

# Financial reporting quality and investment efficiency in manufacturing firms: The role of firm characteristics in an emerging market

*Hanh Thi My Le, Cheng-Po Lai, Vu Hoai Phan, Vu Tien Pham*

## Abstract

This study examines the relationship between financial reporting quality (FRQ) and investment efficiency (IE) in Vietnamese manufacturing firms and analyses the moderating role of various firm characteristics, including debt maturity (Stdebt), financial strength (Z), firm size and tax upon such relationship. The study uses a sample of manufacturing firms listed on the Vietnamese stock market from 2008 to 2021 to test and analyse overinvestment and underinvestment situations. Results indicate a positive relationship between FRQ and IE among manufacturing firms in Vietnam, and such a relationship is moderated by firm characteristics, including Stdebt, Z, firm size and tax. Moreover, debt maturity, TobinQ, audit and tax positively affect IE, whereas financial strength and firm size tend to affect IE negatively. Similarly, when firms are underinvested, TobinQ and leverage positively affect IE, whereas financial strength has a negative relationship with IE. Furthermore, the studying findings demonstrate that firm characteristics moderate the relationship between FRQ and IE. The results enhance the understanding of firm performance for CEOs and managers and provide short- and long-term internal strategies for sustainable development and goal achievement. Additionally, these findings assist investors in analysing and making informed investment decisions, helping firms minimise risks and enhance their competitiveness. Given the limited empirical research regarding the relationship between FRQ and IE in an emerging market, this study contributes to the existing literature by adding original value to this area. Furthermore, the findings confirm the agency and asymmetry information theories' view.

**Keywords:** *financial reporting quality (FRQ), investment efficiency (IE), manufacturing firm, moderating, emerging market, Vietnam*

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## 1 INTRODUCTION

Financial report quality (FRQ) is critical in global stock markets, including the one in Vietnam. Many scholars have recently emphasised improving FRQ to reduce information asymmetry and enhance market transparency. In particular, for developing economies like Vietnam, the truth and good faith of financial reports are crucial to provide reliable information to shareholders, investors and other stakeholders. Yet, financial fraud is still prevalent, which may negatively impact stakeholders' decision-making. Thus, various accounting laws and regulations have been implemented to prevent fraudulent activities, although auditors might not have absolute control over them. Furthermore, the importance of investment has been emphasized by scholars (Altman & Hotchkiss, 2010; Gomariz & Ballesta, 2014; Hidayat & Mardijuwono, 2021); especially in the context of manufacturing firms. These firms play an integral role in analyzing and supplementing

general financial data with in-depth industry insights to provide useful information for performance evaluation and decision making.

A large body of literature indicates that firms can reduce information asymmetries by enhancing FRQ (Elberry & Hussainey, 2020; Gomariz & Ballesta, 2014; Hidayat & Mardijuwono, 2021). Additionally, investment efficiency (IE) strongly influences the performance and sustainable development of firms, which is of great interest to managers, investors, owners and other stakeholders (Biddle et al., 2009; Chen et al., 2011; Gomariz & Ballesta, 2014; McNichols & Stubben, 2008). Increasing FRQ can reduce adverse selection and moral hazard, enabling managers to identify better investment opportunities and enhancing IE. Moreover, FRQ plays a crucial role in enhancing investor confidence, assisting firms in mitigating risks during challenging times and strengthening their competitiveness.

Chen et al. (2011) examine 'boundary conditions' for the effect of financial reporting on IE and find that FRQ influences IE in private firms in emerging countries. Given this reference, we expect to find a similar association in our sample of manufacturing companies, which often invest heavily in property, plant and equipment (PPE) to support their operations.

We use the model developed by McNichols and Stubben (2008) to measure IE and derive the variance in FRQ information from the model of McNichols (2002), which builds on the work of Dechow and Dichev (2002). Our findings also demonstrate how to limit overinvestment and underinvestment.

Our findings provide valuable insights for investors, managers, owners and other stakeholders regarding the financial reporting of manufacturing firms listed in Vietnam and other countries. Our research contributes to the expanding literature on the empirical evidence of the roles of FRQ in managing and improving IE, particularly in emerging markets like Vietnam. Previous studies have suggested that accounting information may have limited impact in environments with inadequate investor protection mechanisms (Le et al., 2022), and given the low level of investor protection in Vietnam, evaluating the impact of FRQ on IE of listed Vietnamese firms is an important test of the significance of FRQ in improving investment performance.

Our study evaluates FRQ through earnings quality because this approach provides a clear and objective quantification of current financial information. Moreover, this method ensures the information's objectivity, effectively controlling managerial behaviour and reducing information demand conflicts. Furthermore, this study emphasises analysing the factors affecting FRQ and its strong relationship with IE. As stated in the agency theory of Jensen and Meckling (1976), conflict exists between owners and managers. Therefore, CEOs and managers rely on analysing financial reporting to assess investment opportunities, limiting the risks of over or under-investment.

In summary, our research provides critical insights into the role of FRQ in enhancing IE in Vietnam's emerging market. Our findings have significant implications for investors, managers and other stakeholders who rely on financial information to make informed investment decisions.

The remainder of the paper proceeds as follows: Section 2 is the literature review and hypothesis. Section 3 describes in detail the research design with the models, measures of variables and the sample. Section 4 shows the results of model regression. Section 5 provides the conclusion and limitations of this study.

## 2 THEORY AND LITERATURE REVIEW

### 2.1 Theoretical framework

#### 2.1.1 *Financial report quality*

Financial reports play a critical role in providing financial information to users promptly and fairly. The information disclosed in the financial statements must be comprehensive, objective, timely, easily understandable and comparable to ensure the truth and good faith of the financial position, business results, cash flows and other necessary information of the business entity (Financial Accounting Standards Board (FASB), 2010; International Accounting Standards Board (IASB), 2010). This information is vital for users to make informed decisions.

Biddle et al. (2009) state that FRQ refers to the reliability of financial statements in communicating information about a firm's performance, particularly its expected cash flow, to shareholders. This statement is consistent with previous studies (Johnson et al., 2002; Whittington, 2008), highlighting that the financial statements' objective is to inform current and potential investors to make informed decisions. Thus, financial statements must provide reliable, comparable and understandable information (Kamaruzaman et al., 2009). However, Gleason et al. (2008) argue that financial reports cannot be entirely free of bias, as they often involve estimates and assumptions under conditions of uncertainty. Valášková et al. (2021) find that financially distressed firms may manage their financial reports to improve their appearance. Nonetheless, a high-quality financial statement can greatly affect the strategic decisions of managers, especially investors. Biddle et al. (2009), Roychowdhury et al. (2019) and Wajeetongratana et al. (2019) have argued that a high-quality financial statement can increase IE.

#### 2.1.2 *The relationship between FRQ and IE*

Assessing FRQ for profitability is crucial in reducing the risk of inefficient investment. Beest et al. (2009) suppose that high-quality financial reporting information is critical in positively influencing stakeholder financing, credit, and resource allocation decisions, enhancing economic efficiency. A high FRQ is associated with increased IE (Healy & Palepu, 2001; Hung et al., 2020; Wajeetongratana et al., 2019). Moreover, studies have demonstrated that high-quality financial statements can improve IE by minimising market conflicts and agency issues (Biddle et al., 2009; Roychowdhury et al., 2019; Wajeetongratana et al., 2019). According to agency theory, managers tend to act in their self-interest rather than maximising benefits for the organisation (Biddle et al., 2009). Poor information transparency can allow managers to use firm resources for self-serving projects, leading to overinvestment (Alhadi et al., 2021). Conversely, managers may underinvest by abandoning positive present-value projects or rejecting highly productive projects to boost short-term business results, receiving high salaries and bonuses. Competition is a moderating variable in the relationship between FRQ and IE (Alhadi et al., 2021). Companies with limited investment capacity are less likely to under-invest in a highly competitive environment.

In addition to agency theory, asymmetry information theory (Akerlof, 1970) suggests that certain market participants possess more information than others, resulting in adverse selection and moral hazard. According to Myers and Majluf (1984), when information asymmetry exists, corporate executives tend to make investment decisions that benefit themselves at the expense of other investors or shareholders. Consequently, IE is significantly affected, leading to conflicts of interest between the shareholders and other stakeholders. By utilising signalling and information control mechanisms, better FRQ can lead to more efficient resource allocation and better investment decisions by enterprises, enabling investors and shareholders to assess investment

performance more accurately. By promoting greater managerial accountability and increased shareholder oversight, a higher FRQ can help reduce information asymmetry, limit adverse selection and moral hazard and improve IE by mitigating conflicts between managers and investors.

## 2.2 Literature review and hypotheses development

Previous studies have produced mixed findings regarding the relationship between FRQ and IE. Many previous studies have shown a negative (or positive) relationship between FRQ and IE, indicating tendencies toward underinvestment (or overinvestment) (Biddle et al., 2009; Ellili, 2022; Hidayat & Mardijuwono, 2021; O'Connell et al., 2019; Tahat et al., 2022). Thus, higher FRQ can help increase IE and reduce deviation from predicted investment (Hidayat & Mardijuwono, 2021). Chen et al. (2011) examined the role of FRQ in private firms across 79 emerging markets from 2002 to 2005. They found that the relationship between FRQ and IE increases in banking financing and decreases in incentives to minimise earnings for tax purposes. The literature has often asserted this connection between tax-minimisation incentives and the informational role of earnings. Compared with public firms in the United States, firms in emerging markets face less pressure regarding declared regulations and recording accounting books. Furthermore, Mohammadi (2014) investigated the link between FRQ and IE of 93 firms listed on the Tehran stock exchange from 2009 to 2012 and found a positive correlation between FRQ and IE, consistent with previous studies. However, in contrast to these findings, Umiyati and Riyanto (2019) found no effect of financial reporting quality on reducing the chances of overinvestment or underinvestment of the firms on the Indonesia stock exchange.

Gomariz and Ballesta (2014) conducted a study with a sample of Spanish-listed companies from 1998 to 2008 to examine the role of FRQ and debt maturity in IE. They found that FRQ can mitigate the over-investment problem, and lower debt maturity can improve IE by reducing overinvestment and underinvestment problems. Furthermore, financial reporting and debt maturity enhance IE; firms with lower (or higher) use of short-term debt exhibit higher (or lower) FRQ effects on IE.

Approaching FQR based on the characteristics of financial statements on the Tunis stock exchange, Houcine (2017) found that reliability and smoothness increase the IE of the enterprise, but relevance and prudence do not affect investment decisions. Rad et al. (2016) investigated the relationship between FRQ and IE in 558 Malaysian firms from 2001 to 2011 and found a positive relationship between FRQ and IE. However, empirical evidence shows that firms' underinvestment or overinvestment is positively related to earnings management. The more earnings management behaviour increases, the greater the likelihood of inefficient investments (Linhares et al., 2018).

Given the association between earnings management behaviour and investment levels, Linhares et al. (2018) provide evidence that earnings management positively affects investment levels when tested in Brazilian firms from 1996 to 2012, suggesting that the higher the firms' earnings management behaviour, the greater the probability that the firm deviates from true and efficient investment decisions. However, when new regulations are implemented to improve FRQ, the IE of companies is reduced because companies are more managerially entrenched in dealing with tighter regulations (Dou et al., 2019).

Based on this discussion, the hypothesis is as follows:

*H1: There is a relationship between financial reporting quality and IE.*

Continuing the investigation on the relationship between FRQ and IE during financial crises, Safari (2019) found a positive relationship between FRQ and IE in Tehran firms in 2012–2017. However, the financial crisis weakened this relationship. Consistent with this study, Hung et al. (2020) examined Vietnamese listed firms from 2010 to 2019 and found that FRQ has a positive relationship with IE, indicating that enhancing FRQ can increase IE by reducing information asymmetry and agency costs. Nonetheless, when firms face financial constraints, FRQ and financial constraints can reduce their IE. Unlike the risks posed by a financial crisis, the COVID-19 pandemic crisis decreases FRQ, while the board size limits its negative impact on FRQ (Hsu & Yang, 2022). Furthermore, Zeng et al. (2018) found that firm characteristics impact IE. Tegegn (2018) stated that firm characteristics such as firm size, ROA and firm growth moderate the relationship between FRQ and IE.

Kim et al. (2021) analysed comparability as a measure of FRQ and found that increased comparability can prevent overinvestment or underinvestment. Good comparability enables investors to monitor managers' use of company resources, thus increasing the firm's value. Similarly, Alhadi et al. (2021) examined US listed companies from 1981 to 2013 and found that improving FRQ through comparability helps reduce the underinvestment risks and increases firms' IE. Moreover, product market competition has a regulatory effect on the relationship between comparability and IE. The competitive environment can reduce firms' tendency to disclose information, reducing comparability between financial statements and IE. However, in highly competitive markets, firms are less likely to underinvest (Zeng et al., 2018). After analysing moral hazard and adverse selection tenets, the results offer further insights into the relationship between agency theory and financial statement comparability.

When conducting a thorough analysis of the relationship between FRQ and IE regarding under- or overinvestment decisions, Assad and Alshurideh (2020) discovered that firms tend to engage in earnings management to hide their activities from outsiders, thereby reducing FRQ. Similarly, Bhutta et al. (2022) found that earnings management reduces firms' IE, leading to over- or under-investing in Pakistan from 2008 to 2018. Short-term debt can limit the adverse impact of earnings management and improve firm IE.

Regarding the characteristics of financial statements, Dewi and Ulpah (2019) found that the smoothness of financial statements increases the inefficiency of investment activities. In contrast, accrual level, conservatism and relevance do not affect investment decisions. Moreover, Bzeouich et al. (2019) showed a negative relationship between earnings management and IE, consistent with agency theory, which suggests that information asymmetry increases the opportunistic behaviour of managers, leading to overinvestment or underinvestment. The board's involvement effectively controls the relationship between earnings management and investment performance (Bzeouich et al., 2019).

Based on this discussion, the following hypothesis is tested:

*H2: Firm characteristics moderate the relationship between FRQ and IE.*

### **2.3 Characteristics of manufacturing companies in Vietnam**

Manufacturing has long been recognised as a crucial factor in the economic growth of developing countries such as Vietnam, and it has a significant link with the industrial sector. According to the Vietnamese General Statistics Office (2020), industry and construction contributed 32.72% to the country's economy.



**Tab. 1 - Index of Industrial production of the period from 2008 to 2021**

*Unit of measurement: %*

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
<b>All industrial sectors</b>	<b>107</b>	<b>107</b>	<b>109</b>	<b>107</b>	<b>106</b>	<b>106</b>	<b>108</b>	<b>110</b>	<b>108</b>	<b>111</b>	<b>110</b>	<b>109</b>	<b>103</b>	<b>105</b>
Mining and quarrying	99	110	101	99,9	105	99	102	107	94	96	98	101	93	94
Manufacturing and processing industry	111	106	113	110	106	108	109	111	111	115	112	110	105	106
Electricity production and distribution					112	108	113	111	112	110	110	109	103	105
Water supply and waste-water treatment	112	108	115	110,0	108	110	106	107	107	107	106	106	104	104

Source: Data from: <https://www.gso.gov.vn/>

The manufacturing industry in Vietnam has significantly contributed to the country’s growth in the past decade, as reported by HSBC (2022). Its contribution is evident from the substantial increase in the purchasing index (PI) for the manufacturing sector.

### 3 METHODOLOGIES

Previous studies have commonly used many methods to measure FRQ and IE. However, in this study, the authors have chosen to measure FRQ through earnings quality, as it is a method based on clearly quantified and identified financial information on the financial statements in past and current conditions to ensure the objectivity of the information. Moreover, Gomariz and Ballesta (2014) stated that IE is the level of favourable asset investment compared to revenue growth in a financial year. It is also known as a net increase in tangible and intangible assets of firm *i* in year *t* based on sale growth, and it helps mitigate over-investment and under-investment.

#### 3.1 Measurement of variables

##### 3.1.1 Investment efficiency (IE)

This study is based on McNichols and Stubben (2008) to measure IE as follows:

$$\text{Investment}_{i,t} = a_0 + a_1 \text{Rev}_{i,t} + e_{i,t}, \tag{1}$$

where  $\text{Investment}_{i,t}$  is the net increase in assets/lag of the total asset of firm *i* in year *t*,  $\text{Rev}_{i,t}$  is the revenue growth of firm *i* from year *t*-1 to *t*,  $a_0$  is the constant value,  $a_1$  is the variable coefficient,  $e_{i,t}$  is the residual error of model 1, and IE is the absolute value of the remainder in the model multiplied by -1.

##### 3.1.2 Financial report quality (FRQ)

We used the McNichols (2002) model developed from the model of Dechow and Dichev (2002) to measure financial statement quality from the absolute value of residual error as follows:

$$\text{WCA}_{i,t} = a_0 + a_1 \text{CFO}_{i,t-1} + a_2 \text{CFO}_{i,t} + a_3 \text{CFO}_{i,t+1} + a_4 \text{PPE}_{i,t} + a_5 \text{Sale}_{i,t} + e_{i,t}, \tag{2}$$

where  $\text{WCA}_{i,t}$  is the total of accrual accounting of firm *i* in year *t*;  $\text{CFO}_{i,t-1}$ ,  $\text{CFO}_{i,t}$  and  $\text{CFO}_{i,t+1}$  are the change of operating cash flow of firm *i* in year *t*-1, *t* and *t*+1, respectively;  $\text{PPE}_{i,t}$  is property, plant and equipment of firm *i* in year *t*;  $\text{Sale}_{i,t}$  is the change of revenue of firm *i* in year *t*;  $a_0$  is constant value;  $a_1$  to  $a_5$  are the variable coefficients; and  $e_{i,t}$  is residual error of model 2. FRQ is the absolute value of the remainder in the model multiplied by -1.

#### 3.2 Empirical model

This study analysed the correlation between variables and regression models, conducted multivariate regression analysis, and determined the factors influencing FRQ and IE. Three methods were employed: OLS, fixed effect and random effect. The most suitable model was selected after performing regression analysis using these methods. The regression model is presented as follows:

$$IE_{i,t} = b_0 + b_1FRQ_{i,t} + b_2Stdebt_{i,t} + b_3Size_{i,t} + b_4Z_{i,t} + b_5TobinQ_{i,t} + b_6Lev_{i,t} + b_7Pro_{i,t} + b_8Tax_{i,t} + b_9Age_{i,t} + b_{10}Audit_{i,t} + e_{i,t}, \quad (3)$$

where  $IE_{i,t}$  is the investment efficiency of firm  $i$  in year  $t$ ;  $FRQ_{i,t}$  is the financial report quality of firm  $i$  in year  $t$ ;  $Stdebt_{i,t}$  is the short-time debt maturity of firm  $i$  year  $t$ ;  $Size_{i,t}$  and size of firm  $i$  year  $t$ ;  $Z_{i,t}$  is financial strength of firm  $i$  year  $t$ ;  $TobinQ_{i,t}$  is the growth opportunities of firm  $i$  year  $t$ ;  $Lev_{i,t}$  is the financial leverage of firm  $i$  in year  $t$ ;  $Pro_{i,t}$  is the profit margin of firm  $i$  in year  $t$ ;  $Audit_{i,t}$  is the audit firm reputation of firm  $i$  in year  $t$ ;  $Tax_{i,t}$  is the corporate income tax rate of firm  $i$  in year  $t$ ;  $Age_{i,t}$  is the listed time of company of firm  $i$  in year  $t$ .

Tab. 2 - Measurement of variables.

Variables	Definition	Measurement
<i>Investment efficiency (IE)</i>		
IE	The absolute value of the remainder in the model multiplied by -1	$Investment_{i,t} = a_0 + a_1Rev_{i,t} + e_{i,t}$
<i>FRQ(FRQ)</i>		
FRQ	The absolute value of the remainder in the model multiplied by -1	$WCA_{i,t} = a_0 + a_1CFO_{i,t-1} + a_2CFO_{i,t} + a_3CFO_{i,t+1} + a_4PPE_{i,t} + a_5Sale_{i,t} + e_{i,t}$
<i>Control variables</i>		
Stdebt	Short-term debt	$Stdebt = \frac{\text{Short - term debt}}{\text{Total debt}}$
Z	Financial strength	$Z = 0,012X_1 + 0,014X_2 + 0,033X_3 + 0,006X_4 + 0,999X_5$ ( $X_1 = \text{the rotational capital /total asset}$ ; $X_2 = \text{retained earnings /total assets}$ ; $X_3 = \text{earnings before taxes and interest /total assets}$ ; $X_4 = \text{the market value of the equity / total assets}$ ; $X_5 = \text{the turnover / total assets}$ )
TobinQ	Growth opportunities	$TobinQ = \frac{\text{Equity market value} + \text{book value of debt}}{\text{Book value of total assets}}$
Size	Market value of the company	$\ln(\text{Market value of the company})$
Lev	Financial leverage	$Lev = \frac{\text{Total debt}}{\text{Total asset}}$
Pro	Profit margin	$Pro = \frac{\text{Profit after tax}}{\text{Net revenue}}$
Audit	Audit company reputation	Big4 = 1; NonBig4 = 0
Tax	Corporate income tax rate	Circular regulating
Age	Listed time of company	Year of IPO

Table 2 presents the definition and measurement of variables.

### 3.3 Data collection

The data for this study were collected from the audited financial statements, annual reports and management reports of the manufacturing firms listed in Vietnam. The firms must have disclosed sufficient information from 2008 to 2021 and must have been listed for at least three years. As a result, 2,230 firm-years of 221 eligible manufacturing firms were selected for research.

## 4 FINDINGS

#### 4.1 Descriptive statistics

Table 3 statistically describes variables, including the number of observations, mean, standard deviation and minimum and maximum values of the variables in the model. The results show that the sample uses 2,230 firm years for research purposes. The mean of IE is  $-0.82$ , and the mean of FRQ is  $-9.86$ . The results are shown in Tab. 3.

Tab. 3 - Descriptive Statistics of regression variables

Variable	N	Mean	Std. Dev.	Min	Max
IE	2005	$-0.82$	0.68	$-4.25$	0
FRQ	1787	$-9.86$	12.49	$-49.78$	$-0.04$
Stdebt	2230	0.4	0.26	0	0.96
Z	2230	1.32	0.91	0.01	10.38
TobinQ	2230	1.18	0.93	0.28	31.49
Size	2230	26.57	1.69	22.51	33.34
Lev	2230	0.37	0.22	0	0.97
Pro	2230	0.07	0.2	$-2.4$	7.26
Audit	2230	0.26	0.44	0	1
Tax	2230	0.22	0.02	0.2	0.28
Age	2230	7.85	4.1	3	22

Note: Refer to Table 2 for the definition/measurement of variables.

Firms in the sample have high short-term debt, which is 40% of total debt. This indicates that manufacturing companies must borrow frequently to meet their investment needs. The average financial strength index is 1.32, which is less than 1.8, indicating that companies tend to be or are at high risk of bankruptcy (Altman & Hotchkiss, 2010). The average TobinQ of firms is 1.18, which shows that the companies in the sample have a higher market value than their book value; in other words, most of the manufacturing firms in the sample are overvalued. The average size of the company in the sample is 345 billion VND, which is equivalent to 15 million USD ( $\text{Ln}=26.57$ ). The average financial leverage ratio of the companies in the sample is 37%. The profit margin is 7%, signifying that companies have low average profitability and a high loss ratio, which is twice compared to net sales. Big four companies accounted for 26% of the audit market share for manufacturing companies listed in Vietnam. The average tax rate of companies in the sample is 22%. Finally, the firms in the sample have an average listed time of eight years.

#### 4.2 Matrix correlation coefficient between variables

Correlation coefficient ( $r$ ): The linear relationship between independent and dependent variables in the model presents values range from  $-1$  to  $+1$ , and absolute values of  $R$  are higher than the correlation between the variables. Based on the matrix results, the correlation coefficients between the variables are shown in Tab. 4.



Tab. 4 - Correlation analysis. Source: own research

	IE	FRQ	Stdebt	z	TobinQ	Size	Lev	Pro	Aud	Tax	Age
IE	1.0000										
FRQ	0.1469***	1.0000									
Stdebt	0.1430***	-0.0801***	1.0000								
Z	-0.1668***	0.1355***	-0.0362*	1.0000							
TobinQ	0.0182	0.0231	-0.1472***	0.0366*	1.0000						
Size	0.0252	-0.0984***	-0.0472**	-0.1996***	0.4197***	1.0000					
Lev	0.0533**	-0.2945***	0.5411***	0.0302	-0.1478***	-0.1184***	1.0000				
Pro	0.0065	0.1377***	-0.1846***	-0.1075***	0.1111***	0.2070***	-0.1877***	1.0000			
Audit	0.0023	-0.1553***	0.0190	0.0147	0.1873***	0.5303***	-0.0663***	0.0582***	1.0000		
Tax	0.0607***	-0.0061	-0.0294	0.0857***	-0.1009***	-0.1943***	0.3372***	-0.0043	-0.1309***	1.0000	
Age	-0.0356	-0.0024	0.0106	-0.1385***	0.0607***	0.1924***	-0.2796***	0.0450**	0.1609***	-0.5581***	1.0000

Notes: significant levels: +  $p < 0.1$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ , respectively. Refer to Tab. 2 for the definition/measurement of variables.

Based on Tab. 4, most variables demonstrate linear relationships with each other (correlations coefficient  $< 0.6$  in absolute values). Specifically, IE and FRQ, as well as the correlations between IE and FRQ with other control variables, demonstrate coefficients below 0.3. The linear correlation coefficient between IE and FRQ is positive 0.1469. Moreover, variables such as short-term debt, Lev or Tax show a positive correlation with IE, and the coefficients are positive with values of 0.143, 0.053 and 0.0607, respectively. However, IE shows a negative correlation with Z, with a coefficient of 0.1668. FRQ exhibits negative correlations between Stdebt, Size, Lev and Audit, with coefficients of 0.08, 0.098, 0.295 and 0.155. On the other hand, FRQ shows positive correlations with Z and Pro, 0.136 and 0.138.

### 4.3 Analysis of multivariate regression model

The study uses five models to analyse the relationship between the quality of financial reports and the efficiency of asset investment. In addition, the study examines the relationship between IE and firm characteristics. Table 5 presents the results of all regression models. Table 5 shows that, based on the OLS model regression results, the quality of financial reports and IE were positively correlated with  $p\text{-value} = 0.000 < 1\%$  and a positive coefficient (0.0996). Therefore, the higher the FRQ, the higher the IE. This finding is consistent with Biddle et al. (2009), Hidayat and Mardijuwono (2021), Imelda et al. (2022), Roychowdhury et al. (2019) and Wajeetongratana et al. (2019). Moreover, the results show that variables such as Stdebt, Tobin Q and Tax positively correlate with IE, whereas Z and size negatively correlate with IE. Therefore, the debt term, Tobin Q, and tax improve IE, which aligns with Chen et al. (2011) and Gomariz and Ballesta (2014). Furthermore, the lower the tax rate, the more likely the firm will have the opportunity to increase its investment to increase IE. Investment reversal with the efficiency of asset investment is justified by Gomariz and Ballesta (2014).

After completing the verification with models and testing for multicollinearity, the results indicate that multicollinearity is not present. We ran the robustness check to test and select the appropriate regression. We continued to run the fixed and random effects. We then checked the F-test and Hausman test. The result of the tests is presented in Tab. 5. The chosen model is the fixed effect model (FEM), which relies on the robustness check. However, FEM checked autocorrelation and heteroscedasticity after checking with the Wooldridge test (Prob>F=0.0000) and the Wald test (Prob>chi2=0.0000).

The findings are shown in Tab. 5 below.

Tab. 5 - Regression analysis - The relationship between FQR and IE. Source: own research (N = 1,787)

Variable	OLS (1)	Fixed Effect (3)	Random Effect (2)	GLS (4)	GMM (5)	VIF
FRQ	<b>0.010***</b>	<b>0.005***</b>	<b>0.006***</b>	<b>0.003***</b>	<b>0.010***</b>	2.24
Stdebt	<b>0.466***</b>	<b>0.398***</b>	<b>0.431***</b>	<b>0.140***</b>	<b>0.466***</b>	2.01
Z	<b>-0.192***</b>	-0.038	<b>-0.106***</b>	-0.0168	<b>-0.192***</b>	1.66
TobinQ	<b>0.247***</b>	<b>0.122***</b>	<b>0.1429***</b>	0.034	<b>0.247***</b>	1.63
Size	<b>-0.502***</b>	<b>-0.073***</b>	<b>-0.0574***</b>	<b>-0.030**</b>	<b>-0.050***</b>	1.60
Lev	-0.009	<b>-0.365***</b>	<b>-0.272***</b>	-0.107	-0.009	1.50
Pro	-0.111	-0.024	-0.030749	<b>-0.186**</b>	-0.111	1.49
Audit	0.067	<b>0.182***</b>	<b>0.143***</b>	-0.010	<b>0.067*</b>	1.26
Tax	<b>2.390***</b>	0.340	<b>1.488*</b>	-0.427	<b>2.390***</b>	1.20
Age	-0.004	<b>-0.023***</b>	<b>0.016**</b>	-0.004	-0.004	1.18
Cons	-0.091	1.138	0.432	0.239	-0.091	
Year effects	Yes	Yes	Yes	Yes	Yes	
Year effects	Yes	Yes	Yes	Yes	Yes	
Adj.R <sup>2</sup>	11.83%	4.48%	9.67%		12.33%	1.58
F-test	<b>11,89</b>					
	<b>Prob&gt;F=0.000</b>					
Hausman test		<b>Chi2(10)=36.5</b>				
		<b>P&gt;Chi2=0.0001</b>				
Wooldridge test		<b>78.646</b>				
		<b>Prob&gt;F=0.0000</b>				
Breusch-Pagan test	Chi2(1)=108.27		Chiabar2(01)=2203			
	Prob>chi=0.000		Prob>chibar2=0.000			
Wald test		<b>Chi2(211)=27,835</b>				
		<b>Prob&gt;chi2=0.000</b>				
	Select FEM	Select FEM		Select GMM after resolving the errors		

Notes: significant levels: \* p<0.1, \*\* p<0.05, \*\*\* p<0.01, respectively. Refer to Tab. 2 for the definition/measurement of variables.

The study processed the generalised least square (GLS) and generalised method of moments (GMM) test in columns (4) and (5) to ensure a high-reliability level for regressions. The model (5) is an appropriate model that resolves all the models' errors. The results also indicate a positive relation between IE and FRQ (p-value < 1%). Thus, all used models in Table 5 show that FRQ has a positive relationship with the effect on IE, with the higher the FRQ, the greater the IE. Moreover, Stdebt, Tobin Q and tax positively correlate with the effect on IE, whereas Z and firm size have a

negative correlation of 10% significance. The other variables in the model are not statistically significant. The current study finds consistency with Gomariz and Ballesta (2014). Finally, this study processes advanced tests for regression to determine whether or not and how the role of moderating firm characteristics will affect the relationship between IE and FRQ.

#### 4.4 Advanced analysis

##### 4.4.1 Analysis in the context of overinvestment and underinvestment

Analysing the relationship between report quality and IE in the model can enhance the ability of investors to make informed decisions. This finding is consistent with previous studies such as Chen et al. (2011), Gomariz and Ballesta (2014) and Imelda et al. (2022), which have also investigated the influence of IE, overinvestment and underinvestment. The remaining variables are not statistically significant at the 10% level. These findings support Hypothesis 1. The detailed results are presented in Table 6.

Tab. 6 - Regression analysis by grouping - overinvestment and underinvestment group.

Source: own research

Variable	Overinvestment	Underinvestment
Cons	-1.723	-0.980
FRQ	<b>0.011***</b>	0.001
Stdebt	<b>0.576***</b>	0.052
Z	<b>0.604***</b>	<b>-0.309***</b>
TobinQ	<b>0.092***</b>	<b>0.164***</b>
Size	-0.014	-0.004
Lev	<b>-0.375***</b>	<b>0.333**</b>
Pro	<b>-0.242**</b>	0.384
Audit	0.040	0.045
Tax	<b>2.727***</b>	2.043
Age	<b>0.0129**</b>	0.002
Year effects	Yes	Yes
Firm effects	Yes	Yes
N	917	870
Adj. R <sup>2</sup>	37.86%	21.31%

Notes: significant levels: \* p<0.05, \*\* p<0.01, \*\*\* p<0.001, respectively. Refer to Tab. 2 for the definition/measurement of variables.

Table 6 demonstrates that FRQ correlates with overinvestment but not with underinvestment, similar to the results of previous studies. Therefore, FRQ helps mitigate investment levels in an overinvestment context, enabling firms to reduce unnecessary investment and reach an optimal level. This result supports the view that improved FQR can help control overinvestment, limiting inappropriate investment decisions that benefit management but harm minority shareholders.

In contrast, FRQ has no significant effect on IE in the context of underinvestment, suggesting that it does not play a role in controlling management's investment decisions when companies invest lower than expected. This finding is also consistent with studies conducted by Chen et al. (2011), Gomariz and Ballesta (2014) and Imelda et al. (2022). In addition, in an overinvestment context, other firm characteristics such as debt maturity (Stdebt), financial strength (Z), TobinQ,

Lev, Pro, tax and age are correlated with FRQ, whereas size and audit are not. Specifically, debt maturity, financial strength, TobinQ and taxes have a positive effect on IE, whereas profit and leverage negatively affect IE. Similarly, when firms are underinvested, financial strength (Z), Tobin Q and Lev affect IE, whereas the remaining variables are not statistically significant at the 10% level.

**4.4.2 The moderating role of firm characteristics on the relationship between FRQ and IE**

This study examines the moderating effect of various firms on this relationship to clarify the relationship between FRQ and IE. The study will delve into each group of related factors in detail. The detailed results are presented in Table 7.

Tab. 7 - Advanced analysis results of the moderate variables.

Variable	IE (1)	IE (2)	IE (3)	IE (4)
Cons	-0.127	-0.172	-0.636	-0.429
FRQ	<b>0.028***</b>	<b>0.030***</b>	<b>-0.041**</b>	<b>-0.038***</b>
<b>FRQ*Stdebt</b>	<b>-0.036***</b>			
<b>FRQ*Z</b>		<b>-0.019***</b>		
<b>FRQ*Size</b>			<b>0.002***</b>	
<b>FRQ*Tax</b>				<b>0.217***</b>
Stdebt	<b>0.1583*</b>	<b>0.384***</b>	<b>0.454***</b>	<b>0.459***</b>
Z	<b>-0.197***</b>	<b>-0.320***</b>	<b>-0.191***</b>	<b>-0.194***</b>
TobinQ	<b>0.241***</b>	<b>0.241***</b>	<b>0.239***</b>	<b>0.249***</b>
Size	<b>-0.042***</b>	<b>-0.043***</b>	<b>-0.029**</b>	<b>-0.054***</b>
Lev	0.025	0.040	<b>-0.010**</b>	0.025
Pro	-0.106	<b>-0.268**</b>	-0.120	-0.077
Audit	0.054	<b>0.070*</b>	<b>0.735*</b>	<b>0.710*</b>
Tax	<b>2.211***</b>	<b>2.603***</b>	<b>2.361***</b>	<b>4.338***</b>
Age	-0.004	-0.00121	-0.004	-0.004
Year effects	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes
Adj.R2	13.69%	15.84%	12.67%	13.12%

Notes: Significant levels: + \* p<0.1, \*\* p<0.05, \*\*\* p<0.01 respectively. Refer to Tab. 2 for the definition/measurement of variables.

Model (1) in Table 7 indicates that debt maturity interacts with FRQ and IE. In the general models mentioned earlier, FRQ and Stdebt positively affect IE. However, when combined with FRQ and Stdebt, they exhibit a negative impact, altering the positive association between FRQ and IE. This result is consistent with Gomariz and Ballesta (2014), implying that firms with higher short-term debt experience a weaker effect of FRQ on IE. Thus, the impact of FRQ on IE is more robust in firms with below-average short-term debt levels. These findings demonstrate that FRQ and Stdebt can function together to enhance or mitigate IE.

Model (2) shows the moderate financial strength (Z) effect on the relationship between FRQ and IE. The results demonstrate that the interaction of FRQ and Z can mitigate the negative impact on IE. Specifically, FRQ positively affects IE but can reverse the relationship between FRQ and IE when combined with Z.

Model (3) shows that the relationship between FRQ and firm size impacts IE. The main variable FRQ negatively affects IE at a 5% significance level. However, when firm size is introduced, FRQ positively impacts IE with a significance level of 1%. Therefore, a large firm can effectively control and enforce accounting rules to improve FRQ, positively affecting IE. This finding suggests that FRQ and firm size can be used interchangeably to improve return on investment, thereby mitigating inefficiencies.

Similarly, in model (4), the tax rate variable combined with FRQ also negatively affects IE at a 1% significance level. Specifically, FRQ has a positive impact on IE. However, when combined with tax policy, the relationship between FRQ and IE is reversed, negatively impacting IE. Therefore, firms facing higher corporate income tax may make inappropriate decisions that could decrease IE. These findings support Hypothesis 2.

## 5 DISCUSSIONS

This study identifies the relationship between FRQ and the IE of manufacturing companies listed on the Vietnamese stock market, an emerging market. The results indicate a positive correlation between FRQ and IE, implying that the higher the quality of the information provided in the financial statements, the higher the IE of the asset and vice versa. The quality of financial reporting refers to high-quality financial statements that are a reference for making optimal investment decisions, aiming to achieve IE (Imelda et al., 2022). Consequently, it contributes to enhancing the competitiveness of the business against its competitors. This finding is consistent with previous research conducted by Chen et al. (2011) in emerging markets, Gomariz and Ballesta (2014) in Spain, Imelda et al. (2022) in Indonesia, and Alhadi et al. (2021) in the United States. Moreover, other firm characteristics, such as debt maturity (Stdebt), financial strength (Z), TobinQ, Lev, Pro, tax and age, are correlated with FRQ, whereas size and audit are not.

For theoretical contribution, this study confirms agency theory, which suggests that managers tend to perform behaviours to benefit themselves. The managers may reduce the risk by limiting positive present-value projects (underinvestment) or taking on too many projects to increase personal benefit.

Moreover, the findings confirm asymmetry information theory (Akerlof, 1970), indicating that higher FRQ leads to more accountability by management and the belief of stakeholders, mitigating information asymmetry and resolving conflicts between management and stakeholders to improve IE. Furthermore, in the context of companies with excessive investments and firms with much debt, high profits tend to affect IE negatively. In contrast, for companies with higher financial strength, development opportunities and taxes, the increase of IE helps when the company overinvests. This information is essential for investors and stakeholders when evaluating and analysing potential decisions.

This study has also found that firm characteristics such as debt maturity, financial strength, firm size and tax policy can moderate the relationship between FRQ and IE. The results are almost consistent with Tegegn (2018) and Zeng et al. (2018). The results suggest that FRQ can positively impact IE, but certain characteristics can reverse or limit this relationship. This finding highlights the importance of appropriately preparing financial information to improve or mitigate IE. The study also finds that firm size helps regulate the relationship between FRQ and IE, and higher corporate income tax rates encourage firms to provide financial statements that are more purpose-oriented, reducing the usefulness of accounting information. Furthermore, Zeng et al. (2018) found

that firm characteristics impact IE. Tegegn (2018) stated that firm characteristics such as firm size, ROA and firm growth moderate the relationship between FRQ and IE.

## 6 CONCLUSIONS

This study contributes to the literature by examining how FRQ improves a firm's IE. Higher FRQ reduces information asymmetry, enabling it to impact the investment decisions a company will undertake and thus helping investors assess and monitor the effectiveness of the firm's investment projects. As a result, the firm's competitiveness and operational efficiency are enhanced. Furthermore, the research findings demonstrate that firm characteristics moderate the relationship between FRQ and IE. The findings can inform investment decisions and assist companies in making better decisions to achieve their goals. However, the study has limitations. It only considers financial factors and does not examine the influence of non-financial factors. Further research could explore the influence of other non-financial factors on the models using different FRQ measures to provide more comprehensive findings.

Last but not least, Vietnamese Accounting Standards have not been revised, supplemented, or updated in more than 10 years, limiting their effectiveness in current economic operations, particularly in manufacturing companies regarding fair value and property loss. Many countries worldwide, including Vietnam, are moving towards using International Financial Reporting Standards (IFRS). Vietnam plans to adopt IFRS standards for preparation for financial statements by 2025–2030. The results of this study can help CEOs or managers understand the IE and develop short and long-term internal strategies to develop their firms and achieve their goals sustainably. Additionally, these results can aid investors in analysing and making investment decisions by paying attention to FRQ and other factors that promote efficiency and avoid underinvestment and overinvestment.

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### Contact information

#### **Hanh Thi My Le**

Benchmarking Research Group  
Faculty of Accounting, Ton Duc Thang University  
Ho Chi Minh City, Vietnam  
Email: lethimyhanh@tdtu.edu.vn  
ResearcherID: D-6544-2019. ORCID: 0000-0003-0834-488X

#### **Cheng-Po Lai**

Nanhua University  
Department of Finance & Graduate Institute of Financial Management, Taiwan.  
Email: paulai@nhu.edu.tw  
ORCID ID: 0000-0002-5039-4138.

#### **Vu Hoai Phan**

Nanhua University  
Department of Business Administration, Taiwan  
Faculty of Accounting, Ton Duc Thang University  
Ho Chi Minh City, Vietnam  
Email: phanhoaiVu@tdtu.edu.vn  
ORCID ID: 0000-0003-2639-1516

#### **Vu Tien Pham**

Faculty of Accounting, Ton Duc Thang University  
Ho Chi Minh City, Vietnam  
Email: phamtienvu1993@gmail.com