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Income smoothing behaviour and investment efficiency: evidence from an emerging market

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Abstract: This study is conducted to investigate the relationship between income smoothing (ISM) behaviour and investment efficiency (IE) in the context of Vietnam. The research sample includes data from the financial statements of 596 non-financial listed firms for the period from 2010–2017. In this study, the panel fixed-effect regression method (FEM) is employed to measure the correlation and relationships of the variables in the research model. Besides, the generalised method of moments (GMM) method is also applied to control the endogeneity problem when examining the ISM-IE relationship. The results show that ISM has a negative relationship with IE, and this association seems to strengthen for the overinvestment companies. In contrast, an insignificant correlation is found for underinvestment ones. This study has important implications for investors, listed companies, and especially policymakers for judgement of the likelihood of opportunistic behaviour like ISM before making investment decisions. Finally, the research contributes to a literature review on IE and ISM behaviour in emerging markets that have not yet fully adopted IFRS.

Keywords: investment efficiency; income smoothing behaviour; emerging market; fixed-effect regression method; FEM; generalised method of moments; GMM.

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1 Introduction

This research aims to explore the relationship between income smoothing (ISM) and investment efficiency (IE). By examining the sample of Vietnamese listed firms, the authors will answer these research questions:

1 Does the extent of ISM impact the efficiency of investment decisions?

2 Is there any difference between underinvestment and overinvestment firms in the relationship between ISM and IE?

Capital investment decisions significantly impact company activity since the scales involved are often huge, and the repercussions are felt for a long time (Cho and Kang, 2017). In other words, capital investment decision-making is essential in determining a firm's value. After making decisions regarding capital investment, the necessary funds for investment are acquired, and production is initiated subsequent to the establishment of a concrete sales plan, procurement of requisite raw materials, and recruitment of labour. If the decision regarding capital investment is uncertain, it can lead to difficulties in securing funding for development and regaining lost market share due to the time-consuming nature of these activities. When the magnitude of the capital investment is substantial, rectifying any issues that arise can be challenging. Therefore, it is imperative for the manager to meticulously evaluate the investment by taking into account various factors such as forecasting, capital, labour, production, and operational planning (Cho and Kang, 2017). Because of the pivotal role of IE in the firm outcome, the IE topic has been a concern for a long time. Prior studies documented several factors that can influence IE, such as management characteristics (Lai and Liu, 2017; Shahzad et al., 2019a; Shin et al., 2019), corporate social responsibility (Al-Hiyari et al., 2022; Ellili, 2022; Zhong and Gao, 2017), tax avoidance (Mehmood et al., 2022), audit quality (Shahzad et al., 2019b), corporate governance (Lei and Chen, 2018; Med Bechir and Jouirou, 2021), etc. There, the connection between financial reporting quality (FRQ) and IE accounts for significant fractions of research about IE in the accounting literature (Cutillas Gomariz and Sánchez Ballesta, 2014; Ellili, 2022; Jiang and Xin, 2022; Shahzad et al., 2019a, 2019b).

According to Modigliani and Miller (1958), investment opportunities are classified as either profitable or unprofitable based on net present value (NPV), where the profitable ones are the primary drivers of firms' investments, are likely to receive external financing, and should all be pursued until their marginal advantage becomes equal to their marginal costs. In this context, previous research has found that market frictions can cause businesses' investments to deviate from the optimal level, resulting in either underinvestment or overinvestment (García Lara et al., 2016). Overinvestment occurs when managers opt to invest extravagantly by allocating the firm's resources towards unproductive initiatives with the motivation of appropriating part of the firm's resources. Conversely, underinvestment happens when corporations withdraw from successful ventures due to financial constraints and the high costs of borrowing debt and equity (Lai et al., 2013). Previous research indicates that adverse selection and moral hazard (Myers and Majluf, 1984) may give chances and incentives for self-centred managers to pursue personal agendas, possibly leading to business underinvestment and overinvestment. Shareholders would ultimately bear the consequence of such managerial decisions (Biddle et al., 2009). Understanding two main reasons that lead to investment

inefficiency, Shahzad et al. (2019b) explores a way to increase IE: mitigating the adverse selection and moral hazard problems by enhancing the accounting information quality or FRQ.

From theoretical perspective, the agency theory of the firm also supports the finding of Shahzad et al. (2019b) when considering higher FRQ as a solution to reduce the challenge of underinvestment or overinvestment by mitigating asymmetric information. Previous research indicates that high FRQ alleviates the issue of underinvestment or overinvestment in three ways (Biddle et al., 2009; Cheng et al., 2013; Hesarzadeh et al., 2020; Linck et al., 2013; McNichols and Stubben, 2008; Med Bechir and Jouirou, 2021; Yin et al., 2020). For starters, increased FRQ makes it easier for potential investors to choose the proper stocks since comparing business financial data that has not been distorted is easier. As a result, enterprises with promising futures receive funds, hence minimising underinvestment or overinvestment. Second, increased FRQ decreases agency costs and inhibits managers' opportunistic conduct by not allowing them to pursue personal goals of underinvestment or overinvestment at the expense of shareholders. Finally, a greater FRQ reduces moral hazard and unfavourable selection situations.

The literature has ascertained the positive relationship between FRQ and IE (Eissa et al., 2023; Hesarzadeh et al., 2019; Jiang and Xin, 2022; Med Bechir and Jouirou, 2021; Shahzad et al., 2019a, 2019b; Wang et al., 2022). However, the research context can lead to different results from this relationship. Because in developing countries, family firms and the concentrated ownership structure are prevalent. Consequently, problems related to managers' opportunistic behaviours are more serious. Regarding opportunistic behaviours, ISM is found to reduce the FRQ and exacerbate the information asymmetry problem (Bhutta et al., 2021; Bimo et al., 2021; Bzeouich et al., 2019; Eissa et al., 2023; McNichols and Stubben, 2008; Wang et al., 2022). Consequently, it is anticipated that firms that engage in reporting irregularities, especially ISM practices, might be associated with a higher level of inefficiencies (Eissa et al., 2023).

Moreover, the aforementioned arguments suggest that the existence of information asymmetry and principal-agent problems between firms and external capital providers leads to moral hazard and adverse selection problems, which may result in investment inefficiency (underinvestment or overinvestment). In this context, factors that may exacerbate agency problems and information asymmetry may also harm IE (Hammami and Hendijani Zadeh, 2019). From this notion, the authors propose that ISM can significantly increase information asymmetry, resulting in lower firm IE for the following reasons. First, if the available accounting information does not contain previous information on the firm, a manager may misjudge expected future performance and the probability of success, so may invest capital inefficiently (Cho and Kang, 2017). Because information asymmetry between financial analysts and firms may prompt capital providers to require higher returns, increasing the cost of capital (Myers and Majluf, 1984). Consequently, a high extent of opportunistic behaviour such as ISM reduces venture proficiency and financial effectiveness. Second, as several studies in accounting have proposed, FRQ plays a significant role in decreasing agency costs to the extent that financial accounting information is considered an essential part of compensation contracts (Lambert, 2001) and is used by investors to control managers (Bushman and

Smith, 2001). However, ISM is proven to reduce FRQ, resulting in losing the contribution of FRQ in mitigating agency costs. Finally, prior studies document that FRQ is usually higher in public companies than in private ones (Ball and Shivakumar, 2005; Burgstahler et al., 2006) and in countries with better investor protection and more vigorous law enforcement (Holthausen, 2009; Leuz et al., 2003). From this point, the authors assume that the negative relationship between ISM and FRQ can be mitigated in developed countries. However, regarding the research context of developing countries such as Vietnam, there do not exist any studies exploring the relationship between ISM and IE. Therefore, the effect of ISM on a firm's IE remains an empirical question when considering the context of Vietnam.

Conducting this study by examining the sample of Vietnamese listed firms provides a different insight into the association between ISM and IE compared to previous studies for the following reasons. First, although previous research has shed light on the danger of opportunistic behaviour through ISM, it is uncertain if and how the link between ISM and IE changes among different institutional settings, especially for developing countries that lack strong laws and regulations. While consistent evidence from past studies in developed countries like Korea, Spain, the USA, France, Taiwan (Biddle et al., 2009; Cutillas Gomariz and Sánchez Ballesta, 2014; Cho and Kang, 2017; Mehmood et al., 2022; Wang et al., 2022) show that a high level of FRQ is positively related to IE, it must be determined if this holds true for other nations with more dispersed ownership structures and lower investor protection (Ellili, 2022). Second, the recent studies by Eissa et al. (2023) and Shahzad et al. (2019a, (2019b) were conducted to explore the relationship between FRQ (measured by earnings management) and IE in the background of Egypt and Pakistan. They document that these countries have the same characteristic that has high ownership concentration with the dominance of majority shareholders, but Vietnam has unique attributes that are different from previous studies. Vietnam is a developing country with a socialist-oriented market economy; despite having a concentrated ownership environment, the Vietnamese economy is also under the regulation of the government, and the state-owned firms play an essential role in the economy. Third, in 2022, Vietnam commences the phase of voluntary International Financial Reporting Standards (IFRS) application in 2025, which means that Vietnam is still in the progress of IFRS adoption and convergence. In other words, the lack of strict regulation in protecting investors and the delays in adopting IFRS can give more room for conducting ISM and reducing market transparency and earnings quality.

In this research, the authors conducted a study to investigate how ISM affects the efficiency of investments in 596 non-financial Vietnamese listed companies. They used FEM and GMM techniques at both the company and year levels. The results of the study indicate that there is a negative association between a higher degree of ISM and IE. In simpler terms, when companies engage in opportunistic practices such as ISM or manipulating earnings, it has a detrimental effect on the quality of financial information and, subsequently, on IE. Additionally, this negative relationship is more pronounced in firms that tend to overinvest, whereas no similar pattern was observed for underinvesting firms. The research findings were validated through various robustness tests, demonstrating that the results are consistent and reliable.

This study can contribute to the existing literature about ISM and IE in the following ways. First, this is the first study to examine the effect of ISM on IE in the Vietnamese context, where firms are held mainly by large shareholders or the dominance of state-owned firms in the economy. In addition, in such a context investors' interests are less protected than in common law countries (Leuz et al., 2003). The potential for managerial opportunism is further intensified. The idiosyncrasies of the Vietnamese context can result in the adoption of inappropriate ISM and inefficient investments, which may adversely impact the rights of external shareholders.

Second, this study contributes to the existing literature about the relationship between ISM and IE when the previous evidence primarily focuses on developed countries, and there is a lack of empirical evidence in the context of developing countries. In emerging markets, agency problems and information asymmetries are more pronounced than in developed markets, primarily due to a lack of investor protection and a lax disclosure policy. Prior studies also suggest that FRQ may have a more important effect in mitigating information asymmetry and agency problems and, ultimately, improving IE. From this viewpoint, the authors examine to what extent ISM harm FRQ and results in lower IE. Moreover, the study also provides empirical evidence to complement inconclusive evidence about the ISM-IE relationship and help explore the unresolved question of how the relationship between ISM and IE changes via different contextual settings.

In line with prior research, the authors use different proxies for ISM following the models of Jones (1991) and Kothari et al. (2005) to capture the level of ISM practices through discretionary accruals. Besides, several measurements are also used to measure IE in this study (the model of Chen et al., 2011) in the main regression analyses and the model of Biddle et al. (2009) as an alternative measurement of IE in the robustness analyses). The research findings show that ISM practices reduce IE, and the results are confirmed via various robustness tests. When classifying the sample into overinvestment and underinvestment firms, while the results demonstrate that the negative relationship between ISM and IE is more exacerbated, the authors cannot find a significant negative relationship between ISM and IE in underinvestment firms.

The following is the rest of the paper. The IFRS adoption roadmap in the Vietnamese context is presented in Section 2. Section 3 lays forth the theoretical background for this research. Section 4 examines current research on IE and the role of ISM in investment decisions before developing testable hypotheses. Section 5 discusses the research design in depth, including the models, variable measurements, and samples. The results are presented in Section 5, and the major conclusions of this research are presented in Section 6.

2 IFRS application roadmap in Vietnam

Recently, the Minister of Finance has approved implementing financial reporting standards in Vietnam. As a result, the framework for financial reporting in Vietnam will encompass two key components: a strategy for adopting IFRS and a strategy for developing, issuing, and implementing Vietnamese Financial Reporting Standards (VFRS).

The roadmap for adopting IFRS in Vietnam is divided into three phases per the proposed scheme. The first phase, which spanned from 2020 to 2021, primarily focused on fundamental aspects, including:

- Developing and officially publishing the plan for implementing financial reporting standards in Vietnam.
- Establishing a translation committee tasked with reviewing and completing the translation of IFRS into Vietnamese.
- Formulating, promulgating, or submitting to the relevant authorities the necessary legal documents to endorse the translated versions of IFRS in Vietnamese.
- Creating, promulgating, or submitting to the appropriate authorities the requisite legal documents outlining the procedures for applying IFRS.
- Supplementing, amending, and introducing new financial mechanisms related to adopting IFRS.
- Conducting training programs for human resources and initiating the implementation process for businesses to ensure a smooth transition to IFRS.

Phase 1, which spans from 2022 to 2025, is designated as the 'optional application' phase. During this period, businesses meeting specific prerequisites and possessing sufficient resources have the opportunity to voluntarily implement IFRS for the generation of consolidated financial statements. Eligible entities for this phase include:

- Parent companies affiliated with large-scale state economic groups or those having loans supported by international financial institutions.
- Parent companies that are publicly listed entities.
- Large-scale public companies serving as unlisted parent companies.
- Other parent companies meet the necessary criteria.
- Enterprises with 100% foreign direct investment capital, operating as subsidiaries of foreign parent companies, and having the requisite requirements and resources, are also allowed to opt for IFRS adoption, particularly for the preparation of standalone financial statements.

In phase 2, which becomes mandatory after the year 2025, there is a comprehensive plan to apply VFRS to all businesses across various industries and economic sectors operating within Vietnam. This mandate applies to all entities except those utilising IFRS or following accounting regulations designed explicitly for micro-enterprises. The Ministry of Finance will consistently assess and review the VFRS throughout the implementation journey. The aim is to keep these standards up-to-date and in alignment with international norms to the greatest extent feasible, ensuring that they remain in sync with global financial reporting standards.

3 Theoretical framework

3.1 Agency theory

Jensen and Meckling (1976) introduced agency theory, which has since served as the foundation for research in corporate finance. According to agency theory, company managers (agents) carry out their responsibilities to benefit shareholders (principals). When managers cannot fulfil their duties in the best interests of shareholders, agencies face difficulties. Prior research indicates that the agency problem is one of the primary causes of inefficient capital allocation within an organisation. Specifically, the separation between ownership and decision-making could cause managers to invest in suboptimal projects (Lai and Liu, 2017). Brealey and Myers (2000) and Shleifer and Vishny (1997) demonstrate that managers make investments that are detrimental to the interests of shareholders. They invest in initiatives that are not necessarily profitable to strengthen their discretionary power and entrenchment strategies. In this regard, Jensen (1986) suggests that managers are more likely to invest in projects that increase their private benefits at the expense of shareholder interests, mainly when information asymmetry levels are high (Myers and Majluf, 1984).

3.2 Asymmetric information theory

Asymmetric Information theory was first introduced by Akerlof (1970) in 1970. According to Akerlof (1970), asymmetric information is considered one of the causes of market failure, a state in which the market does not achieve an efficient distribution. Asymmetric information is considered one of the causes of market failure, a state in which the market does not achieve an efficient distribution. For emerging economies, asymmetric information has vast consequences. For example, suppose investors do not have sufficient or misleading information to determine the expected dividend of a listed company. In that case, they will price the stock incorrectly, thereby losing their investment opportunity. Specifically, the disadvantage lies entirely with the investor if the valuation is lower than the stock's actual value or the investor overvalues the stock. In this study, the asymmetric information theory is applied to explain the underinvestment or overinvestment behaviour through deeply investigating adverse selection and moral hazard problems.

4 Literature review and hypotheses development

Several studies in the field of accounting (Bushman and Smith, 2001; Dang and Ngo, 2020; Ellili, 2022; Healy and Palepu, 2001; Jiang and Xin, 2022; Shahzad et al., 2019b; Shakespeare, 2020) have posited that an improved FRQ can enhance IE by reducing information asymmetry and agency costs that arise from adverse selection and moral hazard. These factors, in turn, help alleviate underinvestment or overinvestment problems.

Financial reporting plays a crucial role in furnishing investors with firm-specific information. This, in turn, facilitates the efficient operation of financial markets by mitigating market frictions that may arise due to adverse selection problems, as posited

by Bushman and Indjejikian (1993), Holmström and Tirole (1993) and Kanodia and Lee (1998). As per the consensus of various authors, the calibre of financial information is an undiversifiable risk factor. Therefore, the variations in information among investors impact the firm's cost of capital (García-Teruel et al., 2009). Easley and O'Hara (2004) have demonstrated that enhanced disclosure of financial information, both in quality and quantity, can mitigate non-diversifiable information risk among informed and uninformed investors. This, in turn, can lead to a reduction in the cost of capital. In a similar vein, Lambert (2001) demonstrated that improved financial information reduces non-diversifiable risk by altering investors' perceptions of the cash flow distribution, thereby reducing the cost of capital. Analytically, Suijs (2008) demonstrated that a higher quality of financial information reduces the cost of capital by lowering stock volatility, thereby enhancing risk sharing between generations of investors. If FRQ reduces adverse selection costs and, consequently, firms' cost of capital, it can be linked to IE by reducing firms' reliance on external financing, thereby mitigating potential underinvestment issues (Eissa et al., 2023; Ellili, 2022; Wang et al., 2022).

Watts and Zimmerman (1978) contended that 'an important role assigned to financial information is to force managers to act in the interest of shareholders'. For example, many studies (Al-Hiyari et al., 2022; Bushman and Smith, 2001; Chu and Oldford, 2022; Lambert, 2001; Med Bechir and Jouirou, 2021; Sloan, 2001) show that financial information is critical in reducing agency costs. It is widely recognised that shareholders utilise accounting information to monitor and incentivise managers. Accounting information, for example, is frequently used as an input into incentive contracts (Lambert, 2001) and is an essential source of information used by governance structures to oversee management (Abousamak and Shahwan, 2018; Balachandran et al., 2021; Bimo et al., 2021; Bushman and Smith, 2001; Chu and Oldford, 2022; Waweru, 2018). If improved accounting information improves the board of directors' ability to supervise managerial operations, it can play an agency function by lowering managerial incentives to engage in value-destroying projects (Med Bechir and Jouirou, 2021; Park, 2022; Ullah et al., 2020). Thus, FRQ can be linked to IE by reducing agency costs due to moral hazard and, as a result, reducing overinvestment (Hammami and Hendijani Zadeh, 2019; Mbir et al., 2020; Rahman et al., 2023).

Empirical evidence suggests that FRQ reduces investment-cash flow sensitivity (Biddle and Hilary, 2006), and earnings management leads to overinvestment because it distorts managers' information (McNichols and Stubben, 2008), particularly when managers positively increase discretionary accruals. Biddle et al. (2009), for publicly traded companies in the USA, and Chen et al. (2011), for private firms in emerging markets, investigate the effect of FRQ on IE and conclude that higher FRQ encourages underinvestment and discourages overinvestment. Similarly, García Lara et al. (2016) find that accounting conservatism reduces both over and underinvestment in US-listed firms and Xu et al. (2012) find that accounting conservatism reduces both underinvestment or overinvestment in Chinese firms because it facilitates monitoring managers' investment decisions in overinvestment firms and eases access to external financing in underinvestment firms.

Agency theory offers several ways to lessen ambiguities and asymmetries in information systems and better supervise management operations to limit managerial discretion (Bhutta et al., 2021; Bushman and Smith, 2001; Healy and Palepu, 2001; Hope and Thomas, 2008; Mbir et al., 2020; Shahzad et al., 2019a). Some of these consequences have also been covered in many other studies, such as the reduction in capital costs

(Francis, 2004) and the restricted access to the debt market (Bharath et al., 2008). The direct link between FRQ and investment effectiveness has been investigated in several research. For instance, by taking into account loan maturity, Al'Alam and Firmansyah (2019), Cutillas Gomariz and Sánchez Ballesta (2014) and Permatasari and Nengtyas (2020) studied the effect of FRQ on IE. Their empirical findings support the agency theory's predictions and show that FRQ and debt maturity enhance the quality of an investment's efficiency. Additionally, Cutillas Gomariz and Sánchez Ballesta (2014) findings show that FRQ lowers overinvestment, whereas debt maturity reduces both underinvestment and overinvestment.

Extant literature indicates that the agency problems and information asymmetry between managers and outside capital providers may lead to capital investment inefficiency including both underinvestment or overinvestment (Al-Hiyari et al., 2022; Biddle et al., 2009; Bushman and Smith, 2001; Chu and Oldford, 2022; Dang and Ngo, 2020; Eissa et al., 2023; Lai and Liu, 2017; Lai et al., 2013; Med Bechir and Jouirou, 2021). Therefore, this study applies agency theory and asymmetric information theory as the ground theory to explain the relationship between ISM and IE in the Vietnamese context.

According to the agency theory, an inefficient investment may result from the moral hazard and adverse selection attributed to agency conflicts which emerge due to information asymmetry (Menshawy et al., 2021; Ullah et al., 2020). Jensen and Meckling (1976), Myers (1977) and Myers and Majluf (1984) develop a framework for the role of asymmetric information in IE through information problems, such as moral hazard and adverse selection. In the context of moral hazard, a divergence of interests between shareholders and a lack of monitoring of managers can result in management attempting to maximise its own personal interests by making investments that may not be suitable for shareholders (Jensen and Meckling, 1976). This can have the unintended consequences of managerial empire-building and overinvestment (Eissa et al., 2023; Hope and Thomas, 2008; Jiang and Xin, 2022; Liu et al., 2018; Wang et al., 2022; Yin et al., 2020; Zhong and Gao, 2017). In addition, according to Biddle et al. (2009), the disparity in the incentives between principals and agents might lead to managers investing inefficiently in some unlucrative initiatives. Blanchard et al. (1994) investigated using empirical data to test their hypothesis that the agency problem is the crucial factor contributing to falling IE. Under adverse selection, more knowledgeable managers may overinvest if they sell overvalued securities and obtain excess funds. To avoid this, providers of capital can ration the capital or increase its cost, resulting in the rejection of some profitable projects due to limited funds (Biddle and Hilary, 2006; Biddle et al., 2009; Lambert et al., 2007) and subsequent underinvestment. ISM can result in value erosion, which is ultimately caused by information imbalances. In the presence of asymmetric information, residual agency problems are possible. For instance, Fudenberg and Tirole (1995) argue that management has an incentive to manipulate reported earnings to derive incumbency rents from remaining in the firm. DeFond and Park (1997), in support of agency theories, find that controlling shareholders normalise income to understate earnings volatility to derive private control benefits, potentially at the expense of minority shareholders. In light of agency theory and prior research, the author expects a negative impact of ISM on the firm outcome (IE in this case).

Financial disclosure influences IE through the adverse selection and moral hazard problems stemming from information asymmetry (Bens and Monahan, 2004; Biddle and

Hilary, 2006; Biddle et al., 2009; Diamond and Verrecchia, 1991; Francis, 2004; Myers and Majluf, 1984). In other words, based on the information asymmetry theory, the unavailability of the same level of information to all interested parties in capital markets leads to adverse selection and moral hazard problems (Hossain and Farooque, 2019). The adverse selection problem arises when firm managers possess information about the actual value of their companies' assets and investment opportunities (Cheung and Chung, 2022; Ghaleb et al., 2021; Mbir et al., 2020; Rahman et al., 2023). Managers may make use of such private information at their disposal to issue capital and then overinvest the proceeds from this capital issuance in projects that only increases their interest, regardless of the efficacy of the investment (Cheng et al., 2013; Eulaiwi et al., 2018). Creditors, in return, will be more inclined to impose solid financial constraints to safeguard their capital supplied, causing managers to abandon profitable investment projects because of financial shortcomings and costly external financing, which eventually leads to underinvestment (Myers and Majluf, 1984). Moral hazard occurs when managers intending empire-building invest firm resources in unprofitable initiatives to pursue their personal goals at the expense of the shareholders' welfare maximisation objective, leading to overinvestment (Jensen, 1986; Samet and Jarboui, 2017). Moral hazard may also result in underinvestment when risk-averse and risk-averse firm managers do not invest in profitable projects when they have the financial means to do so. In essence, the presence of both under and overinvestment problems may influence strategic investment decisions, thereby reducing the firm value and increasing its likelihood of financial distress (Biddle et al., 2009).

From the arguments and conclusion of prior studies above, the authors propose the following hypothesis:

Hypothesis H1 The extent of ISM behaviour is negatively related to IE.

5 Research design

5.1 Research sample and data collection

The secondary data used to measure the dependent, independent, and control variables were manually obtained from financial documents. The first sample in this research covers all 735 financial and non-financial businesses registered on the Vietnam stock exchanges between 2010 and 2017. The authors then excluded 100 financial organisations from our original sample due to operations and financial statement format differences. Following that, only businesses with enough data to compute all relevant variables in this research are retained, and the final sample contains 596 non-financial businesses. Furthermore, based on market capitalisation, the study sample includes more than 90% of the Vietnamese financial market. Following the sample selection procedure, the total number of observations predicted for this research is 4,300 (strongly balanced panel). However, due to the lack of data (financial data is missing from financial statements) and some specific variables that require the lagged value (some are missing due to the 1-year lag and 2-year lag variables), the observations differ from the expected total observation and the final total observations for the main regression analyses is 1,788 observations and 1,354 observations corresponding to different independent variables which are ISM1 and ISM2.

Before conducting our analyses, the authors also winsorise all variables at the 1st and 99th percentile to filter out outliers. The sample selection process is described in Table 1. In addition, Table 2 categorises the research sample based on industries.

Table 1 Sample selection process

Description	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*Pooled*
Initial sample	630	640	650	670	690	710	730	730	5,450
Excluded									
Banking and insurance companies	100	100	100	100	100	100	100	100	800
Missing annual reports and not yet listed	30	30	30	40	40	50	60	70	350
Final	*500*	*510*	*520*	*530*	*550*	*560*	*570*	*560*	*4,300*

Table 2 Research sample classification based on industry

Industry classification	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*Total*
Basic materials	81	83	85	97	104	124	133	139	846
Consumer cyclicals	70	74	74	80	83	88	91	93	653
Consumer non-cyclicals	47	47	48	50	52	56	61	62	423
Energy	37	39	39	39	39	42	44	44	323
Healthcare	15	16	16	16	16	19	20	20	138
Industrials	147	151	154	160	167	179	189	192	1,339
Technology	14	14	14	15	15	15	16	16	119
Utilities	19	20	23	23	23	26	27	28	189
Total	*430*	*444*	*453*	*480*	*499*	*549*	*581*	*594*	*4,030*

5.2 Empirical model

In this study, the authors propose the following research model to investigate the relationship between ISM and IE based on the previous studies of Cutillas Gomariz and Sánchez Ballesta (2014), Eissa et al. (2023), Shahzad et al. (2019a) and Wang et al. (2022):

$$\begin{aligned} IE_{it} = {} & \delta_0 + \delta_1 \times ISM_{it} + \delta_2 \times ISM_{it} + \delta_3 \times BOARDSIZE_{it} + \delta_4 \times REV_{GROW_{it}} \\ & + \delta_5 \times OCF_{it} + \delta_6 \times CFSALE_{it} + \delta_7 \times LNSALE_{it} + \delta_8 \times SIZE_{it} + \delta_9 \times LEV_{it} \\ & + \delta_{10} \times ROA_{it} + \delta_{11} \times LOSS_{it} + \delta_{12} \times SLACK_{it} + \delta_{13} \times AGE_{it} + \delta_{14} \times TANG_{it} \\ & + \delta_{15} \times YEAR_{it} + \delta_{16} \times INDUSTRY_{it} + \varepsilon_{it} \end{aligned}$$

The descriptions of variables in this study are presented in Appendix.

5.2.1 ISM measurement

The current study employs discretionary accruals as a metric for measuring ISM, building upon the work of Koh (2005). Initially, the computation of two different proxies for discretionary accruals is performed following the methodology proposed by Jones (1991) and Kothari et al. (2005). Subsequently, the author assesses earnings management by utilising non-discretionary accruals, equivalent to reported earnings before interest and tax, and exclusive of extraordinary items, subtracted by discretionary accruals. Calculating the ISM level involves subtracting the reported earnings before interest and tax and before extraordinary items in the previous year from non-discretionary accrual. Ultimately, the absolute value is used to quantify the degree of ISM, independent of the direction of ISM tendencies.

5.2.2 IE measurement

In this study, the authors used the method of Chen et al. (2011) as a proxy for IE. In the model estimated by the following equation, the residual means IE.

$$IE_{it} = \delta_0 + \delta_1 NEG_{it-1} + \delta_2 GRW_{it-1} + \delta_3 NEG_{it-1} \times GRW_{it-1} + \varepsilon_{it}$$

where IE_{it} is the total investment of firm i in year t, defined as the net increase in tangible and intangible assets and scaled by lagged total assets. NEG_{it} takes the value of 1 for negative revenue growth, and 0 otherwise. GRW_{it} is the annual revenue growth rate for firm i in year $t-1$ (sales for firm i in year $t-1$ sales for firm i in year $t-2$)/sales for firm i in year $t-2$. ε_{it} is the residual.

The authors estimate the investment model cross-sectionally for each year and industry. A positive residual means the firm is making investments at a higher rate than expected, so it will overinvest. In contrast, a negative residual assumes that real investment is less than expected, representing an underinvestment scenario. The dependent variable will be the absolute value of the residuals multiplied by –1, so a higher value means higher efficiency.

5.3 Control variables

Following previous studies of Al-Hiyari et al. (2022), Cutillas Gomariz and Sánchez Ballesta (2014), Chu and Oldford (2022), Ellili (2022), Lai and Liu (2017), Med Bechir and Jouirou (2021) and Shahzad et al. (2019b), the authors use some control variables that can influence IE. The measurement of all control variables is presented in Appendix.

5.4 Estimation strategy

Because the study used panel data, a FEM or a random-effect model (REM) had to be chosen. To select viable models, the parameters of the models were evaluated using both fixed and random effects models. The Hausman test was then performed, and the findings indicate that the FEM model is more appropriate. To address the autocorrelation of order one and heteroscedasticity difficulties, with the characteristic of our data being $N > T$, we estimate using Stata 15's command XTPCSE with autocorrelation and heteroscedasticity correction.

Dealing with endogeneity is a common challenge encountered in research within the fields of accounting and finance, as it can potentially introduce bias into the outcomes of regression analyses. Endogeneity occurs when there is a mutual influence between the dependent variable (referred to as IE) and the independent variables (referred to as ISM), thereby leading to a potential distortion in the estimation of their relationship. Furthermore, despite the inclusion of a comprehensive set of time-varying firm-level control variables intended to capture potential factors that could confound the results, the research models remain susceptible to the impact of unobservable variables. In simpler terms, if the research models overlook any crucial variables that influence both ISM and IE, the study's findings may lack accuracy.

To address the issue of endogeneity, we have employed the GMM technique with firm characteristics serving as our instrument variables. Specifically, these instrument variables consist of lagged values from one year ago for BSIZE, REVCHANGE, OCFLOW, LEV, ROA, LOSS, SLACK, and FIXEDASSET, as well as lagged values from two years ago for BSIZE, SLACK, and AGE. This approach helps us account for potential endogeneity by using these lagged values as instrumental proxies to better estimate the relationship between ISM and IE while mitigating the influence of unobserved variables.

6 Empirical results and discussion

6.1 Descriptive statistics

The descriptive statistics of variables in this study are presented in Tables 3, 4 and 5. Table 3 provides the information of the full research sample. Table 4 and Table 5 also present the descriptive statistics of all variables based on the extent of investment (underinvestment or overinvestment firms, respectively).

Regarding the research sample, the mean value of IE (*INVEFF*) across all firm-years is –0.061, while there is a significant difference between the mean value of IE for underinvestment or overinvestment firms (*INVEFF_UNDER* = –0.048 and *INVEFF_OVER* = –0.104). Regarding the ISM, the mean values of ISM in terms of Jones (1991) and Kothari et al.'s (2005) models are 0.89 and 0.881, implying most companies in the sample are conducting opportunistic behaviour. This is consistent with the study of Leuz et al. (2003) when there is more room to conduct ISM in developing countries like Vietnam, which have an undeveloped legal framework to maintain market transparency and a low level of investor protection. When classifying firms into underinvestment firms and overinvestment firms, Tables 4 and 5 indicate that the mean value of IE is –0.048 and –0.097, respectively, which means that the extent of IE for underinvestment firms is much greater than overinvestment ones. The difference between the magnitude of ISM for underinvestment or overinvestment firms is unclear when the mean values of *ISM1* and *ISM2* for underinvestment firms are 0.893 and 0.881. The corresponding figures for overinvestment firms are 0.886 and 0.879.

In terms of the firm's characteristics, the mean value of *ROA*, *REVCHANGE* is 0.063 and 0.125. The figure for *BSIZE* is 5.51, implying the average number of members on the board of directors for the research sample is 5.51. Just nearly 5% of firms face a loss when the mean value of LOSS is 0.04. Table 3 also shows that the average *CFSALE*, *LNSALE*, *FIRMSIZE*, and *FIXEDASSET* are 0.068, 27.09, 27.127 and 0.269, respectively.

Table 3 Descriptive statistics for the full research sample

	Obs.	*Mean*	*Std_Dev*	*Min*	*Max*	*Skew*	*Kurt*
INVEFF	1,788	–0.061	0.058	–0.381	–0.001	–3.063	14.563
INVEFF_UNDER	1,289	–0.048	0.02	–0.076	–0.002	0.525	2.361
INVEFF_OVER	499	–0.102	0.115	–0.668	–0.001	–2.297	9.826
ISM1	1,788	0.889	0.194	0.065	1	–2.505	9.133
ISM2	1,354	0.878	0.197	0.071	1	–2.447	8.888
BSIZE	1,788	5.51	1.07	4	9	1.619	5.149
REVCHANGE	1,788	0.125	0.415	–0.67	2.689	2.962	16.657
OCFLOW	1,788	–395.206	336.066	–1.427.427	398.576	–0.46	3.687
CFSALE	1,788	0.068	0.186	–0.827	0.806	0.211	9.078
LNSALE	1,788	27.09	1.47	23.08	30.86	0.084	2.955
FIRMSIZE	1,788	27.127	1.445	23.767	30.873	0.289	2.886
LEV	1,788	0.236	0.191	0	0.682	0.437	2.135
ROA	1,788	0.063	0.067	–0.118	0.33	1.138	5.656
LOSS	1,788	0.04	0.197	0	1	4.677	22.875
SLACK	1,788	0.632	1.658	0.001	15.089	6.17	47.199
AGE	1,788	2.725	0.445	1.609	3.784	0.118	2.57
FIXEDASSET	1,788	0.269	0.214	0.002	0.873	0.956	3.159

Table 4 Descriptive statistics for underinvestment firms

	Obs.	*Mean*	*Std_Dev*	*Min*	*Max*	*Skew*	*Kurt*
INVEFF	1,289	–0.048	0.02	–0.076	–0.001	0.529	2.373
ISM1	1,289	0.893	0.195	0.065	1	–2.554	9.255
ISM2	961	0.883	0.198	0.071	1	–2.5	9.054
BSIZE	1,289	5.457	1.012	4	9	1.762	5.857
REVCHANGE	1,289	0.132	0.426	–0.67	2.689	2.956	15.923
OCFLOW	1,289	–356.895	332.054	–1.427.427	398.576	–0.551	3.933
CFSALE	1,289	0.062	0.182	–0.827	0.806	0.352	8.613
LNSALE	1,289	27.033	1.47	23.08	30.86	0.102	2.918
FIRMSIZE	1,289	27.083	1.428	23.767	30.873	0.314	3.013
LEV	1,289	0.232	0.189	0	0.682	0.444	2.152
ROA	1,289	0.057	0.066	–0.118	0.33	1.205	5.972
LOSS	1,289	0.053	0.224	0	1	4.001	17.012
SLACK	1,289	0.779	1.904	0.001	15.089	5.368	35.75
AGE	1,289	2.733	0.448	1.609	3.784	0.092	2.55
FIXEDASSET	1,289	0.229	0.203	0.002	0.873	1.293	4.111

Table 5 Descriptive statistics for overinvestment firms

	Obs.	*Mean*	*Std_Dev*	*Min*	*Max*	*Skew*	*Kurt*
INVEFF	499	–0.097	0.095	–.381	–0.001	–1.314	4.084
ISM1	499	0.877	0.191	0.065	1	–2.395	8.917
ISM2	393	0.868	0.192	0.071	1	–2.326	8.541
BSIZE	499	5.645	1.198	4	9	1.298	3.854
REVCHANGE	499	0.107	0.386	–.67	2.689	2.928	18.798
OCFLOW	499	–494.169	326.326	–1.427.427	398.576	–0.309	3.529
CFSALE	499	0.084	0.196	–0.827	0.806	–0.114	10.079
LNSALE	499	27.237	1.461	23.08	30.86	0.041	3.078
FIRMSIZE	499	27.241	1.481	23.767	30.873	0.218	2.608
LEV	499	0.246	0.196	0	0.682	0.412	2.081
ROA	499	0.079	0.065	–0.118	0.33	1.116	5.4
LOSS	499	0.008	0.089	0	1	11.034	122.758
SLACK	499	0.251	0.535	0.001	8.15	8.616	108.988
AGE	499	2.703	0.435	1.609	3.784	0.184	2.635
FIXEDASSET	499	0.373	0.208	0.004	0.873	0.46	2.494

6.2 Correlation matrix

Table 6 presents the correlation matrix to assess the correlation between variables in the study. The highest correlation value is between *ROA* and *LEV* (–0.392). In addition, the VIF values are under 10. Therefore, the collinearity issues in this study are not significant.

6.3 Empirical results

Table 7 presents the FEM regression analyses to test hypothesis H1 about the relationship between ISM and IE. In the first and second columns, the ISM-IE relationship regression results are presented for different ISM measures (ISM1 and ISM2). While the third and fourth columns showed the results for the above relationship regarding the overinvestment firms, the remaining ones described the findings for underinvestment firms.

Specifically, the FEM regression results indicate the negative and significant relationship between ISM and IE (p-value < 0.01 for ISM1 and ISM2). While this impact is more significant for overinvestment firms (p-value < 0.01 for ISM1 and ISM2), the relationship is not found for underinvestment companies (p-value > 0.1 for ISM1 and ISM2). The regression results indicate that the higher level of ISM (lower level of accounting quality) leads to the decline in IE and this correlation is more severe for overinvestment firms. The research findings are consistent with the studies of Cutillas Gomariz and Sánchez Ballesta (2014), Ellili (2022) and Shahzad et al. (2019a, 2019b). In this study, the authors use ISM as substitute proxies for FRQ when the higher level of ISM behaviour, the lower level of accounting quality. Prior studies document the positive relationship between FRQ and IE, and they conclude that a higher level of

accounting quality plays a pivotal role in mitigating information asymmetry and agency problems. This is appropriate and consistent when managers' self-interested behaviours, such as earnings management or ISM, have been shown to hurt firm outcomes by exacerbating asymmetric information and agency problems. Asymmetric information gives rise to the phenomena of 'moral hazard' and 'adverse selection'. The dissemination of inaccurate information may result in an increase in the acquisition cost of shares by prospective shareholders. Therefore, it allows for the possibility of opportunistic managers misallocating surplus funds towards unproductive ventures. Conversely, the absence of oversight after investing in a company presents a prospect for the management to implement their personal interests, whether it be through excessive or insufficient investment. Multiple scholarly investigations (Cutillas Gomariz and Sánchez Ballesta, 2014; Cheng et al., 2013; García-Teruel et al., 2009; Linck et al., 2013) have demonstrated that the presence of asymmetric information gaps can be mitigated by enhancing FRQ. This is since higher FRQ facilitates a uniform level of access to company information for both shareholders and management. Enhanced FRQ facilitates equitable share purchasing for shareholders, thereby mitigating the issue of adverse selection.

Another explanation for the research findings derives from the characteristics of the research context of Vietnam. Previous research has shown that FRQ is often greater in public firms than in private corporations (Ball and Shivakumar, 2005; Burgstahler et al., 2006), as well as in nations with better investor protection and stronger law enforcement (Holthausen, 2009; Leuz et al., 2003). In Vietnam, the legal framework in protecting investors is not strongly developed and lack of regulation to enhance the market transparency. Moreover, the IFRS regulations have not been implemented in Vietnam. On March 23, 2019, the Ministry of Finance released the IFRS application roadmap for Vietnam. Specifically, beginning in 2025, IFRS will be required for the financial statements submitted to Congress by all large-scale state-owned enterprises, listed companies, and public unlisted companies. Other enterprises operating as parents may voluntarily compile consular financial statements in accordance with IFRS. Therefore, Vietnam has not yet officially implemented IFRS. This will create more room for opportunistic behaviours such as ISM and reduce the efficiency of investment decisions. In other words, the research findings are suitable and understandable when considering the context of Vietnam.

In terms of control variables, the FIXEDASSEST, LEV and ROA are found to be negatively related to IE (p-value < 0.01), and these findings are consistent with the study of Shahzad et al. (2019b). Besides, the BSIZE positively correlates with IE for under-and underinvestment firms; however, the positive relationship is missing when considering the whole research sample. For AGE, LOSS, and SLACK, the authors almost find an insignificant relationship with IE (p-value > 0.1), and these results are consistent with Cutillas Gomariz and Sánchez Ballesta (2014) but contradictory to Ellili (2022).

Table 6 Correlation matrix

Variables	*–1*	*–2*	*–3*	*–4*	*–5*	*–6*	*–7*	*–8*	*–9*	*–10*	*–11*	*–12*	*–13*	*–14*	*–15*	*VIF*
1 INVEFF	1.000		1.06													
2 ISM1	–0.019	1.000		3.63												
3 ISM2	–0.017	0.850	1.000		3.76											
4 BOARDSIZE	0.005	–0.072	–0.084	1.000		1.16										
5 REV_GROW	–0.074	0.016	0.023	0.064	1.000		1.04									
6 OCF	0.127	0.109	0.116	–0.039	0.038	1.000		1.93								
7 CFSALE	–0.044	–0.101	–0.101	0.037	0.010	–0.196	1.000		1.25							
8 LNSALE	0.018	0.033	0.055	0.262	0.023	–0.160	–0.041	1.000		6.15						
9 SIZE	0.030	–0.050	–0.038	0.335	0.040	0.091	0.033	0.842	1.000		6.05					
10 LEV	–0.045	0.110	0.136	0.079	0.014	0.161	–0.170	0.347	0.389	1.000		1.68				
11 ROA	–0.082	–0.139	–0.137	0.067	0.015	–0.330	0.280	0.069	–0.059	–0.392	1.000		1.68			
12 LOSS	0.055	–0.145	–0.175	0.013	–0.086	0.041	–0.024	–0.044	0.014	0.110	–0.356	1.000		1.25		
13 SLACK	0.016	0.086	0.075	–0.051	0.086	0.013	–0.017	–0.020	–0.090	–0.113	–0.012	–0.045	1.000		1.17	
14 AGE	0.030	–0.013	–0.032	0.043	–0.092	0.056	–0.052	0.021	0.014	0.035	–0.017	–0.027	–0.049	1.000		1.03
15 TANG	–0.166	–0.188	–0.194	0.103	–0.062	–0.297	0.249	–0.003	0.143	0.242	–0.015	0.052	–0.341	–0.054	1.000	1.88

Table 7 FEM regression results

	INVEFF	*INVEFF*	*INVEFF_OVER*	*INVEFF_OVER*	*INVEFF_UNDER*	*INVEFF_UNDER*
ISM1	–0.0141**		–0.0653***		0.0006	
	[–2.26]		[–3.01]		[0.27]	
ISM2		–0.0147*		–0.0599**		–0.0031
		[–1.80]		[–2.29]		[–1.05]
BSIZE	0.0018	0.0002	0.0066*	0.0029	0.0019***	0.0013**
	[1.31]	[0.15]	[1.79]	[0.69]	[3.39]	[1.97]
REVCHANGE	–0.0088***	–0.0088***	–0.0240**	–0.0421**	–0.0101***	–0.0083***
	[–3.29]	[–2.71]	[–1.98]	[–2.55]	[–8.83]	[–5.64]
OCFLOW	0.0000***	0.0000**	0.0000	0.0000	0.0000*	0.0000
	[3.06]	[2.24]	[1.50]	[1.30]	[1.83]	[1.00]
CFSALE	0.0100	0.0066	0.0720**	0.0070	0.0005	–0.0030
	[1.29]	[0.74]	[2.08]	[0.14]	[0.20]	[–0.86]
LNSALE	0.0044	0.0010	0.0194*	0.0247*	0.0017**	0.0033***
	[1.39]	[0.28]	[1.87]	[1.95]	[2.03]	[3.52]
FIRMSIZE	–0.0006	0.0013	–0.0053	–0.0099	–0.0007	–0.0019**
	[–0.19]	[0.36]	[–0.60]	[–0.89]	[–0.82]	[–2.08]
LEV	–0.0312***	–0.0275**	–0.0853**	–0.0885**	–0.0036	–0.0073*
	[–3.27]	[–2.46]	[–2.30]	[–2.04]	[–1.07]	[–1.90]
ROA	–0.1371***	–0.1652***	–0.3555***	–0.3700***	0.0290***	0.0264**
	[–4.87]	[–4.76]	[–4.26]	[–3.69]	[2.88]	[2.19]
LOSS	–0.0024	0.0038	0.1239*	–0.0134	0.0007	0.0015
	[–0.47]	[0.56]	[1.84]	[–0.25]	[0.33]	[0.67]
SLACK	–0.0005	–0.0005	–0.0025	–0.0035	–0.0008***	–0.0009***
	[–1.20]	[–0.88]	[–0.45]	[–0.57]	[–2.79]	[–2.60]
AGE	0.0023	0.0016	0.0054	0.0023	–0.0004	–0.0008
	[0.69]	[0.40]	[0.53]	[0.17]	[–0.37]	[–0.63]
FIXEDASSET	–0.0455***	–0.0598***	–0.1003***	–0.0447	0.0184***	0.0153***
	[–3.68]	[–4.44]	[–2.80]	[–1.08]	[5.42]	[4.09]
Industry effect	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year effect	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
R^2	0.401	0.429	0.339	0.323	0.753	0.754
N	1,788	1,354	499	393	1,289	961

Notes: t statistics in brackets. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Table 8 FEM regression results (robustness)

	INVEFF_ROBUST	*INVEFF_ROBUST*	*INVEFF_OVER_ROBUST*	*INVEFF_OVER_ROBUST*	*INVEFF_UNDER_ROBUST*	*INVEFF_UNDER_ROBUST*
ISM1	–0.0393***		–0.0628***		–0.0208	
	[–2.92]		[–2.66]		[–1.50]	
ISM2		–0.0204		–0.0643**		–0.0104
		[–1.28]		[–2.29]		[–0.55]
BSIZE	0.0060*	0.0084***	–0.0008	0.0022	0.0094***	0.0116***
	[1.96]	[2.71]	[–0.15]	[0.37]	[3.91]	[4.25]
REVCHANGE	–0.0306***	–0.0316***	–0.0968***	–0.0899***	0.0200***	0.0182***
	[–4.68]	[–4.30]	[–6.14]	[–4.94]	[4.15]	[3.16]
OCFLOW	0.0001***	0.0001***	0.0001***	0.0001***	–0.0000**	–0.0000**
	[4.20]	[3.14]	[4.98]	[4.25]	[–2.24]	[–2.16]
CFSALE	0.0305**	0.0170	0.1364***	0.1269***	–0.0180*	–0.0228*
	[2.05]	[1.04]	[3.04]	[2.69]	[–1.66]	[–1.85]
LNSALE	0.0656***	0.0658***	0.1459***	0.1514***	–0.0262***	–0.0186***
	[8.98]	[8.17]	[12.29]	[11.17]	[–4.48]	[–3.02]
FIRMSIZE	–0.0711***	–0.0693***	–0.1330***	–0.1363***	0.0010	–0.0017
	[–10.26]	[–9.27]	[–12.09]	[–11.09]	[0.19]	[–0.29]
LEV	0.0414*	0.0294	0.3318***	0.2974***	–0.1446***	–0.1402***
	[1.74]	[1.22]	[6.24]	[5.28]	[–7.48]	[–6.74]
ROA	–0.1555**	–0.1826***	–0.4217***	–0.4504***	0.7716***	0.7853***
	[–2.51]	[–2.77]	[–4.52]	[–4.58]	[10.01]	[9.20]
LOSS	–0.0397***	–0.0372***	0.1098***	0.1106**	0.0192**	0.0181*
	[–3.65]	[–2.87]	[3.00]	[2.54]	[2.15]	[1.75]
SLACK	–0.0014	–0.0005	–0.0055	–0.0077	–0.0009	0.0001
	[–0.80]	[–0.28]	[–1.32]	[–1.46]	[–0.67]	[0.10]
AGE	0.0009	0.0093	0.0361**	0.0558***	–0.0060	–0.0113
	[0.08]	[0.75]	[2.30]	[3.10]	[–0.77]	[–1.35]
FIXEDASSET	0.1088***	0.1112***	0.1481***	0.1575***	0.0052	0.0095
	[4.77]	[4.50]	[4.05]	[3.86]	[0.28]	[0.44]
Industry effect	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year effect	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
R^2	0.546	0.581	0.601	0.609	0.683	0.704
N	2312	1858	1027	832	1285	1026

Notes: t statistics in brackets. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Table 9 GMM regression results

	INVEFF	*INVEFF*	*INVEFF_OVER*	*INVEFF_OVER*	*INVEFF_UNDER*	*INVEFF_UNDER*
ISM1	–0.0720**		–0.4745**		0.0091	
	[–2.30]		[–2.25]		[0.56]	
ISM2		0.0606		0.0245		0.0264
		[1.46]		[0.29]		[1.61]
BSIZE	0.0019	0.0004	–0.0004	0.0004	0.0014**	0.0014*
	[1.55]	[0.29]	[–0.08]	[0.11]	[2.10]	[1.82]
REVCHANGE	–0.0100***	–0.0122***	–0.0181	–0.0287***	–0.0110***	–0.0098***
	[–3.19]	[–3.84]	[–1.47]	[–3.20]	[–6.54]	[–5.49]
OCFLOW	0.0000***	0.0000	0.0000	0.0000	0.0000	0.0000
	[2.67]	[1.23]	[1.15]	[1.21]	[0.47]	[0.01]
CFSALE	0.0106	0.0031	0.0394	0.0085	0.0002	–0.0020
	[1.09]	[0.38]	[0.97]	[0.31]	[0.05]	[–0.49]
LNSALE	0.0056*	–0.0030	0.0075	0.0009	0.0023	0.0027*
	[1.91]	[–0.89]	[0.63]	[0.10]	[1.64]	[1.78]
FIRMSIZE	–0.0034	0.0068*	–0.0002	0.0074	–0.0008	–0.0011
	[–1.11]	[1.82]	[–0.02]	[0.85]	[–0.56]	[–0.72]
LEV	–0.0130	–0.0376***	–0.0779	–0.0972**	–0.0040	–0.0094*
	[–1.30]	[–2.95]	[–1.21]	[–2.33]	[–0.94]	[–1.79]
ROA	–0.0938***	–0.0250	–0.1818	–0.1949*	0.0328**	0.0392**
	[–3.03]	[–0.67]	[–1.04]	[–1.72]	[2.53]	[2.57]
LOSS	–0.0054	0.0213*	0.1351*	0.0205	0.0006	0.0069
	[–0.78]	[1.83]	[1.69]	[0.28]	[0.16]	[1.40]
SLACK	–0.0016***	–0.0015**	–0.0154**	–0.0181***	–0.0015***	–0.0015***
	[–3.02]	[–2.33]	[–2.01]	[–2.66]	[–3.89]	[–3.64]
AGE	0.0004	0.0013	–0.0073	0.0055	–0.0016	–0.0001
	[0.14]	[0.38]	[–0.42]	[0.44]	[–1.32]	[–0.09]
FIXEDASSET	–0.0461***	–0.0276**	–0.0530	–0.0655*	0.0144***	0.0185***
	[–4.36]	[–2.25]	[–1.13]	[–1.88]	[3.49]	[3.69]
Industry effect	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year effect	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
R^2	0.032	0.008	0.063	0.063	0.117	0.049
HANSEN_TEST	0.3032	0.1127	0.5089	0.0975	0.0675	0.2089
GMM_C_TEST	0.0734	0.2123	0.2822	0.9409	0.8566	0.0779
N	1679	1277	375	375	1185	913

Notes: t statistics in brackets. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

6.4 Robustness tests

6.4.1 Alternative measurement of IE

Following Biddle et al. (2009), to estimate the expected level of investment for firm *i* in year *t*, we specify a model that predicts the level of investment based on growth opportunities (measured by sales growth). Deviations from the model, as reflected in the error term of the investment model, represent investment inefficiency.

$$IE_{it} = \delta_0 + \delta_1 SalesGrowth_{it-1} + \varepsilon_{it}$$

where IE_{it} is the total investment of firm *i* in year *t*, defined as the net increase in tangible and intangible assets and scaled by lagged total assets. $SalesGrowth_{it-1}$ is the rate of change in sales of firm *i* from $t - 2$ to $t - 1$.

Table 8 presents the FEM regression results for different proxies of IE based on the model of Biddle et al. (2009). The results are consistent; the negative correlation between ISM and IE is still confirmed for the whole sample, and the influence is more severe for overinvestment firms.

6.4.2 Endogeneity control

Endogeneity issues are a common challenge encountered in accounting and finance research, potentially introducing bias into the regression outcomes. The issue of endogeneity arises when there is a mutual influence between the dependent variable (IE) and the independent variables (ISM), leading to a potential bias in the estimation of the relationship between them. In addition, despite the incorporation of an extensive array of time-varying firm-level control variables aimed at capturing potential confounding factors, the research models remain susceptible to the influence of unobserved variables. In other words, if the research models omit any essential variables that influence both ISM and IE, the study's results may be inaccurate. To address the endogeneity issue, we employ the GMM method with firm characteristics as our instrument variables. In particular, the instrument variables include a lag of 1 year for BSIZE, REVCHANGE, OCFLOW, LEV, ROA, LOSS, SLACK, FIXEDASSET along with a lag of two years for BSIZE, SLACK and AGE.

In Table 9, we perform GMM regression as another robustness check. To ascertain the validity of the estimates, we conducted two tests: GMM-C test for the endogeneity and Hansen test for the overidentification. In Table 9, the p-value of GMM-C test is higher than 5 per cent, indicating that the current value of IE and ISM are endogenous variables, thus necessitating the use of GMM estimation technique to avoid bias associated with endogeneity issue. The Hansen test for overidentification is passed, confirming that the additional variables are exogenous, which is prerequisite for the use of GMM. The results of the sign and significance of the main variables in Table 9 are consistent with the tables, confirming the robustness of our findings.

7 Conclusions

In this study, the authors examined the impacts of ISM on IE for 596 non-financial Vietnamese listed firms. The FEM regression method and GMM technique are employed at the firm and year level. The findings suggest that higher level of ISM is correlated with lower IE, which means that the IE is reduced if there are more opportunistic behaviours like ISM or earnings management conducted and decline the quality of accounting information. Furthermore, this reverse correlation is more serious for overinvestment firms, but the authors cannot find the same pattern for underinvestment ones. The research results are confirmed through different robustness tests indicating that the findings are consistent and robust.

Overall, from the results, there are several implications for investors, regulators, and public companies.

First, the findings have relevant implications for investors since they help understand the economic consequences of corporate finance and accounting policies in investment decisions.

Second, in terms of policymaker, as existing ISM reflects inefficient investment decisions, constraining and monitoring ISM practices by governance parties and auditors would enhance firm's IE. Furthermore, regulators in the Vietnamese stock market are advised to assess the quality of financial statements and strengthen governance rules to constrain ISM practices.

Finally, managers of listed companies should invest more in financial disclosure to increase the credibility of their firm's financial reporting perceived by external users. This investment will ensure greater transparency of firms' activities through voluntary disclosure via websites, financial press publications and financial analyst recommendations. Vietnamese listed companies should also improve the quality of the disclosure system to play a better role in capital allocation and reduce the extent of ISM practices, as the research findings indicate that ISM practices decline IE.

Nevertheless, it should be noted that this study's results are subject to certain limitations. First, the present study's outcomes lack generalisability to financial firms, given that the sample does not encompass this particular industry. Second, the consideration of sample size is crucial in the interpretation of study findings. As a result, a future study can use larger samples by involving cross-country firms, an issue that can also enable comparative study. Thirdly, this paper uses only IE as an economic consequence of ISM. Other economic repercussions (such as debt cost, credit risk, etc.) may be the subject of future study. Second, it would be intriguing to observe, in future research, the impact of familial control on the relationship between ISM and IE while maintaining the institutional context.

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Appendix

Variable	*Definition*	*Expected sign*	*Source*
Dependent variables			
INVEFF	IE following model of Chen et al. (2011)		Chen et al. (2011)
INVEFF_UNDER	IE following model of Chen et al. (2011) for underinvestment firms		
INVEFF_OVER	IE following model of Chen et al. (2011) for overinvestment firms		
INVEFF_ROBUST	IE following model of Biddle et al. (2009)		Biddle et al. (2009)
INVEFF_UNDER_ROBUST	IE following model of Biddle et al. (2009) for underinvestment firms		
INVEFF_OVER_ROBUST	IE following model of Biddle et al. (2009) for overinvestment firms		
Independent variables			
ISMOOTH1	The absolute value of (non-discretionary accrual – prior year earnings level ($EBIT_{i,t-1}$)), while: non-discretionary accruals = Earningst – discretionary accrualst (Jones, 1991)	-	Koh (2005)
ISMOOTH2	The absolute value of (non-discretionary accrual – prior year earnings level ($EBIT_{i,t-1}$)), while: non-discretionary accruals = Earningst – Discretionary accrualst (Kothari et al., 2005)	-	
Control variables			
BSIZE	The number of members on the board of directors	+	Al-Hiyari et al. (2022), Ghaleb et al. (2021), Hammami and Hendijani Zadeh (2019), Houcine (2017), Med Bechir and Jouirou (2021), Permatasari and Nengtyas (2020), Rahman et al. (2023), Shahzad et al. (2019a, 2019b) and Shin et al. (2019)
LEV	Total long-term debt divided by total assets	-	
REVCHANGE	The change in sales throughout the year (%)	-	
FIXEDASSET	The natural logarithm of the firm's tangible assets	-	
ROA	Total net income over total assets	-	
AGE	The natural logarithm of the firm's age	-	
OCFLOW	Cash-flow from operation	+	
CFSALE	Final cash flow from operating activities divided by final total assets	+	
LNSALE	The ratio of operating cash flow to total assets	+	
LOSS	Dummy variable: 1 if income before tax and extraordinary items is negative; otherwise = 0	+	
SLACK	The ratio of cash to fixed assets	-	
FIRMSIZE	The natural logarithm of total assets	-	