM during the pandemic in order to present a positive and stable image of their profits (signaling theory) to investors and creditors, thus enabling them to survive and overcome the crisis period, such as the studies by [24], [25] and [26] . Based on these arguments and empirical evidence, the authors propose the following hypotheses regarding the impact of Covid-19 on EM as follows.

H2a*: There is a difference in the level of EM among listed industrial companies in Vietnam between the pre-Covid-19 period and the Covid-19 period.*

H2b: *There is a difference in the level of EM among listed industrial companies in Vietnam between the Covid-19 period and the post-Covid-19 period.*

2.2.3 The moderating role of Covid-19

In addition to the evidence showing the impact on the level of EM, COVID-19 also had a significant effect on financial leverage of industrial firms in Vietnam. Given the sector's heavy reliance on debt financing to meet substantial investment needs during the production process, it is undeniable that borrowing is an important source of capital and can provide substantial benefits, particularly in terms of tax shields. However, a high debt ratio during a crisis can be a double-edged sword for firms. This is evident in the case of Vietnamese industrial companies. When the lockdown orders due to COVID-19 were issued, demand for products sharply decreased, supply chains were disrupted, and input costs surged, while firms still had to maintain fixed asset-related expenses, leading to severe capital shortages. With an already high debt ratio in their capital structure, these firms found it very difficult to take on additional debt. Particularly in the context of COVID-19, creditors became more cautious about firms with high leverage and were more likely to increase interest rates or tighten credit terms. Studies by [27], [28] and [29] have highlighted that COVID-19 is a critical factor that must be considered to ensure the accuracy of financial analyses, such as EM and firm performance.

Therefore, the authors examine the moderating role of COVID-19 in the relationship between financial leverage and EM through the following hypothesis.

H3*: COVID-19 plays a moderating role in the relationship between financial leverage and earnings management.*

III. RESEARCH METHODOLOGY

3.1 Data and research sample

The initial sample consists of 205 firms classified within the industrial sector on the two largest stock exchanges in Vietnam, including the Ho Chi Minh Stock Exchange (HOSE) and the Hanoi Stock Exchange

(HNX). This selection of these two exchanges ensures the credibility and availability of the data. The sample period begins in 2017 to ensure a sufficiently large dataset for meaningful analysis.

Data of firms' financial statements were collected from Vietstock.com, one of the major platforms providing financial data for listed companies in Vietnam and being widely used in many studies. Meanwhile, information regarding the onset of COVID-19 in Vietnam is based on the official announcement made by the Prime Minister on February 1, 2020, and the end of the pandemic is determined based on the Ministry of Health's assessment on October 10, 2021 that Vietnam transitioned into the "new normal" phase [30].

From the initial sample, the authors excluded firms that were listed after 2017 (total 2 firms), and those that did not have complete financial statements or were not fully audited (total 58 firms). The final dataset comprises panel data from 145 firms over seven years, yielding a total of 1,015 observations. This refined sample is used for the official analysis in the study. The data will be extracted and organized using Excel software to compute the necessary financial indicators. Following data processing, outliers will be addressed using Stata software to ensure that any extreme values do not bias the results of the study.

3.2 Research variables

3.2.1 Earning management (EM)

There are various approaches to measuring EM. If the behavior of profit manipulation is solely based on changes in accounting methods, EM can be calculated on an accrual basis (AEM). However, if there are signs of adjustments in actual transactions, the level of earnings management should be measured based on real transactions (REM).

In the context of this study, the authors argue in favor of "control hypothesis" of Jensen, suggesting that within the scope of this research, the incentives for EM are not as significant as the management's awareness—especially for managers of highly leveraged firms—of the consequences of EM, particularly the penalties associated with debt covenants. Therefore, if given a choice, firms would prefer to use techniques that are easy to implement, difficult to detectand and low costs incurred, such as making adjustments through changes in accounting methods within the allowable range.

[31], [2] and several subsequent studies have shown that accruals are a powerful tool for EM because they are more flexible than adjusting actual transactions, allowing firms to alter financial statements while maintaining the integrity of core business operations. Hence, based on the research objectives of this study, the authors chose to AEM as proxy for measure EM.

Following the studies of [31] and [32], the paper measures discretionary accruals (DA) by subtracting non- discretionary accruals (NDA) from total accruals (TA). This method starts by calculating TA for the accounting period, then uses a regression technique based on a number of influencing factors to estimate NDA. The difference between TA and NDA is considered as DA. This calculation process is described in the following steps.

Step 1: TA is calculated for each firm i at each year t using the following formula

$$TAi,t = Net\ income_{i,t} - Operating\ cash\ flow_{i,t}$$

Step 2: Perform a regression of TA using the Jones model

$$\frac{TA_{(i,t)}}{A_{(i,t-1)}} = \alpha + \beta_1 \left(\frac{\Delta REV_{(i,t)}}{A_{(i,t-1)}}\right) + \beta_2 \left(\frac{PPE_{(i,t)}}{A_{(i,t-1)}}\right) + \epsilon_{(i,t)}$$

- $TA_{i,t}$: is the total accruals for firm i in year t
- $A_{i,t-1}$: is the total assets for firm i in the previous year (t−1)
- $\Delta REV_{i,t}$: is the change in revenue for firm i in year t
- $PPE_{i,t}$: is the property, plant, and equipment for firm i in year t
- α, β_1, and β_2: are the estimated coefficients
- $\epsilon_{i,t}$: is the error term

Step 3: Use the estimated coefficients from the regression model in step 2 to calculate NDA for each observation in the dataset using the following formula.

$$\frac{NDA_{(i,t)}}{A_{(i,t-1)}} = \alpha + \beta_1 \left(\frac{\Delta REV_{(i,t)}}{A_{(i,t-1)}}\right) + \beta_2 \left(\frac{PPE_{(i,t)}}{A_{(i,t-1)}}\right)$$

Step 4: Determine DA using the formula:

$$DAi,t = TAi,t - NDAi,t$$

Additionally, to test the robustness of the model, the authors also measure EM using model from [32]. The calculation steps are similar to those above, except that the equation in Step 2 and Step 3 are modified as follows.

$$\frac{TA_{(i,t)}}{A_{(i,t-1)}} = \alpha + \beta_1 \left(\frac{\Delta REV_{(i,t)} - \Delta REC_{(i,t)}}{A_{(i,t-1)}}\right) + \beta_2 \left(\frac{PPE_{(i,t)}}{A_{(i,t-1)}}\right) + \epsilon_{(i,t)}$$

$$\frac{NDA_{(i,t)}}{A_{(i,t-1)}} = \alpha + \beta_1 \left(\frac{\Delta REV_{(i,t)} - \Delta REC_{(i,t)}}{A_{(i,t-1)}}\right) + \beta_2 \left(\frac{PPE_{(i,t)}}{A_{(i,t-1)}}\right)$$

Where: $\Delta REC_{i,t}$ is the change in accounts receivable for firm i in year t compared to year t−1.

Since this study focuses on measuring the level of EM, the value of DA will be taken as the absolute value after calculation.

3.2.2 Financial leverage and Covid-19

Based on studies such as [12], [15], [16] and defintion of financial leverage, the independent variable *financial leverage (LEV)* is measured as the ratio of total debt to total assets.

Meanwhile, variable *Covid-19 (COV)* is a dummy variable that plays a moderating role in the model, with its value defined as follows: it takes the value of 0 for the years corresponding to the outbreak of Covid-19, namely 2020 and 2021; it takes the value of 1 for the pre-Covid period, corresponding to the years 2017-2019; and it takes the value of 2 for the post-Covid period, corresponding to the years 2022 and 2023. The milestones that define the outbreak and control of Covid-19 are presented in Section 3.1.

3.2.3 Control variables

The author uses the following control variables, built upon prior researches.

Operating Cash Flow (OCF): Reflecting the ability to generate cash from core business activities, OCF enables firms to maintain stability and sustainable development. If cash flow is stable and positive, a firm can confidently invest in new projects, expand its scale or face financial challenges without relying excessively on external capital. Therefore, there is considerable evidence suggesting that operating cash flow has an inverse relationship with EM. For instance, studies by [16], among others, provide support for this argument.

Firm Size (SIZ): Larger firms typically have stronger financial capabilities and advantages in accessing capital at preferential costs. This allows them not only to invest in new projects but also to expand capacity and improve competitive strength. As a result, these firms can solidify their market position, increase business efficiency and better meet customer needs. Therefore, the authors expect to observe a positive relationship between firm size and EM, as concluded in several previous studies, such as those by [33], [34] and [35].

Revenue Growth Rate (GRO): This indicator reflects a firm's ability to seize opportunities and its growth potential. When firms achieve more growth opportunities, the ability to self-finance also increases, thereby reducing reliance on external funding sources. This not only helps firms maintain financial independence but also creates favorable conditions for profit growth [36]. Therefore, revenue growth rate is expected to have a positive relationship with EM, as suggested in recent studies [34], [35], [37].

The table below summarizes the variables used in the study.

Table 1. Summary of Variables. Source: Authors.

Variables	Symbols	Measures	References
Level of EM based on the model of Jones (1991)	EM1	|DA|	[16], [35], [38], [39], [40]
Level of EM based on the model of Dechow (1995)	EM2	|DA|	[34], [37], [38], [41]
Financial leverage	LEV	Total debt/Total asset	[6], [11], [12], [15], [16], [23]
Covid-19	COV	0: for year of 2020, 2021 1: for year of 2017, 2018, 2019 2: for year of 2022, 2023	[27], [28], [29]
Firm size	SIZ	Ln (total assets)	[12], [33], [35], [37], [38], [41], [42], [43]
Revenue Growth Rate	GRO	$(Sales_t - Sales_{t-1})/Sales_t$	[35], [37], [38], [41], [43]
Operating cash flow	OCF	Extract from Cash flow statement	[16]

3.3 Research model

Based on the research objective of examining the impact of financial leverage (LEV) on earnings management (EM), as well as exploring the impact of Covid-19 on earnings management and the relationship between LEV and EM, the authors use two baseline models as follows.

Model 1: $EM1_{i,t} = \alpha_0 + \alpha_1 LEV_{i,t} + \alpha_2 COV_{i,t} + \alpha_3 OCF_{i,t} + \alpha_4 SIZ_{i,t} + \alpha_5 GRO_{i,t} + \varepsilon_{i,t}$ **(1)**

Model 2: $EM1_{i,t} = \alpha_0 + \alpha_1 LEV_{i,t} + \alpha_2 COV_{i,t} + \alpha_3 LEV_{i,t} * COV_{i,t} + \alpha_4 X + \varepsilon_{i,t}$ **(2)**

Where:

- $EM1_{i,t}$: the level of EM based on the model of [31]

- $LEV_{i,t}$ * $COV_{i,t}$: is the variable representing the moderating role of Covid-19 on the relationship between financial leverage and the level of EM
- X: represents the control variables in the model
- $\varepsilon_{i,t}$: random error term
- α: regression coefficients

Additionally, to test the robustness of the base models, the authors also perform analyses for two extended models as follows.

Model 3: $EM2_{i,t} = \alpha_0 + \alpha_1 LEV_{i,t} + \alpha_2 COV_{i,t} + \alpha_3 X + \varepsilon_{i,t}$ **(3)**

Model 4: $EM2_{i,t} = \alpha_0 + \alpha_1 LEV_{i,t} + \alpha_2 COV_{i,t} + \alpha_3 LEV_{i,t} * COV_{i,t} + \alpha_4 X + \varepsilon_{i,t}$ **(4)**

Where: EM2 measures the level of EM based on the model of [32].

IV. RESULTS AND DISCUSSIONS

4.1 Descriptive statistics

Table 2 presents the descriptive statistics of the sample's characteristics, including the number of observations (Obs.), mean, median (p50), standard deviation (sd), maximum and minimum values from 1,015 observations corresponding to 145 companies during the period from 2017 to 2023. Before conducting descriptive statistics, the authors removed outliers to prevent biases that could arise from individual observations affecting the model.

Table 2. Descriptive Statistical Analysis. Source: Authors.

Variables	Obs.	mean	p50	sd	min	max
EM1	1,015	0.1999609	0.070703	0.3993386	0.0012367	2.698542
LEV	1,015	0.4551681	0.4494175	0.2221428	0.0129723	0.9938766
SIZ	1,015	6.65e+07	2.37e+07	4.63e+08	-9.01e+09	2.86e+09
GRO	1,015	20.51327	20.40567	1.450013	16.79986	24.50337
OCF	1,015	0.0649714	0.0363177	0.3780609	-0.8669261	1.963935

Results from Table 2 reveal the existence of EM within the research sample, with the average level of EM across firms accounting for approximately 20% of total assets. However, this level is not consistent across companies, as some firms exhibit a very low level of EM, as low as 0.1%, while others report as high as 269%. From the perspective of debt financing, the average value of the LEV is around 46%, indicating a relatively high financial leverage within the sample. However, the minimum and maximum values of LEV show a significant disparity, with values of 1.3% and 99.4%, respectively. This suggests that some firms hardly use any debt during their operational period, while others rely entirely on external financing, even borrowing to offset "negative equity" due to business losses. This is consistent with the context of the study sample, which spans the period of the global economic crisis triggered by the COVID-19 pandemic.

In addition, variables such as OCF and GRO also show considerable disparities between their maximum and minimum values, reflecting the uneven distribution of operating cash flow and revenue growth rates across firms in the sample. Meanwhile, the SIZ variable indicates a difference in firm size, though this difference is not substantial. It indicates that the firms in the sample having relatively homogeneous sizes.

4.2 Correlations Analysis

To assess the strength of the linear relationships and the potential for multicollinearity among the variables in the regression models, a correlation analysis is conducted with the results presented in Table 3 below.

Table 3. Correlation coefficient matrix. Source: Authors.

	EM1	LEV	OCF	SIZ	GRO	COV
EM1	1.0000					
LEV	-0.1028*	1.0000				
OCF	-0.0346	-0.0988*	1.0000			
SIZ	-0.1250*	0.3567*	0.0789*	1.0000		
GRO	-0.0166	0.1187	-0.0366	0.1051	1.0000	
COV	-0.3725*	-0.0124	0.0510	0.0291	-0.0204	1.0000

*Notes: *, **and *** denotes the significance level at 10%, 5% & 1%, respectively*

The results from correlation analysis show that the pairwise correlation coefficients between the independent variables and the control variables are not high, with most values being below 0.4, indicating that the correlation between each pair of variables is not strong enough to cause multicollinearity. The results also

show that EM1 is correlated with most of the independent variables and control variables. Specifically, EM1 has a negative correlation with the variables LEV, SIZ, and COV at a 10% significance level.

4.3 Regression analysis

Regression analysis will be implemented for four models mentioned in Section 3.3, including baseline models 1 and 2, and extended models 3 and 4 for robustness test. Before conducting regression analysis, the authors performed a selection among the three commonly recommended regression methods for panel data, including Pooled OLS, Random effects model (REM) and Fixed effect model (FEM). Specifically, F-test is conducted to decide between Pooled OLS and FEM, Breusch-Pagan test is conducted to choose between Pooled OLS and REM, and Hausman test is conducted to select between REM and FEM. The results from Table 4 show that Pooled OLS regression method is the most suitable for all four models.

Table 4. Rationale of model selecting. Source: Authors.

Type of inspection	**P-value**	**Model selection**
F-Test	Model 1,2,3,4: 1.0000	Model 1,2,3,4: Select Pooled OLS
Breusch–Pagan test	Model 1,2,3,4: 1.0000	

The authors continued to conduct the necessary tests related to the assumptions of regression models for both baseline and extended models, including tests for multicollinearity, heteroscedasticity and residual autocorrelation, in order to ensure that the research results are appropriate and reliable. The results indicate the existence of heteroscedasticity in all four models. Therefore, the authors conducted the regression using Feasible Generalized Least Squares (FGLS) approach to address this issue. The regression results are presented in Table 5 below.

Table 5. FGLS estimation results. Source: Authors.

	Baseline models		**Extended models**	
Variables	**1 (EM1)**	**2 (EM1)**	**3 (EM2)**	**4 (EM2)**
LEV	-0.079**	-0.229***	-0.068**	-0.202***
	(-2.44)	*(-4.35)*	*(-2.16)*	*(-3.94)*
OCF	-0.000	-0.000*	-0.000	-0.000
	(-1.51)	*(-1.65)*	*(-1.46)*	*(-1.58)*
SIZ	-0.002	-0.000	0.000	0.001
	(-0.29)	*(-0.06)*	*(0.05)*	*(0.24)*
GRO	0.017	0.017	0.002	0.003
	(0.91)	*(0.95)*	*(0.01)*	*(0.16)*
COV=1	-0.251***	-0.312***	-0.231***	-0.286***
	(-14.94)	*(-11.69)*	*(-13.03)*	*(-10.99)*
COV=2	-0.249***	-0.78***	0.343***	-0.347***
	(-13.61)	*(-8.32)*	*(3.03)*	*(-7.83)*
LV_COV		0.134***		0.119***
		(3.31)		*(3.01)*
Constant	0.405***	0.449***	0.343***	0.385***
	(3.48)	*(3.82)*	*(3.03)*	*(3.37)*
Observations	1,015	1,015	1,015	1,015
Prob > chi2	0.0000	0.0000	0.0000	0.0000

Notes: *, **and *** denotes the significance level at 10%, 5% & 1%, respectively, t statistics in parentheses.

The results from the four models provide further support for hypothesis H1 regarding the inverse impact of financial leverage on EM. This impact is statistically significant with coefficients and corresponding p-values of LEV variable are (α = -0.079, $p < 0.05$), (α = -0.229, $p < 0.01$), (α = -0.068, $p < 0.05$) and (α = -0.202, $p < 0.05$) for model 1,2,3,4 respectively. These findings suggest that, within the scope of the study sample, firms with higher debt ratios tend to exhibit lower level of EM. This result aligns with "control hypothesis" of [10] and is consistent with previous studies, such as those by σ [12], [16], [35] and [43]. This can be explained by the characteristic of Vietnamese industrial firms, which often maintain relatively high debt ratios in order to continuously finance substantial capital requirements for their specific production and business activities. Consequently, maintaining strong relationships with creditors to secure access to capital at low costs over the long term is crucial. This also leads firms to exercise EM more cautiously. Moreover, with a high debt ratio in the capital structure, firms are perceived to carry higher risk and thereby are subject to closer scrutiny by creditors, including through loan covenants and credit evaluation processes. This, in turn, limits the firms' ability to manipulate financial statement information through accrual-based techniques.

Regarding the impact of Covid-19 on the level of EM, the regression coefficients for COV variable for both the pre-Covid (COV=1) and post-Covid (COV=2) periods are negative and statistically significant at the 1% level for models 1, 2, and 4. However, for model 4, the coefficient is positive and statistically significant at

the 1% level for EM measured basing on the Dechow model. These results support hypotheses H2a and H2b, indicating that there are differences in the level of EM during the Covid-19 period compared to the pre- and post-Covid periods. Specifically, leve lof EM is lower during the pre- and post-Covid periods than during the ongoing Covid period. These findings provide evidence that firms tend to increase EM under such a periods of economic crisis like Covid-19. In contrast, during periods of economic stability, firms are more likely to maintain stability and growth, thus facing fewer pressures that could lead to EM. As such, the pre-Covid period shows lower level of EM than the Covid period. In the post-Covid period, as the economy gradually recovers, the financial pressures on firms tend to ease. Firms focus on recovering business operations, restructuring, and sustainable development. Therefore, in the post-Covid period, EM levels also tend to decrease as firms prioritize long-term recovery and development strategies over short-term EM to achieve immediate goals.

The regression results of four models also indicate the moderating role of COV variable in which significantly changes the coefficient of the LEV variable. Specifically, the regression coefficient of the LEV variable in model 1 (without the moderating variable) is -0.079, whereas in model 2 (with the moderating variable), it is -0.229. A similar pattern is observed for the regression coefficients of the LEV variable in models 3 (without the moderating variable) and 4 (with the moderating variable), with values of -0.068 and -0.202, respectively. Moreover, the regression coefficient of the interaction term LEV*COV in both models 2 and 4 is statistically significant at the 1% level, indicating the moderating role of Covid-19 in the relationship between financial leverage and EM. These results support hypothesis H3.

Additionally, the coefficients for the moderating variable are positive in both models. By setting the value of the COV variable to 0 for the Covid-19 period, this implies that Covid-19 weakens the inverse impact of financial leverage on EM. This can be explained by the argument that in a period of economic stability, firms with higher debt ratios tend to be more cautious in their EM practices, possibly due to concerns about the costs and risks associated with penalties or sanctions from creditors, and about the long-term strategic relationships with creditors. However, during the Covid-19 period, the widespread economic downturn leads to reduced revenues, higher costs, and disruptions in cash flows for firms. Managers also face pressures and expectations from owners and other stakeholders. In such a situation, managers will weigh the consequences of being penalized by creditors for EM practices against the consequences of not meeting expectations, which could result in a loss of trust, potential threats to survive in Covid and recover after Covid, as well as to grow in long-run. As a result, firms tend to be less cautious in EM practices. Overall, in the pre-Covid period, the higher the debt ratio, the greater the level of caution in EM. However, during the Covid-19 pandemic, the negative effect of debt ratio on EM still exists, but it weakens, suggesting that managerial caution in EM decreases due to the need to cope with financial pressures and expectations from stakeholders.

V. CONCLUSION

5.1 Summary

The authors conducted study on the sample of 145 companies in the industrial sector from 2017 to 2023, covering the Covid-19 period, with the aim of evaluating the impact of financial leverage EM, as well as the moderating role of Covid-19 in the relationship between financial leverage EM. Based on secondary data from the financial statements of the companies collected from the Vietstock platform, the authors performed descriptive statistical analysis, correlation analysis and regression analysis using Stata 17 software.

Through the process of running and comparing the Pooled OLS, FEM, and REM regression methods, as well as performing tests for violations of regression assumptions, FGLS regression method was chosen. The results indicate that financial leverage has an inverse effect on EM, meaning that companies with higher debt ratios tend to have lower levels of EM. This finding supports “control hypothesis” of [10] and is consistent with previous studies such as those by [11], [12], [13] and [16].

Furthermore, the results also show differences in the level of EM between the pre-, during, and post-Covid-19 periods. Specifically, in the pre- and post-Covid periods, the level of EM tends to decrease compared to those in Covid period. This finding supports the argument that pressures during periods of economic hardship, with significant negative impacts on businesses, create a strong incentive for EM. Additionally, regarding the moderating role, the results indicate that Covid-19 weakened the inverse effect of financial leverage on EM. This suggests that the managers’caution in performing EM diminished as they had to cope with financial pressures as well as expectations from stakeholders.

5.2 Contributions

From a theoretical perspective, findings from thes study provide additional empirical evidences for research on EM in general, as well as the relationship between financial leverage on EM in particular. Furthermore, compared to studies focusing on the whole market with various sectors, this study specifically focuses on industrial enterprises, thus providing a deeper perspective on one of the sectors with unique characteristics and high demands for capital investment. Moreover, the study also broadens the research stream on the relationship between financial leverage on EM by examining the moderating role of Covid-19. This

creates a foundation for further research in the future, especially in the context of major shocks such as pandemics or economic crises.

From a practical perspective, the research provides several implications for both businesses and stakeholders. Firstly, it implies that companies cannot pursue debt policies independently from their EM practices, as an excessive and unnecessary EM behavior can significantly damage the company's reputation in the eyes of creditors, making it more difficult to raise capital in the future. Therefore, companies need to balance the benefits and costs of EM, especially during periods of economic hardship, to ensure the stability of capital mobilization and enhance the company's reputation among shareholders and investors. Secondly, the stakeholders of companies, such as creditors, investors and others, can apply research results to gain deeper insights into the quality of profits, and thus making more accurate and effective decisions. Especially, when making decions under such an significantly uncertain conditions like Covid-19, understanding implications from the study can help investors, creditors and other stakeholders to identify potential risks of companies, enabling them to make timely and informed decisions.

5.3 Limitations and directions for future research

Firstly, the rearch sample only includes industrial companies listed on the HNX and HOSE stock exchanges because of the available of data. This may reduce the generalizability of the research findings when applied to entire industrial sector. Future research could consider expanding the sample by including industrial companies listed on other stock exchanges, such as the Upcom market. However, it is important to note that comparative techniques should be employed to account for differences arising from the characteristics of various stock exchanges. This approach will help mitigate potential biases and ensure that any variations observed are not solely due to the unique features of different stock markets, but rather reflect underlying patterns in the industrial sector.

Secondly, EM practices stem from managerial decisions. Therefore, in addition to external factors that may influence managers, internal factors such as behavioral psychology and the personal characteristics of individual CEOs need to be considered in future research. These internal factors can play a significant role in shaping managers' financial reporting practices and decisions. Taking them into account as moderating role would help ensure a more comprehensive and accurate explanation of the relationship between financial leverage and EM.

Thirdly, as mentioned, there are several proxies for EM, but this study only applies the accrual-based measurement using the two models developed by [31] and [32], thereby may do not fully capture all aspects of EM. Future research could use multiple models to cross-validate findings to gain a more comprehensive view of EM practices and the relationship between financial leverage and EM, as well as to increase the reliability of the research findings.

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**Corresponding Author: Trinh Bang Nguyen[1]*
[1](School of Finance and Accouting, Industrial University of Hochiminh City, Vietnam)