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Financial reporting quality, ownership structure and investment efficiency: An empirical analysis of Vietnamese listed firms

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Thi Ha Thu Dinh

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Abstract of a thesis submitted in partial fulfilment of the
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Investment efficiency (IE) is one of the most researched topics in corporate finance in the last 20 years. In an ideal world, firms invest until the marginal benefit of their investments equals the marginal cost. However, because of market imperfections such as information asymmetry, moral hazard and adverse selection, firms may deviate from the optimal level, which results in inefficient investment. Prior research suggests that inefficient investment negatively affects firm performance and leads to higher costs of equity. Given the importance of efficient investment to firm growth and performance, there has been a significant body of literature on the factors affecting IE. However, there is a limited number of studies exploring IE in newly emerging markets such as Vietnam. In order to enrich the literature on IE in emerging markets, this study examines the impacts of two firm-specific characteristics - ownership structure and financial reporting quality (FRQ) - on the IE of Vietnamese listed firms. This study uses four proxies for FRQ and three measures of ownership structure - ownership concentration, institutional ownership and managerial ownership - to test the effects of ownership structure and FRQ on IE.

Using unbalanced panel data of 645 Vietnamese listed firms from 2007 to 2018, the results show that FRQ has a positive influence on IE. In addition, institutional ownership positively impacts IE but there is no significant relationship between managerial ownership and IE of Vietnamese listed firms. Ownership concentration also has a positive effect on the IE of Vietnamese listed firms but its effect disappears after we control for the effects of institutional ownership and managerial ownership. The impact of FRQ on IE is stronger in Vietnamese state-owned enterprises (SOEs). However, the impact of ownership concentration, institutional ownership and managerial ownership on IE shows no difference between SOEs and non-SOEs. Finally, ownership concentration and institutional ownership have no

significant influence on the relationship between FRQ and IE. Managerial ownership, on the other hand, reduces the positive relationship of FRQ on IE.

To the best of my knowledge, this is the first study that investigates the influence of ownership concentration, institutional ownership and managerial ownership on IE as well as the interaction effect of these three measures of ownership structure and FRQ on the IE of Vietnamese listed firms. The results of this study provide some managerial implications and suggestions for Vietnamese listed firms and policy-makers on how to mitigate firm-level investment inefficiency.

Keywords: Investment efficiency, overinvestment, underinvestment, financial reporting quality, ownership structure

Acknowledgements

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List of Abbreviations

BoD	Board of directors
CEO	Chief Executive Officer
CFA	Chartered Financial Analyst
CFO	Cash flow from operating activities
CLR	Central Limit Theorem
EM	Earnings management
FRQ	Financial reporting quality
GICS	Global Industry Classification Standard
GMM	Generalised method of moments
GMS	General meeting of shareholders
HNX	Hanoi Stock Exchange
HOSE	Ho Chi Minh Stock Exchange
IAS/IFRS	International Accounting Standards
ICE	Information content of earnings
IE	Investment efficiency
IFRS	International Financial Reporting Standards
IV	Instrumental variable
LOE2014	The Law on Enterprises 2014
MoF	Ministry of Finance
NPV	Net present value
OLS	Ordinary least squares
PP	Principal-principal
PPE	Property, plant, and equipment
SB	Supervisory Board
SOEs	State-owned enterprises
SSC	State Securities Commission
TA	Total assets
TLR	Time loss recognition
VASs	Vietnamese accounting standards
VIF	Variance inflation factor
VND	Vietnam dong
WCAs	Working capital accruals

Chapter 1

Introduction

1.1   Research statement and motivation

Investment efficiency (IE) is one of the most researched topics in corporate finance in the last 20 years. In an ideal world, firms invest until the marginal benefit of their investments equals the marginal cost (Abel, 1983; Abel & Eberly, 1994; Hayashi, 1982; Yoshikawa, 1980). However, because of market imperfections such as information asymmetry, moral hazard and adverse selection, firms may deviate from the optimal level, which results in inefficient investment. Inefficient investment could be in the form of overinvestment or underinvestment (Bertrand & Mullainathan, 2003; Hubbard, 1998). Overinvestment exists when a firm makes more investments than the optimal level by undertaking negative net present value (NPV) projects. Underinvestment, on the other hand, refers to the rejection of positive NPV projects. Both overinvestment and underinvestment negatively affect firm performance (Fu, 2010). In addition, according to Abbas et al. (2018), firms that invest inefficiently have higher costs of equity, i.e., it is harder for these firms to attract new investors. Given the importance of efficient investment to firm growth and performance, there has been a significant body of literature on the factors affecting IE (see, e.g., Andres, 2011; Biddle & Hillary, 2006; Biddle et al., 2009; Bushman & Smith, 2001; Cutillas Gomariz & Sánchez Ballesta, 2014). Among these factors, financial reporting quality (FRQ) and ownership structure have attracted researchers' attention. Prior studies indicate that FRQ enhances IE by reducing information asymmetry, moral hazard and adverse selection, some of the main causes of sub-optimal investment (Biddle et al., 2009; Bushman & Smith, 2001; Healy & Palepu, 2001). Several studies also demonstrate that ownership structure has a significant effect on corporate IE. For example, Chen et al. (2017) report an inverse relationship between IE and ownership concentration of Chinese listed firms. The authors argue that concentrated ownership provides opportunities for block shareholders to expropriate minority shareholders and this expropriation could lead to sub-optimal investment. Prior research also pays attention to the effects of some ownership types such as state ownership, family ownership and foreign ownership on IE. Most studies find that state ownership gives rise to investment inefficiency since state-owned enterprises (SOEs) have more severe information asymmetry than non-SOEs (Chen et al., 2011; Chen et al., 2017; Dollar & Wei, 2007). On the other hand, several authors, such as Andres (2011) and Pindado et al. (2011), report that family ownership positively influences IE. These authors argue that family-controlled firms are good at selecting investment projects due to the insightful knowledge and long-term involvement of the family members in the management of their firms. Thus, family firms are less prone to deviation from the optimal investment level than other types of firms. Regarding foreign

ownership, Koo and Maeng (2006) and Chen et al. (2014) find that IE is enhanced in foreign-owned firms. These authors argue that foreign investors prefer firms with low information asymmetry and are more active in managerial monitoring. Thus, managers of foreign-owned firms have less opportunity to pursue their own interests by investing sub-optimally.

To date, most empirical studies on the effect of FRQ on IE focus on the US and other developed markets (see, e.g., Biddle & Hilary, 2006; Biddle et al., 2009; Cutillas Gomariz & Sánchez Ballesta, 2014; McNichols & Stubben, 2008). Research on emerging markets is limited and incomplete. For example, Chen et al. (2011) investigate the influence of FRQ on the IE of firms in some emerging markets, but their study is restricted to private firms. In addition, some other studies on emerging markets such as Dang and Ngo (2020), Herbert and Harto (2021) and Hung et al. (2020) do not control for endogeneity. Since the presence of endogeneity could lead to biased and inefficient estimates (Wooldridge, 2002), failure to control for endogeneity could invalidate these studies' findings. Regarding ownership structure, research on the relationship between ownership structure and IE has been predominantly conducted in China (Chen et al., 2014; Chen et al. 2017; Dollar & Wei, 2007) and mostly focuses on three types of ownership structure - state ownership, foreign ownership and family ownership (Andres, 2011; Chen et al. 2017; Koo & Maeng, 2006; Pindado et al., 2011). The effect of other types of ownership, such as institutional ownership and managerial ownership, on IE has been largely unexamined. The lack of comprehensive research on the effect of FRQ and ownership structure on IE in emerging markets motivates this study. This study aims to investigate the relationships among FRQ, ownership structure and IE of listed firms on the Vietnamese stock market, an emerging market in Asia. Four proxies for FRQ and three measures of ownership structure - ownership concentration, institutional ownership and managerial ownership – are used to test the effects of FRQ and ownership structure on IE.

1.2   Research background

Vietnam is an emerging and transition economy in Southeast Asia. Before 1986, Vietnam's economy was centrally-planned and most Vietnamese people lived in severe poverty. In 1986, Vietnam undertook a series of reforms to transition to a market-oriented economy. Since the introduction of the economic reform in 1986, Vietnam's economy has experienced impressive economic growth. During 1992-2000, the average annual gross domestic product (GDP) growth rate of Vietnam was 7.78% (see Figure 1.1), ranking third in the world behind only China and India (General Statistics Office of Vietnam, 2002). According to the World Bank (2013b), the reform process has transformed Vietnam "from one of the poorest in the world into a low middle-income country" and "one of the most dynamic emerging markets in East Asia region". In 2018, Vietnam was one of the leading exporters of some agricultural products such as rice (top 3), coffee (top 5) and pepper (top 1) (Tridge, 2019) and was a

favourable destination for foreign investment in Southeast Asia. Goldman Sachs (2005) listed Vietnam as one of the Next Eleven (N-11), a group of emerging markets with the potential to become important economies in the 21st century. However, in the last decade, the Vietnamese economy has suffered from a decline in growth. Figure 1.1 shows that the GDP growth rate of Vietnam in the 2010-2018 period averaged at 6.23%, which was lower than the government's target rate (6.5-7%) (General Statistics Office of Vietnam, 2019). Although the economic downturn was partly because of external factors such as the 2008 global financial crisis and the decreasing prices of exporting commodities, it also revealed some inherent problems of the country. The lacking experience of the government in macroeconomic management has led to high inflation in 2008 and 2011 and large trade deficits in 2015. In addition to policy issues, the local firms also have several weaknesses, one of which is the low efficiency of investment. Hung et al. (2020) find that Vietnamese listed firms have difficulty in accessing external finance and, in general, have low IE. The authors also document that underinvestment is more prevalent than overinvestment on the Vietnamese stock market. Since IE is a major concern of Vietnamese listed firms, investigating the factors that affect the IE of these firms is very important.
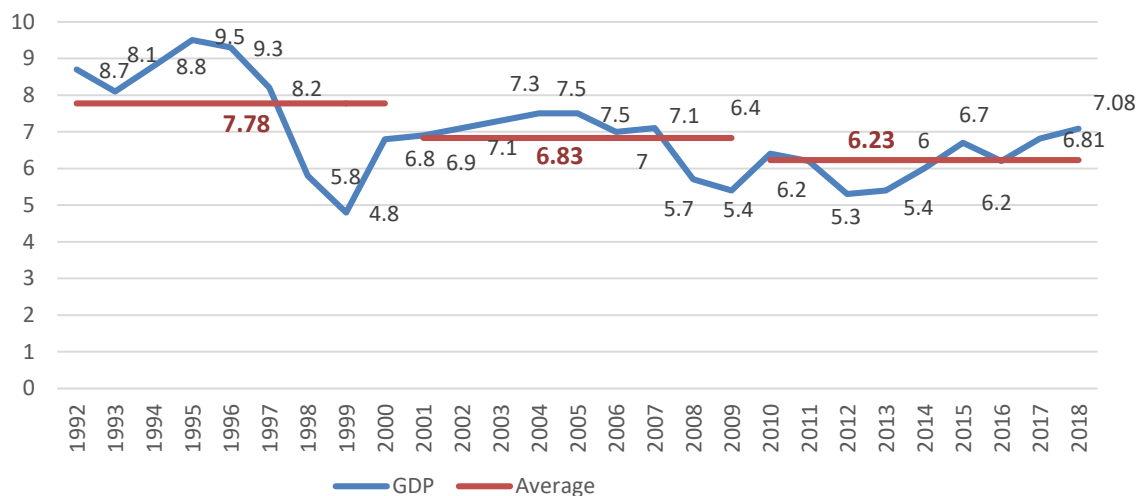
Figure 1.1   Vietnam's GDP % growth rate 1992-2018
Source: Data collected from the General Statistics Office of Vietnam and computed by the author

Vietnam provides an interesting background to explore the relationship between ownership structure (ownership concentration, institutional ownership and managerial ownership) and IE due to several reasons. First, a majority of Vietnamese listed firms are characterised by highly concentrated ownership structures (Nguyen, 2017). However, most previous studies about ownership concentration in Vietnam focus on the influence of ownership concentration on firm performance. For example, Nguyen et al. (2015) and Tran and Le (2020) document a significant relationship between concentrated

ownership and firm performance of Vietnamese listed firms. On the contrary, Hoang et al. (2017) find no significant relationship between ownership concentration and firm performance on the Vietnamese equity market. To date, there is no study on the relationship between ownership concentration and IE of Vietnamese listed firms. Second, the effects of institutional ownership and managerial ownership on IE have been largely ignored on the Vietnamese equity market. Most previous research on ownership structure and IE of Vietnam focuses on state ownership and foreign ownership. For instance, using a sample of listed firms on the Ho Chi Minh Stock Exchange, Vo (2019) finds that residual state ownership negatively affects IE. On the contrary, O'Toole et al. (2016) document no difference in IE between SOEs and private firms in Vietnam. Nevertheless, the authors do find that privatised SOEs with only small State shareholdings have better IE than other firms, suggesting that the privatisation of SOEs by the Vietnamese government has been quite successful. Based on data of 621 Vietnamese listed firms from 2007 to 2017, Tran (2020) reports that foreign ownership negatively affects Vietnamese firms' IE. The author argues that most foreign investors in Vietnam are risk-averse and prefer safe business, hence they might ignore profitable but risky projects.

Figure 1.2 illustrates the average shareholdings of the four main types of shareholders in the Vietnamese stock market from 2010 to 2018. It shows that the average shareholding of institutional investors is fairly high, lower only than that of State shareholders. Notably, in 2013, the total shares that institutional investors held were higher than State shareholders. Regarding managerial ownership which is represented by the shareholding of insiders, although the average proportion of managerial ownership is lower than those of state ownership and institutional ownership, it is still higher than that of foreign ownership and is increasing steadily. Therefore, it can be concluded that institutional and managerial shareholders play a significant role on the Vietnamese stock market and there exists a need to explore the influences of institutional and managerial ownership on the IE of Vietnamese listed firms.
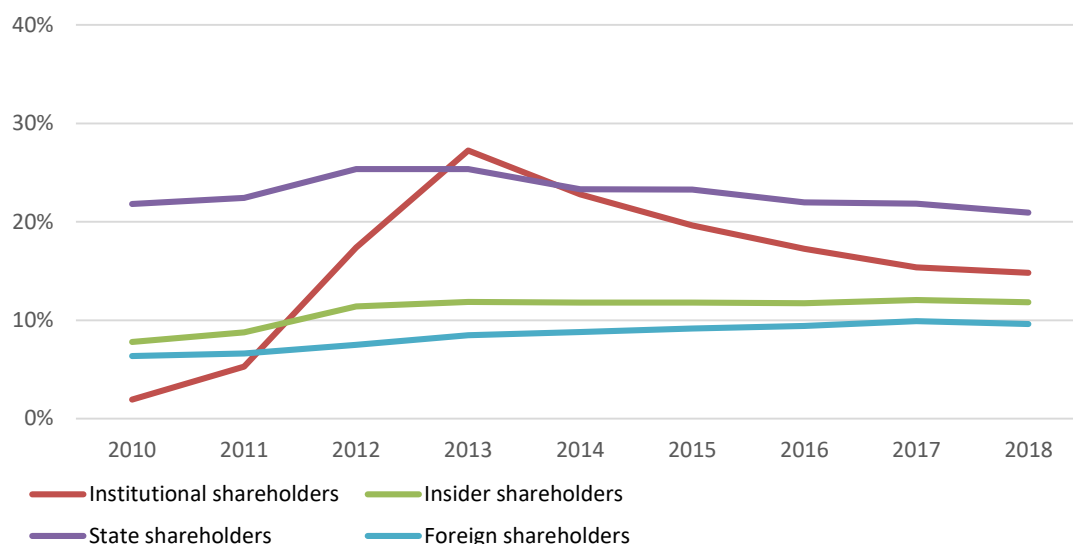
Figure 1.2   The percentage of shareholdings held by the four main types of shareholder
Source**:** Data collected from Bloomberg and computed by the author

With regard to FRQ and IE, there are two studies on the effect of FRQ on the IE of Vietnamese listed firms. The first study, by Hung et al. (2020), reports that FRQ positively influences the IE of Vietnamese listed firms. The authors use the variability of profits to proxy for FRQ. The second study, by Dang and Ngo (2020), also documents a positive relationship between FRQ and IE on the Vietnamese equity market. Unlike Hung et al. (2020), Dang and Ngo (2020) use five accruals measures to proxy for FRQ. However, neither Hung et al. (2020) nor Dang and Ngo (2020) control for possible endogeneity in their studies. Since some previous studies, such as Chen et al. (2011) and Li and Wang (2010), suggest that FRQ may be endogenous, Hung et al.'s (2020) and Dang and Ngo's (2020) failure to correct for endogeneity could lead to erroneous inferences. This study controls for possible endogeneity of FRQ in the robustness test by using two-step system GMM estimators. Regarding the FRQ proxies, four accruals measures are used to proxy for FRQ, three of which were not used in Hung et al.'s (2020) and Dang and Ngo's (2020) studies.

This study also explores whether the effects of FRQ on IE and ownership structure on IE change in state-owned listed firms (firms in which the State holds over 50% of the voting shares). Extant research suggests that state ownership could either positively or negatively affect FRQ. Gaio and Pinto (2018) find that the accounting quality of SOEs is lower than that of non-SOEs in European countries. Similarly, using a sample of SOEs listed in the Chinese A-share market from 2009 to 2017, Gong and Choi (2021) report that greater state ownership results in lower reporting quality of Chinese listed firms. Conversely, Essa et al. (2016) and Tam et al. (2018) find that private firms have a greater likelihood of manipulating their earnings than state-owned firms on the Vietnamese equity market. Unlike other transitional economies in Central and Eastern Europe which aim to fully transition to a market

economy, Vietnam follows China to pursue a "socialist-oriented market economy" (Nguyen and Vo, 2022). This economic system is a market economy under the leadership of the Socialist party (the State). This system allows Vietnam to open its economy to the world and boost the private sector (non-SOEs) while still maintaining the dominance of state ownership in important industries and firms. Although the number of non-SOEs has increased significantly in the last two decades, listed SOEs still dominate the equity market in Vietnam (Fujita, 2020). Since state ownership has a strong presence on the Vietnamese stock market), it is important to investigate whether the influence of FRQ on IE is weaker or stronger in SOEs. Furthermore, the role of other shareholders, such as institutional shareholders and managerial shareholders, might be different between SOEs and non-SOEs. In SOEs, these shareholders will have sparse access to internal information, weak voting power due to their low ownership stakes and higher cost of monitoring (Claessens et al., 2002). Therefore, they may become "free riders" and leave the monitoring role to the State. As a result, the effect of ownership concentration, institutional ownership and managerial ownership on IE may change in SOEs.

As of now, there is no study on the interaction effect of ownership structure and FRQ on IE on the Vietnamese stock market. Since concentrated ownership is an important characteristic of most Vietnamese listed firms, it is critical to explore whether ownership concentration plays any role in mediating the relationship between FRQ and IE. It is also important to investigate the interaction effect of institutional (managerial) ownership and FRQ on IE since these two types of ownership concentration are relevant on the Vietnamese stock market.

1.3   Research objectives

The objectives of this study are to:

i. investigate whether FRQ enhances IE of Vietnamese listed firms;

ii. examine the relationship between ownership structure and IE of Vietnamese listed firms (specifically, the study investigates how ownership concentration, institutional ownership and managerial ownership influence IE);

iii. explore how the effect of FRQ on IE and ownership structure on IE may change in Vietnamese State-owned listed firms compared to non-State-owned listed firms; and

iv. test the interaction effect of ownership structure and FRQ on IE of Vietnamese listed firms.

1.4   Significance of the study

To my best knowledge, this is the first study that explores the influence of ownership concentration on IE on the Vietnamese stock market. Prior literature has investigated this influence in some stock

markets such as China (Chen et al. 2017), Pakistan (Azhar et al., 2019) and Jordan (Tayem, 2015), but no such study has been conducted on the Vietnamese stock market. Vietnam is not only an emerging market but is also a transition economy. Therefore, it differs from other emerging economies in some aspects, such as the lack of a legal framework and institutions to protect minority shareholders (World Bank, 2013a) and the influential role of the State in many listed firms (Vo, 2019). As a result, the findings from other emerging markets might not hold for the Vietnamese stock market and it is necessary to explore the effect of ownership concentration on IE in Vietnam.

This study also constitutes the first attempt to examine the effects of institutional ownership and managerial ownership on IE in the context of the Vietnamese stock market. Previous research on the link between ownership structure and IE of Vietnamese firms does not address the influence of these two types of ownership (O'Toole et al., 2016). Given the importance of institutional and managerial shareholders on the Vietnamese stock market (see Figure 1.2), it is essential to take into account institutional and managerial ownership when examining the relationship between ownership structure and IE of Vietnamese listed firms.

In addition, this study sheds light on the effect of ownership structure on the relationship between FRQ and IE on the Vietnamese stock market, which has not been previously explored. Prior studies have predominantly focused on the direct relationship between FRQ and IE or between ownership structure and IE (Biddle et al., 2009; Chen et al., 2014; Pindado et al., 2011). There is little research that investigates how FRQ affects IE in firms with different ownership structures.

This study also supplements extant literature by exploring the effects of FRQ and ownership structure on IE in state-owned listed firms. Although the Vietnamese government has been actively trying to divest state capital from listed firms, the number of listed firms in which the State holds over 50% of the total shares in the Vietnamese stock markets is still substantial. Fujita (2020) finds that in 2016, among the 100 largest firms on the Vietnamese stock market, 39 firms (approximately 40%) have the State as the controlling shareholder. Therefore, it is important to explore whether the influence of firm-level characteristics such as FRQ and ownership structure on IE change under the influence of state ownership.

Moreover, this study enriches the literature on IE in emerging markets. Empirical research on IE in emerging markets is quite limited despite the increasing contribution of these markets to the world's economy. Therefore, this study adds to the understanding of the effects of firm-specific characteristics on IE in emerging markets, which might help firms in these markets improve their IE.

Finally, this study provides some managerial implications and suggestions for Vietnamese listed firms and policy-makers on how to mitigate firm-level investment inefficiency. For instance, the study's

results reveal that FRQ helps mitigate investment inefficiency of Vietnamese listed firms. Therefore, shareholders should require managers to improve the FRQ of their firms to enhance IE.

1.5 Organisation of the thesis

The rest of the thesis is structured in the following manner. Chapter 2 reviews the literature on the relationships among ownership structure, FRQ and IE. Based on the literature, 11 hypotheses are developed. Sample selection, definitions of variables and methodology are presented in Chapter 3, followed by the empirical results in Chapter 4. Chapter 5 summarises the main findings and limitations, discusses policy implications and provides suggestions for future research.

Chapter 2

Theoretical background, literature review and hypothesis development

2.1 Introduction

Chapter 2 provides a comprehensive theoretical and empirical literature review of research relevant to the study. Section 2.2 discusses the concept of IE including the definitions and determinants of IE in the literature. Section 2.3 reviews prior research on the relationship between FRQ and IE in the context of developed markets, emerging markets and Vietnamese market. Section 2.4 discusses the effect of three ownership structures: ownership concentration, institutional ownership and managerial ownership, on IE. Section 2.5 reviews the effect of FRQ and ownership structure on the IE of SOEs. Prior research on the interaction effect of FRQ and ownership structure on IE is discussed in Section 2.6. Sections 2.3 to 2.6 also develop testable hypotheses. Section 2.7 summarises the chapter.

2.2 Investment efficiency

2.2.1 Definitions of investment efficiency

To date, there has been no universally accepted definition of IE. However, most researchers define IE based on three popular theories: neoclassical theory, agency theory and real options theory (Gao & Yu, 2020). The neoclassical theory of investment is built on the assumption that the ultimate goal of a firm is to maximise the present value of discounted net cash flows subject to some constraints from its production function (Abel & Eberly, 1994; Fazzari et al., 1988; Hayashi, 1982; Jorgenson, 1963; Keynes, 1936). This goal decides the firm's optimal investment level. Any investment that deviates from the optimal level would be considered inefficient. Sub-optimal investment could be in the form of overinvestment or underinvestment (Bertrand & Mullainathan, 2003; Hubbard, 1998). Overinvestment occurs when firms make more investments than the optimal level by undertaking negative NPV projects. In contrast, underinvestment refers to the abandonment of projects with positive NPV. To measure IE, many neoclassical authors have tried to capture the optimal level of investment. According to Keynes (1936), the optimal investment level depends solely on the marginal return to capital. Keynes asserts that firms use the marginal return to capital to rank investment projects and select the projects where the marginal return to investment is greater than the cost of capital. His theory, however, suffers from two major drawbacks. First, the theory does not take into

account the investment adjustment costs. Second, Keynes assumes that the marginal return to capital is the same for all firms' investments. In fact, this assumption may not hold when firms have decreasing or increasing returns to scale.

Jorgenson (1963) modifies Keynes' theory by taking into account the influence of adjustment cost on the optimal investment level. The author considers the optimal investment rate as the rate that offsets the marginal adjustment cost with Tobin's marginal q. Based on Jorgenson's idea, some researchers have developed measures of IE that involve Tobin's q. For example, Abiad et al. (2008, p. 270) measure IE as "the variation in expected returns by the dispersion in Tobin's q". Abel and Eberly (1994) propose a theoretical framework that indicates that the optimal investment level can fluctuate depending on Tobin's q. Consistent with Abel and Eberly (1994), Bushman et al. (2011) develop a model to reflect the relationship between optimal investment and the timely recognition of economic losses. The optimal investment level is derived by taking the first derivative of the adjustment cost function. McNichols and Stubben (2008) regard sub-optimal investment as excess investment from the optimal investment level that is the residual from the total investment opportunities. The authors also use Tobin's q to control for firm-specific investment opportunities. Although the above measures incorporate the influence of adjustment cost on optimal investment level, the limitation of Tobin's q jeopardises the validity of these measures. First, Tobin's q theory is based on two assumptions, "the constant returns to scale" and "perfect competition", which may be violated in the real world (Hayashi, 1982). Second, since the marginal q cannot be directly observed (Hayashi, 1982), several measures are used to proxy for marginal q, which can lead to measurement error.

To overcome the drawbacks of Tobin's q-based measures of IE, Biddle and Hilary (2006) use "investment-cash flow sensitivity" as a proxy for IE. They argue that financially constrained firms rely on internal funds to support their investments. Therefore, "investment-cash flow sensitivity" reflects the efficiency of a firm's investments. The greater the "investment-cash flow sensitivity", the lower the IE. Like other measures of IE, this method has some limitations. First, since it is initially developed for financially constrained firms, it is not suitable for firms that have unlimited access to external funds. Second, Chen and Chen (2012) document that cash flow sensitivity has almost completely disappeared in the past few years, making "investment–cash flow sensitivity" a poor proxy for IE.

Another theory based on the neoclassical framework is the accelerator theory (Samuelson, 1939). The accelerator theory of investment presumes that the investment level is a function of the output level. If there is a growth in output level, firms will make more investments to expand their capacity. Based on the accelerator theory, Biddle et al. (2009) propose a model to investigate the relationship between firm-level investment and sales growth. The residuals from their model are regarded as proxies for sub-optimal investment. Observations in the bottom quartile are categorised as "underinvestment"

and those in the top quartile are categorised as "overinvestment". Although the authors' model is quite simple and easy to estimate, it suffers from one limitation. The limitation is that the model is based on the presumption that a firm can alter its investment completely within a short period of time. However, in the real world, the adjustment of capital investment is time-consuming and requires a considerable amount of resources.

Another literature strand defines IE based on the well-known agency theory (Berle & Means, 1932; Jensen & Meckling, 1976). The agency theory is concerned with the conflicts between the owners (principals) and managers (agents) of a firm. In older types of firms such as sole proprietorship or family firms, there is a convergence of interest between owners and managers. However, in the modern corporate world, the control and ownership of a firm are often separated (Berle & Means, 1932). The emergence of large enterprises has led to the establishment of public firms in which numerous shareholders contribute their money to a firm's equity. Most shareholders are not actively involved in a firm's day-to-day management. Instead, they enter into a contract with managers who are paid to manage the firm's day-to-day activities and serve the shareholders' interests. Since shareholders do not personally take care of the firm on a daily basis, they possess less information about the firm's performance than managers. This is often referred to as the "information asymmetry" problem. In the presence of asymmetric information, managers may try to maximise their own welfare rather than that of the shareholders (Jensen & Meckling, 1976). This will result in conservative investment, which is the rejection of risky but value-enhancing projects. Therefore, under the agency theory framework, IE is defined as the riskiness of investment projects carried out by managers (Biddle et al., 2013; John et al., 2008). The rationale is that if managers undertake risky but profitable projects, the firm's IE will improve. The biggest disadvantage of these methods is that they do not directly measure the optimal level of IE. That is why these measures are not commonly used to proxy for IE.

Real options theory presumes that firms are allowed to make an adjustment to their investment projects when unfavourable events occur (Myers, 1977). Specifically, managers are given the option to expand production, abandon a project, change inputs and outputs, and delay production under uncertainty. According to real options theory, an investment is considered efficient when managers exercise their available options in the right manner. Based on this idea, Bulan (2005) develops a model to examine the relationship between corporate investment and uncertainty. In Bulan's model, total firm risk is decomposed into market, industry and firm-specific risks. The author discovers that higher industry and firm-specific uncertainty lead to a decrease in investment. Although the real options theory approach is more realistic than the neoclassical theory approach since it takes into account the choices that firms can make under unfavourable circumstances, it provides no information about the optimal investment level. Another drawback of this method is the difficulty in measuring uncertainty.

Typically, investment decisions are made based on forecast uncertainty. However, when applying the model, ex-post estimates of uncertainty are often used, which may result in measurement error.

Although there are various definitions of IE in the literature, most prior studies on the relationship between firm-level characteristics and IE use the definition based on the neoclassical theory (e.g., Biddle et al., 2006; Chen et al., 2011; Pindado et al., 2011). This definition provides researchers with a framework to measure the optimal investment level. Therefore, this study adopts the definition of IE based on the neoclassical theory of investment.

2.2.2 Determinants of investment efficiency

This study adopts the neoclassical investment theory to define IE. However, the theory does not provide a sufficient theoretical foundation to explore the determinants of IE since it mostly focuses on the optimal investment level (Jorgenson, 1963; Keynes, 1936). Therefore, the study follows Biddle et al. (2009) to discuss the determinants of IE based on the agency theory, which is inarguably the most well-known theory on the behaviours of firms in modern finance.

The agency theory posits that the separation between ownership and control of a firm can result in information asymmetry, a situation in which managers are better informed about the firm's performance than its owners (Berle & Means, 1932; Jensen & Meckling, 1976). Since managers and shareholders have conflicting interests, which Jensen and Meckling (1976) refer to as principal-agent conflicts, managers could be self-interested and exploit firms' resources to favour their interests. Moral hazard occurs when managers use their insider information to pursue their personal welfare rather than that of shareholders. Moral hazard can lead to either overinvestment or underinvestment depending on the amount of free cash flow that is the available funds in "excess" of that required to finance all projects with a positive NPV (Bertrand & Mullainathan, 2003; Jensen, 1986; Shleifer & Vishny, 1989). If managers have substantial amounts of free cash flow at their disposal, they will try to grow the firm beyond the optimal level to expand their power and increase their compensation (Jensen, 1986). This "empire building" motive induces managers to invest even in projects with a negative NPV, which is in stark contrast to shareholders' interests. In their widely cited paper, Opler et al (1999, p.35) conclude that "firms with more excess cash have higher capital expenditures, and spend more on acquisitions, even when they have poor investment opportunities". In addition to the "empire building" motive, managers may overinvest for "entrenchment" purposes. Shleifer and Vishny (1989) find that some managers invest in projects that are value-destroying but emphasise their competencies to boost their personal values and reputation, rather than benefit the company financially. Sub-optimal investment also occurs when managers opt for a "quiet life" and avoid making difficult decisions (Bertrand & Mullainathan, 2003). On the one hand, this can result in overinvestment if managers refuse to shut down an old and underperforming plant because it may involve confronting

the labour unions and sacking employees. On the other hand, this can also lead to underinvestment if managers refrain from making a profitable but risky investment that may put them under considerable pressure. Another source of inefficient investment is reputational concern. Holmstrom and Ricart i Costa (1986) argue that reputational concerns may prevent managers from undertaking new investment projects because the result of a new project will provide the public with more information about the managers' competencies. Managers do not like their competencies to be revealed when they plan to move to another firm that promises them higher salaries. On the other hand, if a firm does not have free cash flow and needs financing from external sources, the debt-holders will closely monitor the managers' investment decisions, which leads to underinvestment (Lambert et al., 2007; Stiglitz & Weiss, 1981).

Several previous studies also suggest that adverse selection may cause sub-optimal investment (Stiglitz & Weiss, 1981; Myers & Majluf, 1984). Adverse selection happens when better-informed managers seek to sell overpriced securities to achieve additional funds (Myers & Majluf, 1984). If they succeed, they will overinvest the proceeds (e.g., Baker et al., 2003). To overcome this problem, debt-holders can place restrictions on the number of new investments or raise their cost, which results in underinvestment because some profitable projects will be passed up because of capital constraints (Lambert et al., 2007; Stiglitz & Weiss, 1981). Myers and Majluf (1984) document that, in the presence of adverse selection, the cost of external funds will increase because investors cannot distinguish between good and bad borrowers. To protect themselves, they demand a higher return on their loans or lower the price they are prepared to pay for a firm's equity. The higher cost of capital and the lower stock price will lead to a stronger reliance of a firm's investments on internal cash flow and underinvestment.

In addition to moral hazard and adverse selection, investment inefficiency could stem from the conflict of interest between controlling shareholders (those who own over 50% of total equity) and minority shareholders (also called the principal-principal (PP) conflicts) (La Porta et al., 2000; Shleifer & Vishny, 1997). PP conflicts tend to arise from a combination of two factors: (1) concentrated ownership and control; and (2) weak protection of minority shareholders (Dharwadkar et al., 2000; Young et al., 2008).

The well-known agency theory proposed by Berle and Means (1932) and Jensen and Meckling (1976) is based on the assumption of dispersed ownership. However, in many economies, such as emerging economies, dispersed ownership is not the norm (La Porta et al., 1999). In these markets, ownership and control of many firms are concentrated in the hands of a few controlling shareholders, which places them in a position of ultimate power (Jiang & Peng, 2011). In many cases, controlling shareholders may abuse their decision-making power to expropriate minority shareholders, especially

when minority shareholder rights are not adequately protected by the institutional environment. Expropriation could come in various forms such as diverting a firm's assets to another firm owned by the controlling shareholders or appointing underqualified family members or allies to important positions (Young et al., 2008). In some cases, expropriation can be accomplished by undertaking value-destroying projects or ignoring profitable projects that do not benefit the controlling shareholders, which results in sub-optimal investment (Huyghebaert & Wang, 2012). Figure 2.1 illustrates how information asymmetry, concentrated ownership and weak protection of minority shareholders lead to investment inefficiency.
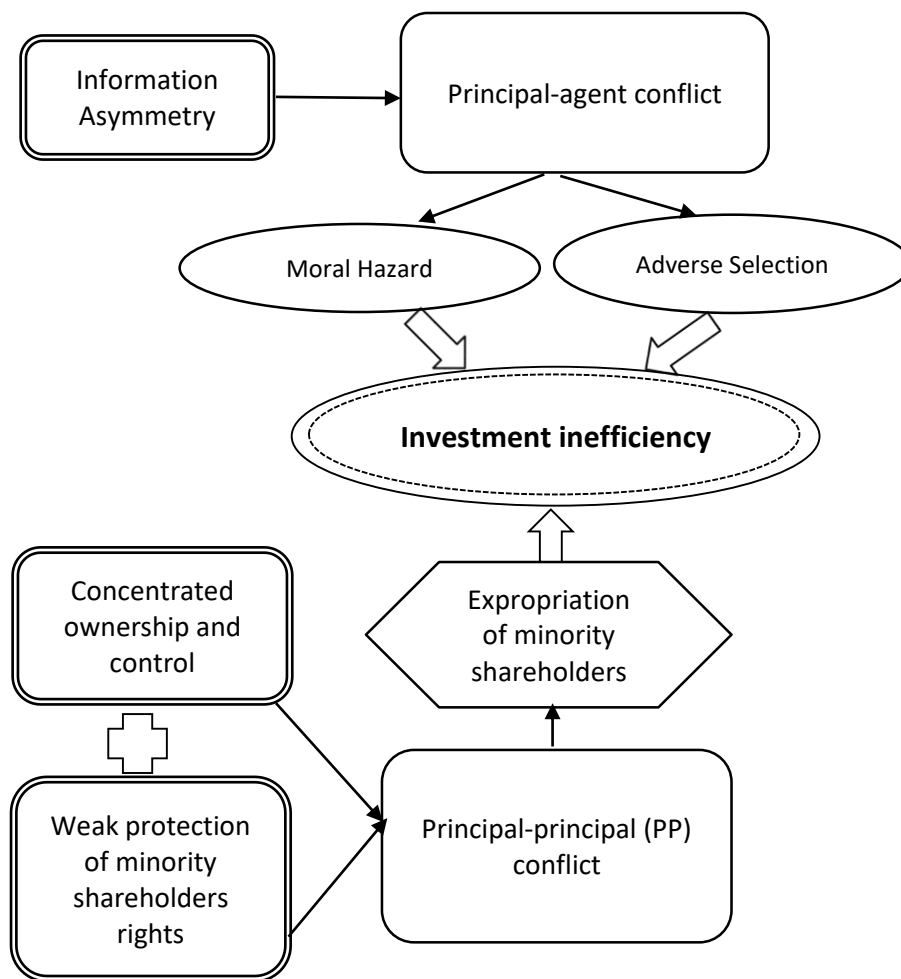
Figure 2.1   Causes of investment inefficiency
Source: Author's compilation from the literature

2.3   Financial reporting quality and investment efficiency

2.3.1   Definition and measurement of financial reporting quality

One of the most widely accepted definitions of FRQ was proposed by Biddle et al. (2009, p. 113), who define FRQ as "the precision with which financial reporting conveys information about the firm's operations, in particular its expected cash flows, that inform equity investors". This definition is quite

similar to that of Tang et al. (2008), who view FRQ as the extent to which financial reports reflect accurate and unbiased information about a firm's performance. Another commonly used definition of FRQ is provided by the Chartered Financial Analyst (CFA) Institute. According to CFA Institute (2015), FRQ is defined as the reliability with which a firm's financial statements convey information about its operating performance and its usefulness for forecasting future cash flows. From these definitions, two main features of high-quality financial reporting information can be inferred. First, financial reporting information must be reliable. According to the Financial Accounting Standards Board's Conceptual framework for financial reporting, financial information is considered to be reliable if it is "complete, neutral and free from error". When the financial information is complete, it provides users with all necessary data about the operating performance of the firm. Neutral information means that the information is free from bias and is not manipulated to influence the decision of users. Second, it must be useful and relevant to the decision-making process of shareholders and other stakeholders. Financial information is relevant if it helps decision-makers predict the future cash flow of a firm and assists them in making rational investment decisions. For instance, managers can possibly select good investment projects by looking at the profit margins reported by other firms.

Given the importance of high-quality financial reporting information, extant research has suggested different proxies for the measurement of FRQ, among which disclosure quality and earnings quality are the most commonly used proxies. In measuring disclosure quality, some researchers have developed their own disclosure index which incorporates the evaluation of some disclosure items on the annual reports (e.g. Buzby, 1974; Cooke, 1989; Hooks et al., 2002). For example, Buzby (1974) constructs an index of 39 items to assess the disclosure of financial and non-financial information on the annual reports of small and medium-sized firms. The weight of each item is determined based on its importance toward disclosure quality as perceived by the financial analysts. Likewise, Hooks et al. (2002) develop an index of 76 information items to measure disclosure quality and assign the weight of the item based on professional opinions. In addition to the disclosure index, some authors use the disclosure ratings provided by professional bodies as measures of disclosure quality. For instance, Ben and Monahan (2004) and Healy et al. (1999) use the AIMR ratings issued by CFA to proxy for voluntary disclosure quality of U.S firms. Other ratings used to measure disclosure quality include ratings issued by Financial Analysts Federation – FAF and the ratings by Standard & Poor's (S&P).

Earnings information is one of the factors that investors pay most attention to in financial reports, Therefore, earnings quality is also a common proxy for FRQ. One popular proxy for earnings quality is earnings persistence, which is the continuity and stability of current earnings (Kormendi & Lipe, 1990). Researchers who support the use of earnings persistence argue that firms with more persistent earnings have more ''sustainable'' cash flow that is helpful for equity valuation (Richardson et al., 2005; Sloan, 1996). Current earnings can be decomposed into two components: the cash flow and accrual

component. Sloan (1996, p. 290) argues that "the earnings performance attributable to the accrual component of earnings exhibits lower persistence than earnings performance attributable to the cash flow component of earnings". Therefore, the coefficient of the cash flow component will be considered a measurement of earnings persistence. Another common proxy for FRQ is abnormal accruals (also called discretionary accruals). Today, most countries use accruals-based accounting systems, thus abnormal accruals are considered by many researchers as appropriate proxies for FRQ (Dechow et al., 1995; Jones, 1991). While normal accruals refer to adjustments that represent earned revenue and incurred expenses, discretionary accruals reflect distortions caused by the misapplication of accounting rules or earnings manipulation. Some widely used accruals models include the Jones (1991) model, the Kothari et al. (2005) model, the Dechow and Dichev (2002) model and the Francis et al. (2005) model. Earnings smoothing or income smoothing is also a common measure of FRQ. Because earnings can greatly fluctuate over time, managers often use smoothing techniques to reduce the variation and improve the persistence of earnings (Beidleman, 1973; Fudenberg & Tirole, 1995). However, if managers unethically use smoothing techniques to create a huge amount of cash flow, it will lead to a distortion in earnings and mislead investors (Bhattacharya et al., 2003). There are two measures of earnings smoothing, the volatility of earnings relative to the volatility of cash flow from operating activities (CFO) and the correlation between the change in accruals and the change in CFO (Leuz et al., 2003; Myers & Skinner, 1999). Extant research also uses time loss recognition (TLR) as a proxy for FRQ. This measure is based on the rationale that if the incurred losses in returns are recognised in a timely manner, a firm will have better earnings quality (Ball & Shivakumar, 2005; Basu, 1997). There are, however, some measurement issues with TLR (Dechow et al., 2010). First, TLR measures are based on the assumption of market efficiency, which might not apply in the real world. Second, losses in returns might reflect all information, not just earnings information so it may not be appropriate to infer earnings quality from the TLR.

Due to the limited data of Vietnamese listed firms, this study could not develop a disclosure index or use a professional body's index to measure disclosure quality. Instead, the earnings quality measures, in particular, the discretionary accruals and TLR, are used to proxy for FRQ. Although there are several problems associated with accruals models, such as model misspecification and omitted variables (McNichols, 2002; Dechow et al., 2002), they are still the most widely used proxies for the measurement of FRQ. Dechow et al. (2010) find that in their review of 300 papers of FRQ, around 100 papers use the abnormal accruals as proxies for earnings quality. The methodology used in this thesis to obtain abnormal accruals will be discussed in the next chapter.

2.3.2 The relationship between financial reporting quality and investment efficiency

Prior research suggests that higher FRQ can enhance IE by reducing information asymmetry that gives rise to market imperfections such as moral hazard and adverse selection (Bushman & Smith, 2001; Lambert et al., 2007; Leuz & Verrecchia, 2000; Kanodia & Lee, 1998). When moral hazard and adverse selection are mitigated, firms will enjoy better project selection ability and lower cost of capital which results in the reduction of inefficient investment (see Figure 2.2).

Material removed due to copyright compliance

Figure 2.2   The link between financial reporting quality and investment efficiency
Source: Adapted from Verdi (2006)

Kanodia and Lee (1998) argue that financial reporting provides a significant firm-specific source of information for investors to monitor firms' operations and therefore, reduces information asymmetry between shareholders and managers. The authors observe that most investors use financial reports to assess and predict the firm's future cash flows before making investment decisions. Therefore, these reports have a disciplinary role over managerial behaviour. To enhance the credibility of financial reports and attract the attention of investors, managers are forced to reveal some of their insider information and information asymmetry is mitigated. The authors also propose a theoretical model in which investors can identify suboptimal investments based on the precision of the profit and loss report. Similarly, Bushman and Smith (2001) demonstrate that financial reporting information can enhance the IE and economic performance of a firm through three channels (see Figure 2.3). First, high-quality financial information reduces information asymmetry and assists management in

identifying and distinguishing between profitable and unprofitable investment projects. Second, financial information has a monitoring role over managerial investment decisions. Since shareholders often rely on financial information, especially earnings ratios, to evaluate the competency of managers, managers are put under pressure to select good investment projects or they will be dismissed by shareholders. Third, good accounting information helps mitigate adverse selection and liquidity risk. When all investors have access to high-quality information, the liquidity risk of the capital market as a whole will be reduced which will encourage investors to undertake long-term and profitable investment projects. Using a model based on the Capital Asset Pricing Model, Lambert et al. (2007) find that high-quality accounting information can mitigate a firm's cost of capital by influencing investors' appraisal of the distribution of future cash flows and reducing information asymmetry. When the cost of capital is low, firms will find it easier to raise funds and be less likely to underinvest. Regarding the relationship between adverse selection and FRQ, Chang et al. (2009) develop an adverse selection model which shows that firms with better FRQ enjoy lower adverse selection costs and lower levels of risk from their creditors and can raise capital more easily. If FRQ mitigates adverse selection, it could, therefore, improve a firm's IE.

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Figure 2.3   Three channels through which financial reporting information may affect investment and economic performance
Source: Adapted from Bushman and Smith (2001)

The positive effect of FRQ on IE has been vastly supported by many empirical studies. Based on samples of US firms, Biddle et al. (2009), Verdi (2006), McNichols and Stubben (2008) and Hope and Thomas (2008) find that higher quality financial reporting can mitigate overinvestment and underinvestment problems. Biddle et al. (2009) show that FRQ enhances the IE of US firms by mitigating information

asymmetry between managers and creditors. Specifically, the authors use four proxies to measure FRQ: two accruals quality measures developed by Dechow and Dichev (2002) and Wysocki (2008); a disclosure transparency measure proposed by Li (2008); and a summary measure of all three proxies to conclude that firms with higher FRQ are less inclined to depart from the optimal investment level and less sensitive to macro-economic shocks. Using discretionary accruals derived from Dechow and Dichev's (2002) model as proxies for FRQ, Verdi (2006) finds that FRQ is negatively associated with both overinvestment and underinvestment of US listed firms from 1980-2003. Verdi shows that the effect of FRQ on IE is more pronounced among firms in low-quality information environments. The author's findings suggest that FRQ and other sources of information are substitutable in informing investors about a firm's performance. McNichols and Stubben (2008) also examine the effect of FRQ on IE in the US market, but with a different approach. Instead of directly investigating the FRQ-IE relationship, the authors examine how the distortion of financial reporting information, which is evidenced by managers' earnings manipulation, affects the IE of US firms during the 1978-2000 period. Their research reveals that earnings manipulation is positively associated with sub-optimal investment by US firms. However, after firms correct the misreported information and improve their FRQ, their IE is enhanced. These findings, therefore, confirm the positive influence of FRQ on IE. Using a sample of US multinationals, Hope and Thomas (2008) report that firms that do not disclose their geographic earnings tend to invest extensively in their foreign operations to increase sales even though it leads to a lower profit margin. Their findings suggest that the disclosure quality of US multinational enterprises is negatively associated with overinvestment. Cheng et al. (2013) investigate the FRQ-IE relationship by examining the investment behaviour of firms that disclose weaknesses in their financial reports under the Sarbanes-Oxley Act (2002). The Sarbanes–Oxley Act (2002) is a US federal law that imposes various reporting and disclosure requirements on US listed firms with the aim of protecting investors from fraudulent accounting activity. The authors document that in the pre-disclosure period, firms that disclose weaknesses in their financial reporting tend to invest sub-optimally when they are financially constrained. However, after disclosure, these firms' IE improves considerably.

FRQ also enhances the IE of firms in other developed countries. Cutillas Gomariz and Sánchez Ballesta (2014) document a positive relationship between FRQ and IE on the Spanish stock market. In addition, the authors find that the effect of FRQ on IE is more pronounced among firms with higher levels of short-term debt financing. Cherkasova and Rasadi (2017) find that higher FRQ helps reduce the investment inefficiency of firms in Eastern European countries. The relationship between FRQ and underinvestment is stronger in the industrial sector than in the retail sector. The authors attribute this phenomenon to the prevalent use of accrual accounting and easy access to the stock market of Eastern European industrial companies.

Similar results are documented for emerging markets. Chen et al. (2011) were the first authors to examine the influence of FRQ on the IE of firms in these markets. They find that FRQ helps improve the IE of private firms in 21 emerging markets. The authors also discover that the effect of FRQ on IE increases among firms with a higher amount of bank debt and decreases among firms with more tax pressures. Chen et al.'s (2011) study, however, suffers from two drawbacks. First, the study is limited to private firms so their findings cannot be generalised to other types of firms. Second, their data are obtained from the World Bank Enterprise Survey from 2002 to 2005. Using survey data, some financial information might not be available. Therefore, their model cannot incorporate some control variables suggested in previous studies. Using five proxies to measure FRQ, Li and Wang (2010) document that FRQ mitigates investment inefficiency on the Chinese stock market. Similarly, Rad et al. (2016) report a positive relationship between FRQ and IE on the Malaysian equity market. For the Vietnamese stock market, two studies have investigated the relationship between FRQ and IE of Vietnamese listed firms. Using five discretionary accruals measures to proxy for FRQ, Dang and Ngo (2020) find that FRQ exerts a positive influence on the IE of Vietnamese listed firms. Similarly, using the variability of profit to measure earnings quality, Hung et al. (2020) document that earnings quality is positively associated with the IE of firms listed on the Vietnamese stock market. Although these two studies yield similar findings, none controls for possible endogeneity of FRQ, which could lead to biased and inconsistent estimates. Therefore, this study will address this limitation by using two-step system GMM estimators to control for endogeneity in the robustness test.

Since most prior studies show that FRQ positively affects IE, a similar finding for Vietnamese listed firms is expected. Therefore, the study's first hypothesis is:

> H1: There is a positive relationship between FRQ and IE of Vietnamese listed firms.

2.4 Ownership structure and investment efficiency

The ownership structure of a firm is identified by the distribution of equity and the identity of the equity owners (Jensen & Meckling, 1976). Ownership structure is regarded as an important corporate governance mechanism to discipline managers and improve IE (Chen, 2001; John & Kedia, 2006). The link between ownership structure and IE has recently received much attention in the literature (e.g., Chen et al., 2011; Chen et al., 2017; Jiang et al., 2011). This study focuses on the influence of three measures of ownership structure: ownership concentration, institutional ownership and managerial ownership, on IE.

2.4.1 Ownership concentration and investment efficiency

Ownership concentration is defined by the number of large block shareholders and the percentage of equity owned by shareholders (Zwiebel, 1995). There are two types of ownership concentration:

dispersed ownership and concentrated ownership. If a firm has a significant number of shareholders with minor shareholdings and no large block shareholders, it means that the firm has a dispersed ownership structure. If a few block shareholders own the majority of shares in a firm, the firm is said to have a concentrated ownership structure.

Prior studies suggest that the impact of ownership concentration on IE is influenced by entrenchment and alignment effects. As discussed in section (2.2.2), besides the principal-agent conflict (Berle & Means, 1932; Jensen & Meckling, 1976), in firms with concentrated ownership structures, there might be PP conflicts (La Porta et al., 2000; Shleifer & Vishny, 1997). Specifically, controlling shareholders might use their dominance to pursue their own welfare and expropriate minority shareholders. This is called "the entrenchment effect". Previous studies show that expropriation by block shareholders is a serious problem in Asian countries such as China, Malaysia and Indonesia (Claessens et al., 2000; Gao & Kling, 2008; Wang & Ye, 2014). Expropriation often entails abusing a firm's resources and may result in overinvestment or underinvestment (Huyghebaert & Wang, 2012). Therefore, firms with a highly concentrated ownership structure could have lower IE.

Ownership concentration may also have a positive influence on IE if there is an alignment of interests between large shareholders and minority shareholders ("the alignment effect"). Berle and Means (1932) argue that firms with dispersed ownership tend to underperform since no shareholder has enough incentive to monitor management. When ownership structure becomes more concentrated, some shareholders with large stakes may have sufficient motivation to scrutinise managers. These shareholders cooperate with minority shareholders for the ultimate benefit of their firm, rather than pursuing their own welfare. According to Jensen and Meckling (1976), investors who hold significant blocks of equity have to bear a bigger portion of the cost of "squandering corporate wealth". As a result, the exclusive gains they may derive from sub-optimal investment may not exceed the overall benefits of efficient investment. Thus, large shareholders align their interests with those of minority shareholders and pay more attention to managerial monitoring. Shleifer and Vishny (1986) find that block shareholders are willing to pay the monitoring cost since the potential benefit that they obtain can compensate for the corresponding cost. Under block shareholders' strict monitoring, managers might have less incentive to deviate from optimal investment (Bushman & Smith, 2001). Therefore, ownership concentration could have a positive influence on IE.

Empirical evidence on the ownership concentration-IE relationship is inconclusive. Using the residuals from Richardson's (2006) model as proxies for IE, Chen et al. (2017) report that ownership concentration negatively affects the IE of Chinese listed firms. The authors contend that the inverse relationship is attributable to the entrenchment effect of large shareholders on minority shareholders. Similarly, Azhar et al. (2019) document that ownership concentration harms the IE of Pakistan listed

firms. In contrast, using a sample of industrial firms listed on the Jordanian stock market, Tayem (2015) finds that when ownership concentration increases, Jordanian listed firms are more likely to invest efficiently. Tayem argues that when an investor holds a significant block of equity, he/she has to pay a large share of the cost of appropriating the firm's resources. Therefore, large shareholders tend to converge their interests with those of minority shareholders.

Since findings on the influence of ownership concentration on IE are significant but mixed, the study hypothesises that ownership concentration could either positively or negatively affect IE on the Vietnamese stock market. Consequently, the study's second hypothesis is:

> H2a: There is a significant relationship between ownership concentration and IE on the Vietnamese stock market.

2.4.2 Institutional ownership and investment efficiency

Institutional ownership refers to the percentage of shares owned by institutional investors. According to Maurer (2003), institutional investors are specialised financial organisations that pool funds from small investors and invest those funds in stocks, bonds or other assets to achieve certain goals. Institutional investors often include mutual funds, insurance companies, pension funds, commercial banks, endowment funds and hedge funds (Kochhar & David, 1996).

Institutional investors are the most common type of investor in the world. De La Cruz et al. (2019) report that institutional investors own approximately 41% of global market capitalisation in 2017. An institutional investor might be an independent entity or part of a large corporation or conglomerate. For instance, a mutual fund is often a subsidiary of a commercial bank or an insurance company. Although different types of institutional investors may pursue different objectives, they all share a few common characteristics (Maurer, 2003). First, by pooling funds, these institutions help small investors share their risks with other investors. Second, the pooling of funds enables institutional investors to invest in large volumes. Therefore, they can achieve economies of scale, i.e., have lower commission charges. Third, institutional investors mostly invest in liquid assets such as stocks, bonds and other "standardised" instruments. Investment in less liquid assets, such as real estate, account for only a small portion of their funds. Fourth, the asset management process of institutional investors is governed by professional fund managers and is subject to comprehensive regulations. Finally, most institutions match assets and liabilities in terms of maturity.

Previous studies suggest that institutional investors are associated with better monitoring of portfolio firms. Using a survey of 143 portfolio managers, chief investment managers and experts of large institutional investors in the US, Europe and other parts of the world, McCahery et al. (2010) find that

institutional shareholders actively participate in managerial monitoring. The authors document that most institutional investors intervene in the portfolio of firms via private discussions with managers. They only take public measures such as filing a shareholder proposal or criticising the management at the annual meeting if the private negotiations are not effective. Based on a sample of US hedge funds, Brav et al. (2018) find that a significant number of hedge funds in their sample (48.3%) communicate directly with the management on a regular basis. Similarly, Maug (1998) reports that large institutional shareholders tend to engage in monitoring activities to get higher returns. The author also finds that market liquidity motivates large investors' monitoring since it enables investors to hold larger stakes in the firms and reduce the monitoring costs. Aggarwal et al. (2011) document that firms with higher institutional ownership are more likely to sack incompetent managers, which suggests that institutional investors promote good governance practices. Since institutional ownership is associated with better monitoring, it is expected that institutional investors will contribute to the enhancement of IE of the portfolio firms.

Empirically, many studies document a positive relationship between institutional ownership and IE in several markets. Using a sample of non-financial listed firms on Shanghai and Shenzhen Stock Exchanges, Cao et al. (2020) find that institutional shareholders play a vital role in improving the IE of Chinese listed firms. To explore whether the effect of institutional ownership on IE is driven by certain types of institutional investors, the authors classify institutional investors into three groups based on their connection with portfolio firms, i.e., "pressure-resistant", "pressure-sensitive" and "pressure-indeterminate" investors. "Pressure-resistant" institutional investors include those who have weak relationships with the portfolio firms. "Pressure-sensitive" investors are those who maintain close relationships with the management of their portfolio firms. If the institutional investors do not have any business connection with the portfolio firms, they will be classified as "pressure-indeterminate" investors. Among the three groups, the authors report that only pressure-resistant institutional shareholders are associated with enhanced IE; this effect is stronger if these pressure-resistant institutional shareholders are long-term investors.

Ward et al. (2020) argue that institutional investors' incentives to monitor management are not the same for all firms in their portfolios. The authors, therefore, focus on the role that "motivated monitoring" institutional investors play on the IE of US listed firms. To identify "motivated monitoring" institutional investors, the authors sort all stocks of each institutional investor's portfolio into 10 decile groups based on holding value. They find that almost half of institutional investors' portfolio value is in the decile 1 group, which suggests that this group has the highest motivation to monitor portfolio firms. Using multivariate regression models, the authors find that total ownership of institutional investors in the decile 1 group is positively associated with IE, indicating that firms with more motivated monitoring institutional investors are more likely to invest efficiently.

Azhar et al. (2019) investigate the effect of several ownership structure measures including institutional ownership on IE on the Pakistan Stock Exchange. Using the dynamic GMM estimator to estimate the institutional ownership-IE relationship, the authors find that only mutual funds significantly improve IE. Other types of institutional investors have no significant influence on the IE of Pakistan listed firms. The authors argue that since mutual funds often have little business relationship with their portfolio firms, they can exercise their monitoring role better than other types of institutional investors.

Since most of the previous research suggests that institutional investors play an effective role in improving IE, institutional ownership may also positively affect the IE of Vietnamese listed firms. Therefore, the study's next hypothesis is:

H2b: There is a positive relationship between institutional ownership and IE on the Vietnamese stock market.

2.4.3 Managerial ownership and investment efficiency

Managerial ownership is defined as the fraction of shares owned by the management of the firm (Jensen & Meckling, 1976). Managerial ownership is also called insider ownership since it refers to equity stakes by managers who possess inside information of the firm.

Jensen and Meckling (1976) assert that managerial ownership may alleviate agency conflicts by reducing the divergence of interest between managers and shareholders. The authors argue that when managers' ownership claims in a firm increase, managers will have less incentive to pursue their personal welfare by engaging in value-destroying activities. In addition, when managers become shareholders, they are incentivised to devote more effort to exploring profitable investment projects (Jensen & Meckling, 1976). Managerial ownership not only mitigates shareholder-manager conflict but also eases the expropriation of minority shareholders by controlling shareholders. Using a sample of Chinese firms listed on Shanghai and Shenzhen stock exchanges, Gao and Kling (2008) find that managerial ownership helps alleviate tunneling activities by controlling shareholders when managers are minority shareholders. Tunneling refers to the expropriation of a firm's assets by controlling shareholders at the expense of minority shareholders. Since tunneling involves transferring assets from the firms to large shareholders, it may worsen firms' financial constraints and result in underinvestment (Zhang et al., 2014). If managers are minority shareholders, they will try to eliminate tunneling to protect their personal interests. As a result, underinvestment will be prevented and IE will be improved under the presence of managerial ownership. Since previous studies suggest that managerial ownership may alleviate agency problems, it is expected that insider ownership positively affects IE.

Some authors, however, suggest that the convergence of interest only exists when a manager holds a small ownership stake in a firm. Fama (1980) argues that when managers own only a minor stake, their performance will be monitored not only by other shareholders but also by market mechanisms. In particular, Fama argues that the managerial labour market serves as an effective mechanism to discipline managers. In a competitive labour market, incompetent managers could easily be replaced by better managers. Conversely, if managers are not satisfied with the compensation they receive, they may decide to leave the firm. In addition, competition in the product market (Hart, 1983) and the threat of corporate takeover (Jensen & Ruback, 1983) also discourage managers from non-value maximisation activities. If the product market is uncompetitive, i.e., some firms have supernormal profits compared with other firms, the managers of these firms may have extra funds at their disposal and are more likely to pursue personal objectives. But if the product market is perfectly competitive, there will be limited resources in the hands of managers and they will stick to value-maximisation objectives. Regarding corporate takeover, since under-performing firms could be targets for takeover, inefficient management is likely to be dismissed when a firm has a new owner. Therefore, for their own sake, managers with small ownership stakes will align their interests with those of other shareholders. However, when a manager owns a substantial stake in a firm, he/she will be entrenched and has enough voting power to guarantee his/her position in the firm. Based on a sample of 371 Fortune 500 firms in the US in 1980, Morck et al. (1988) demonstrate that when managerial ownership in a firm reaches a certain level, managers will be powerful enough to break free from shareholders' monitoring. Particularly, the authors document that when insider ownership is in the 5% to 25% range, managers will negatively influence firm performance. Similarly, using a sample of 142 firms listed on the New York Stock Exchange, Hermalin and Weisbach (1991) document a non-monotonic relationship between managerial ownership and firm performance. A positive relationship exists when managerial ownership ranges from 0% to 1% and from 5% to 20%, whereas a negative relationship is observed when managerial ownership is in 1% to 5% range and greater than 20%.

Wright et al. (1996) use cross-sectional regression to examine the relationship between insider ownership and corporate risk-taking of US listed firms in 1986 and 1992. The authors find that managerial ownership positively affects corporate risk-taking at low levels of ownership but the relationship becomes negative at high levels. Their findings suggest that when managers own small stakes, they are likely to take more risks and might overinvest. However, when equity ownership by managers increases to a certain level, they will be more conservative and might underinvest. Using data of 1,406 Belgian firms, Beyer et al. (2012) report that when managers hold a significant number of firm shares, they may overinvest in R&D projects. However, if managers hold no shares, they tend to underinvest. Their finding implies a non-linear insider ownership-IE relationship. More recently, Vijayakumaran (2021) investigates the influence of insider ownership on IE of 1,420 Chinese listed

firms during 2003-2010. Using the system-GMM method to estimate their regression models, Vijayakumaran reports that insider ownership positively affects IE because it aligns managers' incentives with the interests of shareholders.

Since previous findings on managerial ownership and IE are inconclusive, the next hypothesis is:

> H2c: There is a significant relationship between managerial ownership and IE on the Vietnamese stock market.

2.5 The effect of financial reporting quality and ownership structure on investment efficiency in state-owned enterprises

2.5.1 The effect of financial reporting quality on investment efficiency in state-owned enterprises

Previous studies provide conflicting evidence on the quality of financial reporting of SOEs. Capalbo et al. (2018) point out that state ownership can lead to lower FRQ due to two reasons. First, SOEs are often associated with lower quality of corporate governance (Borisova et al., 2012; Shleifer, 1998) and such a condition might facilitate managerial discretion and increase the likelihood of earnings manipulation. Second, external monitoring has been shown to be weaker in SOEs. According to Wang et al. (2008), the use of small local external auditors is prevalent among Chinese SOEs although these auditors may provide poorer audit quality than well-known auditors. Chen et al. (2010) argue that banks often grant credit to SOEs due to government intervention, which suggests that banks have no real monitoring role over the performance of SOEs. Therefore, it can be inferred that managers of SOEs are more inclined to manage their earnings and SOEs have lower FRQ than privately-owned enterprises (POEs).

On the other hand, some studies provide several reasons to support the existence of a positive relationship between government ownership and FRQ. First, it is documented that executive compensation contracts in SOEs typically place less weight on performance than POEs (Liu et al., 2012). As a result, managers are not motivated to engage in opportunistic behaviour to make the financial reports look good in shareholders' eyes. Second, SOEs are subject to soft budget constraints and may have better access to loans from state-owned banks (Haß et al., 2019). Since SOEs can obtain funds at a low cost, SOE managers have less incentive to manipulate their earnings.

Consistent with the theoretical arguments, there have been mixed empirical findings on the relationship between state ownership and FRQ. Some studies on Chinese SOEs provide evidence that state ownership is positively associated with earnings management (EM) which is the alteration of financial reporting information to mislead investors about the firm's performance. Using a sample of 1,176 listed Chinese companies, Guo and Ma (2015) find that EM is more prevalent in SOEs than POEs.

Similarly, Chen et al. (2008) analyse the EM activities of Chinese listed firms during 1994 - 2000 and conclude that state ownership positively affects EM. More recently, Gong and Choi (2021) use a sample of listed SOEs in China's A-share market during 2009-2017 to examine whether state ownership affects the accounting quality of Chinese listed firms. The authors use EM to proxy for accounting quality and find that SOEs in China's A-share market manage earnings more than non-SOEs. The authors argue that the positive relationship might be due to the lack of monitoring by other shareholders in SOEs. A positive relationship is also found in some other countries. Gaio and Pinto (2018) report that the disclosure quality of listed state-owned firms in European countries, measured by abnormal accruals, is much lower than those of POEs. Based on data of 1,200 Italian SOEs, Ruggiero et al. (2021) investigate the effect of three dimensions of state-owned firms: ownership, political control, and goal ambiguity, on EM. Using multivariate regression models to estimate these effects, the authors find that state ownership and financial control have a positive effect on EM.

On the contrary, Wang and Yung (2011) observe that SOEs in China are less likely to manage their earnings than non-SOEs. The authors believe that due to the protection from the government, SOE managers are placed under less pressure to manipulate earnings. The authors' finding is supported by Ding et al. (2007) who use two proxies, discretionary accruals and non-operating revenue/sales ratio, to measure EM and find that POEs in the Chinese stock market tend to manipulate their earnings more than SOEs due to their inferior position in the market. The inverse relationship between government ownership and EM is also confirmed in two studies on the Vietnamese stock markets. Essa et al. (2016) examine a large sample of 570 Vietnamese listed firms from 2010-2014. The authors find that the presence of state ownership in Vietnamese listed firms helps alleviate information asymmetry and reduces earnings manipulation. Similarly, using a matched sample of SOEs and non-SOEs, Tam et al. (2018) document that state ownership mitigates EM by Vietnamese listed firms.

Some researchers, including Madani et al. (2013) and Capalbo et al. (2014), document no relationship between government ownership and EM by Italian and Iranian firms. Although the empirical findings on the relationship between state ownership and FRQ are mixed, most studies on the Vietnamese stock markets show that EM is less prevalent in SOEs than non-SOEs. Therefore it is hypothesised that state ownership has a positive effect on the FRQ of Vietnamese listed firms. If state ownership is positively associated with FRQ, it is expected that the effect of FRQ on IE will increase in SOEs. This study, therefore, hypothesises that:

> H3a: The effect of FRQ on IE increases in Vietnamese SOEs

2.5.2 The effect of ownership structure on investment efficiency in state-owned enterprises

In SOEs where the State owns at least 50% of the total shares, the State will be the controlling shareholder and other shareholders, including institutional shareholders and managerial shareholders, may serve as minority shareholders. Several studies suggest that state ownership is detrimental to minority shareholders' wealth. In their book "*The Grabbing Hand: Government Pathologies and Their Cures*", Shleifer and Vishny (1998) argue that the government may use their "grabbing hand" to extract wealth from SOEs. In particular, the government may divert the firm's resources for its own benefit or use SOEs' assets to pursue political or social goals. Based on a survey of 2,400 firms in China, Cull and Xu (2005) report that a large number of Chinese managers perceive state ownership as a threat to a firm's performance. Using multivariate regression models, Qian et al. (2011) find that the expropriation of minority shareholders by controlling shareholders is more severe in SOEs than in POEs. The authors argue that controlling shareholders' motivation to expropriate largely depends on the firm's cost of capital. If firms can obtain bank loans at a lower cost, controlling shareholders will have stronger incentives to extract private benefits from firms. Since SOEs often have better access to bank loans because of their political ties, they will be incentivised to expropriate minority shareholders through tunneling or self-dealing which, in turn, causes inefficient investment. Based on a sample of Chinese listed firms from 2004 to 2012, Chen et al. (2017) empirically find that ownership concentration aggravates investment inefficiency and the effect is more pronounced in SOEs than in non-SOEs. The authors attribute this effect to the severe expropriation of minority shareholders by the State in SOEs. Prior studies also suggest the monitoring role of other (non-State) shareholders might decrease in SOEs. Jensen and Meckling (1976) posit that monitoring shareholders have to incur all the costs but receive only a fraction of the monitoring benefits that are proportional to the number of ownership stakes they own. Since minority shareholders have low ownership stakes, the potential gain from monitoring might not make up for the associated costs they have to incur (Jensen & Meckling, 1976; Yammeesri, 2003). Thus, they might become "free-riders", expecting the State to perform the monitoring role and bear the monitoring cost (Gailmard, 2009). Since other (non-State) shareholders have less incentive to oversee managers in SOEs, the influence of institutional ownership, managerial ownership and ownership concentration on IE may decrease in SOEs.

Some authors, such as Heugens et al. (2020), however, find that the State as a controlling shareholder benefits other shareholders. Using a large sample of 1,354 control transactions from 1990 to 2017 from 54 countries, Heugens et al. (2020) report that state ownership reduces the private benefit of control, which is the appropriation of a firm's wealth by large shareholders. The authors argue that modern SOEs are less entrenched and tend to avoid engaging in activities that hurt firm performance. If the State converges its interests with those of other shareholders, it is likely that the effect of other

types of ownership structures on IE will strengthen in SOEs. By analyzing related party transactions of Chinese SOEs, Cheung et al. (2010) document that minority shareholders are expropriated in locally government-controlled firms since local government officials are less likely to be sued for misappropriating state funds. In contrast, minority shareholders benefit from state ownership in central government-controlled firms since these firms are typically large and have fewer opportunities to expropriate.

To date, there has been no research on ownership structure and IEs in Vietnam SOEs. Since most of the existing literature shows that minority shareholders are expropriated by the State and have less incentive to monitor managers in SOEs, it is predicted that the effect of other measures of ownership structure including ownership concentration, institutional ownership and managerial ownership on IE will decrease in SOEs. Therefore, the study's next hypothesis that:

> H3b: The effect of ownership concentration, institutional ownership and managerial ownership on IE worsens in Vietnamese SOEs.

2.6 The interaction effect of financial reporting quality and ownership structure on investment efficiency

2.6.1 The effect of ownership concentration on the relationship between financial reporting quality and investment efficiency

Previous studies argue that large shareholders could distort financial information to expropriate wealth from minority shareholders (Djankov et al., 2008; Shleifer & Vishny, 1997). As large shareholders typically hold positions on the executive team, it is easy for them to manipulate financial reports to favour personal interests. Using data on 977 firms in seven East Asian countries, Fan and Wong (2002) find that controlling shareholders tend to manage earnings for private purposes, which leads to lower credibility of financial reporting. In addition, the authors document that large shareholders hinder the flow of information to outside investors and, therefore, reduce earnings informativeness. Zhong et al. (2007) also report that ownership concentration leads to an increase in discretionary accruals of NYSE firms. The authors argue that the presence of blockholders induces managers to manipulate earnings for income-increasing purposes. Based on data on Brazilian listed firms, Sousa and Galdi (2016) document a negative association between ownership concentration and information content of earnings (ICE). In particular, the authors find that firms with a dispersed ownership structure have better earnings informativeness than those with concentrated ownership structures. As FRQ is negatively affected by ownership concentration, the effect of FRQ on IE might be worse in firms with a concentrated ownership structure.

Other researchers argue that, because of their long-term commitment to the firm, blockholders in highly concentrated firms are motivated to monitor opportunistic managers and report financial figures in good faith (Demsetz & Lehn, 1985). Moreover, for large shareholders, the cost of managerial monitoring is lower than the anticipated benefits, which provides blockholders greater incentive to discipline managers (Ramsey & Blair, 1993).

Since the literature suggests a significant interaction effect of ownership concentration and FRQ on IE, the following hypothesis is tested:

> H4a: Ownership concentration has a significant effect on the relationship between FRQ and IE of Vietnamese listed firms

2.6.2 The effect of institutional ownership on the relationship between financial reporting quality and investment efficiency

Prior research suggests that institutional ownership could strengthen the effect of FRQ on IE. Using discretionary accruals to measure EM, Rajgopal and Venkatachalam (1997) find that institutional shareholders help mitigate the EM of US firms through their active involvement in monitoring. The authors argue that institutional activism results in less information asymmetry and prevents managers from conducting opportunistic behaviours. A similar finding is documented by Cornett et al. (2008) who report a negative relationship between institutional ownership and EM. Focusing on local institutional investors, Ayers et al. (2011) and Chhaochharia et al. (2012) document that local institutional ownership curtails EM by managers. These authors argue that because of the close geographic proximity to their portfolio firm, local institutional shareholders are generally more informed about the firm's operations than remote institutional shareholders. Thus, the presence of local institutional investors in a firm reduces the information asymmetry between managers and shareholders, which is the main reason for managerial discretion. Based on a sample of US listed firms from 1995-2006, Ramalingegowda and Yu (2012) report that firms with a higher level of institutional ownership are more inclined to report conservatively and the positive effect of institutional ownership on reporting conservatism is stronger among firms with ample growth opportunities and severe information asymmetry. According to the authors, it is challenging for shareholders to monitor management directly in these firms. Therefore, institutional shareholders tend to depend on other monitoring channels, such as conservative reporting, to discipline managers.

Since the literature suggests that institutional ownership is associated with reduced EM and better FRQ, this study conjectures that institutional ownership reinforces the FRQ-IE relationship on the Vietnamese equity market. Thus, that the following hypothesis is tested:

H4b: Institutional ownership strengthens the relationship between FRQ and IE of Vietnamese listed firms

2.6.3 The effect of managerial ownership on the relationship between financial reporting quality and investment efficiency

According to the agency theory, low managerial ownership leads to the separation of interests between managers and shareholders (Berle & Means, 1932; Jensen & Meckling, 1976). As a result, when managers have low ownership stakes in a firm, they are inclined to opportunistically manage the firm's earnings for their own benefit (Healy, 1985; Holthausen et al., 1995). As managers' ownership stakes increase, their interests align with those of shareholders and their propensity for EM will decline. As a result, due to the alignment effect, earnings manipulation will be negatively associated with managerial ownership (Warfield et al., 1995).

On the other hand, when managers own a significant number of shares in a firm, they will be powerful enough to secure their position and ignore capital market punishments. In this case, managers will be motivated to manipulate earnings for their self-interest (Morck et al., 1988).

Empirical results on the influence of managerial ownership on FRQ are mixed. Using data on US firms, Warfield et al. (1995) document that higher managerial ownership results in better FRQ. Particularly, the authors find that managerial ownership positively affects the ICE and mitigates discretionary accruals. In contrast, based on a sample of Danish firms, Gabrielsen et al. (2002) report that insider ownership is associated with poor ICE, and gives rise to discretionary accruals. The authors attribute these relationships to the difference in institutional background between US and Denmark. Due to the concentrated ownership structures of Danish listed firms, information asymmetry is more severe in Denmark than in the US. Thus, managers of Danish listed firms are incentivsed to manipulate earnings. The authors also argue that their finding is applicable to firms in many non-US countries because managerial ownership is more prevalent in Demark than in the US and this happens in most non-US countries. Using a sample of Singaporean firms, Yeo et al. (2002) document a non-monotonic relationship between managerial ownership and both the ICE and discretionary accruals. They find that when managerial ownership is below 25%, managerial ownership improves the ICE and decreases abnormal accruals but when insider ownership exceeds 25%, managers become entrenched and aggravate EM.

Since prior studies report a significant effect of managerial ownership on FRQ, this study hypothesises that managerial ownership significantly affects the FRQ-IE relationship of Vietnamese listed firms.

H4c: Managerial ownership has a significant effect on the relationship between FRQ and IE of Vietnamese listed firms.

2.7 Summary

This chapter comprehensively reviews prior studies on the effects of two firm-level characteristics, FRQ and ownership structure, on IE. A summary of the empirical evidence on these relationships is provided in Table 2.1. Among various definitions of IE in the literature, this study adopts the definition of IE based on the neoclassical theory, the most widely used theory in investment. The literature suggests that information asymmetry, concentrated ownership and weak protection of minority shareholders are the main causes of investment inefficiency.

There are consistent findings of the positive effect of FRQ on IE in previous studies and we expect that the same relationships will apply to Vietnamese listed firms. The influence of ownership structure on IE depends on the type of ownership. Prior studies document that institutional ownership is positively associated with IE in almost every market whereas ownership concentration and managerial ownership may either negatively or positively affect IE. The study's hypotheses on the ownership structure-IE relationship on the Vietnamese equity market are developed in line with these findings. There are also significant but mixed findings on the effect of FRQ and ownership structure on the IE of SOEs. Therefore, it is hypothesised that the influence of FRQ and ownership structure on IE will significantly change in Vietnamese SOEs. Regarding the mediating effect of ownership structure on the FRQ-IE relationship, there are no prior studies on these effects. Therefore, these effects are inferred based on the effect of ownership structure on FRQ documented in extant research. Table 2.2 summarises the study's hypotheses.

Table 2.1 A summary of the empirical evidence on the relationship between financial reporting quality (FRQ) and investment efficiency (IE), ownership structure and investment efficiency and ownership structure and financial reporting quality

Dependent variable	Main independent variable	Study	Sample	Research period	Methods	Results
IE	FRQ	Biddle et al. (2006)	Listed firms in the US and 34 countries	1975-2001 1993-2004	2SLS, OLS, GMM	Higher FRQ enhances IE
		Verdi (2006)	US-listed firms	1980-2003	Fixed effects	FRQ is negatively associated with overinvestment and underinvestment
		McNichols and Stubben (2008)	16,032 US-listed firms	1978-2002	OLS, Granger causality test	Firms with lower FRQ overinvest
		Hope and Thomas (2008)	502 US multinationals	1992-2001	OLS	The disclosure quality of US multinational enterprises is negatively associated with overinvestment.
		Biddle et al. (2009)	US-listed firms (34,791 firm-year observations)	1993-2005	OLS	FRQ mitigates over- and underinvestment
		Li and Wang (2010)	Chinese listed firms	1998-2006	OLS, fixed effects, random effects	Higher FRQ reduces over- and underinvestment
		Chen et al. (2011)	6,727 private firms in 21 emerging markets	2002-2005	OLS, fixed effects, 2SLS	FRQ improves IE.
		Cutillas Gomariz & Sánchez Ballesta (2014)	Spanish listed firms (576 firm-year observations)	1998-2008	OLS, 2SLS, GMM	Higher FRQ mitigates overinvestment
		Rad et al. (2016)	558 Malaysian listed firms	2001-2011	OLS	FRQ contributes to the improvement of IE.
		Dang & Ngo (2020)	Vietnamese listed firms; 4459	2010-2019	OLS	FRQ positively affects IE

			firm-year observation			
		Hung et al. (2020)	Vietnamese listed firms; 4,704 observations	2010-2018	GLS	Better FRQ improves IE.
IE	Ownership concentration	Tayem (2015)	84 Jordanian listed firms	2002-2011	Pooled OLS, fixed effects, Arellano-Bond first differenced dynamic panel	Higher ownership concentration leads to an increase in IE.
		Chen et al. (2017)	5912 firm-year observations	2004-2012	OLS	Ownership concentration inversely impacts IE
		Azhar et al. (2019)	50 Pakistan listed firms	2010-2015	Dynamic GMM	Ownership concentration negatively affects IE
IE	Institutional ownership	Cao et al. (2018)	Chinese listed firms (8372 observations)	2009-2014	OLS	Institutional ownership enhances IE.
		Ward et al. (2019)	11,903 US listed firms	1995–2015	OLS, 2SLS	"Motivated monitoring" institutional investors improve IE
		Azhar et al. (2019)	50 Pakistan listed firms	2010-2015	Dynamic GMM	Only mutual funds significantly enhance IE. Other types of institutional investors do not significantly influence IE.
IE	Managerial ownership	Wright et al. (1996)	US listed firms (358 firms for 1986 and 514 firms for 1992)	1986 and 1992	OLS	The relationship between managerial ownership and IE is non-linear
		Beyer et al. (2012)	1,406 Belgian firms	2009	Tobit	There is a non-linear relationship between managerial ownership and IE.
		Vijayakumaran (2021)	1,420 Chinese listed firms	2003–2010	System GMM	Managerial ownership significantly improves IE

FRQ	State ownership	Chen et al. (2008)	4,437 Chinese listed firms	1994-2000	Logistic regression	Local SOEs in China have a greater likelihood of manipulating their earnings than POEs
		Wang and Yung (2011)	577 Chinese listed firms	1998 – 2006	OLS	State ownership is negatively associated with EM
		Ding et al. (2007)	273 Chinese privately-owned and SOEs	2001-2002	OLS	SOEs have less tendency to manipulate their earnings than POEs
		Capalbo et al. (2014)	Unlisted Italian privately-owned and SOEs	2009-2012	OLS	State ownership does not influence EM
		Madani et al. (2013)	102 Iranian listed firms	2003 – 2010	Fixed effects	State ownership does not significantly affect earnings quality
		Guo and Ma (2015)	1,176 Chinese listed firms	2004-2010	OLS	A higher ratio of state ownership leads to an increase in EM
		Essa et al. (2016)	570 Vietnamese listed firms	2010-2014	OLS	State ownership discourages EM
FRQ	Ownership concentration	Fan and Wong (2002)	977 firms in 7 East Asian countries	1991-1995	OLS	Controlling shareholders have a tendency to manage earnings for private purposes, which leads to lower credibility of financial reporting.
		Zhong et al. (2007)	US listed firms on New York Stock Exchange (5,475 firm-year observations)	1994-2003	OLS, Fama and Macbeth Regression	Higher ownership concentration leads to an increase in discretionary accruals of New York Stock Exchange firms.
		Roodposhti and Chashmi (2010)	196 firms listed on the Tehran stock exchange	2004-2008	Pooled OLS	Higher ownership concentration results in less EM
		Alves (2012)	34 listed Portuguese firms	2002-2007	OLS	Ownership concentration enhances the quality of financial reporting by reducing managers' incentives to manage earnings.

		Sousa and Galdi (2016)	Brazilian listed firms	1999-2014	OLS	Ownership concentration inversely affects ICE.
FRQ	Institutional ownership	Rajgopal and Venkatachalam (1997)	US listed firms (5,707 observations)	1989-1995	Probit	Institutional shareholders help mitigate EM of U.S firms through their active involvement in monitoring.
		Cornett et al. (2008)	US S&P 100 firms	1994-2003	Fama-McBeth regression	Higher institutional ownership leads to less earnings manipulation
		Ayers et al. (2011)	US listed firms (12,507 observations)	1996-2008	OLS	Local institutional ownership is associated with fewer EM by managers.
		Chhaochharia et al. (2012)	US listed firms (10,695 observations)	1990-2007	OLS	Local institutional ownership decreases EM
		Ramalingegowda and Yu (2012)	US listed firms (6,911 firm-years)	1995–2006	OLS	Firms with a higher level of institutional ownership tend to report conservatively
FRQ	Managerial ownership	Warfield et al. (1995)	4,778 firm-year observations.	1988-1990	OLS	Higher managerial ownership results in a better quality of financial reporting.
		Gabrielsenet al. (2002)	76 Danish firms	1991-1995	OLS	Insider ownership is associated with poor ICE and gives rise to discretionary accruals.
		Yeo et al. (2002)	Singaporean firms (490 observations)	1990-1992	OLS	There is a non-monotonic relationship between insider ownership and both the ICE and discretionary accruals.

Table 2.2   A summary of the study's hypotheses

	Hypothesis	Expected sign
H1	There is a positive relationship between FRQ and IE of Vietnamese listed firms	+
H2a	There is a significant relationship between ownership concentration and IE on the Vietnam stock market	+/-
H2b	There is a positive relationship between institutional ownership and IE on the Vietnam stock market.	+
H2c	There is a significant relationship between managerial ownership and IE on the Vietnam stock market.	+/-
H3a	The effect of FRQ on IE increases in Vietnamese SOEs	+
H3b	The effect of ownership concentration, institutional ownership and managerial ownership on IE worsens in Vietnamese SOEs.	-
H4a	Ownership concentration has a significant effect on the relationship between FRQ and IE of Vietnamese listed firms.	+/-
H4b	Institutional ownership strengthens the relationship between FRQ and IE of Vietnamese listed firms.	+
H4c	Managerial ownership has a significant effect on the relationship between FRQ and IE of Vietnamese listed firms	+/-

Chapter 3

Research methodology

3.1 Introduction

This chapter discusses the research methods used in this study. Section 3.2 describes the research framework. Section 3.3 discusses the institutional background of Vietnamese listed firms. Section 3.4 provides details about the sample and data collection process. Section 3.5 explains the measurement of variables in the study including the dependent, explanatory and control variables and section 3.6 discusses the methodology and the empirical models. Section 3.7 identifies the sources of possible endogeneity in the study and describes the methods to deal with endogeneity. Section 3.8 summarises the chapter.

3.2 Research framework

Based on the literature review in Chapter 2, Figure 3.1 presents the research framework. The primary focus of this research is the IE of Vietnamese listed firms. The study examines the direct impact of FRQ and ownership structure on IE and the interaction effect of FRQ and ownership structure on IE of Vietnamese listed firms. To investigate the influence of ownership structure on IE, the study focuses on three measures of ownership structure whose relationship with IE has not been studied in previous research – ownership concentration, institutional ownership and managerial ownership. In addition, since SOEs are prevalent in the Vietnamese stock market, the study also examines whether the influence of FRQ and ownership structure on IE changes in SOEs. Since most prior studies document that FRQ enhances IE, the FRQ-IE relationship is hypothesised to be positive. The impact of ownership structure on IE, however, could be either positive or negative based on ownership type. For institutional ownership, it is hypothesised that institutional ownership positively impacts IE because of the monitoring effect of institutional investors. For ownership concentration and managerial ownership, the impact of these measures of ownership structure on IE is hypothesised to be significant but could be either positive or negative. The interaction effect of FRQ and ownership structure on IE also depends on the ownership measures. Institutional ownership is hypothesised to reinforce the FRQ-IE relationship of Vietnamese listed firms whereas ownership concentration and managerial ownership are expected to have either positive or negative impacts on the relationship between FRQ and IE of Vietnamese listed firms.

Several control variables such as size, age, ROA, leverage, Z-score, tangibility, financial slack and Big4 are included to capture the effects of other firm-level characteristics on the IE of Vietnamese listed firms.
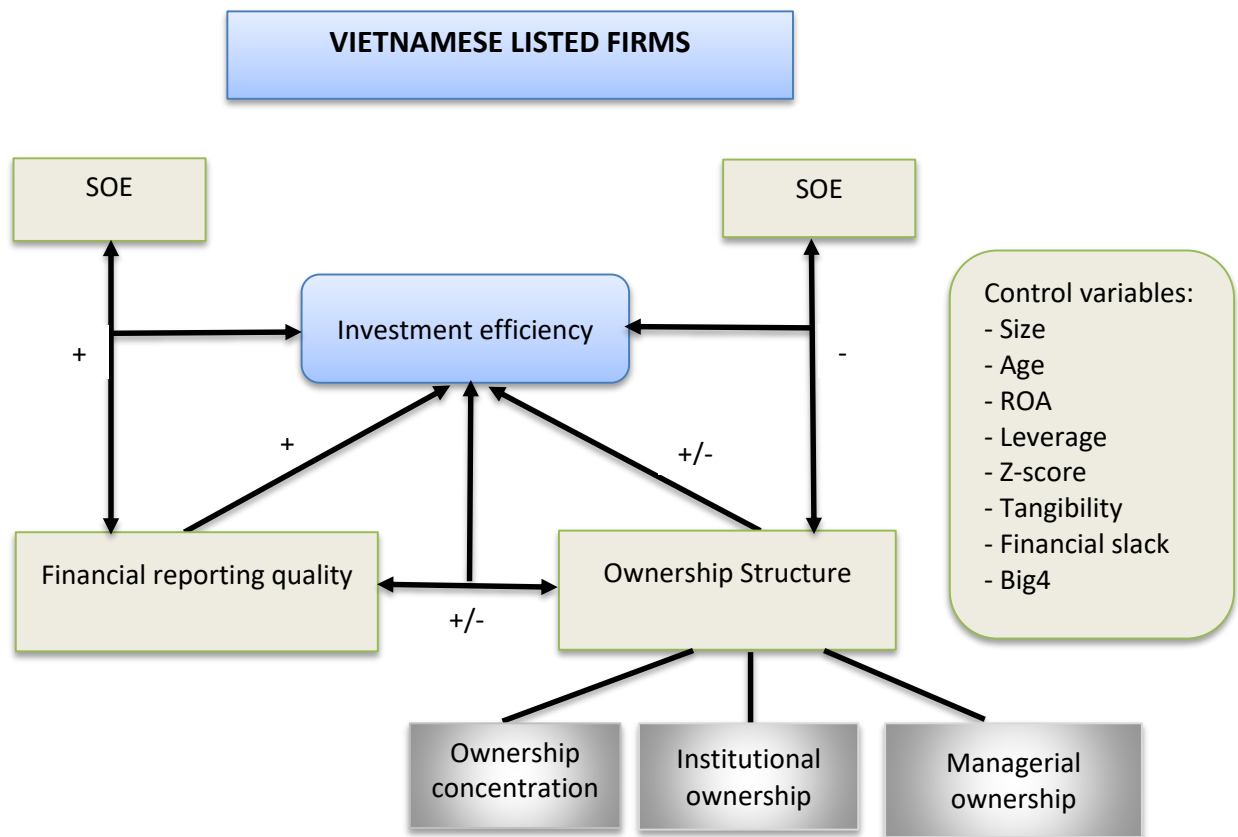
Figure 3.1   The research framework of the study

3.3   Institutional background

3.3.1   Overview of the Vietnamese stock market

The Vietnamese stock market was officially launched in July 2000 with the inauguration of Ho Chi Minh City Securities Trading Centre. In March 2005, the second trading centre, Hanoi Securities Trading Centre came into operation. In 2007 and 2009, these trading centres were renamed the Ho Chi Minh Stock Exchange (HOSE) and the Hanoi Stock Exchange (HNX). Table 3.1 presents the number of listed firms and market capitalisation of HOSE and HNX from 2007 to 2018. From 2007 to 2010, the number of listed firms on both exchanges increased dramatically. By the end of 2010, there were 642 listed companies on the two exchanges, 367 on the HNX and 275 on the HOSE. From 2010 to 2018, there was minimal change in the number of listed firms, but significant growth in total market capitalisation. By the end of 2018, the combined market capitalisation of HOSE and HNX was 3,062 trillion VND, which is four times the capitalisation in 2010 (HOSE & HNX, 2019). To ameliorate the transparency of the

Vietnamese stock market and attract more foreign investors, the Vietnamese government planned to merge HOSE and HNX into one exchange in 2021.

Table 3.1   The number of listed firms and market capitalisation of Ho Chi Minh Stock Exchange and Hanoi Stock Exchange in 2007-2018

	Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
No. of listed stocks	**HOSE**	138	170	196	275	301	308	301	305	307	320	344	373
	HNX	112	168	257	367	393	396	377	365	377	376	384	376
Market cap. (in trillion VND)	**HOSE**	364	170	495	591	454	678	842	985	1147	1492	2614	2870
	HNX	130.1	55.9	125.4	131.8	83.7	86.5	106.9	136	151.6	151.8	223	192

Source: HOSE & HNX, 2019

The listing requirements for companies to list on HOSE and HNX are different (see Table 3.2).

Table 3.2   The listing requirements of Ho Chi Minh Stock Exchange and Hanoi Stock Exchange

	HOSE	HNX
Charter capital	≥ 120 billion VND	≥ 30 billion VND
Time of operation	≥ two years	≥ one year
ROE in the preceding year	≥ 5%	≥ 5%
Business operation profit	Surplus profit in two preceding years	Surplus profit in the previous year
Disclosure	Compulsory for Board of Management, Supervisory Board and major shareholders	N/a
Minimum number of shareholders	3000	100

Source: HOSE & HNX, 2019

Table 3.2 shows that the listing requirements of HOSE are stricter than those of HNX. For example, to be listed on HOSE, a firm must be profitable in two preceding years whereas HNX requires firms to have a profit in only one preceding year. Therefore, most stocks listed on HOSE belong to large, well-established and financially sound firms. In addition, the market capitalisation of HOSE is always higher than HNX (see Table 3.1). For instance, in 2017, the market capitalisation of HOSE was 2,614 trillion VND, which was 11 times higher than HNX. Therefore, the official index of HOSE (VNIndex) is often considered the benchmark index of the Vietnam stock market while the HNX index is essential only to those who invest in the HNX.

3.3.2 Corporate governance in Vietnam

The Law on Enterprises 2014 (LOE2014) is the primary legislation for corporate governance in Vietnam. The LOE2014 was enacted by the National Assembly on 1 July, 2015, to supersede the Law on Enterprise 2005. The LOE2014 has 10 chapters and 213 articles that regulate the establishment, governance structure, reorganisation and dissolution of all types of Vietnamese enterprises. Besides the LOE2014, if a firm is listed on the Vietnamese stock market, it has to abide by the Law on Securities 2006 (revised in 2010). Other subordinate legislation that applies to the corporate governance of Vietnamese listed firms includes the Model Charter 2017[1], the Code of Corporate Governance for Listed Companies 2017 (the Code 2017)[2] and the listing rules of HOSE or HNX. The Model Charter 2017 was issued by the Ministry of Finance (MoF) to assist Vietnamese listed firms in preparing their own Charter. Although the Model Charter 2017 is non-compulsory, almost all listed firms have adopted the model charter without modification except for the details of the firm (Hai & Lien, 2012). The Code 2017 is based on the OECD corporate governance principles. However, unlike the OECD principles, which are voluntary, the Code 2017 is compulsory for all Vietnamese listed firms.

According to the LOE2014 Article 134 and the Code 2017, a listed firm is entitled to choose between a two-tier board structure and a one-tier board structure:

– A two-tier Board structure includes a General Meeting of Shareholders (GMS), a Board of Directors (BoD), a CEO (managing director) and a Supervisory Board (SB).

– A one-tier Board structure includes a GMS, a BoD and a CEO (managing director). In this case, at least 20% of the BoD members shall be independent members and there shall be an internal audit committee under the BoD.

The GMS is the supreme decision-making authority of the firm, including all shareholders with the right to vote. The GMS includes the Annual General Meeting and Extraordinary Meetings. The Annual GMS discusses and approves the most important issues of the firm such as the long-term development strategies; modification of the company Charter; stock issuing; and dividends. Extraordinary meetings may be held in special circumstances such as upon the request of the SB or a shareholder or group of shareholders who hold over 10% of total equity for at least 6 consecutive months.

The BoD members are appointed by the shareholders at the annual and extraordinary GMS. The BoD can make decisions on important management matters such as the medium-term development strategies; the transfer of technology; sales or loan agreements of assets valued at 35% or more of the

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[1] See Circular No. 95/2017/TT-BTC
[2] See Decree No. 71/2017/ND-CP

firm's assets; and the appointment of the CEO. Article 13 of The Code 2017 requires that "*at least one-third of the BoD members must be non-executive/independent members*".

A CEO is a person responsible for overseeing the day-to-day operations of a firm. The CEO could be chosen from the BoD members or could be hired from outside the firm. The responsibility of the CEO includes daily management and administration of the firm, implementation of business strategies, recruitment of employees, and appointment/dismissal of managers.

An SB has from three (3) to five (5) members and the tenure of SB members cannot exceed 5 years. Members of the SB may, however, be re-appointed for an unlimited number of terms. The primary duty of the SB is to supervise the BoD and the CEO in the management and administration of the firm. SB members are not allowed to hold management positions.

Thi (2018) argues that the current corporate governance system in Vietnam is a mixture of the continental Europe model and the Anglo-Saxon model. The BoD of Vietnamese listed firms is like that of Anglo-Saxon countries, comprising both executive directors and independent directors. Different from the BoD, the SB consists exclusively of non-executive directors, whose main task is to monitor the BoD. This feature is like the two-tier board model in Germany and the Netherlands. While the BoD is in charge of strategic management, the SB performs the supervisory role.

3.3.3 Vietnamese accounting system and reporting environment

3.3.3.1 Vietnamese accounting system

The accounting system of Vietnam is classified into four hierarchical levels. The highest level is the accounting law, followed by decrees, accounting standards, and accounting regimes.

- The accounting law and accounting decrees

The first Vietnamese Law on Accounting (the Accounting Law 2003) was issued on 17 June 2003 and became effective from 1 January 2004. The Accounting Law 2003 has seven chapters and 64 articles, that provide regulations on accounting and reporting practices for all types of firms in Vietnam. The introduction of the Accounting Law 2003 has had a positive effect on the Vietnamese economy (Hung, 2015). First, the law provides a legal foundation for the Vietnamese government and the MoF to introduce subordinate legislation such as decrees, accounting standards, and accounting regimes, that create a uniform legal framework for the development of the Vietnamese accounting system. Second, after the issuance of the Accounting Law 2003, the rights and obligations of accountants have been more clearly defined. Accountants must perform their tasks under the regulations of the Accounting Law 2003 and take responsibility should they breach their duty.

In 2015, the Accounting Law 2003 was amended to reflect new changes in accounting practice. The Accounting Law 2015, which came into effect on 1 January, 2017, was a significant upgrade over the Accounting Law 2003. One of the most significant modifications in the Accounting Law 2015 is "the inclusion of the "fair value" concept to facilitate the issuance of related accounting standards in this area for financial instruments, fixed assets, and investment properties" (World Bank, 2016, p. 23).

The second level in the Vietnamese accounting system is accounting decrees issued by the government. These decrees guide the application of some articles in the accounting law, e.g., the accounting period, the storage of accounting records, the conditions under which a firm can provide accounting services, and the supply of cross-border accounting services.

- Accounting Standards

From 2001 - 2005, MoF issued 26 Vietnamese accounting standards (VASs) that were based on the International Accounting Standards and International Financial Reporting Standards (IAS/IFRS) with some modifications to reflect local accounting practices. The timeline of the issuance of VASs is presented in Figure 3.2. The release of VASs marked an important milestone in the development of the Vietnamese accounting system as it demonstrated Vietnam's commitment to converging its accounting regulations with global standards, paving the wave for Vietnam to become a WTO member in 2007. The content of VASs ranges from general instructions on the preparation of financial statements to more technical subjects such as the record of the change in the foreign exchange rate (Dezan Shira & Associates, 2016).

Material removed due to copyright compliance

Figure 3.2   Timeline of the issuance of the 26 VASs
Source: Adapted from Dezan Shira & Associates (2016)

Some studies have been carried out to examine the convergence rate of VASs with IAS/IFRS since their introduction in 2001. For instance, Pham et al. (2010) find that from 2001-2005 when VASs were initially introduced, the similarity between VASs and IAS was 84%, which was quite high given the fact that the Vietnamese accounting system was strongly influenced by the Soviet Union model in the 1990s. However, since 2006, VASs have not been updated to accommodate amendments to IAS and the new IFRS, causing a considerable decrease in the convergence rate to a very modest 62%. Some major differences that exist between VASs and IAS/IFRS include terminology, measurement methods and presentation of financial reports. For example, though IAS/IFRS allows firms to choose among four measurement methods (historical cost, current cost, net realizable value and present value), only the historical costs method is permitted in VAS.

Vietnam has been working towards full IFRS adoption. In February 2019, the MoF proposed a roadmap for the adoption of IFRS in Vietnam. Specifically, the adoption of IFRS will be divided into two phases.

Phase 1 - from 2022 to 2025: The MoF selects several enterprises (such as SOEs and listed firms) to prepare financial reports under IFRS.

Phase 2 - after 2025: The adoption of IFRS would be compulsory for all SOEs, listed firms and unlisted firms.

- Accounting regime

According to Article 3 of the Accounting Law 2015, an accounting regime includes *"regulations and guidelines for a specific field of business or a specific type of firm"*. Currently, there are three regimes applicable for business accounting in Vietnam: an accounting regime under Circular No. 200/2014/TT-BTC for all types of businesses; an accounting regime for small and medium enterprises under Circular No. 133/2016/TT-BTC; and an accounting regime for micro-business under Circular 132/2018/TT-BTC. The main difference between VASs and these regimes is that though VASs provide general accounting principles for all types of business, the regimes consist of guidelines and practical interpretation for the application of VASs for specific types of firms such as the chart of accounts, forms of accounting records, types of ledgers.

3.3.3.2 Vietnamese reporting environment

All Vietnamese listed firms are currently obliged to adhere to the reporting stipulations in the Accounting Law 2015 and the Law on Securities 2006 (modified in 2010). Article 29 of the Accounting Law 2015 requires that *"all annual financial statements must be prepared in conformity with VASs and submitted to relevant authorities within 90 days"*. The disclosure of financial statements could be "*in the forms of printing, written notification, or other forms of public posting"* (The Accounting Law, 2015). The Law on Securities 2006 and the listing rules of HOSE and HNX require all listed companies to

disclose semi-annual and interim financial statements. The semi-annual statements must be appraised and the annual statements must be audited by State Securities Commission (SSC)-approved auditors. MOF issued Circular 155 /2015/TT-BTC to provide detailed guidance on the information disclosure of listed firms on the stock markets. According to Circular 155, the disclosure of information must be complete, accurate and prompt. Firms must take responsibility for the content of the disclosed information. If there is any change in the disclosed information, the firm must announce the change and its reason.

Under Circular 155, there are two types of disclosure: periodical disclosure and extraordinary disclosure. Periodical disclosure includes disclosure about annual financial statements, GMS, and securities offers. Article 8 of Circular 155 requires that "*the annual financial statements must be disclosed within 10 days from the date they are signed by auditors, but not later than 90 days after the last day of the financial year*". Extraordinary disclosure refers to the disclosure of some special events such as suspension of business activities, announcements about the redemption of shares, and changes in dividend payment rate. All applicable instances of extraordinary disclosure must be made within 10 days before the meeting date of the GMS. In addition, publicly traded firms have to disclose foreign ownership and corporate objectives concerning the environment, society and sustainability. Those that submit their financial statements late, or who do not have adequate data in their statements, are penalised. Fines for late or non-disclosure of financial reports range from VND5 million ($210) to VND50 million ($2,100) depending on the circumstances (Decree No. 41/2018/ND-CP).

Despite the MoF's effort to enhance the promptness and quality of information disclosure, many Vietnamese-listed firms are still reluctant to adhere to the disclosure requirements. In 2018, 32 firms listed on HNX submitted their financial statements to SSC later than the deadline stipulated in Circular 155 (HNX, 2019). Some Vietnamese listed firms expunged essential disclosures, such as related party transactions and the nature of contingent assets and liabilities in their annual reports (World Bank, 2016).

3.4 Data collection

The study dataset includes non-financial firms listed on both the HOSE and HNX. Financial firms are eliminated because the financial statements of these firms are different from non-financial firms in the sample. In addition, financial firms are subject to different regulations so some variables might not be comparable between financial firms and non-financial firms. For example, in Vietnam, non-financial firms are subject to the Law on Enterprise (2015), whereas financial firms must comply with the Law on Credit Institutions (2010). All variables are winsorised at the 1st and 99th percentile to reduce the influence of outliers.

The financial reporting data are obtained from the Bloomberg database and the audited financial reports published on the websites of the firms from January 2007 to December 2018. Where possible, data collected from one source were verified by data from another source. The year 2007 was chosen as the first year of the study period due to two reasons. First, there is a lack of firm-level observations before 2007. Until 1 January, 2006, there were only 38 listed firms on both HOSE and HNX. If we exclude financial firms and firms with missing data, the sample will be fewer than 30 firms. Thus, this study collects data from January 2007 when the number of listed firms on the two Stock Exchanges had increased to 193 firms. Second, 2007 is the year that the Law on Securities of Vietnam officially came into effect. Before the issuance of the Law on Securities 2007, the Vietnamese stock market was regulated by Decree 144/2003/ND-CP issued by the government. However, some provisions of this Decree are unclear and in conflict with other laws such as the Law on Enterprise and the Law on Investment (State Securities Commission, 2006). The issuance of the Law on Securities of Vietnam has created a uniform legal framework for securities trading activities and contributed to the development of the stock market.

Ownership data are collected from two sources. Ownership concentration data are obtained from Vietstock (Tai Viet Corporation), one of the leading financial data providers in Vietnam. Data on institutional and managerial ownership are collected from the Bloomberg database. On Bloomberg, ownership data for most firms are available only from 2010 forward. The reason is that, in 2010, the Vietnamese government issued Decree 85/2010/ND-CP, which stated that firms failing to comply with regulations on information disclosure will be penalised. Therefore, many firms started to disclose more corporate governance information including institutional and managerial ownership data since 2010.

3.5 Measurement of variables

3.5.1 Dependent variable

Theoretically, IE exists when there is no deviation from the expected level of investment. This study uses Biddle et al.'s (2009) model to estimate the expected level of investment based on the sales growth of each firm. This model is developed based on the accelerator theory (Samuelson, 1939), a theory under the neoclassical framework (Gao & Yu, 2020). This model has been increasingly used by recent researchers to measure IE due to its ease of computation (e.g., Chen et al., 2011; Cutillas Gomariz & Sánchez Ballesta, 2014; Rad et al., 2016). The regression model is given in equation (3.1) as follows:

$$Inv_{i,t} = \beta_0 + \beta_1 SalesGrowth_{i,t-1} + \varepsilon_{i,t} \tag{3.1}$$

where: $Inv_{i,t}$ denotes total investment, calculated as the net increase in tangible and intangible assets; $SalesGrowth_{i,t-1}$ denotes the percentage of change in sales; and *i* and *t* are subscripts of firms and years, respectively. Both variables are deflated by lagged total assets (TA) to control for heteroskedasticity.

The study performs cross-sectional regression of equation (3.1) for each year and industry. Following Chen et al. (2011), equation (3.1) is estimated with at least 10 observations in an industry in a year. Different from previous studies that used the Fama-French (1997) industry classification to group the industries (Biddle et al., 2009; Chen et al., 2011), this study follows the Global Industry Classification Standard (GICS) to divide the industries in Vietnam into 24 groups. GICS is a standardised industry classification system jointly developed by Morgan Stanley Capital International (MSCI) and S&P. GICS is the official industry classification benchmark used by HOSE and HNX. Hrazdil and Scott (2013) find that GICS produces better estimates of discretionary accruals than other industry classifications.

The residuals of equation (3.1) represent the deviation of the actual investment from the expected investment level and are considered proxies for investment inefficiency. If the residual is positive, it means that a firm is making more investments than the expected level based on sales growth. In other words, the firm overinvests. If the residual is negative, it implies that a firm is making less investment than the expected level, reflecting an underinvestment problem. To obtain the dependent variable (denoted as *IE*), the absolute value of the residuals of equation (3.1) is multiplied by minus one ($IE = -|\varepsilon_{i,t}|$). Therefore, a higher value of *IE* means higher efficiency of investment.

3.5.2 Independent variables

3.5.2.1 Financial reporting quality

As discussed in Chapter 2, this study uses measures of earnings quality as proxies for FRQ. Three accruals models are used to measure the earnings quality of Vietnamese listed firms. Kothari et al. (2005) argue that all accrual models are subject to model misspecification problems. Therefore, researchers should use various accruals models to mitigate measurement errors. The application of different measures also enables us to compare and generalise the results.

The first FRQ proxy (denoted as *FRQ1*) is derived from the accruals quality model developed by Dechow and Dichev (2002). This model is one of the most common accruals models in accounting research and has been used in various studies (e.g., Aboody et al., 2005; Cutillas Gomariz & Sánchez Ballesta, 2014; Francis et al, 2004; Li & Wang, 2010), to obtain a proxy for FRQ. The authors use working capital accruals (WCAs) to identify earnings manipulation since cash flow recognitions associated with working capital often happen within a year, making WCA more tractable than non-WCA. The authors argue that WCAs are temporary adjustments to the realisations of cash flows over time plus an "estimation error

term", which is the noise that truncates the useful role of accruals. Based on this argument, the authors developed a model that reflects the relationship between WCA and past, present and future cash flows as shown in equation (3.2):

$$\Delta WCA_{i,t} = \gamma_0 + \gamma_1 CFO_{i,t-1} + \gamma_2 CFO_{i,t} + \gamma_3 CFO_{i,t+1} + \varepsilon_{i,t} \qquad (3.2)$$

where: $\Delta WCA_{i,t}$ represents the change in WCAs of firm *i* in year *t*, defined as the change in non-cash current assets less the change in current non-interest-bearing liabilities; and $CFO_{i,t-1}$, $CFO_{i,t}$ and $CFO_{i,t+1}$ are CFO items on the statement of cash flows in years *t*-1, *t* and *t*+1, respectively.

Equation (3.2) is regressed by year and industry. The residuals in equation (3.2) represent a mismatch between WCA and cash flows which reflects low earnings quality. To ease exposition, this study follows Chen et al. (2011) to multiply the absolute value of the residuals by minus one to obtain *FRQ1* (*FRQ1*=$-|\varepsilon_{i,t}|$). As a result, a greater value of *FRQ1* equals greater FRQ. Since Dechow and Dichev (2002) directly model the relationship between cash flow and accruals, one advantage of their approach is that it does not require assumptions such as non-discretionary accruals are constant (DeAngelo, 1986) or revenue is nondiscretionary (Jones, 1991).

The second proxy (denoted as *FRQ2*) is obtained from McNichols' (2002) model, which is a modified version of Dechow and Dichev's (2002) model. Like Dechow and Dichev's (2002) model, this model also captures the extent to which working capital accruals (WCA) relate to past, present and future cash flows. McNichols also improves Dechow and Dichev's (2002) model by incorporating revenue and property, plant and equipment (PPE) into the measurement of discretionary accruals. By comparing her new model with Dechow and Dichev's (2002) and Jones' (1991) model, McNichols shows that her model generates a higher adjusted R^2.

McNichols' (2002) model is given by:

$$\Delta WCA_{i,t} = \beta_0 + \beta_1 CFO_{i,t-1} + \beta_2 CFO_{i,t} + \beta_3 CFO_{i,t+1} + \beta_4 \Delta RV_{i,t} + \beta_5 PPE\_G_{i,t} + \varepsilon_{i,t} \qquad (3.3)$$

where: $\Delta WCA_{i,t}$ represents the change in WCA of firm *i* in year *t*, defined as the change in non-cash current assets less the change in current non-interest-bearing liabilities; $CFO_{i,t-1}$, $CFO_{i,t}$ and $CFO_{i,t+1}$ are CFO items on the statement of cash flows in years *t*-1, *t* and *t*+1, respectively; $\Delta RV_{i,t}$ is the change in revenue; and $PPE\_G_{i,t}$ is the gross value of PPE. All variables are divided by lagged TA to control for heteroskedasticity.

Equation (3.3) is regressed by year and industry. The residuals in equation (3.3) represent the change in working capital that is not explained by net cash from operational activities, change in sales and PPE. To obtain *FRQ2*, the absolute value of the residuals of equation (3.3) is multiplied by minus one (*FRQ2*=$-|\varepsilon_{i,t}|$). Subsequently, a greater value of *FRQ2* equals greater FRQ.

To obtain the third proxy (*FRQ3*), the model of Ball and Shivakumar (2005) is applied. Although Dechow and Dichev's (2002) and McNichols' (2002) models are popular proxies for FRQ, one drawback of these models is the assumption that the only role of WCA is to reduce noise in cash flow. Ball and Shivakumar (2005, p. 93) argue that another function of accruals is a "timely recognition of economic gains and losses". Based on this argument, the authors propose a piecewise linear estimation model of accruals and cash flow that incorporates both functions of accruals: reduction of noise in cash flow and asymmetric recognition of economic gains and losses, as shown in equation (3.4):

$$ACCR_{i,t} = \gamma_0 + \gamma_1 DCFO_{i,t} + \gamma_2 CFO_{i,t} + \gamma_3 DCFO_{i,t} \times CFO_{i,t} + \varepsilon_{i,t} \qquad (3.4)$$

where: $CFO_{i,t}$ is the CFO item on the statement of cash flows of firm *i* in year *t*; $ACCR_{i,t}$ is measured as the change in non-cash working capital plus the change in short-term debt and depreciation; and $DCFO_{i,t}$ is a dummy variable equal to 1 if $CFO_{i,t}$<0, and 0 otherwise. All variables are scaled by lagged TA and perform cross-sectional regression of equation (3.4) for each year–industry group. *FRQ3* is calculated as the absolute value of residuals from equation (3.4) multiplied by minus one (*FRQ3*=$-\left|\varepsilon_{i,t}\right|$). Thereafter, a higher value of *FRQ3* represents better FRQ.

Finally, to attenuate measurement error in the FRQ proxies and draw inferences based on a summary FRQ measure, the three FRQ proxies are aggregated into one aggregate measure. Specifically, this study follows Biddle et al. (2009) and Chen et al. (2011) to normalise all proxies and then average them to obtain the summary FRQ metric (*FRQ_SM*).

Among the four FRQ proxies, the first proxy is used by Dang and Ngo (2020) and the other three proxies have not been used in any previous study on FRQ and IE of Vietnamese firms. By using these proxies, the study could test whether the relationship between FRQ and IE is consistent across multiple FRQ proxies.

3.5.2.2 Ownership structure

To test the impact of ownership structure on Vietnamese listed firms' IE, three ownership variables - ownership concentration, institutional ownership and managerial ownership are used.

Ownership concentration

To date, researchers have measured ownership concentration in many different ways. The most popular measure of ownership concentration is the total percentage of shares owned by the largest shareholder (e.g., De Miguel et al., 2004; Grosfeld & Tressel, 2002; Sousa & Galdi, 2016; Thomsen & Pedersen, 2000). Although this measure is simple, one problem with it is that the shareholding of the largest shareholder may not represent his/her power in the firm. Mavruk et al. (2020, p. 963) argue that "a shareholder's control depends not only on his share in the company but also on the holdings

of other shareholders, and a measure that only looks at the largest shareholder's voting rights obviously fails to take into account the weights of other owners". Therefore, many researchers measure ownership concentration by the voting share of several large shareholders (usually 5 or 20 largest shareholders) (e.g., Demsetz & Lehn, 1985; Demsetz & Villalonga, 2001). Although this measure is more plausible than using the voting share of only the largest shareholder, it may still be erroneous if there is a disagreement among the large shareholders (Mavruk et al., 2020). Another way to measure ownership concentration is using a threshold. Berle and Means (1932) define a concentrated firm as a firm in which there is a controlling shareholder who holds at least 20% of the total shares. Other studies suggest other thresholds to determine a controlling shareholder, most of which are from 5% to 20% of the total shares. Although it is common to use such cut-offs, the selection of these thresholds is often debatable. For example, with a threshold of 10%, it is unclear why a shareholder with 11% of the total shares should be regarded as a controlling owner when a shareholder holding 9% should not. Another popular measure of ownership concentration is the Herfindahl index (Herfindahl, 1950). This index is calculated as the sum of the squared sums of all shareholders' voting shares. One advantage of this measure is that it takes into account the ownership stakes of all shareholders. However, this index might not be available in many countries where firms are not required to provide information on the shareholding of all shareholders.

In this study, ownership concentration (denoted as *CO5*) is measured by the sum of the percentage of shares of all shareholders who hold at least 5% of a firm's ordinary shares. This measure is used in most studies on ownership concentration on the Vietnamese stock market (e.g., Hoang et al., 2017; Tran and Le, 2020) for two reasons. First, according to Circular 52/2012/TT-BTC, Vietnamese listed firms are required to disclose the shareholding of only those block shareholders who own at least 5% of a firm's total shares. Thus, most firms do not disclose the shareholding of other shareholders and the Herfindahl index may not be applicable for the Vietnamese stock market. In addition, the number of large shareholders who hold at least 5% of the shares varies among firms so it is impossible to calculate the voting share of the 5 or 10 largest shareholders for all firms.

Institutional ownership

Institutional ownership (denoted as *ITO*) is measured by the percentage of shares owned by institutional investors. Since there is no definition of institutional investors in Vietnamese law and data on institutional ownership are obtained from the Bloomberg database, institutional investors are defined based on US law. According to the Securities Exchange Act 1934, institutional investors include an investment company, a bank, savings and loan association, insurance company, business development company, small business investment company, employee benefit plan, a private business development company or a trust.

Managerial ownership

Managerial ownership (denoted as *ISO*) is measured by the percentage of shares owned by insiders. Most previous studies follow Himmelberg (1999) to define insiders as directors and managers of listed firms. However, according to Circular 52/2012/TT-BTC issued by the Ministry of Finance of Vietnam, insiders include BoD members, SB members, managing director, deputy managing director and chief accountants. This study uses the definition in Circular 52/2012/TT-BTC to define insiders.

In Vietnam, it is common that a manager or director holds a number of shares on behalf of the government. The shareholding of these insiders is not counted as managerial ownership because it represents state ownership.

3.5.3 Control variables

Previous studies document that, apart from FRQ and ownership structure, some variables including size, age, ROA, leverage, Z-score, tangibility, financial slack and Big 4 have significant impacts on IE (Biddle et al., 2009; Chen et al., 2011; Rad et al., 2016).

Size

Prior studies find that investment decreases considerably with firm size (Badertscher et al., 2013; Biddle & Hilary, 2006). Gala and Julio (2016) report an inverse relationship between firm size and its investment rate. Regarding IE, Chen et al. (2011) find that large firms are better at mitigating investment inefficiency. In contrast, Rad et al. (2016) document that larger firms are more inclined to engage in dysfunctional and opportunistic behaviours such as overinvestment or underinvestment. Therefore, size is predicted to be either positively or negatively associated with IE. To measure the size of a firm, this study takes the natural logarithm of TA (denoted as *LnTA*). Since firm size can sometimes be too large or too small, the use of logarithms helps normalize the distribution of the data (Biddle et al., 2009).

Age

Age is calculated as the number of years since firms were listed on either HOSE or HNX. Anderson et al. (2012) postulate that firms at certain phases of their life cycle exhibit different investment behaviour. In particular, when firms reach a certain age, they tend to select their investments more carefully and are less likely to undertake suboptimal investment projects. Biddle et al. (2009) also report that older firms are less prone to underinvest or overinvest. Therefore, age is predicted to positively affect IE. The natural logarithm of age (*LnAge*) is used to normalise the data distribution.

Asset Tangibility

Asset tangibility (denoted as *Tang*) is calculated as the ratio of PPE to TA. Asset tangibility affects a firm's ability to acquire external financing since more tangibility means more available collateral when a firm applies for a loan. Almeida et al. (2007) find that asset tangibility increases the investment-cash flow sensitivities and, thereby, decreases IE. The authors' finding is supported by Chen et al. (2011) who document that more tangibility leads to an increase in both underinvestment and overinvestment. Therefore, tangibility is expected to negatively affect IE.

Leverage

Leverage (*Lev*) is measured by total liabilities over TA. Prior literature argues that highly leveraged firms are less likely to be able to acquire more debt to fund their investments (Anderson et al., 2012). Biddle et al. (2009) document that as firms' debts increase, their underinvestment increases. On the other hand, firms with lower leverage can easily grasp new investment opportunities (Baderstscher et al., 2013). Therefore, leverage is expected to reduce IE.

Return on assets

Return on assets (denoted as *ROA*) is calculated as the ratio of net income over TA. Myers and Majluf (1984) find that managers are more inclined to engage in dysfunctional behaviours such as underinvestment or overinvestment when their firm is making more profit. Similarly, Chen et al. (2011) document that ROA has a negative association with IE. Therefore, this study predicts that ROA negatively affects IE.

Financial Slack

Financial slack (denoted as *Slack*) is calculated as the ratio of cash to TA. Prior research suggests that financial slack impacts a firm's investment decisions (Biddle & Hilary, 2006; Biddle et al., 2009; Chen et al., 2011). The availability of cash flow helps reduce a firm's dependence on external funds. Therefore, firms with large cash balances tend to overinvest (Badertscher et al., 2013). As a result, financial slack is predicted to negatively affect IE.

Bankruptcy risk

The extant literature provides evidence that firms' investment decisions could be influenced by bankruptcy risk (Castanias, 1983). Schnabel and Frank (1984) find that the presence of bankruptcy risk may induce firms to reject positive NPV projects and undertake negative NPV projects. Similarly, Biddle et al. (2009) report that the IE of a firm improves when the firm is exposed to a low risk of bankruptcy. Bankruptcy risk (denoted as *Zcr*) is measured by the Z-score which is a statistical score developed by

Altman (1968) to measure the likelihood that a company will go bankrupt. The formula for a Z-Score is:

$$Z = 1.2X1 + 1.4X2 + 3.3X3 + 0.6X4 + 1.0X5 \qquad (3.5)$$

where: X1 = working capital/TA; X2 = retained earnings/TA; X3 = earnings before interest and taxes/TA; X4 = book value of equity/total liabilities; and X5= sales/TA.

Based on the results of the Z-score, Altman (1968) classifies firms into one of the three zones of discrimination:

Z> 2.6 – "Safe" Zone ("non-bankrupt" zone)

1.1 <Z< 2.6 – "Grey" Zone ("zone of ignorance")

Z< 1.1 – "Distress" Zone ("bankrupt" zone)

Although the classification is not 100% accurate, it suggests that a higher Z-score represents a lower risk of bankruptcy. Therefore, the Z-score (denoted as *Zsc*) is expected to have a positive influence on IE.

Audit quality (Big4)

Boubaker et al. (2018) document that high-quality auditors enhance IE by reducing managerial discretion and providing other informal services such as advice, knowledge sharing and assurance. To measure audit quality, the authors use *Big4*, a dummy variable equal to 1 if the firm is audited by any of the 'top 4' audit firms (Deloitte, Ernst & Young (EY), PricewaterhouseCoopers (PwC), and Klynveld Peat Marwick Goerdeler (KPMG)) and 0 otherwise. Consistent with Boubaker et al. (2018), Rad et al. (2016) find that firms audited by the 'top 4' audit companies have better IE. Since prior studies document a significant relationship between *Big4* and IE, *Big4* is included as a control variable in this study and it is predicted that *Big4* has a positive impact on IE.

Table 3.3 presents the definitions and measurements of all variables.

Table 3.3   Definition of the variables

Variable	Definition
IE	Investment efficiency derived from Biddle et al.'s (2009) model
FRQ1	Financial reporting quality proxy derived from Dechow and Dichev's (2002) model
FRQ2	Financial reporting quality proxy derived from McNichols' (2002) model
FRQ3	Financial reporting quality proxy derived from Ball and Shivakumar's (2005) model
FRQ_SM	The summary FRQ
CO5	Ownership concentration = the sum of percentages of shares held by all the shareholders who own at least 5% of a firm's total shares
ITO	Institutional ownership = the sum of percentages of shares held by institutional investors
ISO	Managerial ownership = the sum of percentages of shares held by insiders
SOEdum	Equals 1 if the State owns over 50% of the total shares and 0 otherwise
LnTA	The natural logarithm of a firm's assets
LnAge	The natural logarithm of a firm's age
Tang	Fixed assets/TA
ROA	Net income/TA
Lev	Total liabilities/TA
Zsc	Altman Z's score (see equation (3.5))
Slack	Cash/TA
Big4	Equals 1 if a firm is audited by one of the Big 4 audit firms (Deloitte, EY, PwC and KPMG) and 0, otherwise
Sd_CFO	The standard deviation of CFO in the preceding three years
Loss	Equals 1 if a firm reports a loss and 0 otherwise
LnBOD	The natural logarithm of the total number of directors on the board
BOD_FEdum	Equals 1 if there is at least 1 female director on the board and 0 otherwise
Infl_rate	The inflation rate

3.6   Methodology

3.6.1   Estimation methods

Pooled ordinary least squares (OLS) regressions with Petersen's (2009) two-dimensional clustered robust standard errors at the firm and year level are used to test the research hypotheses. Petersen (2009) argues that clustering standard errors at the firm- and year-level helps control for heteroscedasticity, cross-sectional and time-series dependence and enhances the accuracy of estimates. This is a common method in estimating standard errors in corporate finance research using panel data. Industry fixed-effects based on GICS classification are included to control for industry factors that affect IE.

3.6.2   Empirical models

The study uses equation (3.6) to test the hypothesis (H1), i.e., there is a positive relationship between FRQ and IE:

$$IE_{i,t} = \beta_0 + \beta_1 FRQ_{i,t} + \beta_k ControlVar_{i,t} + \varepsilon_{i,t} \tag{3.6}$$

where: $IE_{i,t}$ is investment efficiency; $FRQ_{i,t}$ denotes different proxies of FRQ; $ControlVar_{i,t}$ is control variables including $LnTA_{i,t}$, $LnAge_{i,t}$, $Tang_{i,t}$, $ROA_{i,t}$, $Lev_{i,t}$, $Zsc_{i,t}$, $Slack_{i,t}$ and $Big4_{i,t}$ that are defined in section (3.5.2.3); and i and t are subscripts of firms and years, respectively.

To test sub-hypotheses (H2a), (H2b) and (H2c) on the relationship between ownership structure and IE, the study first examines the individual effect of each ownership structure measure (ownership concentration, institutional ownership and managerial ownership) on IE. Next, all measures of ownership structure are included in a unified model to examine the effect of one measure while controlling for other measures. Therefore, the following equations are estimated:

$$IE_{i,t} = \beta_0 + \beta_1 CO5_{i,t} + \beta_k ControlVar_{i,t} + \varepsilon_{i,t} \qquad (3.7)$$

$$IE_{i,t} = \beta_0 + \beta_1 ITO_{i,t} + \beta_k ControlVar_{i,t} + \varepsilon_{i,t} \qquad (3.8)$$

$$IE_{i,t} = \beta_0 + \beta_1 ISO_{i,t} + \beta_k ControlVar_{i,t} + \varepsilon_{i,t} \qquad (3.9)$$

$$IE_{i,t} = \beta_0 + \beta_1 CO5_{i,t} + \beta_2 ITO_{i,t} + \beta_3 ISO_{i,t} + \beta_k ControlVar_{i,t} + \varepsilon_{i,t} \qquad (3.10)$$

where: $CO5_{i,t}$, $ITO_{i,t}$ and $ISO_{i,t}$ denote ownership concentration, institutional ownership and managerial ownership, respectively; $ControlVar_{i,t}$ is control variables including $LnTA_{i,t}$, $LnAge_{i,t}$, $Tang_{i,t}$, $ROA_{i,t}$, $Lev_{i,t}$, $Zsc_{i,t}$, $Slack_{i,t}$ and $Big4_{i,t}$ that are defined in section 3.5.2.3; and i and t are subscripts of firms and years, respectively.

To test sub-hypotheses (H3a) and (H3b) on the impacts of FRQ on IE and ownership structure on IE in SOEs, the study estimates the following equations:

$$IE_{i,t} = \beta_0 + \beta_1 FRQ_{i,t} + \beta_2 FRQ_{i,t} \text{x} SOEdum_{i,t} + \beta_3 SOEdum_{i,t} + \beta_k ControlVar_{i,t} + \varepsilon_{i,t} \ (3.11)$$

$$IE_{i,t} = \beta_0 + \beta_1 CO5_{i,t} + \beta_2 CO5_{i,t} \text{x} SOEdum_{i,t} + \beta_3 SOEdum_{i,t} + \beta_k ControlVar_{i,t} + \varepsilon_{i,t} \ (3.12)$$

$$IE_{i,t} = \beta_0 + \beta_1 ITO_{i,t} + \beta_2 ITO_{i,t} \text{x} SOEdum_{i,t} + \beta_3 SOEdum_{i,t} + \beta_k ControlVar_{i,t} + \varepsilon_{i,t} \ (3.13)$$

$$IE_{i,t} = \beta_0 + \beta_1 ISO_{i,t} + \beta_2 ISO_{i,t} \text{x} SOEdum_{i,t} + \beta_3 SOEdum_{i,t} + \beta_k ControlVar_{i,t} + \varepsilon_{i,t} \ (3.14)$$

$$IE_{i,t} = \beta_0 + \beta_1 CO5_{i,t} + \beta_2 ITO_{i,t} + \beta_3 ISO_{i,t} + \beta_4 CO5_{i,t} \text{x} SOEdum_{i,t} + \beta_5 ITO_{i,t} \text{x} SOEdum_{i,t} +$$

$$\beta_6 ISO_{i,t} \text{x} SOEdum_{i,t} + \beta_7 SOEdum_{i,t} + \beta_k ControlVar_{i,t} + \varepsilon_{i,t} \qquad (3.15)$$

where: $SOEdum_{i,t}$ equals 1 if the State holds over 50% of the total shares and 0 otherwise; $FRQ_{i,t} \text{x} SOEdum_{i,t}$, $CO5_{i,t} \text{x} SOEdum_{i,t}$; $ITO_{i,t} \text{x} SOEdum_{i,t}$ and $ISO_{i,t} \text{x} SOEdum_{i,t}$ are the interaction

terms between four FRQ proxies, ownership concentration, institutional ownership and managerial ownership and $SOEdum_{i,t}$; and i and t are subscripts of firms and years, respectively.

The following equation is estimated to test sub-hypotheses (H4a), (H4b) and (H4c) on the interaction effect of FRQ and ownership structure on IE:

$$IE_{i,t} = \beta_0 + \beta_1 FRQ_{i,t} + \beta_2 FRQ_{i,t} xCO5_{i,t} + \beta_3 FRQ_{i,t} xITO_{i,t} + \beta_4 FRQ_{i,t} xISO_{i,t} + \beta_5 CO5_{i,t} + \beta_6 ITO_{i,t} + \beta_7 ISO_{i,t} + \beta_k ControlVar_{i,t} + \varepsilon_{i,t}$$ (3.16)

where: $FRQ_{i,t} xCO5_{i,t}$, $FRQ_{i,t} xITO_{i,t}$ and $FRQ_{i,t} xISO_{i,t}$ are the interaction terms between four proxies of FRQ and three measures of ownership structure (ownership concentration, institutional ownership and managerial ownership); and i and t are subscripts of firms and years, respectively.

3.7 Endogeneity

Endogeneity refers to the correlation between the independent variables and the error term. Robert and Whited (2013, p.494) posit that endogeneity is "the most important and pervasive issue confronting studies in empirical corporate finance". The existence of endogeneity could result in biased and inconsistent estimates that may invalidate empirical studies' findings (Wooldridge, 2002).

3.7.1 Causes of endogeneity

Generally, endogeneity stems from three sources: (i) omitted variables; (ii) reverse causality (simultaneity) and/or (iii) measurement errors (Robert & Whited, 2013).

Omitted variable bias

An omitted variable refers to any variable that should be included as an independent variable because of its relevance to the dependent variable but, for some reason, is not. Since these omitted variables are included in the error term, endogeneity will occur when these omitted variables are correlated with the independent variables. Omitted variable bias often arises when the omitted variables are unobservable (Roberts & Whited, 2013). Therefore, it is also called unobserved heterogeneity bias. One example of a possible omitted variable in this study is managerial capability. This variable is hard to observe and quantify but is likely to have a significant influence on both FRQ and IE. According to Demerjian et al. (2013), firms with more capable CEOs have better quality financial reporting evidenced by fewer restatements, improved earnings persistence and better accruals estimation. Similarly, Habib and Hasan (2017) find that managerial ability significantly affects IE by increasing overinvestment. Since managerial ability significantly impacts both IE and FRQ, endogeneity may exist due to omitted variable bias. Another possible omitted variable is policy uncertainty that is also difficult

to measure but may induce underinvestment (Im et al., 2021) and affect the ownership structure of a firm by making investors more reluctant to invest (Alawfi & Vergos, 2017).

Reverse causality (simultaneity)

Reverse causality (simultaneity) occurs when independent variables (FRQ, ownership concentration, institutional ownership and managerial ownership) and IE are jointly determined. For example, ownership concentration and institutional ownership could have significant impacts on IE but firms with greater IE could also attract large investors and institutions, resulting in reverse causality between ownership concentration, institutional ownership and IE (Cao et al., 2020; Himmelberg et al., 1999). In addition, FRQ may affect IE but firms in which managers invest inefficiently could have lower quality of reporting since managers want to disguise their poor performance, leading to a false inference about a positive relationship between FRQ and IE (Chen et al., 2011). With regard to managerial ownership, managers of a firm with high IE could attempt to increase their ownership stake in the firm since becoming a large shareholder of a well-performing firm greatly benefits them (Demsetz & Lehn, 1985). As a result, there might be reverse causality between managerial ownership and IE.

Measurement errors

Measurement error refers to the discrepancy between the true value of a variable and its measured value (its proxy) (Wooldridge, 2002). Measurement error may occur because of either incorrect data collection or a theoretical difference between the variable of interest and its proxy. For example, if the proxies for FRQ do not have a strong theoretical justification, measurement errors will arise. When the measurement error is in the explanatory variable, it becomes a part of the error term, causing the error term to be correlated with the explanatory variable and inducing endogeneity. In this study, all proxies for IE, FRQ and ownership structure have been used multiple times in previous studies (e.g., Biddle et al., 2009; Chen et al., 2011; Cutillas Gomariz & Sánchez Ballesta, 2014) and have solid theoretical justifications. Therefore, it is unlikely that endogeneity could exist in this study due to a measurement error.

3.7.2 Dealing with endogeneity

The most efficient way to deal with endogeneity is using instrumental variables (IV) that are correlated with the endogenous independent variables and uncorrelated with the error term (Basmann, 1957). However, it is challenging to find an appropriate IV for ownership structure measures because any variable that affects ownership structure is also likely to influence IE (Himmelberg et al., 1999). For FRQ, prior research suggests several possible IVs for FRQ but due to limited available data on the Vietnamese stock market, these variables are unobtainable. Therefore, in this study, the two-step

system generalised method of moments (GMM) estimators are employed to control for endogeneity issues. One benefit of using GMM is that it could deal with endogeneity in panel data by using "internal instruments", which are lags of the instrumented variables. Since the two-step system GMM is applied for dynamic models, this study follows Shao et al. (2013), Ullah et al. (2020) and Ibrahim et al. (2021) to include the first lag of IE in all regressions. The results of the two-step system GMM are reported in the robustness test in section (4.6.2).

In addition to using the two-step system GMM, the study uses the lagged of the explanatory variables to control for endogeneity. Particularly, the current values of the explanatory variables are replaced by the one-year lagged values. Previous studies suggest that using lagged independent variables helps mitigate the effect of reverse causality which causes endogeneity (Ahmed & Ali, 2017; Wintoki et al., 2012). The reason is that while the dependent variable may have reserve causality with the current values of the independent variables, it is unlikely that it might affect the lagged value of the independent variables.

3.8 Summary

This chapter discusses the data collection and research method. The study uses panel data methodology with secondary data and regression analysis. Most data are obtained from the Bloomberg database except the ownership concentration data that are provided by Vietstock, a popular financial data database in Vietnam.

This chapter also discusses the measurement of FRQ, ownership structure, IE and control variables in the study. The study follows previous research to use earnings quality measures as proxies for FRQ. Specifically, three FRQ proxies are derived from Dechow and Dichev's (2002), McNichols' (2002) and Ball and Shivakumar's (2005) models. The final FRQ proxy is an aggregate measure of the three other proxies. To measure ownership structure, the percentages of ownership concentration, institutional ownership and managerial ownership are used. IE is measured as the deviation of the actual investment from the expected investment level. In addition, eight control variables are included to control for the impact of other firm-level characteristics on IE.

The chapter also describes the research framework and the institutional background of the research. Since the accounting system and corporate governance background of Vietnam are quite distinctive, some of the study's findings may be different from previous findings in the literature.

Chapter 4

Results

4.1 Introduction

This chapter presents the empirical results. Section 4.2 provides the descriptive statistics of the dependent, independent and control variables. Section 4.3 reports the correlation matrix among the variables. Diagnostic tests are presented in Section 4.4 to ensure that the regression models are correctly specified. Section 4.5 discusses the regression models' results. The robustness tests are reported in section 4.6. Section 4.7 summarises the chapter.

4.2 Descriptive statistics

4.2.1 Sample

The study's initial sample comprises 749 firms listed on either HOSE or HNX, corresponding to 8,988 firm-year observations. The sample excludes 104 financial firms, resulting in a deduction of 1,248 firm-year observations. Likewise, 1,553 firm-year observations are excluded due to missing information. Overall, the final sample comprises 6,187 observations, covering 645 non-financial listed companies over 12 years from 2007 to 2018. Table 4.1 shows that among the 645 listed firms, 339 are listed on HNX and 306 on HOSE. HNX has more listed firms than HOSE since the listing requirements of HNX are less stringent than those of HOSE (see Table 3.2), making it easier for small firms to list on HNX.

Table 4.1   The distribution of Vietnamese listed firms by Stock Exchange in 2018

Name of Stock Exchange	Number of firms	Number of observations
HOSE	306	2,951
HNX	339	3,236
Total	645	6,187

Source: Bloomberg (accessed Dec 2020)

Table 4.2 reports the distribution of firms by industry group. According to the GICS, firms are classified into 24 industry groups. However, some industries such as food and staples, retailing and semiconductors and semiconductor equipment do not exist on the Vietnamese stock market. Bank, insurance and diversified financial industries are also excluded since financial firms are subject to different accounting and governance regulations. Therefore, the final sample consists of 19 industry groups. Among the 645 firms in the sample, over a quarter operate in the capital goods industry (178 firms, 27.60%) and the smallest number of firms is in the telecommunication services industry (1 firm, 0.16%).

Table 4.2   Sample distribution by industry

No	GICS Industry group	Number of firms	Percentage (%)
1	Automobiles & Components	7	1.09%
2	Capital Goods	178	27.60%
3	Commercial & Professional Service	16	2.48%
4	Consumer Durables & Apparel	25	3.88%
5	Consumer Services	17	2.64%
6	Energy	35	5.43%
7	Food, Beverages & Tobacco	66	10.23%
8	Health Care Equipment & Service	4	0.62%
9	Household & Personal Products	3	0.47%
10	Materials	126	19.53%
11	Media & Entertainment	14	2.17%
12	Pharmaceuticals, Biotechnology	17	2.64%
13	Real Estate	24	3.72%
14	Retailing	14	2.17%
15	Software & Services	6	0.93%
16	Technology Hardware & Equipment	12	1.86%
17	Telecommunication Services	1	0.16%
18	Transportation	47	7.29%
19	Utilities	33	5.12%
	Total	645	100

Source: Author's calculations

Table 4.3 presents the distribution of the firm-year observations by year. It shows that the number of observations increased consistently every year except for 2018, mostly due to the increase in the number of newly listed firms. The least number of observations is in 2007, with 250 firm-year observations, which accounts for 4.04% of the sample, whereas 2017 has the largest number of observations, with 642 firm-year observations equivalent to 10.38% of the sample.

Table 4.3   Sample distribution by year

Year	No of observation	Percentage (%)
2007	250	4.04
2008	369	5.96
2009	447	7.22
2010	484	7.82
2011	498	8.05
2012	513	8.29
2013	532	8.6
2014	565	9.13
2015	611	9.88
2016	636	10.28
2017	642	10.38
2018	640	10.34
Total	6,187	100

Source: Author's calculations

4.2.2 Descriptive statistics

Table 4.4 presents the descriptive statistics of the dependent variables, independent variables and control variables used in the study over the twelve-year period from 2007 to 2018.

Table 4.4   Descriptive statistics

Variables	(1) N	(2) Mean	(3) Median	(4) Standard deviation	(5) Min	(6) Max
IE	4,574	-0.079	-0.049	0.093	-0.548	0
FRQ1	4,539	-0.092	-0.064	0.090	-0.470	0
FRQ2	4,525	-0.088	-0.062	0.085	-0.412	0
FRQ3	5,203	-0.090	-0.062	0.089	-0.417	0
FRQ_SM	4,525	-0.090	-0.064	0.083	-0.433	0
CO5	4,572	0.497	0.512	0.212	0.05	1
ITO	4,707	0.162	0.015	0.237	0	0.817
ISO	4,707	0.112	0.050	0.144	0	0.654
SOEdum	5,078	0.310	0	0.462	0	1
TA (billion Dong)	6,187	1,452	440	3,219	19	22,795
Age (year)	5,527	5.981	6	3.541	1	19
Lev	6,180	0.491	0.514	0.223	0.0402	0.907
Tang	6,073	0.275	0.220	0.214	0.003	0.881
Slack	6,187	0.100	0.061	0.108	0.000	0.522
Zsc	5,512	3.416	2.415	3.578	0.012	24.43
ROA (%)	5,703	6.818	5.267	7.683	-12.04	35.95
Big4	5,035	0.214	0	0.410	0	1

Notes: Refer to Table 3.3 for variable definitions. N is the number of observations.

Source: Author's calculations

The main variable (*IE*) has a mean (median) value of -0.079(-0.049). This result is similar to those of the US (Verdi, 2006) and Spanish (Cutillas Gomariz & Sánchez Ballesta, 2014) markets. It contradicts the conventional presumption that firms in developed markets invest more efficiently than those in emerging markets.

For the FRQ proxies, firms in the sample have a mean value of -0.092 for *FRQ1* derived from Dechow and Dichev's (2002) model; -0.088 for *FRQ2* derived from McNichols' (2002) model; -0.090 for *FRQ3* derived from Ball and Shivakumar's (2005) model; and -0.090 for the summary FRQ (*FRQ_SM*) (see Table 4.4). These values are lower than the corresponding values of firms in the US stock market (Biddle et al., 2009; Chen et al, 2011; Verdi, 2006) and the Spanish stock market (Cutillas Gomariz & Sánchez Ballesta, 2014). As discussed in section (3.5.2.1), the absolute values of the FRQ proxies are multiplied by -1, which means that higher values reflect better FRQ. Therefore, the results suggest that the FRQ of Vietnamese listed firms, in general, is lower than that of firms in developed markets. This finding is in line with Ball et al. (2000) who document that FRQ is lower in countries where concentrated ownership structures are prevalent.

The mean (median) value of ownership concentration (*CO5*) is 0.497 (0.51) suggesting that most Vietnamese listed firms have highly concentrated ownership with block shareholders on average holding as much as half of the total shares. This finding is in agreement with La Porta et al.'s (1999) finding that concentrated ownership is the most commonly observed ownership pattern in emerging markets. The mean value of *ITO* is 0.162, indicating that institutional shareholders on average hold 16.20% of the total shares. The mean value of *ISO* is 0.112, which indicates that the average shareholding of managerial shareholders on the Vietnamese stock market is 11.2%. The mean value of *SOEdum* is 0.31, which means that 31% of the listed firms in the sample are SOEs.

With regard to the control variables, firm size (measured by TA) ranges from 19 billion VND to 22,795 billion VND and has a mean value of 1,452 billion VND. The median value of firm size (440 billion VND) is considerably lower than the mean value (1,452 billion VND), indicating that the distribution of firm size data is strongly right-skewed with more small firms than large firms. The reason is that the sample includes more HNX firms than HOSE firms and most firms listed on HNX are smaller than on HOSE (HNX and HOSE annual reports, 2019). The average age of the firms in the sample is 6 years, suggesting that most firms are newly listed. The average leverage ratio of the sample is 49.1%, which is in line with prior research on the Vietnamese stock market (Phuong & Hung, 2020). Tangibility (measured by the ratio of fixed assets over TA) has a mean value of 27.5%. The average Z-score (*Zsc*) of the sample is 3.42, which implies that most firms are safe from bankruptcy (Altman, 1968). The mean value of *Slack* (measured by the ratio of cash over TA) is 10%, which is higher than that of the US (7.9%) reported by Martinez-Sola et al. (2010) and Canada (3.87%) reported by Gill and Shah (2012). A possible reason is that Vietnam still has underdeveloped capital markets with high lending rates (World Bank, 2019), thus Vietnamese listed firms prefer holding a substantial amount of cash to avoid the high cost of debt. The profitability ratio (*ROA*) of the listed firms in the sample averages 6.82%, which is quite similar to a previous study on Vietnamese listed firms (6.4%) (Vu et al., 2019). In addition, only 21.4% of the firms in the sample are audited by Big 4 audit companies, which is much lower than the corresponding value of Malaysian listed firms (51.8%) reported by Rad et al. (2016). One possible explanation for the low use of the Big 4 in Vietnam is that Big 4 audit firms require higher audit fees, which discourages many firms from using their services.

Table 4.5 reports the mean values of IE, FRQ, ownership concentration, institutional ownership, managerial ownership and all control variables for SOEs and non-SOEs samples and the t-test results for differences in means. The t-test results show significant differences in mean values of most variables between SOEs and non-SOEs. Compared with non-SOEs, SOEs have better FRQ with all proxies of FRQ significantly higher than those of non-SOEs. This is consistent with Tam et al. (2019) who document that Vietnamese SOEs have better earnings quality than POEs. SOEs have more concentrated ownership which is evident since over 50% of the total shares of SOEs are held by the

State. SOEs also have a higher level of institutional ownership than non-SOEs. The level of managerial ownership in SOEs, however, is lower than that in non-SOEs. One possible reason is that during the privatisation of Vietnamese SOEs, especially in the early stage, the State prioritised selling equity stakes to institutional investors, making it difficult for individual investors like managers to own SOEs' shares. For example, according to Decree No. 44/1998/ND-CP, individuals could not buy more than 10% of the total shares of an SOE whereas institutions could buy as much as 20% of the total equity of an SOE. Regarding other variables, SOEs, in general, are larger and younger than non-SOEs. SOEs also have more tangible assets, more debt, more cash and higher ROA than non-SOEs which is in line with O'Toole et al.'s (2016) findings. The authors argue that due to their political connections, SOEs enjoy a monopoly in many protected sectors such as mining and telecommunications and earn supernormal profits compared with non-SOEs. SOEs are also more likely to use Big 4 auditors than non-SOEs. A possible explanation is that many large Vietnamese SOEs have foreign shareholders and these shareholders often request financial reports to be audited by Big 4 firms (Ngo et al., 2020). Since the mean values of FRQ and the three measures of ownership structure of SOEs are significantly different from those of non-SOEs, the impact of FRQ and ownership structure on IE might be different between SOEs and non-SOEs, which supports the hypotheses (H3a) and (H3b).

Table 4.5   Differences in means for SOEs and non-SOEs

	SOEs		Non-SOEs		Mean difference	t-value
	Mean	SD	Mean	SD		
IE	-0.076	0.091	-0.078	0.093	0.002	0.346
FRQ1	-0.082	0.076	-0.093	0.092	0.011	4.003***
FRQ2	-0.079	0.073	-0.089	0.087	0.010	3.662***
FRQ3	-0.081	0.079	-0.090	0.091	0.009	3.443***
FRQ_SM	-0.081	0.071	-0.091	0.085	0.010	3.941***
CO5	0.629	0.133	0.441	0.212	0.188	35.135***
ITO	0.277	0.300	0.120	0.190	0.157	17.678***
ISO	0.035	0.072	0.147	0.154	-0.111	-32.791***
LnTA	13.333	1.384	13.076	1.482	0.256	5.969***
LnAge	1.539	0.699	1.638	0.725	-0.099	-4.623***
Tang	0.328	0.240	0.249	0.194	0.079	11.460***
Lev	0.538	0.214	0.477	0.221	0.060	9.209***
Slack	0.106	0.112	0.096	0.106	0.009	2.800**
Zsc	3.240	2.942	3.380	3.670	-0.140	-1.440
ROA	7.121	6.987	6.375	7.820	0.747	3.357***
Big4	0.249	0.432	0.210	0.408	0.038	2.786**
N	1572		3506		5078	

Notes: Table 4.5 reports the differences in means for SOE and non-SOE samples. Variable definitions are listed in Table 3.3 unless otherwise specified. SD: standard deviation. N: the number of observations. *,**,*** Significant at the 10%, 5% and 1% levels, respectively.
Source: Author's calculations

4.3 Correlation matrix

Table 4.6 presents the correlation matrix of all the variables in the study. As predicted, all four proxies of FRQ are significant and positively correlated with the proxy for IE, which supports hypothesis (H1). Ownership concentration is positively correlated with IE, which is consistent with hypothesis (H2a) that there is a significant relationship between ownership concentration and IE. Both institutional ownership and managerial ownership are significantly and positively associated with the IE of Vietnamese listed firms, which supports hypotheses (H2b) and (H2c).

With regard to FRQ proxies, the FRQ proxies are positively and significantly correlated with one another. Although the correlation coefficients among the FRQ proxies are quite high, they are still less than one suggesting that they capture somewhat different aspects of FRQ.

Among the control variables, age is positively correlated with IE, which is consistent with the prediction that mature firms are more likely to have better IE. Tangibility (*Tang*) is negatively correlated with IE suggesting that firms with more fixed assets are likely to have lower IE. This finding is in line with Almeida et al. (2007) who argue that asset tangibility increases the investment-cash flow sensitivities and, thereby, decreases IE. *ROA* is negatively correlated with IE, which corroborates Chen et al.'s (2011) and Rad et al. (2016)'s findings. *Big4* is positively correlated with IE indicating that firms being audited by Big 4 audit firms tend to invest more efficiently.

Table 4.6   Pearson's correlation matrix

Variable	IE	FRQ1	FRQ2	FRQ3	FRQ_SM	CO5	ITO	ISO	SOEdum	TA	Age	Tang	Lev	Slack	Zsc	ROA	Big4
IE	1																
FRQ1	0.16***	1															
FRQ2	0.13***	0.91***	1														
FRQ3	0.16***	0.82***	0.76***	1													
FRQ_SM	0.17***	0.97***	0.94***	0.92***	1												
CO5	0.03*	0.06***	0.06***	0.05***	0.06***	1											
ITO	0.03*	0.06***	0.06***	0.06***	0.06***	0.32***	1										
ISO	0.03*	-0.01	-0.01	0	-0.01	-0.12***	-0.24***	1									
SOEdum	0.01	0.06***	0.05***	0.05***	0.06***	0.41***	0.30***	-0.35***	1								
TA	-0.02	0.03**	0.03*	0.06***	0.04***	0.07***	0.19***	-0.03**	0.02	1							
Age	0.09***	0.07***	0.05***	0.07***	0.07***	0.09***	0.11***	-0.01	-0.09***	0.10***	1						
Tang	-0.22***	0.08***	0.09***	0.09***	0.09***	0.12***	0.05***	-0.06***	0.17***	0.08***	-0.04***	1					
Lev	0.02	0.07***	0.07***	0.09***	0.07***	0	-0.04***	0.07***	0.13***	0.13***	-0.02	-0.03**	1				
Slack	0.02	-0.07***	-0.07***	-0.10***	-0.09***	0.13***	0.13***	-0.13***	0.04***	0	-0.02*	-0.19***	-0.27***	1			
Zsc	-0.02	-0.09***	-0.08***	-0.10***	-0.10***	0.13***	0.11***	-0.06***	-0.02	-0.05***	-0.02*	-0.05***	-0.57***	0.35***	1		
ROA	-0.06***	-0.07***	-0.07***	-0.09***	-0.08***	0.10***	0.12***	-0.09***	0.05***	0.01	-0.12***	-0.01	-0.42***	0.36***	0.57***	1	
Big4	0.03*	0.03**	0.03*	0.02	0.02	0.21***	0.18***	-0.10***	0.04***	0.39***	0.09***	0.03**	0.01	0.11***	0.02	0.07***	1

Notes: Refer to Table 3.3 for variable definitions. *** p<0.01, ** p<0.05, * p<0.1

4.4 Diagnostic tests

4.4.1 Normality

The study uses the values of skewness and kurtosis to test for the normality of the sample data. Gujarati (2003) suggests that if the skewness value equals 0 or the kurtosis value equals 3, the data are perfectly symmetrical, i.e., normally distributed. Table 4.7 shows that the values of skewness and kurtosis of all variables are different from 0 and 3 indicating the presence of non-normality in the data. However, according to the Central Limit Theorem (CLR), if the sample size is large enough, the distribution will be approximately normal. A rule of thumb used in many statistics textbooks (Mimmack et al., 2001; Ross, 2005; Stock & Watson, 2007) is that if the sample has at least 30 observations, the sampling distribution will approximate a normal distribution. Other authors such as Albright and Winstons (2014) state that a sample size of at least 40 is large enough for the CLR to hold. Since the sample size has 6,187 observations, non-normality is not a problem in the study according to the CLR.

Table 4.7   Skewness and kurtosis values

Variable	(1) Skewness	(2) Kurtosis
IE	-2.580	11.031
FRQ1	-1.852	6.833
FRQ2	-1.705	5.954
FRQ3	-1.722	5.889
FRQ_SM	-1.825	6.499
CO5	-0.216	2.416
ITO	1.343	3.444
ISO	1.757	5.803
Age	0.516	2.697
TA	4.672	27.478
Tang	0.906	3.087
Lev	-0.190	2.068
Slack	1.810	6.277
Zsc	3.350	17.428
ROA	1.174	5.696
Big4	1.398	2.955

Source: Author's calculations

4.4.2 Multicollinearity

The study uses Pearson's correlation results in Section (4.3) to detect multicollinearity. If the absolute value of the correlation coefficients between two independent variables is higher than 0.8, multicollinearity exists and could result in lower precision of estimated coefficients (Gujarati, 2003). Table 4.6 shows that all variables in the present study except for the FRQ proxies are weakly or moderately correlated with the absolute value of their correlation coefficients less than 0.8. Since the

FRQ proxies will be included in separate models, it can be inferred that there is no multicollinearity issue among the variables.

In addition, the variance inflation factor (VIF) is used to identify multicollinearity. Hamilton (2012) argues that using Pearson's correlations is not enough to rule out multicollinearity since these correlations only reveal relationships among pairs of variables. Hamilton suggests using a better diagnostic test such as VIF which can identify correlations among multiple explanatory variables. A rule of thumb commonly used by practitioners is if VIF > 10, there is a problem of multicollinearity. Table 4.8 shows that the highest VIF is 1.99. The Pearson correlation results and VIF values confirm that there is no multicollinearity problem among the independent variables.

Table 4.8   Variance inflation factor (VIF) results

Variable	VIF	1/VIF
FRQ1	1.02	0.98
FRQ2	1.02	0.98
FRQ3	1.03	0.97
FRQ_SM	1.03	0.97
CO5	1.22	0.82
ITO	1.24	0.81
ISO	1.09	0.92
TA	1.26	0.79
Age	1.03	0.97
Tang	1.12	0.89
Lev	1.61	0.62
Slack	1.37	0.73
Zsc	1.99	0.50
ROA	1.74	0.57
Big4	1.26	0.79
Mean VIF	1.33	

Source: Author's calculations

4.4.3 Heteroskedasticity

Heteroskedasticity is present in a study when the variance of the error terms is not constant across observations. Baltagi (2008) finds that heteroskedasticity leads to inefficient estimated coefficients and biased standard errors. The Modified Wald statistic is used to test for heteroskedasticity in the residuals (Baltagi, 2008). The null hypothesis of the Modified Wald test is "there is homoscedasticity in the residuals". Table 4.9 shows that all p-values = 0.000 and, therefore, the null hypothesis is rejected and the presence of heteroskedasticity in the residuals is accepted. To correct this issue, a two-dimensional cluster is used to correct the standard errors. Petersen (2009) finds that when standard errors are clustered by firm and year, heteroskedasticity will be controlled.

Table 4.9   Modified Wald test results of the sample

	Modified Wald test for groupwise heteroskedasticity in fixed-effect regression model				
	H0: sigma(i)^2 = sigma^2 for all i (there exists homoscedasticity)				
	Equation 3.6	**Equation 3.7**	**Equation 3.8**	**Equation 3.9**	**Equation 3.10**
Results	$\chi2(600)=3.4e+06$ Prob> $\chi2$ =0.000	$\chi2(600)=1.8e+31$ Prob>$\chi2$=0.000	$\chi2(583)=1.2e+07$ Prob> $\chi2$=0.000	$\chi2(605)=6.1e+32$ Prob> $\chi2$ =0.000	$\chi2(600)=1.8e+31$ Prob>$\chi2$= 0.000
	Equation 3.11	**Equation 3.12**	**Equation 3.13-3.14**	**Equation 3.15**	**Equation 3.16**
	$\chi2(588)=4.1e+09$ Prob>$\chi2$ = 0.000	$\chi2(613)=1.6e+32$ Prob>$\chi2$=0.000	$\chi2 (602)= 6.4e+31$ Prob> $\chi2$ = 0.000	$\chi2(600) = 1.7e+32$ Prob>$\chi2$ = 0.000	$\chi2(523)=6.6e+06$ Prob>$\chi2$= 0.000

Source: Author's calculations

4.4.4   Serial correlation (Auto-correlation)

Serial correlation, also known as auto-correlation, can be understood as the correlation of one variable at different times. The Wooldridge (2002) test is used to confirm the presence of serial correlation. The null hypothesis of the Wooldridge test is "no first-order autocorrelation". Table 4.10 shows that all p-value =0.000 and, therefore, the null hypothesis is rejected and the study accepts the presence of serial correlation.

Table 4.10   Wooldridge (2002) test results for serial correlation

	Wooldridge test for serial correlation in panel data				
	H0: no first-order autocorrelation				
	Equation 3.6	**Equation 3.7**	**Equation 3.8**	**Equation 3.9**	**Equation 3.10**
Results	$F(1,524)=24.20$ Prob > F =0.000	$F(1,530) = 25.69$ Prob > F = 0.000	$F(1, 550)= 17.24$ Prob > F = 0.000	$F(1,550)=17.30$ Prob>F= 0.000	$F(1, 499)=24.54$ Prob > F=0.000
Equation 3.11	**Equation 3.12**	**Equation 3.13**	**Equation 3.14**	**Equation 3.15**	**Equation 3.16**
$F(1,524)=24.20$ Prob> F=0.000	$F(1,518) = 28.33$ Prob>F=0.000	$F(1,520)= 24.08$ Prob> F= 0.000	$F(1, 520) = 24.00$ Prob> F= 0.000	$F(1,512)= 6.63$ Prob>F = 0.000	$F(1, 301)=22.34$ Prob > F=0.000

Source: Author's calculations

To control for serial correlation, this study follows Petersen (2009) to cluster the standard errors at firm and year levels. Petersen argues that clustering standard errors at firm and year levels helps control for serial correlation.

4.4.5   Endogeneity

Endogeneity occurs when an independent variable is correlated with the error term (Wooldridge, 2002). Endogeneity is "a major concern for many areas of business and management research that rely on regression analysis" (Abdallah et al., 2015, p. 791). According to Wooldridge (2002), the presence

of endogeneity could lead to biased and inconsistent OLS estimates. Roberts and Whited (2013, p. 495) note that "in many cases, endogeneity can be severe enough to reverse even qualitative inference".

Table 4.11 reports the results of the Durbin-Wu-Hausman test. The null hypothesis of the Durbin-Wu-Hausman test is "H0: explanatory variables are exogenous". Table 4.11 shows that the null hypothesis is rejected for equations (3.6) to (3.16), indicating the presence of endogeneity. The study controls for endogeneity in the robustness test by using two-step system GMM estimators.

Table 4.11   Durbin-Wu-Hausman test results for endogeneity

The Durbin-Wu-Hausman test for endogeneity					
H0: explanatory variables are exogenous					
Results	**Equation 3.6**	**Equation 3.7**	**Equation 3.8**	**Equation 3.9**	**Equation 3.10**
	$\chi2(1) = 8.53$ Prob>F=0.004	$\chi2(1) = 13.35$ Prob > F = 0.004	$\chi2 (2) = 24.51$ Prob > F = 0.000	$\chi2(1) = 28.13$ Prob> F = 0.000	$\chi2(1) = 25.15$ Prob> F = 0.000
Equation 3.11	**Equation 3.12**	**Equation 3.13**	**Equation 3.14**	**Equation 3.15**	**Equation 3.16**
$\chi2(1) = 11.37$ Prob> F = 0.001	$\chi2(1) = 23.17$ Prob>F=0.000	$\chi2(1) = 18.15$ Prob> F=0.002	$\chi2(1) = 21.34$ Prob> F = 0.000	$\chi2(1) = 19.04$ Prob> F = 0.001	$\chi2(4) = 17.65$ Prob> F = 0.001

Source: Author's calculations

4.5   Regression results

4.5.1   The effect of financial reporting quality on investment efficiency

This section presents the results of the relationship between FRQ and IE of Vietnamese listed firms. The study uses pooled OLS regression with firm- and year-clustered standard errors to estimate equation (3.6). The study employs three different proxies for FRQ obtained from Dechow and Dichev's (2002) model (*FRQ1*), McNichols' (2002) model (*FRQ2*) and Ball and Shivakumar's (2005) model (*FRQ3*). In addition, to reduce measurement errors in each FRQ proxy and to generalise the results, the three proxies are aggregated into one summary proxy. The study follows Biddle et al. (2009) and Chen et al. (2011) to normalise all proxies and average them to obtain the summary FRQ proxy *(FRQ_SM)*.

The regression results of the relationship between FRQ and IE of Vietnamese listed firms are reported in Table 4.12. Columns I, II, III and IV in Table 4.12 present the results obtained from equation (3.6) using the four proxies of FRQ: *FRQ1*, *FRQ2, FRQ3* and *FRQ_SM*, respectively. These columns show that all estimated coefficients of FRQ are positive and significant. The estimated coefficient of *FRQ1* is positive (0.179) and is significant at the 1% level, suggesting that higher FRQ results in better IE.

Table 4.12　Regression results of the effect of financial reporting quality on investment efficiency

Variable	Dependent variable = IE			
	I	II	III	IV
FRQ1	0.179***			
	(5.948)			
FRQ2		0.156***		
		(5.589)		
FRQ3			0.189***	
			(7.279)	
FRQ_SM				0.204***
				(6.491)
LnAge	0.008***	0.009***	0.009***	0.008***
	(3.543)	(3.682)	(4.111)	(3.460)
LnTA	-0.004**	-0.004**	-0.003*	-0.004**
	(-2.325)	(-2.306)	(-2.148)	(-2.368)
Lev	0.004	0.005	-0.003	0.004
	(0.282)	(0.331)	(-0.226)	(0.281)
Tang	-0.089***	-0.088***	-0.088***	-0.090***
	(-8.523)	(-8.212)	(-10.053)	(-8.573)
Slack	0.005	0.005	0.003	0.007
	(0.488)	(0.443)	(0.322)	(0.657)
Zsc	0.000	0.000	0.000	0.000
	(0.142)	(0.109)	(0.182)	(0.177)
ROA	-0.001*	-0.001*	-0.001*	-0.001*
	(-1.929)	(-1.880)	(-2.064)	(-1.857)
Big4	0.014**	0.014**	0.013**	0.014**
	(2.792)	(2.777)	(2.999)	(2.836)
Constant	-0.003	-0.005	-0.010	-0.000
	(-0.139)	(-0.274)	(-0.546)	(-0.020)
Observations	3,507	3,507	4,138	3,507
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.098	0.094	0.098	0.100

Notes: Results are obtained from pooled OLS regressions. *,**,*** indicate significance at the 10%, 5% and 1% level, respectively. t-statistics are in parentheses. Standard errors are clustered at firm and year levels to control for heteroskedasticity and cross-sectional and time-series correlation. Industry fixed-effects based on GICS classification are included. See Table 3.3 for variable definitions.
Source**:** Author's calculations

Likewise, the estimated coefficients of *FRQ2*, *FRQ3* and *FRQ_SM* are also positive and significant at the

1% level. In terms of economic significance, the estimated coefficients indicate that an increase of FRQ

by one standard deviation leads to an increase of IE by 0.016% (for *FRQ1*), 0.013% (for *FRQ2*) and

0.017% (for *FRQ3*) and 0.017% (for *FRQ_SM*). These findings are consistent with the preliminary results

of the correlation analyses in section (4.3). Table 4.12 shows that the adjusted R^2 of equation (3.6)

ranges from 9.4% to 10%, which is quite low compared with that of the US market (Biddle et al, 2009;

Verdi, 2006) but is similar to that of the Chinese stock market (Li & Wang, 2010). Since China is also a transitional economy with many similarities to Vietnam, such as high level of state ownership, highly concentrated ownership structure and poor investor protection (Yu, 2013), it is reasonable that the adjusted R^2 of equation (3.6) of Vietnamese listed firms is similar to that of Chinese listed firms.

With regard to the control variables, the coefficient of *LnTA*, which measures firm size, is negative and significant, indicating that bigger firms are more likely to deviate from an optimal investment level than smaller firms. This finding is in agreement with Rad et al. (2016) who document that large firms on the Malaysian stock market tend to invest inefficiently. Consistent with the prediction, firms audited by Big 4 audit firms are more likely to invest efficiently. This is predictable since Che et al. (2020) find that Big 4 audit firms provide higher-quality audits than other audit firms and higher-audit quality will reduce information asymmetry and improve IE (Boubaker et al., 2018). *LnAge* is also positively related to IE, which is consistent with previous studies (Biddle et al, 2009; Chen et al., 2011, Rad et al., 2016). When firms are older, they tend to select their investments more cautiously and will be less likely to undertake sub-optimal investment projects. Therefore, it is expected that firm age positively influences IE. The estimated coefficient of *ROA* is negative and significant, which indicates that profitable firms tend to invest sub-optimally. This finding is in line with Myers and Majluf's (1984) argument that managers are likely to engage in dysfunctional behaviours such as underinvestment or overinvestment when their firms are more profitable. Tangibility (*Tang*) is negatively and significantly associated with IE suggesting that firms with a higher level of tangible assets are more likely to make inefficient investments. Since tangible assets are frequently used as collateral for loans, asset tangibility affects a firm's ability to acquire external funding. When a firm has a lot of tangible assets, it will obtain external financing more easily. Hence, managers will have more spare funds to invest inefficiently (Chen et al., 2011), leading to a negative effect of tangibility on IE.

Overall, the results in Table 4.12 support the hypothesis (H1), i.e., higher FRQ improves the IE of Vietnamese listed firms. The positive relationship between FRQ and IE could be attributable to the role of FRQ in reducing information asymmetry between managers and shareholders. According to the agency theory, information asymmetry exists because of the separation of ownership and control between managers and shareholders (Berle & Means, 1932; Jensen & Meckling, 1976). Managers know more about a firm's performance than shareholders and may use their inside information to expand the firm beyond the optimal level for "empire building" or "entrenchment" motives (Jensen, 1986; Shleifer and Vishny, 1989), which results in overinvestment. In contrast, managers who prefer "a quite life" may reject risky but value-creating investment projects, which leads to underinvestment (Bertrand & Mullainathan, 2003). Therefore,information asymmetry is the main cause of investment inefficiency (Biddle et al, 2009; Chen et al., 2011). According to Ding (2011), information asymmetry is more evident in emerging markets due to a lack of investor protection, which exacerbates manager-

shareholder agency conflicts. Some authors such as Holmstrom and Tirole (1993) and Kanodia and Lee (1998) argue that high-quality financial reporting could alleviate information asymmetry by assisting managers in identifying and distinguishing between profitable and unprofitable investment projects. In addition, good and transparent information enables shareholders to better monitor managerial behaviour (Bushman & Smith, 2001; Lambert, 2001). With shareholders' strict monitoring, managers will be under pressure to invest more efficiently. The results, therefore, support existing literature on FRQ and IE, which suggests that higher FRQ results in enhanced IE (Bushman & Smith, 2001; Leuz & Verrecchia, 2000; Kanodia & Lee, 1998). The finding also agrees with earlier empirical findings in developed markets. For example, based on samples of US firms, Biddle et al. (2009), Hope and Thomas (2008), McNichols and Stubben (2008) and Verdi (2006) find that higher quality financial reporting can mitigate overinvestment and underinvestment problems and therefore improves IE. Cutillas Gomariz and Sánchez Ballesta (2014) document a positive relationship between FRQ and IE on the Spanish stock market. The result is also consistent with Dang and Ngo (2020) and Hung et al. (2020) who report a positive and significant relationship between FRQ and IE of Vietnamese listed firms. Among the four FRQ proxies that we use in this study, three proxies (*FRQ2*, *FRQ3* and *FRQ_SM*) have not been used by any previous study on the FRQ-IE relationship on the Vietnamese stock market (Dang & Ngo, 2020; Hung et al., 2020). By using these proxies, the study can test whether the positive effect of FRQ on IE of Vietnamese listed firms is significant across multiple measures of FRQ.

4.5.2 The effect of ownership structure on investment efficiency

To investigate the effect of ownership structure on IE of Vietnamese listed firms, the effects of three measures of ownership structure: ownership concentration, institutional ownership and managerial ownership, on IE are tested. First, the effect of each measure on IE is examined separately and then all measures of ownership structure are included in a unified model to examine whether the effect of any measure changes when controlling for other measures. Columns I, II, III and IV in Table 4.13 report the regression results of the effect of ownership concentration on IE, institutional ownership on IE, managerial ownership on IE and all three measures of ownership structure on IE, respectively.

4.5.2.1 The effect of ownership concentration on investment efficiency

Column I in Table 4.13 shows that the estimated coefficient of ownership concentration variable (*CO5*) is significant and positive (0.024) at the 5% level. This result suggests that when ownership concentration increases, there will be an increase in a firm's *IE.* In terms of economic significance, the result indicates that when ownership concentration increases by 1%, *IE* increases by 0.3%. This finding is consistent with the hypothesis (H2a), i.e., ownership concentration has a significant effect on IE and agrees with the empirical finding on the Jordanian market (Tayem, 2015). As discussed in Section (2.4.1), ownership concentration could have either a positive or negative influence on IE. The positive

effect is driven by the alignment effect, which exists when controlling shareholders align their interests with minority shareholders and pay attention to managerial monitoring (Jensen & Meckling, 1976; Pindado & De la Torre, 2009). Ownership concentration could also have a negative relationship with IE if the controlling shareholders use their dominant power to abuse minority shareholders (Huyghebaert & Wang, 2012). As discussed in section (2.2.2), concentrated ownership results in the principal-principal conflict which provides incentives for controlling shareholders to expropriate minority shareholders. Expropriation may involve overinvesting in value-destroying projects or rejecting profitable projects, which results in underinvestment (Huyghebaert & Wang, 2012). The study's result provides evidence that the alignment effect dominates over the entrenchment effect in most Vietnamese firms. Since large shareholders hold a substantial number of shares in a firm,

Table 4.13   Regression results of the effect of ownership structure on investment efficiency

Variable	Dependent variable = IE			
	I	II	III	IV
CO5	0.024**			0.015
	(2.411)			(1.405)
ITO		0.018**		0.014*
		(2.366)		(1.967)
ISO			0.006	0.003
			(0.733)	(0.334)
LnAge	0.011***	0.010***	0.011***	0.010***
	(5.551)	(4.816)	(5.323)	(5.013)
LnTA	-0.002	-0.003*	-0.003	-0.002
	(-1.118)	(-1.983)	(-1.691)	(-1.449)
Lev	-0.001	-0.000	-0.001	-0.002
	(-0.097)	(-0.013)	(-0.088)	(-0.186)
Tang	-0.081***	-0.082***	-0.080***	-0.082***
	(-7.725)	(-8.282)	(-8.427)	(-7.519)
Slack	-0.009	-0.008	-0.002	-0.015
	(-0.815)	(-0.859)	(-0.227)	(-1.402)
Zsc	-0.000	-0.000	-0.000	-0.000
	(-0.188)	(-0.218)	(-0.150)	(-0.289)
ROA	-0.001*	-0.001*	-0.001*	-0.001
	(-2.029)	(-2.048)	(-1.938)	(-1.848)
Big4	0.010*	0.012**	0.013**	0.010
	(1.853)	(2.506)	(2.723)	(1.795)
Constant	-0.056***	-0.028	-0.035*	-0.045**
	(-3.341)	(-1.518)	(-1.966)	(-2.697)
Observations	3,676	4,015	4,015	3,610
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.065	0.067	0.070	0.065

Notes: Results are obtained from pooled OLS regressions. *,**,*** indicate significance at the 10%, 5% and 1% level, respectively. t-statistics are in parentheses. Standard errors are clustered at firm and year levels to control for heteroskedasticity, and cross-sectional and time-series correlation. Industry fixed-effects based on GICS classification are included. See Table 3.3 for variable definitions.

Source: Author's calculations

they will have to incur a greater part of the costs of "squandering corporate wealth" (Jensen & Meckling, 1976). Therefore, the exclusive benefits they acquire from sub-optimal investment may not outweigh the benefits of efficient investment and there will be an alignment of interests between large shareholders and minority shareholders. In addition, when shareholders own large ownership stakes, the potential benefit of monitoring is high enough to compensate for the associated cost (Shleifer & Vishny, 1986). Therefore, large shareholders are willing to bear the monitoring cost, which results in lower information asymmetry and better IE. Overall, the study's finding supports the extant literature on the alignment effect of ownership concentration on IE (Jensen & Meckling, 1976; Pindado & De la Torre, 2009).

4.5.2.2 The effect of institutional ownership on investment efficiency

Column II in Table 4.13 shows that the estimated coefficient of the institutional ownership variable (*ITO*) is positive (0.018) and significant at the 5% level, suggesting that institutional ownership has a positive effect on IE. In terms of economic significance, when institutional shareholdings increase by 1%, *IE* increases by 0.23%. This finding supports the hypothesis (H2b) that there is a positive relationship between institutional ownership and IE of Vietnamese listed firms. This result lends support to the existing literature on the institutional ownership-IE relationship. Maug (1998) argues that institutional investors, especially those with large shareholdings, are incentivised to influence managerial activities to obtain greater portfolio returns. Brickley et al. (1988) report that institutions tend to challenge managerial decisions that are detrimental to shareholders' value to protect their wealth. Using a sample of US hedge funds, Brav et al. (2018) find that a large number of these funds intervene in the portfolio firms by private discussions with managers. If these private negotiations fail, institutions can take public measures such as filing a shareholder proposal or criticising the management at the annual meeting. In the worst-case scenario, institutions can use proxy fights to vote against management. Since institutional shareholders are motivated to monitor managerial activities, managers will have less opportunity to depart from the optimal investment level. Therefore, it is reasonable that institutional ownership is positively associated with IE. The study's finding suggests that institutional shareholders in most Vietnamese listed firms play an active role in overseeing management, which results in a positive relationship between institutional ownership and IE on the Vietnamese stock market. Empirically, the study finding is consistent with Cao et al. (2020) who report that an increase in institutional shareholdings is associated with enhanced IE of Chinese listed firms.

4.5.2.3 The effect of managerial ownership on investment efficiency

Column III in Table 4.13 shows that the estimated coefficient of managerial ownership (*ISO*) is positive (0.006) but insignificant, suggesting that managerial ownership has no significant effect on the IE of Vietnamese listed firms. This finding fails to support H2c that managerial ownership has a significant relationship with IE of Vietnamese listed firms. This result contradicts existing literature which confirms

either a positive or negative influence of managerial ownership on IE (Azhar et al., 2019; John et al.; 2008; Vijayakumaran, 2021). However, the study's finding is relevant in the context of Vietnam. First, the average percentage of managerial ownership of Vietnamese listed firms is quite low (11.2%) compared with institutional ownership (16.2%) and much lower than those of large shareholders (49.7%) (see Table 4.4). Jensen & Meckling (1976) argue that the more shares managers hold, the more they will converge their interests with those of other shareholders. Therefore, if managers own only a small number of shares, they will not have sufficient motivation to maximise shareholders' value by investing efficiently. Second, previous findings in sub-sections (4.5.2.1) and (4.5.2.2) suggest that large shareholders and institutional shareholders in Vietnamese listed firms pay a considerable amount of attention to managerial monitoring. Loderer and Martin (1997, p. 250) argue that managers' incentives to pursue their own interests could be offset by "the inability to effectively shape decisions". Therefore, if managers do not have sufficient decision authority because of strict monitoring from other shareholders, it is unlikely that managerial ownership has any effect on IE.

4.5.2.4 The effect of ownership concentration, institutional ownership and managerial ownership on investment efficiency

Since ownership concentration, institutional ownership and managerial ownership are three distinct measures of ownership structure, all these measures are included in one model to investigate the effect of each measure on IE while controlling for other measures. Column IV in Table 4.13 shows that only the estimated coefficient of *ITO* is significant at the 10% level after controlling for managerial ownership and ownership concentration. Since the estimated coefficient of *ITO* is positive (0.014), it suggests that institutional ownership is positively associated with the IE of Vietnamese listed firms and supports the hypothesis (H2b). Different from the individual models, the estimated coefficient of *CO5* is no longer significant after controlling for institutional and insider ownership. One explanation for this finding is that many institutional shareholders are also large shareholders and only these institutional shareholders play an effective role in improving the IE of Vietnamese listed firms. Other large shareholders have no role in eliminating sub-optimal investment. Therefore, when we include ownership concentration and institutional ownership in the same model, only the estimated coefficient of *ITO* is significant. Regarding managerial ownership, the estimated coefficient of *ISO* is insignificant, which agrees with the result in section (4.5.2.3).

Regarding the control variables, firm age (*LnAge*) positively affects IE indicating that older firms are less likely to deviate from optimal investment level. *Tang* has a negative influence on IE, which is in line with previous studies (Chen et al., 2011, Rad et al., 2016).

4.5.3 The effect of financial reporting quality and ownership structure on investment efficiency of state-owned listed firms

4.5.3.1 The effect of financial reporting quality on investment efficiency of state-owned listed firms

To test the effect of FRQ on IE in state-owned listed firms, the interaction terms between the FRQ proxies and the *SOEdum* variable, which equals 1 if the State owns over 50% of the total shares in the firm and 0 otherwise, are included in equation (3.11). Columns I, II, III and IV in Table 4.14 show that the estimated coefficients of *FRQ1xSOEdum* and *FRQ_SMxSOEdum* are positive and significant at the 5% level and the coefficients of *FRQ2xSOEdum* and *FRQ3xSOEdum* and are positive and significant at the 10% level. Since all interaction terms of FRQ and *SOEdum* are positive, it is concluded that the effect of FRQ on IE will increase in state-owned listed firms. This result supports H3a which hypothesises that the influence of FRQ on IE changes in state-owned listed firms. The finding also supports existing literature which documents that Vietnamese SOEs have better quality financial reporting than their non-SOE counterparts (Essa et al., 2016; Tam et al., 2019). Previous studies provide evidence that because of their political connections, SOEs often enjoy special treatment from the government. For example, Chen et al. (2010) document that state-owned banks frequently provide credit to state-owned listed firms based on political factors rather than profitability and the quality of the financial information. Since SOEs are highly protected by the government, they will have less incentive to manage their earnings (Wang and Yung, 2011). In addition, Liu et al. (2012) document that the compensation contracts for SOEs' managers often place more weight on social and political objectives than the firm's performance. Hence, the management of SOEs will have weaker incentives to mask their earnings figures and the quality of financial information of SOEs will be better than that of non – SOEs. If earnings quality is higher in SOEs, it is reasonable that the influence of FRQ on IE will be enhanced in SOEs.

Regarding the control variables, *LnAge* is positively associated with IE, which is in agreement with previous studies (Biddle et al, 2009; Chen et al., 2011, Rad et al., 2016). Size (denoted by *LnTA*) negatively affects IE, which is consistent with Rad et al. (2016). Tangibility (*Tang*) is negatively and significantly associated with IE suggesting that firms with a higher level of tangible assets are more likely to deviate from the optimal investment level. This finding is in line with previous research, which also documents a negative relationship between tangibility and IE (Almeida et al., 2007; Chen et al., 2011). *Big4* positively affects IE, which agrees with Rad et al.'s (2016) finding.

Table 4.14   Regression results of the effect of financial reporting quality and investment efficiency in state-owned enterprises

Variable	Dependent variable= IE			
	I	II	III	IV
FRQ1	0.155***			
	(6.087)			
FRQ1xSOEdum	0.093**			
	(2.719)			
FRQ2		0.138***		
		(5.508)		
FRQ2xSOEdum		0.075*		
		(2.109)		
FRQ3			0.154***	
			(5.727)	
FRQ3xSOEdum			0.135*	
			(2.200)	
FRQ_SM				0.173***
				(7.203)
FRQ_SMxSOEdum				0.126**
				(2.400)
SOEdum	0.023***	0.022***	0.025***	0.025***
	(5.692)	(4.687)	(5.651)	(5.880)
LnAge	0.008***	0.009***	0.009***	0.008***
	(3.807)	(4.062)	(4.295)	(3.766)
LnTA	-0.003*	-0.003*	-0.002	-0.003*
	(-1.862)	(-1.850)	(-1.772)	(-1.928)
Lev	-0.002	-0.003	-0.007	-0.002
	(-0.158)	(-0.196)	(-0.523)	(-0.129)
Tang	-0.094***	-0.094***	-0.092***	-0.095***
	(-9.194)	(-8.772)	(-10.877)	(-9.183)
Slack	-0.002	-0.004	-0.004	-0.001
	(-0.198)	(-0.319)	(-0.361)	(-0.099)
Zsc	-0.000	-0.000	0.000	-0.000
	(-0.133)	(-0.136)	(0.051)	(-0.071)
ROA	-0.001	-0.001	-0.001*	-0.001
	(-1.786)	(-1.806)	(-1.834)	(-1.671)
Big4	0.014**	0.015**	0.013**	0.014**
	(2.930)	(2.930)	(3.077)	(2.962)
Constant	-0.012	-0.013	-0.021	-0.010
	(-0.579)	(-0.654)	(-1.212)	(-0.492)
Observations	3,327	3,327	3,934	3,327
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.106	0.098	0.104	0.108

Notes: Results are obtained from pooled OLS regressions. *,**,*** indicate significance at the 10%, 5% and 1% level, respectively. t-statistics are in parentheses. Standard errors are clustered at firm and year levels to control for heteroskedasticity, and cross-sectional and time-series correlation. Industry fixed-effects based on GICS classification are included. See Table 3.3 for variable definitions.
Source: Author's calculations

4.5.3.2 The effect of ownership concentration, institutional ownership and managerial ownership on investment efficiency of state-owned listed firms

Table 4.15 reports the regression results of equations (3.12) to (3.15) on the effect of ownership concentration, institutional ownership and managerial ownership on IE of Vietnamese SOEs. Columns I, II, III, and IV in Table 4.15 provide the results of the influence of ownership concentration on IE, institutional ownership on IE, managerial ownership on IE and all three measures on IE, respectively. These results show that the estimated coefficients of the interaction terms (*CO5xSOEdum*, *ISOxSOEdum*, *ITOxSOEdum*) are insignificant for equations (3.12) to (3.15), which indicates that the effect of ownership concentration, institutional ownership and managerial ownership on IE does not change in SOEs. This finding fails to support hypothesis (H3b), i.e., that the effect of ownership concentration, institutional ownership and managerial ownership on IE will worsen in Vietnamese SOEs. In addition, after including the interaction terms in equations (3.12) and (3.13), the significant effect of ownership concentration and institutional ownership on IE we document in sub-sections (4.5.2.1) and (4.5.2.2) disappears. These findings imply that the positive effect of ownership concentration and institutional ownership on IE does not exist in SOEs. In SOEs, the effect of large shareholders and institutions on IE might be overshadowed by the influence of the State because the State is the largest (controlling) shareholder and has dominating power over other shareholders. Since other shareholders usually have small stakes in the firm, they might become "free riders" and leave the monitoring role to the State (Jensen & Meckling, 1976; Yammeesri, 2003). This might be the reason why the positive effect of ownership concentration and institutional ownership on IE vanishes in SOEs.

4.5.4 The interaction effect of ownership structure and financial reporting quality on investment efficiency

Table 4.16 reports the regression results of the interaction effect of FRQ and ownership structure on IE. Columns I, II, III and IV provide the results of the interaction effect between three measures of ownership structure and *FRQ1*, *FRQ2*, *FRQ3* and *FRQ_SM*, respectively. To investigate the effect of ownership structure on the FRQ-IE relationship, the study focuses on the estimated coefficients of the interaction terms, which are *FRQ1xCO5*, *FRQ1xITO*, *FRQ1xISO*, *FRQ2xCO5*, *FRQ2xITO*, *FRQ2xISO*, *FRQ3xCO5*, *FRQ3xITO*, *FRQ3xISO*, *FRQ_SMxCO5*, *FRQ_SMxITO*, *FRQ_SMxISO*. Columns I, II, III and IV in Table 4.16 show that the estimated coefficients on the four interaction terms (*FRQ1xISO*, *FRQ2xISO*, *FRQ3xISO*, *FRQ_SMxISO*) are negative and significant. In addition, the coefficients of the four FRQ proxies are positive and significant. This result indicates that managerial ownership worsens the positive relationship between FRQ and IE. This finding supports H4c: Managerial ownership has a significant influence on the relationship between FRQ and IE of Vietnamese listed firms. This result is also in line with the entrenchment hypothesis which suggests that when managers own a significant number of shares in a firm, they become entrenched and can ignore

Table 4.15 Regression results of the effect of ownership concentration, institutional ownership and managerial ownership on investment efficiency in state-owned enterprises

Variable	Dependent variable = IE			
	I	II	III	IV
CO5	0.008			-0.000
	(0.847)			(-0.018)
CO5xSOEdum	0.002			0.001
	(0.066)			(0.049)
ITO		0.008		0.012
		(0.982)		(1.465)
ITOxSOEdum		0.004		-0.004
		(0.374)		(-0.336)
ISO			0.016	0.014
			(1.541)	(1.359)
ISOxSOEdum			0.023	0.019
			(0.958)	(0.729)
SOEdum	0.015	0.012**	0.016***	0.016
	(0.951)	(2.547)	(4.150)	(0.964)
LnAge	0.011***	0.011***	0.011***	0.010***
	(4.907)	(4.849)	(5.213)	(4.324)
LnTA	-0.001	-0.002	-0.002	-0.002
	(-0.890)	(-1.524)	(-1.019)	(-0.939)
Lev	-0.004	-0.005	-0.009	-0.006
	(-0.350)	(-0.436)	(-0.700)	(-0.537)
Tang	-0.084***	-0.085***	-0.085***	-0.084***
	(-8.562)	(-8.960)	(-9.008)	(-8.200)
Slack	-0.013	-0.012	-0.008	-0.014
	(-1.121)	(-1.151)	(-0.735)	(-1.221)
Z_score	-0.000	-0.000	-0.000	-0.000
	(-0.110)	(-0.297)	(-0.308)	(-0.230)
ROA	-0.001*	-0.001*	-0.001*	-0.001*
	(-2.138)	(-1.982)	(-2.054)	(-1.971)
Big4	0.011*	0.012**	0.013**	0.011*
	(2.106)	(2.556)	(2.630)	(2.054)
Constant	-0.055**	-0.038*	-0.049**	-0.052**
	(-3.019)	(-2.002)	(-2.564)	(-3.105)
Observations	3,634	3,824	3,824	3,571
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.07	0.072	0.073	0.069

Notes: Results are obtained from pooled OLS regressions. *,**,*** denote significance at the 10%, 5% and 1% level, respectively. t-statistics are in parentheses. Standard errors are clustered at firm and year levels to control for heteroskedasticity, and cross-sectional and time-series correlation. Industry fixed-effects based on GICS classification are included. See Table 3.3 for variable definitions.
Source: Author's calculations

capital market punishments (Morck et al., 1988). Therefore, managers will be incentivised to manipulate earnings for their self-interest. If managerial ownership leads to lower FRQ, it is expected that managerial ownership decreases the positive influence of FRQ on IE. The study's finding is also in

agreement with Gabrielsen et al. (2002) who empirically document that an increase in insider ownership results in lower earnings quality of Danish listed firms.

Other measures of ownership structure, ownership concentration and institutional ownership, do not influence the FRQ-IE relationship. This finding contradicts the hypotheses (H4a) and (H4b): ownership concentration and institutional ownership have significant impacts on the relationship between FRQ and IE. The finding contrasts with Wang et al. (2014) who empirically document that ownership concentration significantly affects the relationship between FRQ and IE of Chinese listed firms. A possible explanation for this finding is that large shareholders and institutional investors in Vietnamese listed firms do not have enough experience and expertise to detect EM and enhance FRQ. According to Dechow and Skinner (2000), EM can be difficult to identify since it is sometimes challenging to distinguish between acceptable accounting flexibility and earnings manipulation. Therefore, shareholders need experience and expertise in accounting and finance to identify whether managers have distorted earnings figures. However, Vietnamese domestic shareholders still lack knowledge of accounting, financial analysis, and portfolio management (Nguyen et al., 2021). If large shareholders and institutional shareholders cannot play an efficient role in improving FRQ, it is reasonable that the influence of ownership concentration and institutional ownership on the FRQ-IE relationship is not significant in Vietnamese listed firms.

Regarding the control variables, *LnAge* positively affects IE, which indicates that mature firms are inclined to invest more efficiently than newly established firms. This finding agrees with previous findings by Chen et al., (2011) and Rad et al., (2016). Tangibility (*Tang*) is negatively and significantly associated with IE suggesting that firms with a higher level of tangible assets are more likely to deviate from the optimal investment level. This result is consistent with Almeida et al. (2007) who find that asset tangibility increases the investment-cash flow sensitivities and thereby decreases IE.

Table 4.16 Regression results of the interaction effect of ownership structure and financial reporting quality on investment efficiency

Variable	Dependent variable = IE			
	I	II	III	IV
FRQ1	0.183***			
	(3.891)			
FRQ1xCO5	0.035			
	(0.458)			
FRQ1xITO	0.039			
	(0.278)			
FRQ1xISO	-0.296**			
	(-3.030)			
FRQ2		0.142**		
		(3.225)		
FRQ2xCO5		0.027		
		(0.516)		

FRQ2xITO		0.086		
		(0.664)		
FRQ2xISO		-0.194*		
		(-2.123)		
FRQ3			0.179***	
			(5.204)	
FRQ3xCO5			-0.048	
			(-0.401)	
FRQ3xITO			0.092	
			(0.555)	
FRQ3xISO			-0.208**	
			(-3.033)	
FRQ_SM				0.134***
				(4.213)
FRQ_SMxCO5				-0.008
				(-0.088)
FRQ_SMxITO				0.090
				(0.791)
FRQ_SMxISO				-0.241***
				(-4.135)
CO5	0.018	0.017	0.016	0.019
	(1.265)	(1.263)	(1.017)	(1.011)
ITO	0.014	0.019	0.013	0.018
	(1.009)	(1.374)	(0.890)	(1.167)
ISO	-0.026	-0.016	0.001	-0.004
	(-1.657)	(-1.134)	(0.183)	(-0.403)
LnAge	0.009***	0.009***	0.006**	0.005
	(4.763)	(4.883)	(2.813)	(1.504)
LnTA	-0.003	-0.003	-0.002	-0.001
	(-1.829)	(-1.833)	(-1.469)	(-0.484)
Lev	0.002	0.003	-0.005	-0.001
	(0.183)	(0.228)	(-0.404)	(-0.056)
Tang	-0.091***	-0.089***	-0.094***	-0.092***
	(-7.144)	(-6.726)	(-6.683)	(-4.458)
Slack	-0.006	-0.008	0.006	0.012
	(-0.609)	(-0.776)	(0.480)	(1.147)
Zsc	-0.000	-0.000	-0.001	-0.001
	(-0.162)	(-0.169)	(-0.640)	(-0.813)
ROA	-0.001	-0.001	-0.000	-0.001
	(-1.416)	(-1.377)	(-1.276)	(-1.444)
Big4	0.010	0.010	0.009	0.009
	(1.707)	(1.741)	(1.438)	(1.255)
Constant	-0.020	-0.022	-0.025	-0.046**
	(-1.155)	(-1.245)	(-1.498)	(-2.703)
Observations	3,028	3,028	2,553	1,822
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.096	0.086	0.096	0.093

Notes: Results are obtained from pooled OLS regressions. *,**,*** denote significance at the 10%, 5% and 1% level, respectively. t-statistics are in parentheses. Standard errors are clustered at firm and year levels to control for heteroskedasticity, and cross-sectional and time-series correlation. Industry fixed-effects based on GICS classification are included. See Table 3.3 for variable definitions.

Source: Author's calculations

4.6 Robustness tests

4.6.1 Alternative measurements of investment efficiency

Several sensitivity tests are carried out to test the measurement of IE. First, the expanded investment model developed by Chen et al. (2011) is employed to measure IE. Chen et al. (2011, p. 14) argue that "the relation between investment and revenue growth could differ between revenue decreases and revenue increases". Therefore, the authors propose a piecewise linear regression model that allows total investment to follow different linear trends over different segments of revenue growth.

The model is as follows:

$$Inv_{i,t} = \beta_0 + \beta_1 NRev_{i,t-1} + \beta_2 \%RevGr_{i,t-1} + \beta_3 NRev_{i,t-1} * \%RevGr_{i,t-1} + \varepsilon_{i,t} \qquad (4.1)$$

where: $Inv_{i,t}$ = total investment, calculated as the net increase in tangible and intangible assets; $NRev_{i,t-1}$ = 1 for negative revenue growth and 0 otherwise; and $\%RevGr_{i,t-1}$ = annual revenue growth

The residuals in equation (4.1) are considered proxies for investment inefficiency. To obtain IE proxy from Chen et al.'s (2011) model (IE_Chen$_{i,t}$), the absolute value of these residuals is multiplied by minus one. Table 4.17 reports the regression results of equations (3.6) to (3.16) after replacing IE$_{i,t}$ with IE_Chen$_{i,t}$. The results show that the findings in section (4.5) remain unchanged except that the coefficient of FRQ2xISO is negative but insignificant. However, since the coefficients of the interaction terms between the three other FRQ proxies and *ISO* (*FRQ1xISO*, *FRQ3xISO* and *FRQ_SMxISO*) are still significant, it is concluded that insider ownership worsens the impact of FRQ on IE.

Table 4.17 **Robustness check with investment efficiency proxy obtained from Chen et al.'s (2011) model (IE_Chen)**

Panel A: Regression results of the effect of financial reporting quality on IE_Chen

Variable	Dependent variable= IE_Chen			
	I	II	III	IV
FRQ1	0.182***			
	(5.741)			
FRQ2		0.163***		
		(5.615)		
FRQ3			0.189***	
			(7.262)	
FRQ_SM				0.206***
				(6.277)
LnAge	0.008***	0.009***	0.009***	0.008***
	(3.587)	(3.670)	(4.074)	(3.496)
LnTA	-0.004*	-0.004*	-0.003*	-0.004**
	(-2.236)	(-2.208)	(-2.074)	(-2.273)
Lev	0.001	0.002	-0.005	0.001
	(0.058)	(0.093)	(-0.322)	(0.059)
Tang	-0.087***	-0.086***	-0.087***	-0.088***
	(-8.478)	(-8.014)	(-9.971)	(-8.484)
Slack	0.008	0.007	0.008	0.009
	(0.785)	(0.713)	(0.904)	(0.962)
Zsc	0.000	0.000	0.000	0.000
	(0.316)	(0.285)	(0.389)	(0.349)
ROA	-0.001*	-0.001*	-0.001**	-0.001*
	(-2.090)	(-2.027)	(-2.362)	(-2.025)
Big4	0.014**	0.015**	0.013**	0.015**
	(3.152)	(3.057)	(3.004)	(3.198)
Constant	-0.002	-0.004	-0.009	0.000
	(-0.099)	(-0.221)	(-0.487)	(0.019)
Observations	3,507	3,507	4,138	3,507
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.097	0.094	0.098	0.099

Panel B: Regression results of the effect of ownership structure on IE_Chen

Variable	Dependent variable=IE_Chen			
	I	II	III	IV
CO5	0.026**			0.017
	(2.641)			(1.630)
ITO		0.019**		0.013*
		(2.503)		(1.953)
ISO			0.005	0.002
			(0.664)	(0.268)
LnAge	0.010***	0.010***	0.011***	0.009***
	(4.952)	(4.389)	(4.635)	(4.434)
LnTA	-0.002	-0.003*	-0.003	-0.002
	(-1.076)	(-1.931)	(-1.620)	(-1.353)
Lev	-0.003	-0.001	-0.002	-0.003
	(-0.208)	(-0.060)	(-0.124)	(-0.250)
Tang	-0.080***	-0.080***	-0.079***	-0.079***
	(-7.232)	(-7.978)	(-8.063)	(-6.975)
Slack	-0.005	-0.002	0.005	-0.009
	(-0.440)	(-0.167)	(0.479)	(-0.846)
Zsc	-0.000	-0.000	0.000	-0.000
	(-0.068)	(-0.011)	(0.059)	(-0.172)
ROA	-0.001**	-0.001**	-0.001*	-0.001*
	(-2.271)	(-2.387)	(-2.304)	(-2.124)
Big4	0.010*	0.012**	0.013**	0.010*
	(1.929)	(2.524)	(2.711)	(1.861)
Constant	-0.053**	-0.028	-0.035*	-0.043*
	(-2.929)	(-1.463)	(-1.900)	(-2.240)
Observations	3,676	4,015	4,015	3,610
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.064	0.068	0.065	0.064

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Panel C: Regression results of the effect of financial reporting quality on IE_Chen in SOEs

Variable	Dependent variable = IE_Chen			
	I	II	III	IV
FRQ1	0.161***			
	(6.079)			
FRQ1xSOEdum	0.093**			
	(2.692)			
FRQ2		0.149***		
		(5.840)		
FRQ2xSOEdum		0.068*		
		(1.853)		
FRQ3			0.154***	
			(5.568)	
FRQ3xSOEdum			0.148*	
			(2.144)	
FRQ_SM				0.180***
				(7.002)
FRQ_SMxSOEdum				0.119*
				(2.059)
SOEdum	0.022***	0.020***	0.025***	0.023***
	(5.823)	(4.703)	(5.101)	(5.634)
LnAge	0.008***	0.009***	0.009***	0.008***
	(4.296)	(4.508)	(4.589)	(4.231)
LnTA	-0.003*	-0.003*	-0.003*	-0.003*
	(-1.918)	(-1.902)	(-1.839)	(-1.980)
Lev	-0.005	-0.005	-0.008	-0.004
	(-0.280)	(-0.317)	(-0.559)	(-0.257)
Tang	-0.091***	-0.092***	-0.090***	-0.092***
	(-8.607)	(-8.116)	(-10.316)	(-8.591)
Slack	0.001	-0.001	0.001	0.002
	(0.096)	(-0.051)	(0.156)	(0.198)
Zsc	-0.000	-0.000	0.000	0.000
	(-0.021)	(-0.017)	(0.186)	(0.042)
ROA	-0.001*	-0.001*	-0.001*	-0.001
	(-1.854)	(-1.860)	(-2.065)	(-1.767)
Big4	0.014**	0.015**	0.013**	0.015**
	(3.180)	(3.154)	(2.945)	(3.207)
Constant	-0.009	-0.010	-0.018	-0.007
	(-0.445)	(-0.511)	(-1.051)	(-0.351)
Observations	3,327	3,327	3,934	3,327
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.106	0.097	0.107	0.108

Panel D: Regression results of the effect of ownership structure on IE_Chen in SOEs

Variable	Dependent variable=IE_Chen			
	I	II	III	IV
CO5	0.013			0.005
	(1.255)			(0.480)
CO5xSOEdum	0.000			-0.000
	(0.004)			(-0.003)
ITO		0.011		0.014
		(1.537)		(1.771)
ITOxSOEdum		0.001		-0.007
		(0.104)		(-0.553)
ISO			0.015	0.013
			(1.706)	(1.589)
ISOxSOEdum			0.017	0.011
			(0.659)	(0.398)
SOEdum	0.014	0.012**	0.015***	0.015
	(0.863)	(2.370)	(3.926)	(0.911)
LnAge	0.010***	0.011***	0.011***	0.010***
	(4.705)	(4.733)	(5.010)	(4.135)
LnTA	-0.002	-0.003	-0.002	-0.002
	(-0.970)	(-1.545)	(-1.026)	(-1.025)
Lev	-0.005	-0.005	-0.009	-0.006
	(-0.397)	(-0.414)	(-0.608)	(-0.470)
Tang	-0.082***	-0.082***	-0.082***	-0.081***
	(-8.030)	(-8.351)	(-8.353)	(-7.581)
Slack	-0.008	-0.005	-0.000	-0.008
	(-0.737)	(-0.524)	(-0.026)	(-0.730)
Zsc	-0.000	-0.000	-0.000	-0.000
	(-0.002)	(-0.166)	(-0.170)	(-0.117)
ROA	-0.001**	-0.001*	-0.001*	-0.001*
	(-2.376)	(-2.264)	(-2.271)	(-2.254)
Big4	0.011*	0.012**	0.013**	0.011*
	(2.025)	(2.379)	(2.480)	(1.943)
Constant	-0.051**	-0.036	-0.046**	-0.048**
	(-2.637)	(-1.858)	(-2.373)	(-2.502)
Observations	3,634	3,824	3,824	3,571
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.068	0.072	0.072	0.067

Panel E: Regression results on the interaction effect of ownership concentration and financial reporting quality on IE_Chen

Variable	Dependent variable = IE_Chen			
	I	II	III	IV
FRQ1	0.166***			
	(3.699)			
FRQ1xCO5	0.058			
	(0.808)			
FRQ1xITO	0.041			
	(0.299)			
FRQ1xISO	-0.249*			
	(-2.083)			
FRQ2		0.129**		
		(3.274)		
FRQ2xCO5		0.036		
		(0.722)		
FRQ2xITO		0.115		
		(0.872)		
FRQ2xISO		-0.130		
		(-1.307)		
FRQ3			0.175***	
			(4.058)	
FRQ3xCO5			-0.033	
			(-0.255)	
FRQ3xITO			0.060	
			(0.360)	
FRQ3xISO			-0.157*	
			(-2.063)	
FRQ_SM				0.161***
				(5.309)
FRQ_SMxCO5				-0.067
				(-0.758)
FRQ_SMxITO				0.089
				(0.867)
FRQ_SMxISO				-0.195**
				(-3.061)
CO5	0.020	0.018	0.019	0.011
	(1.488)	(1.392)	(1.250)	(0.631)
ITO	0.015	0.022	0.010	0.020
	(1.220)	(1.867)	(0.719)	(1.523)
ISO	-0.022	-0.011	0.001	-0.005
	(-1.273)	(-0.841)	(0.116)	(-0.488)
LnAge	0.008***	0.009***	0.006**	0.005
	(4.366)	(4.381)	(2.667)	(1.488)
LnTA	-0.003	-0.003	-0.002	-0.001
	(-1.755)	(-1.785)	(-1.353)	(-0.455)
Lev	0.001	0.001	-0.009	-0.006
	(0.038)	(0.080)	(-0.635)	(-0.286)
Tang	-0.087***	-0.085***	-0.089***	-0.086***
	(-6.637)	(-6.150)	(-6.237)	(-3.826)
Slack	-0.002	-0.005	0.008	0.013
	(-0.212)	(-0.372)	(0.721)	(1.027)
Zsc	-0.000	-0.000	-0.000	-0.001

	(-0.088)	(-0.089)	(-0.331)	(-0.513)
ROA	-0.001	-0.001	-0.001	-0.001
	(-1.589)	(-1.532)	(-1.461)	(-1.504)
Big4	0.011*	0.012*	0.009	0.007
	(2.107)	(2.086)	(1.498)	(1.263)
Constant	-0.019	-0.021	-0.023	-0.036*
	(-0.958)	(-1.025)	(-1.265)	(-2.015)
Observations	3,028	3,028	2,553	1,822
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.093	0.085	0.094	0.090

Notes: Results are obtained from pooled OLS regressions. *,**,*** denote significance at the 10%, 5% and 1% level, respectively. t-statistics are in parentheses. Standard errors are clustered at firm and year levels to control for heteroskedasticity, cross-sectional and time-series correlation. Industry fixed-effects based on GICS classification are included. See Table 3.3 for variable definitions.
Source: Author's calculations

Second, this study follows Chen et al. (2011) to replace sales growth with assets growth as a proxy for investment opportunities. The modified model is given in equation (4.2):

$$Inv_{i,t} = \beta_0 + \beta_1 Assetsgrowth_{i,t-1} + \varepsilon_{i,t} \qquad (4.2)$$

where: $Inv_{i,t}$ denotes total investment, calculated as the net increase in tangible and intangible assets; $AssetsGrowth_{i,t-1}$ denotes the percentage of change in TA; and *i* and *t* are subscripts of firms and years, respectively.

The absolute values of the residuals in equation (4.2) are multiplied by minus one to obtain thenew IE (IE_AG$_{i,t}$). Using these proxies, equations (3.6) to (3.16) are estimated to test the study's hypotheses. Table 4.18 presents the regression results after replacing IE$_{i,t}$ with IE_AG$_{i,t}$. Overall, the results in Table 4.18 are consistent with the main findings in section (4.5).

Table 4.18   Robustness check with IE_AG

Panel A: Regression results of the effect of financial reporting quality on IE_AG

Variable	Dependent variable = IE_AG			
	I	II	III	IV
FRQ1	0.196***			
	(11.346)			
FRQ2		0.188***		
		(10.251)		
FRQ3			0.204***	
			(11.966)	
FRQ_SM				0.226***
				(12.396)
LnAge	0.004	0.005*	0.005**	0.004
	(1.737)	(1.954)	(2.279)	(1.635)
LnTA	-0.003**	-0.003**	-0.002**	-0.003**
	(-2.725)	(-2.687)	(-2.495)	(-2.787)
Lev	0.008	0.009	0.001	0.008
	(0.779)	(0.821)	(0.100)	(0.775)
Tang	-0.047***	-0.047***	-0.046***	-0.048***
	(-5.447)	(-5.506)	(-5.982)	(-5.594)
Slack	-0.004	-0.004	-0.002	-0.002
	(-0.306)	(-0.316)	(-0.199)	(-0.164)
Zsc	0.001	0.001	0.001	0.001
	(1.251)	(1.314)	(1.512)	(1.317)
ROA	-0.001**	-0.001**	-0.001**	-0.001**
	(-2.506)	(-2.430)	(-2.788)	(-2.398)
Big4	0.012***	0.012***	0.011***	0.012***
	(3.577)	(3.415)	(3.760)	(3.649)
Constant	-0.014	-0.015	-0.016	-0.011
	(-0.932)	(-1.023)	(-1.200)	(-0.735)
Observations	3,507	3,507	4,139	3,507
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.093	0.082	0.096	0.098

Panel B: Regression results of the effect of ownership concentration on IE_AG

Variable	Dependent variable = IE_AG			
	I	II	III	IV
CO5	0.022**			0.015
	(2.621)			(1.702)
ITO		0.020***		0.015**
		(3.456)		(2.644)
ISO			0.001	0.000
			(0.054)	(0.040)
LnAge	0.006***	0.006**	0.007**	0.006**
	(3.277)	(2.630)	(3.100)	(2.706)
LnTA	-0.002	-0.002*	-0.002	-0.002
	(-1.460)	(-2.178)	(-1.674)	(-1.731)
Lev	0.003	0.005	0.005	0.003
	(0.414)	(0.556)	(0.468)	(0.338)
Tang	-0.038***	-0.037***	-0.036***	-0.038***
	(-4.524)	(-4.431)	(-4.392)	(-4.303)
Slack	-0.015	-0.011	-0.006	-0.019
	(-1.362)	(-1.096)	(-0.501)	(-1.839)
Zsc	0.001	0.001	0.001	0.001
	(1.062)	(1.339)	(1.435)	(1.027)
ROA	-0.001**	-0.001**	-0.001**	-0.001**
	(-2.865)	(-3.075)	(-2.995)	(-2.750)
Big4	0.010**	0.011**	0.012**	0.010**
	(2.512)	(2.860)	(3.113)	(2.336)
Constant	-0.055***	-0.038**	-0.045**	-0.047**
	(-3.793)	(-2.648)	(-3.107)	(-3.033)
Observations	3,677	4,016	4,016	3,611
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.044	0.042	0.039	0.038

Panel C: Regression results of the effect of financial reporting quality on IE_AG of SOEs

Variable	Dependent variable = IE_AG			
	I	II	III	IV
FRQ1	0.173***			
	(8.496)			
FRQ1xSOEdum	0.065**			
	(2.849)			
FRQ2		0.166***		
		(7.546)		
FRQ2xSOEdum		0.068*		
		(2.097)		
FRQ3			0.174***	
			(7.714)	
FRQ3xSOEdum			0.095*	
			(2.040)	
FRQ_SM				0.192***
				(8.291)
FRQ_SMxSOEdum				0.114**
				(2.961)
SOEdum	0.014***	0.015***	0.016***	0.018***
	(4.630)	(4.583)	(4.444)	(5.543)
LnAge	0.004	0.004	0.004*	0.004
	(1.457)	(1.683)	(2.019)	(1.406)
LnTA	-0.003**	-0.003**	-0.002**	-0.003**
	(-2.698)	(-2.678)	(-2.570)	(-2.812)
Lev	0.002	0.002	-0.002	0.003
	(0.202)	(0.153)	(-0.205)	(0.258)
Tang	-0.050***	-0.050***	-0.048***	-0.051***
	(-6.179)	(-6.128)	(-6.803)	(-6.097)
Slack	-0.011	-0.012	-0.009	-0.009
	(-0.864)	(-0.895)	(-0.776)	(-0.711)
Zsc	0.001	0.001	0.001	0.001
	(0.800)	(0.860)	(1.247)	(0.885)
ROA	-0.001*	-0.001*	-0.001**	-0.001*
	(-2.236)	(-2.209)	(-2.445)	(-2.068)
Big4	0.013***	0.013***	0.012***	0.013***
	(4.141)	(4.077)	(4.130)	(4.257)
Constant	-0.015	-0.015	-0.021	-0.013
	(-1.047)	(-1.095)	(-1.672)	(-0.919)
Observations	3,327	3,327	3,935	3,327
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.095	0.086	0.097	0.101

Panel D: Regression results of the effect of ownership structure and IE_AG in SOEs

Variable	Dependent variable = IE_AG			
	I	II	III	IV
CO5	0.012			0.004
	(1.254)			(0.467)
CO5xSOEdum	0.010			0.014
	(0.595)			(0.784)
ITO		0.022**		0.020***
		(3.352)		(3.438)
ITOxSOEdum		-0.012		-0.015
		(-1.017)		(-1.283)
ISO			0.005	0.006
			(0.467)	(0.575)
ISOxSOEdum			0.029	0.019
			(1.436)	(0.845)
SOEdum	0.003	0.009*	0.010**	0.003
	(0.258)	(2.229)	(2.839)	(0.235)
LnAge	0.006**	0.005*	0.006**	0.005*
	(2.788)	(2.194)	(2.596)	(2.297)
LnTA	-0.002	-0.002*	-0.001	-0.002
	(-1.405)	(-1.894)	(-1.061)	(-1.420)
Lev	0.003	0.001	-0.003	0.001
	(0.368)	(0.064)	(-0.299)	(0.161)
Tang	-0.040***	-0.039***	-0.039***	-0.039***
	(-5.395)	(-5.446)	(-5.424)	(-5.049)
Slack	-0.016	-0.015	-0.011	-0.019
	(-1.505)	(-1.405)	(-0.951)	(-1.665)
Zsc	0.001	0.001	0.001	0.001
	(1.176)	(1.096)	(1.082)	(1.127)
ROA	-0.001**	-0.001**	-0.001**	-0.001**
	(-2.909)	(-2.949)	(-3.018)	(-2.899)
Big4	0.011**	0.010**	0.011**	0.010**
	(2.865)	(2.928)	(3.171)	(2.611)
Constant	-0.053***	-0.040**	-0.051***	-0.050***
	(-3.598)	(-2.693)	(-3.433)	(-3.489)
Observations	3,635	3,825	3,825	3,572
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
R-squared	0.04	0.045	0.044	0.045

Panel E: Regression results of the interaction effect of financial reporting quality and ownership structure on IE_AG

Variable	Dependent variable = IE_AG			
	I	II	III	IV
FRQ1	0.244***			
	(7.817)			
FRQ1xCO5	-0.038			
	(-0.499)			
FRQ1xITO	-0.065			
	(-1.102)			
FRQ1xISO	-0.236**			
	(-2.757)			
FRQ2		0.257***		
		(12.739)		
FRQ2xCO5		-0.091		
		(-1.581)		
FRQ2xITO		-0.069		
		(-0.972)		
FRQ2xISO		-0.203*		
		(-2.223)		
FRQ3			0.258***	
			(5.381)	
FRQ3xCO5			-0.150**	
			(-2.309)	
FRQ3xITO			-0.041	
			(-0.423)	
FRQ3xISO			-0.111*	
			(-2.182)	
FRQ_SM				0.261***
				(4.217)
FRQ_SMxCO5				-0.132
				(-1.274)
FRQ_SMxITO				-0.085
				(-1.863)
FRQ_SMxISO				-0.130**
				(-2.766)
CO5	0.011	0.006	0.008	0.006
	(1.073)	(0.643)	(1.100)	(0.644)
ITO	0.007	0.008	0.005	0.005
	(0.969)	(0.805)	(0.549)	(0.724)
ISO	-0.022*	-0.019	-0.000	-0.005
	(-2.088)	(-1.681)	(-0.059)	(-0.504)
LnAge	0.004*	0.005*	0.002	0.002
	(1.943)	(2.121)	(1.308)	(1.197)
LnTA	-0.002**	-0.003**	-0.002*	-0.002
	(-2.493)	(-2.470)	(-1.980)	(-1.307)
Lev	0.006	0.005	0.005	0.007
	(0.616)	(0.571)	(0.429)	(0.457)
Tang	-0.047***	-0.046***	-0.045***	-0.042**
	(-4.593)	(-4.658)	(-4.429)	(-2.969)
Slack	-0.014	-0.016	-0.000	0.006
	(-1.294)	(-1.428)	(-0.014)	(0.374)
Zsc	0.001	0.001	0.001	0.001

	(0.893)	(0.937)	(1.145)	(1.144)
ROA	-0.001*	-0.001*	-0.001*	-0.001**
	(-2.180)	(-2.125)	(-2.125)	(-2.803)
Big4	0.010**	0.010**	0.007*	0.008**
	(2.421)	(2.487)	(2.141)	(2.490)
Constant	-0.018	-0.017	-0.024	-0.029**
	(-1.293)	(-1.203)	(-1.573)	(-2.366)
Observations	3,028	3,028	2,554	1,822
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.092	0.083	0.092	0.095

Notes: Results are obtained from pooled OLS regressions. *,**,*** denote significance at the 10%, 5% and 1% level, respectively. t-statistics are in parentheses. Standard errors are clustered at firm and year levels to control for heteroskedasticity, and cross-sectional and time-series correlation. Industry fixed-effects based on GICS classification are included. See Table 3.3 for variable definitions.
Source: Author's calculations

4.6.2 Endogeneity

The results of the Durbin-Wu–Hausman test in Section (4.4.5) show that endogeneity is present in the study. Consequently, endogeneity needs to be controlled for to ensure the validity of the estimates. Two-step system GMM estimators are used to control for potential endogeneity in this study. One advantage of using GMM is that it can deal with endogeneity in panel data by using an internally generated IV. The two-step system GMM estimation results are reported in Table 4.19. After controlling for endogeneity, all previous results remain the same. Table 4.19 also shows that the results of the Hansen test for over-identification are statistically insignificant, indicating that the instruments are valid. The p-value of the Arellano-Bond test for second-order autocorrelation (AR(2)) is also insignificant, suggesting that instruments from the second lag of dependent variables are appropriate instruments for the endogenous variable.

Table 4.19 Robustness check using two-step system GMM estimators

Panel A: Regression results of the effect of financial reporting quality on investment efficiency

Variable	Dependent variable = IE			
	I	II	III	IV
L.IE	0.224***	0.237***	0.077***	0.229***
	(3.375)	(3.553)	(3.133)	(3.618)
FRQ1	0.121***			
	(4.148)			
FRQ2		0.115***		
		(3.823)		
FRQ3			0.284**	
			(2.024)	
FRQ_SM				0.152***
				(4.663)
LnTA	-0.001	0.001	0.005	0.001
	(-0.091)	(0.125)	(1.137)	(0.133)
LnAge	0.006*	0.006*	0.004	0.006*
	(1.850)	(1.747)	(1.256)	(1.676)
Tang	-0.001	-0.009	-0.120**	-0.005
	(-0.019)	(-0.163)	(-2.556)	(-0.102)
Lev	-0.049	-0.039	0.008	-0.045
	(-0.880)	(-0.718)	(0.154)	(-0.820)
Slack	0.059	0.064	-0.088	0.071
	(0.420)	(0.463)	(-1.243)	(0.515)
Zsc	-0.000	-0.000	0.006**	-0.000
	(-0.021)	(-0.100)	(2.375)	(-0.080)
ROA	-0.002***	-0.002***	-0.001	-0.002***
	(-3.087)	(-3.010)	(-1.535)	(-3.100)
Big4	-0.004	-0.006	0.021	-0.004
	(-0.194)	(-0.289)	(0.836)	(-0.234)
Constant	-0.017	-0.044	-0.100	-0.039
	(-0.145)	(-0.377)	(-1.329)	(-0.352)
Observations	3,155	3,155	3,779	3,155
Number of instruments	27	27	30	27
Hansen p-value	0.428	0.268	0.112	0.428
AR(2)	0.463	0.427	0.749	0.431

Panel B: **Regression results on the effect of ownership concentration on investment efficiency**

Variable	Dependent variable = IE			
	I	II	III	IV
L.IE	0.110**	0.082***	0.309**	0.267***
	(2.011)	(3.419)	(2.014)	(4.009)
CO5	0.038*			-0.071
	(1.749)			(-1.457)
ITO		0.032*		0.044*
		(1.858)		(1.917)
ISO			0.026	0.046
			(0.497)	(0.855)
LnTA	-0.010	-0.015**	0.009	-0.011
	(-1.517)	(-2.080)	(1.141)	(-1.644)
LnAge	0.007**	0.009**	0.006	0.005
	(2.070)	(2.423)	(1.523)	(1.456)
Tang	-0.067**	-0.082	-0.083	-0.185***
	(-2.034)	(-1.635)	(-1.477)	(-4.469)
Lev	-0.138***	-0.061	0.008	-0.089**
	(-4.359)	(-1.153)	(0.152)	(-2.410)
Slack	-0.143**	-0.302**	-0.171	-0.390***
	(-2.084)	(-2.019)	(-1.379)	(-3.017)
Zsc	-0.003	0.003	0.007*	-0.000
	(-1.632)	(0.982)	(1.838)	(-0.020)
ROA	-0.002**	-0.002	0.001	0.001
	(-1.999)	(-1.233)	(0.486)	(0.992)
Big4	-0.010	0.023	0.034	0.011
	(-0.394)	(1.089)	(1.303)	(0.414)
Constant	0.168**	0.189*	-0.185	0.229**
	(2.055)	(1.936)	(-1.467)	(2.194)
Observations	3,407	3,721	3,721	3,373
Number of instruments	71	28	22	45
Hansen p-value	0.264	0.160	0.293	0.336
AR(2)	0.499	0.624	0.271	0.561

Panel C: Regression results of the effect of financial reporting quality on investment efficiency in state-owned enterprises

Variable	Dependent variable = IE			
	I	II	III	IV
L.IE	0.063*	0.111***	0.083***	0.117***
	(1.696)	(3.680)	(2.874)	(3.538)
FRQ1	0.084*			
	(1.838)			
FRQ1xSOEdum	0.125*			
	(1.654)			
FRQ2		0.064*		
		(1.695)		
FRQ2xSOEdum		0.127***		
		(3.403)		
FRQ3			0.099**	
			(2.374)	
FRQ3xSOEdum			0.147*	
			(1.813)	
FRQ_SM				0.080*
				(1.828)
FRQ_SMxSOEdum				0.187**
				(2.179)
SOEdum	0.086*	0.015	0.029	0.024
	(1.958)	(0.625)	(1.131)	(1.209)
LnAge	0.012	0.008	0.006	0.006
	(1.379)	(1.528)	(1.559)	(1.523)
LnTA	-0.071***	-0.010	-0.006	-0.000
	(-3.735)	(-0.796)	(-0.588)	(-0.046)
Lev	-0.205**	-0.198***	-0.179***	-0.043
	(-2.335)	(-3.059)	(-2.867)	(-0.651)
Tang	-0.387**	0.003	-0.113*	-0.039
	(-2.408)	(0.030)	(-1.654)	(-0.381)
Slack	-1.091**	-0.094	-0.272	-0.027
	(-2.044)	(-0.340)	(-1.141)	(-0.104)
Zsc	-0.000	-0.001	0.006	-0.001
	(-0.013)	(-0.217)	(1.318)	(-0.323)
ROA	0.000	-0.001	-0.002	-0.002*
	(0.067)	(-0.702)	(-1.286)	(-1.857)
Big4	0.086**	0.012	0.017	0.002
	(1.979)	(0.449)	(0.695)	(0.090)
Constant	1.140***	0.165	0.147	-0.019
	(3.633)	(0.880)	(0.958)	(-0.135)
Observations	3,005	3,005	3,605	3,005
Number of instruments	22	25	26	25
Hansen p-value	0.858	0.134	0.375	0.128
AR(2)	0.193	0.156	0.167	0.151

Panel D: Regression results of the effect of ownership structure on investment efficiency in state-owned enterprises

Variable	Dependent variable = IE			
	I	II	III	IV
L.IE	0.267***	-0.050	0.310***	0.258***
	(4.200)	(-0.350)	(3.635)	(2.875)
CO5	0.005			0.003
	(0.138)			(0.046)
CO5xSOEdum	-0.057			0.063
	(-0.348)			(0.354)
ITO		0.009		0.009
		(0.225)		(0.284)
ITOxSOEdum		0.000		-0.014
		(0.007)		(-0.356)
ISO			0.020	0.022
			(0.325)	(0.317)
ISOxSOEdum			0.009	-0.066
			(0.146)	(-0.961)
SOEdum	0.045	0.017	0.010	-0.027
	(0.449)	(1.175)	(1.083)	(-0.245)
LnTA	0.002	-0.000	0.003	0.001
	(0.401)	(-0.007)	(0.557)	(0.181)
LnAge	0.004	0.007*	0.005	0.005
	(1.362)	(1.662)	(1.419)	(1.341)
Tang	-0.048	-0.138***	-0.045	-0.037
	(-1.556)	(-2.984)	(-1.389)	(-0.916)
Lev	-0.012	-0.043	-0.012	0.001
	(-0.327)	(-0.946)	(-0.358)	(0.030)
Slack	-0.208**	-0.185	-0.197	-0.147
	(-2.321)	(-1.450)	(-1.463)	(-0.965)
Zsc	0.004*	0.002	0.003	0.004
	(1.787)	(0.738)	(1.020)	(1.303)
ROA	-0.000	-0.002	-0.000	-0.000
	(-0.497)	(-1.534)	(-0.257)	(-0.348)
Big4	0.016	0.021	0.012	0.012
	(1.030)	(0.901)	(0.595)	(0.571)
Constant	-0.059	-0.017	-0.072	-0.070
	(-0.988)	(-0.170)	(-1.058)	(-0.720)
Observations	3,373	3,553	3,553	3,340
Number of instruments	46	35	30	42
Hansen p-value	0.219	0.175	0.281	0.268
AR(2)	0.680	0.261	0.204	0.789

Panel E: Regression results of the interaction effect of ownership structure and financial reporting quality on investment efficiency

Variable	Dependent variable = IE			
	I	II	III	IV
L.IE	0.091***	0.081***	0.087**	0.159***
	(2.869)	(2.584)	(2.327)	(3.380)
FRQ1	0.256**			
	(1.977)			
FRQ1xCO5	0.021			
	(0.056)			
FRQ1xITO	-0.411			
	(-0.838)			
FRQ1xISO	-0.642**			
	(-2.287)			
FRQ2		0.293*		
		(1.859)		
FRQ2xCO5		0.000		
		(0.000)		
FRQ2xITO		-0.778		
		(-0.944)		
FRQ2xISO		-0.564*		
		(-1.701)		
FRQ3			0.652*	
			(1.655)	
FRQ3xCO5			-0.886	
			(-1.304)	
FRQ3xITO			0.028	
			(0.173)	
FRQ3xISO			-0.239**	
			(-2.074)	
FRQ_SM				0.699
				(1.309)
FRQ_SMxCO5				-1.145
				(-1.129)
FRQ_SMxITO				0.184
				(0.487)
FRQ_SMxISO				-0.428**
				(-2.542)
CO5	-0.184**	-0.198**	-0.049	-0.091
	(-1.970)	(-2.042)	(-0.419)	(-0.695)
ITO	-0.018	-0.039	0.002	-0.014
	(-0.416)	(-0.637)	(0.091)	(-0.264)
ISO	-0.023	-0.017	0.089**	0.082
	(-0.567)	(-0.408)	(2.387)	(1.276)
LnAge	0.008*	0.007*	0.002	0.002
	(1.848)	(1.651)	(0.451)	(0.387)
LnTA	-0.013	-0.009	0.003	0.006
	(-1.580)	(-0.981)	(0.362)	(0.462)
Lev	-0.072*	-0.076	-0.117**	-0.129**
	(-1.662)	(-1.643)	(-2.569)	(-1.996)
Tang	-0.056	-0.097*	-0.081	-0.002
	(-1.098)	(-1.721)	(-1.245)	(-0.029)
Slack	-0.108	-0.148	-0.014	-0.061

	(-1.259)	(-1.184)	(-0.191)	(-0.669)
Zsc	0.002	0.002	-0.002	-0.007
	(0.729)	(0.738)	(-0.500)	(-1.250)
ROA	-0.001**	-0.001	-0.001**	-0.001
	(-1.967)	(-1.152)	(-1.997)	(-0.706)
Big4	0.033	0.032	0.016	0.010
	(1.255)	(1.074)	(0.649)	(0.259)
Constant	0.261**	0.232	0.021	0.004
	(2.016)	(1.475)	(0.176)	(0.020)
Observations	2,794	2,794	2,381	1,672
Number of instruments	57	54	47	51
Hansen p-value	0.485	0.723	0.785	0.690
AR(2)	0.112	0.127	0.193	0.113

Notes: Results are obtained from two-step system GMM regressions. "*,**,***Significant at 10%, 5% and 1% levels, respectively". See Table 3.3 for variable definitions.
Source: Author's calculations

In addition to using system GMM, the lagged values of the endogenous independent variables are used to control for endogeneity. Prior studies provide evidence that using lagged independent variables helps control for the effect of reverse causality, one of the causes of endogeneity (Ahmed & Ali, 2017; Wintoki et al., 2012). Table 4.20 presents the results of this sensitivity test. It shows that the findings in section (4.5) remain unchanged after we replace the current values of the endogenous independent variables with the lagged values.

Table 4.20   Robustness check using lagged values of endogenous independent variables

Panel A: Regression results of the effect of financial reporting quality on investment efficiency

Variable	Dependent variable = IE			
	I	II	III	IV
L.FRQ1	0.076***			
	(3.594)			
L.FRQ2		0.065**		
		(2.927)		
L.FRQ3			0.086***	
			(7.025)	
L.FRQ_SM				0.086***
				(4.489)
LnAge	0.009***	0.009***	0.009***	0.009***
	(4.064)	(4.160)	(4.026)	(4.041)
LnTA	-0.002	-0.002	-0.002	-0.002
	(-1.556)	(-1.587)	(-1.580)	(-1.570)
Lev	-0.004	-0.004	-0.004	-0.004
	(-0.417)	(-0.366)	(-0.434)	(-0.425)
Tang	-0.082***	-0.082***	-0.081***	-0.082***
	(-8.603)	(-8.421)	(-8.712)	(-8.583)
Slack	-0.004	-0.005	-0.004	-0.004
	(-0.408)	(-0.431)	(-0.376)	(-0.398)
Zsc	-0.000	-0.000	-0.000	-0.000
	(-0.103)	(-0.118)	(-0.041)	(-0.078)
ROA	-0.001*	-0.001*	-0.001*	-0.001*
	(-1.873)	(-1.855)	(-1.857)	(-1.878)
Big4	0.012**	0.012**	0.012**	0.012**
	(2.896)	(2.909)	(2.864)	(2.942)
Constant	-0.027	-0.028	-0.026	-0.026
	(-1.422)	(-1.483)	(-1.474)	(-1.397)
Observations	3,977	3,977	3,990	3,977
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.068	0.066	0.069	0.068

Panel B: Regression results of the effect of ownership structure on investment efficiency

Variable	Dependent variable = IE			
	I	II	III	IV
L.CO5	0.021*			0.007
	(2.111)			(0.743)
L.ITO		0.014**		0.011*
		(2.671)		(1.916)
L.ISO			-0.013	-0.013
			(-0.880)	(-0.841)
LnAge	0.010***	0.009**	0.009**	0.010**
	(4.015)	(2.836)	(2.913)	(3.225)
LnTA	-0.002	-0.003*	-0.002	-0.003
	(-1.347)	(-1.895)	(-1.604)	(-1.733)
Lev	-0.000	0.004	0.004	0.003
	(-0.028)	(0.400)	(0.414)	(0.299)
Tang	-0.073***	-0.075***	-0.075***	-0.067***
	(-7.462)	(-6.882)	(-6.909)	(-6.923)
Slack	0.000	-0.002	0.000	0.002
	(0.034)	(-0.164)	(0.019)	(0.221)
Zsc	-0.000	-0.000	-0.000	-0.000
	(-0.253)	(-0.435)	(-0.374)	(-0.408)
ROA	-0.001**	-0.001	-0.001	-0.001**
	(-2.321)	(-1.885)	(-1.851)	(-2.438)
Big4	0.012**	0.013**	0.013**	0.012**
	(2.812)	(2.696)	(2.891)	(3.074)
Constant	-0.050**	-0.034*	-0.036	-0.040*
	(-2.997)	(-1.988)	(-1.890)	(-2.119)
Observations	3,421	3,599	3,599	3,192
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.061	0.062	0.061	0.061

Panel C: Regression results of the effect of financial reporting quality on investment efficiency in state-owned enterprises

Variable	Dependent variable = IE			
	I	II	III	IV
L.FRQ1	0.073***			
	(3.748)			
L.FRQ1xSOEdum	0.070*			
	(1.997)			
L.FRQ2		0.071***		
		(3.382)		
L.FRQ2xSOEdum		0.074*		
		(2.007)		
L.FRQ3			0.064***	
			(5.289)	
L.FRQ3xSOEdum			0.101*	
			(2.135)	
L.FRQ_SM				0.075***
				(3.944)
L.FRQ_SMxSOEdum				0.093*
				(1.956)
SOEdum	0.020***	0.022***	0.021***	0.021***
	(6.039)	(6.160)	(6.562)	(6.203)
LnAge	0.009**	0.008**	0.009***	0.009***
	(3.218)	(2.909)	(3.612)	(3.263)
LnTA	-0.002	-0.002	-0.002	-0.002
	(-1.101)	(-0.791)	(-1.250)	(-0.947)
Lev	-0.009	-0.010	-0.009	-0.008
	(-0.686)	(-0.794)	(-0.807)	(-0.714)
Tang	-0.085***	-0.087***	-0.082***	-0.083***
	(-7.919)	(-7.462)	(-8.764)	(-7.741)
Slack	-0.006	-0.009	-0.004	-0.003
	(-0.589)	(-0.780)	(-0.443)	(-0.340)
Zsc	-0.000	-0.000	-0.001	-0.000
	(-0.212)	(-0.249)	(-0.498)	(-0.385)
ROA	-0.001*	-0.001	-0.000	-0.000
	(-1.872)	(-1.454)	(-1.411)	(-1.248)
Big4	0.012**	0.012**	0.011**	0.012**
	(2.534)	(2.595)	(2.613)	(2.812)
Constant	-0.034	-0.039	-0.034	-0.037
	(-1.495)	(-1.494)	(-1.612)	(-1.524)
Observations	3,189	3,317	3,800	3,189
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.077	0.077	0.077	0.077

Panel D: Regression results of the effect of ownership structure on investment efficiency of state-owned enterprises

Variable	Dependent variable = IE			
	I	II	III	IV
L.CO5	-0.000			-0.002
	(-0.038)			(-0.178)
L.CO5xSOEdum	0.011			0.005
	(0.948)			(0.472)
L.ITO		-0.006		-0.004
		(-0.596)		(-0.408)
L.ITOxSOEdum		0.018		0.014
		(1.281)		(0.878)
L.ISO			-0.004	-0.005
			(-0.220)	(-0.344)
L.ISOxSOEdum			0.017	0.011
			(0.669)	(0.426)
SOEdum	0.009	0.010**	0.014**	0.008
	(1.137)	(3.204)	(3.464)	(1.082)
LnAge	0.011***	0.009**	0.010***	0.010**
	(3.598)	(3.041)	(3.504)	(3.167)
LnTA	-0.002	-0.002	-0.002	-0.002
	(-1.270)	(-1.328)	(-1.015)	(-1.044)
Lev	-0.004	-0.001	-0.001	-0.002
	(-0.378)	(-0.083)	(-0.145)	(-0.213)
Tang	-0.074***	-0.075***	-0.078***	-0.071***
	(-7.735)	(-7.311)	(-7.243)	(-7.368)
Slack	-0.001	-0.001	-0.005	0.001
	(-0.099)	(-0.093)	(-0.504)	(0.059)
Zsc	-0.000	-0.001	-0.000	-0.000
	(-0.296)	(-0.631)	(-0.388)	(-0.418)
ROA	-0.001**	-0.000	-0.001	-0.001**
	(-2.538)	(-1.591)	(-1.812)	(-2.525)
Big4	0.013**	0.014**	0.014**	0.014**
	(2.833)	(2.703)	(2.934)	(3.180)
Constant	-0.046*	-0.044**	-0.048*	-0.047*
	(-2.216)	(-2.425)	(-2.266)	(-2.210)
Observations	3,260	3,440	3,440	3,066
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.067	0.067	0.067	0.065

Panel E: Regression results of the interaction effect of financial reporting quality and ownership structure on investment efficiency

Variable	Dependent variable = IE			
	I	II	III	IV
L.FRQ1	0.085***			
	(4.301)			
L.FRQ1xL.CO5	-0.009			
	(-0.174)			
L.FRQ1xL.ITO	0.029			
	(0.301)			
L.FRQ1xL.ISO	-0.207**			
	(-2.382)			
L.FRQ2		0.068**		
		(2.690)		
L.FRQ2xL.CO5		-0.001		
		(-0.012)		
L.FRQ2xL.ITO		0.047		
		(0.426)		
L.FRQ2xL.ISO		-0.221*		
		(-2.349)		
L.FRQ3			0.102***	
			(3.663)	
L.FRQ3xL.CO5			0.001	
			(0.009)	
L.FRQ3xL.ITO			0.006	
			(0.075)	
L.FRQ3xL.ISO			-0.196*	
			(-2.077)	
L.FRQ_SM				0.096***
				(3.777)
L.FRQ_SMxL.CO5				-0.000
				(-0.003)
L.FRQ_SMxL.ITO				0.029
				(0.293)
L.FRQ_SMxL.ISO				-0.230**
				(-2.448)
L.CO5	0.008	0.009	0.008	0.008
	(0.719)	(0.741)	(0.699)	(0.744)
L.ITO	0.010	0.012	0.009	0.010
	(1.677)	(1.742)	(1.559)	(1.694)
L.ISO	-0.030	-0.031	-0.029	-0.031
	(-1.452)	(-1.424)	(-1.451)	(-1.499)
LnAge	0.007*	0.008**	0.007**	0.007**
	(2.348)	(2.523)	(2.387)	(2.394)
LnTA	-0.002	-0.002	-0.002	-0.002
	(-1.387)	(-1.432)	(-1.485)	(-1.415)
Lev	-0.000	0.000	-0.000	-0.000
	(-0.033)	(0.034)	(-0.030)	(-0.043)
Tang	-0.071***	-0.071***	-0.072***	-0.072***
	(-7.051)	(-6.899)	(-7.182)	(-7.122)
Slack	-0.004	-0.005	-0.005	-0.004
	(-0.304)	(-0.382)	(-0.363)	(-0.341)
Zsc	-0.000	-0.000	-0.000	-0.000

	(-0.266)	(-0.269)	(-0.184)	(-0.232)
ROA	-0.001*	-0.001*	-0.001*	-0.001*
	(-2.050)	(-2.012)	(-2.025)	(-2.028)
Big4	0.011**	0.011**	0.011**	0.011**
	(2.741)	(2.765)	(2.821)	(2.783)
Constant	-0.032	-0.033	-0.029	-0.031
	(-1.700)	(-1.733)	(-1.575)	(-1.655)
Observations	3,071	3,071	3,073	3,071
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.063	0.062	0.065	0.064

Notes: Results are obtained from pooled OLS regressions. *,**,*** denote significance at the 10%, 5% and 1% level, respectively. t-statistics are in parentheses. Standard errors are clustered at firm and year levels to control for heteroskedasticity and cross-sectional and time-series correlation. Industry fixed-effects based on GICS classification are included. See Table 3.3 for variable definitions.
Source: Author's calculations

4.6.3 Additional control variables

Since Chen et al. (2011, p. 26) argue that "adding more control variables comes at the cost of reducing the sample size and thus a trade-off exists between sample size (and hence generalisability) and model completeness.", this study only includes eight control variables which have been regularly used in previous research in the main tests. In this section, some other control variables are added to the regressions to check if the study's findings are affected by omitted variables bias.

Following Cutillas Gomariz and Sánchez Ballesta (2014), the study includes the standard deviation of CFO in the preceding three years (*Sd_CFO*) and a dummy variable that equals 1 if a firm reports a loss and 0 otherwise (*Loss*) in the regressions. Since Nor et al. (2017) find that board characteristics significantly affect IE, we include two measures of board characteristics: the total number of directors on the board (*LnBOD*) and a dummy variable (*BOD_FEdum*) that equals 1 if there is at least one female director on the board and 0 otherwise. To control the effect of macroeconomic conditions on IE, the inflation rate (*Infl_rate*) is also included in the regressions.

Table 4.21 reports the regression results after including five additional control variables. The results that we find in the main tests remain unchanged. It also shows that adding more control variables reduces the sample size since there are missing observations in the additional variables. For example, Column I in Panel A in Table 4.21 shows that the number of observations of equation (3.6) is 3,325, a decrease of 182 observations compared with the results in Table 4.12. The adjusted R^2 of the new regressions after adding new control variables also decreases which proves that the new variables may not improve the models' predictive power.

Table 4.21 Robustness check with five additional control variables

Panel A: Regression results of the effect of financial reporting quality on investment efficiency

Variable	Dependent variable = IE			
	I	II	III	IV
FRQ1	0.165***			
	(5.200)			
FRQ2		0.148***		
		(4.833)		
FRQ3			0.176***	
			(6.697)	
FRQ_SM				0.190***
				(5.761)
LnAge	0.009***	0.010***	0.009***	0.009***
	(3.380)	(3.596)	(3.910)	(3.426)
LnTA	-0.005**	-0.005**	-0.004**	-0.005**
	(-2.451)	(-2.509)	(-2.552)	(-2.495)
Lev	-0.002	-0.002	-0.007	-0.002
	(-0.184)	(-0.163)	(-0.632)	(-0.167)
Tang	-0.088***	-0.088***	-0.087***	-0.089***
	(-8.402)	(-8.198)	(-9.815)	(-8.478)
Slack	0.001	0.000	-0.002	0.002
	(0.097)	(0.047)	(-0.189)	(0.237)
Zsc	0.000	0.000	0.000	0.000
	(0.014)	(0.001)	(0.072)	(0.066)
ROA	-0.001**	-0.001**	-0.001*	-0.001*
	(-2.352)	(-2.378)	(-2.013)	(-2.233)
Big4	0.014**	0.014**	0.012***	0.014***
	(3.316)	(3.300)	(3.328)	(3.378)
Sd_CFO	0.000*	0.000*	0.000	0.000*
	(2.002)	(2.143)	(1.792)	(1.966)
LnBOD	-0.004	-0.003	0.004	-0.003
	(-0.285)	(-0.222)	(0.331)	(-0.208)
Loss	-0.016***	-0.017***	-0.010*	-0.016**
	(-3.365)	(-3.460)	(-1.916)	(-3.197)
BOD_FEdum	-0.002	-0.002	-0.002	-0.002
	(-0.549)	(-0.602)	(-0.574)	(-0.591)
Infl_rate	0.001	0.001	0.000	0.001
	(0.708)	(0.728)	(0.480)	(0.723)
Constant	0.019	0.019	-0.002	0.019
	(0.554)	(0.527)	(-0.060)	(0.550)
Observations	3,325	3,325	3,947	3,325
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.095	0.088	0.093	0.097

Panel B: Regression results of the effect of ownership structure on investment efficiency

Variable	Dependent variable = IE			
	I	II	III	IV
CO5	0.019*			0.013
	(1.898)			(1.289)
ITO		0.017*		0.014*
		(2.119)		(1.988)
ISO			0.013	0.011
			(1.498)	(1.241)
LnAge	0.011***	0.011***	0.012***	0.011**
	(3.428)	(3.882)	(4.055)	(3.145)
LnTA	-0.003	-0.005**	-0.004*	-0.004*
	(-1.824)	(-2.464)	(-2.299)	(-2.029)
Lev	-0.006	-0.005	-0.006	-0.007
	(-0.700)	(-0.492)	(-0.628)	(-0.744)
Tang	-0.080***	-0.082***	-0.080***	-0.080***
	(-7.832)	(-8.159)	(-8.263)	(-7.389)
Slack	-0.013	-0.010	-0.004	-0.015
	(-1.099)	(-1.003)	(-0.380)	(-1.302)
Zsc	-0.000	-0.000	-0.000	-0.000
	(-0.324)	(-0.255)	(-0.231)	(-0.352)
ROA	-0.001*	-0.001**	-0.001**	-0.001*
	(-2.179)	(-2.531)	(-2.449)	(-2.159)
Big4	0.009*	0.012**	0.013**	0.010*
	(1.972)	(2.803)	(3.019)	(1.938)
Sd_CFO	0.000**	0.000*	0.000*	0.000*
	(2.310)	(2.007)	(2.187)	(2.114)
LnBOD	0.007	0.004	0.004	0.006
	(0.580)	(0.405)	(0.349)	(0.555)
Loss	-0.011**	-0.015**	-0.015**	-0.012**
	(-2.473)	(-2.647)	(-2.653)	(-2.577)
BOD_FEdum	-0.005	-0.002	-0.003	-0.005
	(-1.567)	(-0.721)	(-0.861)	(-1.453)
Infl_rate	0.001	0.001	0.001	0.001
	(0.640)	(0.717)	(0.632)	(0.763)
Constant	-0.040	-0.014	-0.019	-0.034
	(-1.392)	(-0.470)	(-0.663)	(-1.221)
Observations	3,550	3,876	3,876	3,514
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
R-squared	0.071	0.074	0.072	0.072

**Panel C: Regression results of the effect of FRQ on investment efficiency in state-owned enterprises**

Variable	Dependent variable = IE			
	I	II	III	IV
FRQ1	0.149***			
	(5.451)			
FRQ1xSOEdum	0.077*			
	(2.058)			
FRQ2		0.131***		
		(4.545)		
FRQ2xSOEdum		0.075*		
		(1.991)		
FRQ3			0.152***	
			(5.410)	
FRQ3xSOEdum			0.120*	
			(1.883)	
FRQ_SM				0.168***
				(6.471)
FRQ_SMxSOEdum				0.108*
				(1.879)
SOEdum	0.021***	0.021***	0.023***	0.023***
	(4.906)	(4.753)	(5.412)	(5.257)
LnAge	0.010**	0.010**	0.010***	0.010**
	(3.118)	(3.329)	(3.720)	(3.117)
LnTA	-0.005*	-0.005*	-0.004*	-0.005*
	(-2.044)	(-2.107)	(-2.065)	(-2.056)
Lev	-0.007	-0.007	-0.010	-0.006
	(-0.476)	(-0.501)	(-0.859)	(-0.433)
Tang	-0.092***	-0.092***	-0.091***	-0.093***
	(-8.921)	(-8.493)	(-10.521)	(-8.937)
Slack	-0.004	-0.006	-0.008	-0.003
	(-0.405)	(-0.523)	(-0.650)	(-0.305)
Zsc	-0.000	-0.000	-0.000	-0.000
	(-0.178)	(-0.170)	(-0.044)	(-0.118)
ROA	-0.001*	-0.001*	-0.001	-0.001*
	(-2.014)	(-2.072)	(-1.706)	(-1.871)
Big4	0.013**	0.014**	0.012**	0.013**
	(3.189)	(3.189)	(3.207)	(3.259)
Sd_CFO	0.000	0.000*	0.000	0.000
	(1.740)	(1.894)	(1.442)	(1.664)
LnBOD	0.000	0.002	0.006	0.001
	(0.004)	(0.124)	(0.554)	(0.046)
Loss	-0.014**	-0.015**	-0.009	-0.013**
	(-2.607)	(-2.694)	(-1.586)	(-2.413)
BOD_FEdum	-0.002	-0.002	-0.002	-0.002
	(-0.577)	(-0.624)	(-0.554)	(-0.560)
Infl_rate	0.001	0.001	0.000	0.001
	(0.675)	(0.675)	(0.453)	(0.679)
Constant	0.005	0.005	-0.016	0.005
	(0.149)	(0.127)	(-0.551)	(0.144)
Observations	3,202	3,202	3,801	3,202
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.102	0.095	0.101	0.104

Panel D: Regression results of the effect of ownership structure on investment efficiency in state-owned enterprises

Variable	Dependent variable = IE			
	I	II	III	IV
CO5	0.007			0.000
	(0.781)			(0.016)
CO5xSOEdum	-0.006			-0.004
	(-0.203)			(-0.133)
ITO		0.009		0.014
		(1.064)		(1.538)
ITOxSOEdum		0.002		-0.007
		(0.132)		(-0.549)
ISO			0.023	0.022
			(1.790)	(1.655)
ISOxSOEdum			0.019	0.014
			(0.735)	(0.510)
SOEdum	0.018	0.012**	0.016***	0.020
	(1.095)	(2.397)	(4.015)	(1.145)
LnAge	0.011***	0.012***	0.012***	0.011**
	(3.308)	(3.670)	(3.624)	(2.978)
LnTA	-0.003	-0.004*	-0.004	-0.003
	(-1.733)	(-2.100)	(-1.717)	(-1.686)
Lev	-0.008	-0.009	-0.013	-0.010
	(-0.843)	(-0.879)	(-1.215)	(-1.095)
Tang	-0.083***	-0.084***	-0.084***	-0.083***
	(-8.353)	(-8.718)	(-8.779)	(-7.960)
Slack	-0.016	-0.014	-0.009	-0.016
	(-1.335)	(-1.296)	(-0.847)	(-1.306)
Zsc	-0.000	-0.000	-0.000	-0.000
	(-0.252)	(-0.320)	(-0.350)	(-0.287)
ROA	-0.001*	-0.001*	-0.001**	-0.001*
	(-2.190)	(-2.272)	(-2.338)	(-2.204)
Big4	0.010*	0.012**	0.012**	0.010*
	(2.033)	(2.644)	(2.700)	(2.028)
Sd_CFO	0.000*	0.000*	0.000*	0.000*
	(2.256)	(1.908)	(2.006)	(2.059)
LnBOD	0.009	0.008	0.008	0.009
	(0.862)	(0.745)	(0.826)	(0.843)
Loss	-0.010*	-0.013**	-0.012*	-0.011*
	(-2.195)	(-2.381)	(-2.236)	(-2.258)
BOD_FEdum	-0.004	-0.003	-0.003	-0.005
	(-1.250)	(-0.827)	(-1.023)	(-1.338)
Infl_rate	0.001	0.001	0.001	0.001
	(0.559)	(0.655)	(0.660)	(0.681)
Constant	-0.043	-0.026	-0.039	-0.043
	(-1.500)	(-0.863)	(-1.271)	(-1.487)
Observations	3,535	3,737	3,737	3,499
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.068	0.071	0.072	0.068

Panel E: Regression results of the interaction effect of financial reporting quality and ownership structure on investment efficiency

Variable	Dependent variable = IE			
	I	II	III	IV
FRQ1	0.165**			
	(3.188)			
FRQ1xCO5	0.082			
	(1.068)			
FRQ1xITO	0.018			
	(0.121)			
FRQ1xISO	-0.375*			
	(-2.177)			
FRQ2		0.122*		
		(2.234)		
FRQ2xCO5		0.078		
		(1.578)		
FRQ2xITO		0.064		
		(0.483)		
FRQ2xISO		-0.282**		
		(-2.953)		
FRQ3			0.151***	
			(5.850)	
FRQ3xCO5			-0.012	
			(-0.108)	
FRQ3xITO			0.099	
			(0.545)	
FRQ3xISO			-0.198**	
			(-2.790)	
FRQ_SM				0.097*
				(2.146)
FRQ_SMxCO5				0.036
				(0.403)
FRQ_SMxITO				0.110
				(0.901)
FRQ_SMxISO				-0.226***
				(-3.900)
CO5	0.019	0.019	0.016	0.017
	(1.289)	(1.329)	(1.104)	(0.941)
ITO	0.014	0.019	0.013	0.020
	(0.912)	(1.222)	(0.810)	(1.289)
ISO	-0.022	-0.013	0.007	0.007
	(-1.301)	(-0.947)	(0.777)	(0.573)
LnAge	0.011**	0.011**	0.006*	0.005
	(2.971)	(3.233)	(2.060)	(1.114)
LnTA	-0.004*	-0.005*	-0.003	-0.002
	(-2.092)	(-2.133)	(-1.846)	(-0.758)
Lev	-0.002	-0.002	-0.008	-0.007
	(-0.217)	(-0.157)	(-0.718)	(-0.436)
Tang	-0.089***	-0.088***	-0.089***	-0.086***
	(-7.094)	(-6.639)	(-6.448)	(-4.067)
Slack	-0.004	-0.006	0.003	0.012
	(-0.381)	(-0.528)	(0.213)	(0.876)
Zsc	-0.000	-0.000	-0.001	-0.001

	(-0.248)	(-0.224)	(-0.636)	(-0.925)
ROA	-0.001	-0.001	-0.000	-0.001
	(-1.710)	(-1.749)	(-1.223)	(-1.322)
Big4	0.011*	0.011*	0.009	0.009
	(1.925)	(1.990)	(1.543)	(1.325)
Sd_CFO	0.000*	0.000*	0.000**	0.000*
	(1.983)	(2.056)	(2.449)	(2.260)
LnBOD	-0.001	0.000	0.010	-0.005
	(-0.037)	(0.002)	(0.800)	(-0.495)
Loss	-0.013**	-0.014**	-0.007	-0.009
	(-2.773)	(-2.966)	(-1.241)	(-1.222)
BOD_FEdum	-0.005	-0.005	-0.002	-0.002
	(-1.214)	(-1.312)	(-0.457)	(-0.424)
Infl_rate	0.001	0.001	0.000	0.001
	(0.902)	(0.903)	(0.727)	(0.638)
Constant	-0.004	-0.005	-0.026	-0.026
	(-0.133)	(-0.159)	(-0.993)	(-0.997)
Observations	2,936	2,936	2,477	1,760
Firm/year cluster	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.096	0.086	0.090	0.085

Notes: Results are obtained from pooled OLS regressions. *,**,*** denote significance at the 10%, 5% and 1% level, respectively. t-statistics are in parentheses. Standard errors are clustered at firm and year levels to control for heteroskedasticity and cross-sectional and time-series correlation. Industry fixed-effects based on GICS classification are included. See Table 3.3 for variable definitions
Source: Author's calculations

4.7 Summary

This chapter presents the study's empirical results. Overall, the regression results support the hypothesis (H1), i.e., there is a positive relationship between FRQ and IE of Vietnamese listed firms. This finding is in line with the literature on the positive influence of FRQ on IE (e.g., Biddle et al, 2009; Chen et al., 2011, Hung et al., 2020). FRQ has a positive influence on IE since higher FRQ helps eliminate information asymmetry, one of the main causes of sub-optimal investment (Biddle et al, 2009; Chen et al., 2011). The finding on the impact of institutional ownership on IE is consistent with hypothesis H2b which predicts that there is a positive relationship between institutional ownership and IE of Vietnamese listed firms. This finding supports existing literature on the monitoring effect of institutional shareholders on IE (Maug, 1998; McCahery et al., 2016). Ownership concentration has a positive impact on IE, which supports the hypothesis (H2a), but this effect disappears when controlling for institutional ownership and managerial ownership. One possible explanation for this is that many large shareholders are also institutional shareholders and only these institutional shareholders contribute to the enhancement of IE. Therefore, when all measures of ownership structure are included in one unified model, only the positive impact of institutional ownership on IE is significant. Managerial ownership has no significant effect on IE, which contradicts the hypothesis (H2c). The

insignificant result may be due to either the low shareholding of managerial shareholders in most Vietnamese listed firms or the inability of managers to shape decisions under block shareholders' and institutional shareholders' strict monitoring.

The study also finds that the influence of FRQ on IE is stronger in state-owned firms, which corroborates the hypothesis (H3a). One possible reason is that SOE managers have weaker incentives to manipulate earnings since they have easy access to bank finance. Therefore, the quality of financial reporting by SOEs is better than for non-SOEs and the influence of FRQ on IE increases in SOEs. The study's finding also shows that the effect of ownership concentration, institutional ownership and managerial ownership on IE does not change in SOEs. This finding contradicts hypothesis (H3b) but supports the literature which argues that when there is a controlling shareholder who owns over 50% of the total shares in the firms, other shareholders might become "free riders" and disregard managerial monitoring (Yammeesri, 2003).

Regarding the interaction effect of FRQ and ownership structure on IE, the results show that ownership concentration and institutional ownership have no significant influence on the relationship between FRQ and IE, which contradicts the hypotheses (H4a) and (H4b). One explanation for this finding is that large shareholders and institutional investors in Vietnamese listed firms do not have sufficient expertise to identify EM and improve FRQ. The results also show that managerial ownership worsens the positive relationship of FRQ on IE, which supports the hypothesis (H4c). This finding is in agreement with the entrenchment hypothesis which suggests that when managers own a significant number of shares in a firm, they become entrenched and are motivated to manage earnings for their own benefit (Morck et al., 1988), which results in a weaker relationship between FRQ and IE.

Chapter 5

Conclusion

5.1 Introduction

Chapter 5 concludes the study. Section 5.2 summarises the main findings of the effect of FRQ and ownership structure on the IE of Vietnamese listed firms. Section 5.3 discusses the study's contributions to the literature. Section 5.4 presents the implications of the study for Vietnamese policy-makers and listed firms. Section 5.5 discusses the limitations of the study and suggests pathways for future research. Section 5.6 summarises the chapter.

5.2 Main findings of the study

This study investigates the effects of FRQ and ownership structure on the IE of Vietnamese listed firms. To examine the effect of FRQ on IE, four proxies for FRQ are used. The first three proxies are derived from Dechow and Dichev's (2002), McNichols' (2002) and Ball and Shivakumar's (2005) models. The fourth proxy is the average of the other three proxies. Most previous studies on the Vietnamese stock market focus on the effects of state ownership and foreign ownership on IE (O'Toole et al., 2016; Vo, 2019; Tran, 2020). Therefore, other measures of ownership structure whose relationship with IE has not been researched, i.e., ownership concentration, institutional ownership and managerial ownership, are used. In addition, firm size, firm age, leverage, tangibility, financial slack, ROA, Z-score and Big4 are included as control variables in the regressions. The dataset comprises 6,187 observations, covering 645 non-financial firms listed on the two largest stock exchanges of Vietnam, HOSE and HNX, over 12 years from 2007 to 2018. This study follows Biddle et al.'s (2009) study to use OLS regression with firm- and year-clustered standard errors to estimate the models. Petersen (2009) finds that clustering standard errors by firm and year helps control for heteroskedasticity, serial correlation and cross-sectional correlation.

5.2.1 The relationship between financial reporting quality and investment efficiency

The study's results indicate that FRQ is effective in improving the IE of Vietnamese listed firms. This conclusion holds for all four proxies of FRQ and is robust to different measurements of IE. This finding supports the hypothesis (H1) and the literature which states that FRQ helps shareholders monitor managers more effectively and, therefore, reduces moral hazard and discourages managers from investing sub-optimally (Bushman & Smith, 2001; Kanodia & Lee, 1998; Leuz & Verrecchia, 2000). The finding is consistent with previous empirical studies on developed markets (Biddle et al., 2009; Cutillas Gomariz & Sánchez Ballesta, 2014; Hope & Thomas, 2008; Verdi, 2006), emerging markets (Chen et al.,

2011; Li & Wang, 2010; Rad et al., 2016) and Vietnamese stock market (Dang & Ngo, 2020; Hung et al., 2020). This study also addresses a limitation in previous studies on Vietnam's stock markets (Dang & Ngo, 2020; Hung et al., 2020) by controlling for endogeneity of the dependent variables in the robustness test.

5.2.2 The relationship between ownership structure and investment efficiency

This study focuses on the effect of three measures of ownership structure: ownership concentration, institutional ownership and managerial ownership, on the IE of Vietnamese listed firms. To investigate these effects, we first each measure of ownership structure is included in separate regressions to test the individual effect of each measure on IE. Next, they are included in a unified regression to examine whether these effects will change after controlling for other ownership measures.

The result of the individual regression shows that ownership concentration has a significant and positive effect on IE. Since ownership concentration is measured by the total equity owned by large shareholders who own at least 5% of firms' shares, the study's finding indicates that large shareholders play an effective role in improving IE. This finding supports the hypothesis (H2a), i.e., there is a significant relationship between ownership concentration and IE of Vietnamese listed firms. The finding suggests that the alignment effect prevails over the entrenchment effect on the Vietnamese stock market. For large shareholders, the exclusive benefits they may obtain from inefficient investment such as overinvesting for entrenchment purposes may not exceed the overall benefits of optimal investment (Jensen & Meckling, 1976). Thus, they tend to align their interests with those of minority shareholders. Empirically, this result supports Tayem (2015) who documents that ownership concentration positively influences the IE of Jordanian listed firms. However, it contradicts Chen et al. (2017) and Azhar et al. (2019) who report that ownership concentration harms IE on the Chinese and Pakistan stock markets, respectively.

The empirical results show that institutional shareholders help enhance the IE of Vietnamese listed firms. This finding supports the hypothesis (H2b) and the existing literature, which argues that institutional investors are motivated to scrutinise managerial activities due to their desire to obtain greater portfolio returns (Maug, 1998; McCahery et al., 2016). Empirically, this finding is in line with Cao et al. (2018) who report that an increase in institutional shareholdings is associated with enhanced IE of Chinese listed firms.

The multivariate regression results indicate that managerial ownership does not have any significant effect on the IE of Vietnamese listed firms. The results contradict the hypothesis (H2c) and previous research, which document that managerial ownership is either positively or negatively associated with IE (Azhar et al., 2019; Vijayakumaran, 2021). There might be two reasons that lead to this contradictory

finding. First, the average shareholdings by insiders on the Vietnamese stock market are quite low. Since Jensen and Meckling (1976) argue that managers' ownership claims affect their motivation to create value for shareholders, managers with low ownership stakes may not have sufficient incentive to align their interests with those of shareholders. Second, the study's previous result suggests that large and institutional shareholders play an efficient role in overseeing managers, which is evidenced by the positive relationship between ownership concentration, institutional ownership and IE. Under these shareholders' close monitoring, managers will have very few opportunities to divert corporate resources for their own benefit. Since insiders do not have enough motivation or opportunity to pursue their self-interest at the expense of shareholders, it is reasonable that managerial ownership does not significantly affect the IE of listed firms on the Vietnamese stock market.

When we include all three measures of ownership structure in the regression, the influence of ownership concentration on IE disappears and only institutional ownership significantly affects IE. One possible reason is that many large shareholders are also institution shareholders and only these institutional shareholders contribute to the enhancement of IE of Vietnamese listed firms. Therefore, when ownership structure and institutional ownership are included in the same regression, only the coefficient of institutional ownership is significant. Overall, hypothesis (H2b) is supported while hypotheses (H2a) and (H2c) are not supported.

5.2.3 The relationship between financial reporting quality and investment efficiency in state-owned enterprises

The empirical results indicate that the relationship between FRQ and IE is stronger in SOEs than non-SOEs. This finding suggests that government ownership helps strengthen the positive impact of FRQ on IE. This result corroborates the hypothesis H3a: The impact of FRQ on IE will increase in Vietnamese SOEs and supports the extant literature, which asserts that SOEs have better access to state-owned banks' loans based on their political connections (Firth et al., 2009; Haß et al., 2019) and, therefore, have less incentive to manipulate financial reports. Another possible reason is that compensation contracts in SOEs generally pay less emphasis on financial performance than non-SOEs (Liu et al., 2012). As a result, managers are not motivated to engage in opportunistic behaviours to make the financial reports look good in shareholders' eyes. If SOE managers have less motivation to engage in EM, SOEs are more likely to have better quality financial reporting than non-SOEs. As a result, the impact of FRQ on IE in SOEs will be more pronounced than in non-SOEs.

5.2.4 The relationship between ownership structure and investment efficiency in state-owned enterprises

The empirical results show that the effects of ownership concentration, institutional ownership and managerial ownership on IE are not significant in SOEs. In addition, the positive influence of ownership

concentration and institutional ownership on IE that we document with the full sample disappears in the SOE sample. This finding contradicts the hypothesis (H3b), which hypothesised that the effect of ownership structure on IE will change in Vietnamese SOEs. One possible reason is that the State, as a controlling shareholder, hinders the monitoring role of other large and institutional shareholders. In addition, in SOEs, other shareholders may choose to become "free-riders" and do not participate in overseeing managers since the potential benefits of monitoring may not offset the costs they have to incur (Jensen & Meckling, 1976; Yammeesri, 2003).

5.2.5 The interaction effect of financial reporting quality and ownership structure on investment efficiency

The results show that only managerial ownership has a significant influence on the FRQ-IE relationship. The other two measures of ownership structure - ownership concentration and institutional ownership - do not affect the relationship between FRQ and IE. These results support the hypothesis (H4c), i.e., managerial ownership has a significant effect on the relationship between FRQ and IE but contradicts hypotheses (H4a) and (H4b), i.e., that ownership concentration and institutional ownership have significant effects on the relationship between FRQ and IE. These findings suggest that when managers' ownership stakes increase, they will become entrenched and manipulate accounting numbers for their own interests, which results in a weaker relationship between FRQ and IE (Demsetz, 1983; Gabrielsen et al., 2002). Empirically, these results contradict Wang et al. (2014) who find that ownership concentration mediates the relationship between FRQ and IE on the Chinese stock market. One possible explanation for the insignificant mediating effect of institutional ownership and managerial ownership on the FRQ-IE relationship is that large shareholders and institutional investors of Vietnamese listed firms do not have sufficient experience and expertise to identify EM and improve FRQ. Dechow and Skinner (2000) argue that EM can be difficult to detect since it is very difficult to distinguish between acceptable accounting flexibility and earnings manipulation. Therefore, shareholders need expertise in accounting and finance to identify whether managers have distorted earnings figures. However, Vietnamese domestic shareholders still lack knowledge of accounting, financial analysis and portfolio management (Nguyen et al., 2021) and the presence of foreign investors is still limited because of Vietnam's investment policy. As a result, the influence of ownership concentration and institutional ownership on the FRQ-IE relationship is not significant for Vietnamese listed firms.

A summary of the results of the hypothesis testing is presented in Table 5.1.

Table 5.1   A summary of the results of the hypothesis testing

	Hypothesis	Expected sign	Results of the hypothesis testing
H1	There is a positive relationship between FRQ and investment efficiency of Vietnamese listed firms	+	Supported
H2a	There is a significant relationship between ownership concentration and IE on the Vietnam stock market	+/-	Not supported
H2b	There is a positive relationship between institutional ownership and IE on the Vietnam stock market.	+	Supported
H2c	There is a significant relationship between managerial ownership and IE on the Vietnam stock market.	+/-	Not supported
H3a	The effect of FRQ on IE increases in Vietnamese SOEs	+	Supported
H3b	The effect of ownership concentration, institutional ownership and managerial ownership on IE worsens in Vietnamese SOEs.	-	Not supported
H4a	Ownership concentration has a significant effect on the relationship between FRQ and IE of Vietnamese listed firms.	+/-	Not supported
H4b	Institutional ownership strengthens the relationship between FRQ and IE of Vietnamese listed firms.	+	Not supported
H4c	Managerial ownership has a significant effect on the relationship between FRQ and IE of Vietnamese listed firms	+/-	Supported

5.3 Contributions of the study

The study contributes to the existing literature in several ways.

First, this study is the first attempt to investigate the effects of ownership concentration, institutional ownership and managerial ownership on IE of listed firms on the Vietnamese stock market. Vietnam is not only an emerging market but also a transition economy in which the State is the largest shareholder in many firms (Vo, 2019). Therefore, ownership concentration of Vietnamese listed firms is quite different from other emerging markets where insiders are usually the largest shareholders (Claessens and Yurtoglu, 2013). As a result, findings from other emerging markets on the influence of ownership concentration on IE may not hold for the Vietnamese stock market. Regarding institutional and managerial ownership, these types of ownership structures have been largely ignored despite their prominent presence on the Vietnamese stock market. Therefore, this study fills a gap in the literature by exploring the effects of ownership concentration, institutional ownership and managerial ownership on IE of Vietnamese listed firms.

Second, this study complements the literature by examining the interaction effect of FRQ and ownership structure on the IE of Vietnamese listed firms. Prior studies have mainly concentrated on the direct relationship between FRQ and IE or between ownership structure and IE (Biddle et al., 2009; Chen et al., 2014; Pindado et al., 2011). To date, no study examines how ownership structure meditates the effect of FRQ on IE of Vietnamese listed firms.

Third, since state-owned firms are very popular on the Vietnamese stock market (Vo, 2019), this study contributes to the literature by investigating the effects of FRQ and ownership structure on IE in state-controlled listed firms. State-controlled firms are different from private firms in many aspects such as focusing more on political and social objectives than profit maximisation, having better access to bank financing due to political ties, and being less exposed to market pressures (Boubakri et al., 2008; Ramamurti, 2000). Thus, the relationship between FRQ and IE may change in Vietnamese SOEs. Therefore, this study's findings broaden the understanding of the link between FRQ and IE in a transition economy where SOEs still dominate.

Finally, by using the two-step system GMM estimator to control for endogeneity of FRQ, this study produces robust results on the influence of FRQ on the IE of Vietnamese listed firms. Li and Wang (2010) argue that though FRQ may affect IE, firms in which managers invest inefficiently could have a low quality of reporting since managers tend to disguise their poor performance. As a result, there may be reverse causality between FRQ and IE, which causes endogeneity. Dang and Ngo's (2020) and Hung et al.'s (2020) studies on the relationship between FRQ and IE of Vietnamese listed firms ignored

the endogeneity problem. This study addresses that limitation by using the two-step system GMM to control for possible endogeneity of FRQ.

5.4 Implications

The study provides several implications for policy-makers and non-financial listed firms in Vietnam. First, the findings suggest that good quality of financial reporting enhances the IE of listed firms in Vietnam. Therefore, Vietnamese listed firms should develop a sound governance process for financial reporting. The governance process should include vigilant monitoring of the preparation of financial reports to ensure that the reports are clear, precise, meet the needs of investors and align with good international practice. Auditors also play an important role in maintaining the quality of financial reporting (DeFond & Zhang, 2014). Thus, Vietnamese listed firms should employ highly qualified auditors, such as the Big 4 firms, to enhance the quality of their financial statements. In addition, policy-makers should boost and facilitate the development of a fair and transparent financial market to help investors access effective financial information. To ameliorate the transparency of accounting information, the MoF should speed up the full adoption of IFRS. According to Barth et al. (2008), the convergence to IFRS will enhance the accounting quality of listed firms. Since IAS/IFRS requires increased disclosure and limits the measurement methods that a firm may use, it will inhibit managers' opportunities to manipulate accounting figures (Ashbaugh & Pincus, 2001). Currently, the adoption of IFRS in Vietnam is quite slow compared with other emerging markets (EY, 2017). Therefore, it is recommended that Vietnam steps up the adoption of IFRS to improve the FRQ of Vietnamese listed firms. Moreover, Vu (2012) argues that one possible reason for the poor quality of financial reporting in Vietnam is weak legal enforcement. Thus, the State Securities Commission of Vietnam should impose heavier fines or penalties on firms that violate the disclosure requirements of the two stock exchanges. These fines and penalties will hold managers accountable for a firm's disclosure quality and reduce their incentives to manage earnings. It is also recommended that Vietnamese regulators require members of audit committees of the listed firms to have certain degrees of expertise in finance and law to enhance their monitoring role. Several previous studies indicate that audit committees with expertise in law, finance or accounting can exercise their monitoring roles better than those without this knowledge (Taylor, 2011).

Second, the findings indicate that institutional shareholders play an effective role in improving the IE of Vietnamese listed firms. Therefore, the presence of institutional investors should be promoted on the Vietnamese stock market. Currently, domestic institutional investors are free to invest in any firm but foreign institutional investors are subject to investment restrictions under the Investment Law of Vietnam. Thus, it is essential that the government relaxes the investment restrictions for foreign institutional investors. Since the Vietnamese stock market is still immature and underdeveloped

(Nhung, 2013), the restrictions on foreign investment should be relaxed gradually to ensure that foreign institutional investors do not take control of firms in key sectors such as energy, mining, telecommunications and airlines. In addition, Vietnam could learn from developed markets, such as the US or the UK, how they establish and facilitate the operations of industry trade associations. In these countries, industry trade associations have effectively connected and helped institutional investors share knowledge and technical information with one another. In the US, trade associations also manage to influence government legislation and regulations in a direction beneficial to their institution's members. Another possible way to encourage investment by institutional investors would be tax relief. Currently, some types of institutional investors, such as pension funds and mutual funds, are eligible for special tax treatment in the US. Vietnamese regulators should learn from the US experience to provide tax relief for long-term institutional investors, such as pension funds, mutual funds and insurance companies.

Third, the results indicate that the effect of FRQ on IE is stronger in SOEs. One reason for this finding is that SOEs have less incentive to manipulate earnings due to political connections that allow them to enjoy a lower cost of capital. Therefore, instead of increasing state ownership in Vietnamese listed firms, facilitating bank financing for non-SOEs would be a better approach to improve the positive effect of FRQ on the IE of these firms. A transparent capital market is needed so that banks have enough information on firms' creditworthiness to allow them to grant cheaper loans. The results also show that the effect of ownership concentration and institutional ownership on IE disappears in SOEs. This suggests that the State as controlling shareholders hinders the positive effect of ownership concentration and institutional ownership on IE. Thus, the privatisation process should be continued to reduce state ownership in sectors where the State does not need to have control.

Finally, the results show no significant relationship between insider ownership and IE and that insider ownership undermines the positive effect of FRQ on IE. Since these results suggest that insiders are using their power and discretion to manipulate earnings for their private benefit, other shareholders should pay more attention to managerial accounting activities. In addition, shareholders should attempt to increase managers' motivation to invest efficiently by providing more benefits to them. For instance, executive compensation contracts should detail extra benefits that managers are entitled to if they make profitable investments for the firm.

5.5 Limitations and recommendations for future research

The study is subject to several limitations as follows.

First, this study provides empirical results of only one emerging market, Vietnam. Black et al. (2014) argue that studies conducted in a single country setting provide in-depth analysis but suffer from a

lack of generalisability. Therefore, although most of the study's findings are consistent with the results from previous studies in developed markets, it does not provide a strong foundation for generalisation to all emerging markets. Hence, future research could consider exploring the effect of FRQ and ownership structure on IE in a multiple-country setting.

Second, due to data unavailability, the measurement of total investment in section (3.5.1) does not include R&D expenditure. Although we attempt to include every component of total investment as suggested by Biddle et al. (2009), data on R&D expenditure cannot be obtained since there is no R&D item on the income statement of Vietnamese listed firms. However, the exclusion of R&D expenditure may not significantly affect the results since, according to OECD (2014), only a few Vietnamese listed firms engage in R&D activity.

Third, the regression results may suffer from omitted variable bias. In addition to the dependent and control variables included in this study, there are other factors such as board characteristics, management characteristics and policy changes that may influence the IE of Vietnamese listed firms. In section (4.6.3), five additional variables are included in the regressions to control for omitted variable bias. However, due to data unavailability, it is impossible to obtain other variables that may affect IE. Industry fixed-effects are included in all equations to remove some of the omitted variable bias. Nevertheless, this bias might still exist and future research could attempt to add more control variables in studies when these variables become available.

Fourth, in addition to the four proxies of FRQ in the study, there are other measures of FRQ in the literature, such as earnings persistence, earnings smoothness and investors' responsiveness to earnings. Future researchers could consider examining the effect of these proxies on the IE of Vietnamese listed firms. Regarding ownership structure, the effect of three measures of ownership structure, i.e., ownership concentration, institutional ownership and managerial ownership, on the IE of Vietnamese listed firms are explored. In addition to these three measures, state ownership, foreign ownership and family ownership are also prevalent in Vietnam. Exploring the influence of these types of ownership on the IE of listed firms on the Vietnamese stock market could be a possible avenue for future research.

Lastly, only non-financial listed firms are examined in this study. Financial firms are excluded from the sample since they are subject to different regulations. However, the role of financial firms, especially commercial banks, on the Vietnamese stock market has increased considerably in the last decade. Therefore, future researchers should consider investigating the effects of FRQ and ownership structure on the IE in Vietnam's financial sector. In addition, the sample only includes firms from the two largest stock exchanges in Vietnam. However, there is another stock market called UPCOM which is a regulated over-the-counter market for unlisted public firms. In recent years, UPCOM has expanded

enormously in terms of the number of trading firms and market capitalisation. In 2019, 872 firms were trading on UPCOM with a total registered trading volume of 41.8 billion shares and a market capitalisation of 921 billion VND. Since data on firms traded on UPCOM are limited, there is a lack of research examining the IE of UPCOM's firms. Future studies could examine the effect of FRQ and ownership structure on IE of firms trading on UPCOM when additional data are available.

5.6 Summary

This chapter summarises the main findings, the study's contributions to the literature, implications of the findings and recommendations for future studies. The study examines the effects of FRQ and ownership structure on the IE of Vietnamese non-financial listed firms. The results indicate that FRQ has a significantly positive effect on the IE of Vietnamese listed firms. For ownership structure, institutional ownership enhances IE. Managerial ownership and ownership concentration, however, have no significant influence on IE. The results also show that the relationship between FRQ and IE is more pronounced in state-owned listed firms. The relationship between the three measures of ownership structure and IE, however, disappears in SOEs. In addition, ownership concentration and institutional ownership do not significantly affect the relationship between FRQ and IE but managerial ownership worsens the effect of FRQ on IE.

The study contributes to the existing literature on IE in a number of ways: the first study to investigate the effects of ownership concentration, institutional ownership and managerial ownership on IE of listed firms in Vietnam, an emerging and transition market in Southeast Asia; controlling for endogeneity of FRQ when investigating the role that FRQ has on IE of Vietnamese listed firms; the first attempt to examine whether the influence of FRQ and ownership structure on IE differs in Vietnamese SOEs; enriching the extant literature by testing the interaction effect of FRQ and ownership structure on the IE of Vietnamese listed firms. Based on the findings, the study provides several implications for Vietnamese listed firms on how to enhance IE, such as developing a comprehensive governance process for financial reporting, hiring high-quality external auditors, ensuring more vigilant monitoring of managerial activities, and offering extra benefits to managers to encourage them to invest efficiently. The study also acknowledges that Vietnamese policy-makers could play an important role in improving the IE of non-financial listed firms. The study, therefore, makes several suggestions to Vietnamese regulators such as facilitating a transparent financial market, providing tax relief for institutional investors and promoting the efficiency of industry trade associations.

Like other research, this study is subject to some limitations such as lack of generalisability of our results due to using a single-country sample, the exclusion of R&D expenditure in the investment model due to data unavailability, possible omitted variables bias and only non-financial listed firms are included in the sample. Future studies could extend the research timeframe and conduct their study

on IE in a multi-country setting. In addition, more proxies for FRQ and measures of ownership structure could be taken into consideration in future studies.

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