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ARTICLE

How Investor Sentiment Influences Stock Price Informativeness of Firms' Future Earnings: Evidence From China's Stock Market

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ABSTRACT

This paper explores whether the level of stock price informativeness about listed companies' future earnings is influenced by investor sentiment. In prior studies, investor sentiment, which can be regarded as the mood of the market, is defined as a belief about unjustified firms' future cash flow, investment returns and risks in capital markets. At the same time, stock price informativeness indicates how much information about a firm's future earnings is reflected by stock prices. Higher price informativeness indicates a higher market efficiency level. Using linear regression analysis based on panel data from China's stock market and listed companies, this research documents how stock price informativeness can be reduced by investor sentiment during market pessimism. However, although the explanatory power of future earnings over stock returns is strengthened by positive sentiment, it is not certain that positive sentiment increases price informativeness since the asset price bubble exists with extreme market optimism. Furthermore, the effect of sentiment on price informativeness would be weakened by higher state-owned shareholding. These empirical results imply that sentiment, to a certain degree, causes the investors' ignorance during pessimism and exaggeration during optimism over firms' earning prospects. Moreover, investors usually lack favour for state-owned enterprises during optimism, even though these companies actually have considerable earning prospects. While during pessimism, which usually happens after a crisis, the profitability and reliability of these state-owned enterprises are again emphasised by investors.

Keywords: Sentiment; Informativeness; Stock market efficiency; State-owned shareholding

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1. Introduction

Literature commonly agrees that the purpose of financial markets and systems is to lead to the efficient allocation of financial capital and this efficient allocation requires that financial markets as a whole can price financial assets correctly [1, 2]. As one of the components of the financial system, the stock market also needs to be able to price shares reasonably and correctly to achieve a rational allocation of financial capital, ensuring that financial resources will flow to competitive industries and enterprises. According to the Gordon growth model, the value of shares of a company depends on the ability to earn profits and pay dividends in the future. The better the company's profitability and earnings prospects, the higher the value of its stock and the higher the market price of the stock [3]. Thus, to some extent, the stock price implies information about the firm's profitability in the future, which is defined as the stock price informativeness about the firm's future earnings [4, 5, 6].

Capital markets rely on the arbitrage mechanism to price financial assets accurately. According to the traditional finance theory, investors trade based on their judgments in the light of the available information [7]. Although the information available to investors is not entirely consistent and some investors are better informed than others. As trading continues and market pricing continues to be adjusted, stock prices will eventually fully reflect all the information about the value of the stock, including both public and private information. It is then impossible to achieve higher than average market returns on a risk-adjusted basis by using current information, given that stock prices only respond to new information, while the traders who lack information, investment skills or rationality will eventually be eliminated from the market because of persistent losses [1, 8, 9, 10, 11, 2].

However, researchers in psychology have found that, contrary to the traditional finance and efficient market theory, individuals are not as rational as the rational man hypothesis but are susceptible to psychological and behavioural influences that can lead to systematic deviation of decisions from rational expectations [12]. This behavioural effect also exists in the stock market and investor sentiment is one of the most important factors that influences investment decisions and market efficiency, as it can easily spread widely in societies where there is an informational cascade [13].

As argued in prior literature, sentiment predicts the direction of stock price movements, as pessimism about the stock market enhances downward pressure on stock prices, while optimism links to a rise in stock prices [14, 15, 16]. Sentiment also negatively relates to stock returns [17, 18, 19], negatively relates to market volatility [20, 21, 22], and both extreme high or low sentiment leads to extremely high trading volume [17, 14]. Most importantly, investor sentiment impedes the realisation of the arbitrage mechanism based on rational investors and their private information described in traditional financial theory. The inability to predict how sentiment will change and the significant influence of sentiment on markets makes arbitrage become abnormally risky, costly and less attractive to arbitragers, while noise traders may be compensated for taking on excessive risks made by themselves and even receive higher returns than sophisticated investors [17].

Moreover, some stocks are hard to price because of the difficulty and subjectivity of determining their true values, making these stocks more speculative than others and more likely to be impacted by prevailing sentiment [23]. From the perspective of investor sentiment research, although stock prices and returns depend on a firm's value, these two variables also relate to noise traders and market sentiment. Therefore, the arbitrage I mechanism that ensures stock market efficiency could be out of order and the stock prices could deviate from their fundamental value.

Although the association of investor sentiment with the stock market, the reason behind the association and the role of sentiment as a market signal have been well discussed, few studies have directly illustrated how and to what extent investor sentiment affects the stock market's ability to

anticipate firms' future earnings and to generate rational pricing, i.e., the stock price informativeness. As for the research on stock price informativeness, although many papers have demonstrated how market and accounting institutions, such as income smoothing [24], state ownership [25, 26], investor protection [27], corporate disclosure policy [28], transparency [29] and credit ratings [30], can affect the market's ability to predict firms' future earnings, few studies have focused on the effect of behavioural factors.

Therefore, in order to provide new evidence to fill this research gap, the objective of this paper is to investigate whether investor sentiment has an impact on the informativeness of stock prices and the accuracy of market pricing. Considering the effect of sentiment on stock markets described by previous studies, that pessimism would generate a greater effect than optimism does, I hypothesise that investors steeped in pessimism tend to ignore the fundamentals of the company and its true earning potential. Thus, stock prices during periods of pessimism will be less informative about firms' future earnings than during other periods. Meanwhile, I also incorporate state ownership as an analysed factor in the study, since, on the one hand, it has already been proved that state-owned shareholding reduces the stock price informativeness [26, 31], on the other hand, attributes, such as large asset scales, long earnings history and a high proportion of tangible assets may make state-owned firms less sensitive to market sentiment [23]. Therefore, I hypothesise that higher state ownership reduces the effect of sentiment on stock price informativeness.

In my empirical analysis, I employ the panel data showing stock returns, firms' annual financial results and market sentiment index in A shares of China's stock market from 2004 to 2020, covering 27,051 firm-year observations and 3,709 listed firms across 312 industrial categories. Regression analyses were performed according to the Main Board and the ChiNext (the two main trading boards with different price limits and listing regimes) separately, to ensure that the characteristics of the different boards do not affect the robustness of the findings.

Finally, in line with prior studies, I found that investor sentiment negatively predicts the stock returns. Regarding my hypotheses, market pessimism reduces the market anticipation accuracy on firms' future earnings. Furthermore, I found that, although state ownership proportion negatively relates to stock price informativeness, higher state-owned shareholding weakens the effect of sentiment on stock price informativeness. These findings are all in line with the prior literature about sentiment analysis mentioned above.

The remaining parts of the paper are structured as follows: Section 2 contains the literature review and my hypothesis development. Section 3 presents the methodology and the research design. Section 4 presents the empirical analysis, including descriptive statistics, empirical results and a battery of sensitivity tests to ensure the robustness of my findings. Finally, Section 5 illustrates the conclusions of the study.

2. Literature Review and Hypothesis Development

2.1 Literature Review

2.1.1 Theoretical Background: Efficient Market Hypothesis

In general, the primary task of capital markets is to provide a proper price as a signal for reasonable allocation of financial stocks and resources. This requires asset prices to fully reflect all available information at any time while the buyer and seller can make rational decisions based on the 'fair price' [8]. In the beginning, the traditional financial theory believed that this was achievable. Investors will adjust their investment decisions and therefore the asset price according to publicly available information. This process will be carried out within a short term and, therefore, it is impossible to achieve higher returns than average market returns by using currently available information, for example, earning announcements, given that stock price only responds to new information [1]. Even though there are investors who are not well-informed and make

irrational investment decisions, arbitragers will always trade against them and thus converge the asset prices to their fundamental value, bringing the market back to efficiency [1, 9]. Those whose judgments bring mispricing will keep losing money to arbitragers and finally quit the market.

Yet this perfect access to information and market arbitrage mechanism seems to remain only at the theoretical level. All arbitrage opportunities require capital and are risky [32]. Access to information and arbitrage are still subject to limitations in real markets, which makes their effectiveness in real markets highly questionable. As noted by Gilson and Kraakman, the cost of accessing and processing information still remains a challenge in understanding how markets behave efficiently [10]. Although many researchers have developed various models to show how the market can act as if everyone is well-informed despite the costs, they still cannot reach a consensus regarding how markets reach efficient information and prices.

The seminal work of Beaver also indicated the weakness of Fama's theory in providing a precise definition for efficient market and information availability [7]. He argued that a securities market is efficient with an information system that includes all signals, data and knowledge investors use to shape their beliefs and expectations about future security prices. The market is considered efficient and prices are said to 'fully reflect' the information system, only if security prices behave as though everyone has equal access to that information system. If superior information, information asymmetry, costly information extraction and heterogeneous belief exist in the market, it is hard to say that the capital market is efficient. The above discussion illustrates that stock prices and returns cannot timely and accurately reflect a company's value and profitability, due to the existence of limitations on market arbitrage mechanisms and investors' access to the same information.

2.1.2 Theoretical Background: Decision-Making and Behaviour Research

Studies about individual decision-making and behavioural finance and economy have confirmed the above obstacles to the realisation of efficient markets. Usually, the investor relies on expected returns or discount rates as the benchmark of investment decisions. Under the background of an efficient market, investors hold homogeneous beliefs among investors and the expected returns can be directly calculated according to the market returns, risk-free interest rates and the stock-to-market correlation [11, 7]. However, in reality, investors may process the same information differently and the individual's background, analysis abilities and the content of the assessed information may lead them to different conclusions, investment decisions and heterogeneous expectations on the stock market [33].

Even though investors have corresponding analysis abilities and the same access to market information, they may still make mistakes with the heuristics in cognitive instincts. When making decisions, individuals may unintentionally employ heuristics, the efficient shortcuts to save energy for mental activities but which usually lead to systematic errors and biases [12]. Daniel et al. found the signs of systematic biases in the stock market that investors may overestimate the precision of their private information signals and their over-confidence affects investment decisions, thus leading to overreaction and underreaction to given market signals and information, causing excess volatility in financial markets [34]. The above results suggest that investors are subject to a range of non-fundamental factors, misjudging the value of a stock and causing systematic price deviations from fundamental value.

2.1.3 Theoretical Background: How Sentiment Affects Stock Markets

The seminal work of DeLong et al. further describes how behavioural factors, mainly investor sentiment, affect stock prices, trading and market efficiency by testing a model including both rational arbitragers who are equipped with a Bayesian approach to evaluate stocks and returns and noise traders who are sentiment-driven [17]. Their analysis shows that investor sentiment significantly affects stock prices, returns and trading volume. The

optimistic sentiment is followed by the increasing stock price but relatively lower return and extreme high or low sentiment will usually be followed by high trading volume. Most importantly, it is shown that sentiment-driven traders disrupt the function of the arbitrage mechanism, which is described as the key of the efficient market.

Furthermore, due to the unpredictable random belief of noise traders, stock prices often deviate from fundamental value to varying degrees and stock investment also becomes abnormally risky, reducing the attractiveness of arbitrage and the efficiency of the arbitrage mechanism. Moreover, unlike the description of efficient market theory, noise traders may be compensated for bearing the risk created by themselves, letting them stay in the market. The work of D'Avolio [35] and Wurgler and Zhuravskaya [36] also showed that it could be risky and costly for arbitraging by holding, trading and betting, especially for small stocks with uncertain values.

The incorporation of non-fundamental information into investment decisions and market sentiment is an important reason why sentiment-driven traders lead to asset prices deviating from their fundamental value. The research of Brown [37] has shown that non-fundamental information which is completely unrelated to the company and the market, such as sports game results [38], weather conditions [39], aviation disasters [40], holidays [41], and seasonal shortness of days [42], is also incorporated into the noise trader's decision-making and market sentiment; while the sentiment signal would be strengthened during spreading and further influence other investors through information cascades [13].

Such arguments have also been supported by research about how media can influence and guide the trend of investors' sentiment. Sentiment expressed directly by the news media can affect the market and prices [43]. Additionally, Tetlock found that high media pessimism robustly brings stress on market price movement even though the information carries no fundamental content about firms' and equities' value and low market returns lead to high media pessimism again [14]. The work of Mutz and Soss also showed that media organisations can change public sentiment by perceiving community salience, setting news agendas and affecting opinion climates [44]. These approaches allow the media to change people's attention and sentiment with the same underlying facts. This effect is more pronounced than ever as social media is growing rapidly. Compared to traditional media such as newspapers, internet news and social media have a much greater power to guide market sentiment [22].

This literature provides an important insight that the stock market does not function as efficiently as described in the theoretical hypothesis; investor sentiment has an impact on asset pricing and market efficiency, and this is the theoretical premise of my research.

2.1.4 Measures of Sentiment

Generally, sentiment indicates the public opinions and attitudes of the community to a certain issue [44]. In a financial context, it is defined as the belief about unjustified firms' future cash flow and investment risks in capital markets [23], which can be divided into positive/bullish, neutral and negative/bearish [15].

Multiple approaches have been developed to estimate sentiment. In general, the measures can be categorised into direct measures and indirect measures. The direct measures for sentiment use surveys by posing questions to investors randomly, collecting information about investors' emotions and expectations and forming the investors' sentiment index, for example, the investor sentiment survey data undertaken by the American Association of Individual Investors, the Consumer Sentiment Index by the University of Michigan and the FTSE 100 Investment Sentiment Scoreboard by Hargreaves Lansdown.

Furthermore, there are three non-direct measures of sentiment. The first is calculated as a measure of market sentiment by analysing the sentiment of a large number of texts on the Internet and calculating a synthesis of the investors' views extracted from them on the form of the rise and fall of the stock market at the time, such as the Fear and Greed Index by CNN and the China investors' index by Peking

University. The second measure is a combination of several market-related indicators that are calculated to construct a corresponding market sentiment index, for example, Baker and Wurgler constructed a measure of stock market sentiment based on the common variation of the closed-end fund discount, NYSE share turnover, the number of IPOs, the average first-day returns on IPOs and equity share in new issues and dividend premium [19]. Chen, Chong and Duan followed this approach and used daily data to construct a similar sentiment index for the Hong Kong stock market [16]. The last type of sentiment uses the significant correlation between some continuous variables or single events and sentiment, such as the weather, sports match results and daylight hours mentioned above, and uses this to infer investor sentiment, since these variables and events have been proven to have an impact on market sentiment [38, 39, 40, 41, 42].

2.1.5 Current Empirical Studies

Following the theoretical framework of DeLong et al. and the approaches to measure sentiment noted above, many researchers have offered empirical evidence of sentiment's effects on the market [17]. Investor sentiment positively relates to stock prices and is negatively correlated with following returns in the short term [14, 18, 19, 45]. Low current market sentiment usually implies that future stock returns will be higher as low sentiment-induced trading has brought stock prices lower than their fundamentals [18].

Overreaction by investors is the key factor in this situation, in addition to the limited arbitrage and herding behaviour. Investors' overreaction or underreaction to market signals causes the incorrect valuation of stocks because of psychological biases, such as overconfidence [23, 18]. This explanation is consistent with Tversky and Kahneman, who found that individuals tend to over-exploit limited information when deciding under uncertainty [46]. More specifically, investors overreact to noise information with high strength but low statistical weight and underreact to information with low strength but high statistical weight, such as a firm's earning announcements [47].

Sentiment-driven traders' overreaction and underreaction to market signals also generate excessive long-lived price fluctuations, which are more volatile than what would be justified by dividend volatility alone [48], while relatively extreme sentiment usually indicates high market volatility [22, 17, 37]. However, unlike the conclusion regarding the effect of sentiment on stock prices, this view is counter to some studies. Brown and Cliff argued that although sentiment levels and changes are closely related to prevailing market returns, sentiment is not a strong predictor of near-term future stock returns and market volatility [49]; they believed that institutional sentiment has a higher effect than the individuals in the market. Wang et al. illustrated that most of our sentiment measures are caused by returns and volatility rather than vice versa [50]. Moreover, Audrino et al. showed that the effect of sentiment is generally small and has only short-term effects on volatility [21].

In addition to the general influence of sentiment on the market, the empirical evidence also shows that sentiment has a significant asymmetrical impact on price, return and volatility. Sentiment has a greater effect on stock prices in stock market downturns than in stock market expansions [15]. Negative sentiment or media content carrying a pessimistic mood usually outperforms that of positive indices when predicting price movements, leading to higher market fluctuations [22, 45, 51, 15]. These investigations and results are consistent with the loss aversion theory proposed by Tversky and Kahneman [52]. Investors are more sensitive to good news when they are optimistic and more sensitive to bad news when they are pessimistic [53]. Based on these observations, I infer that market sentiment's impact on stock price informativeness is different between optimism and pessimism and I will make subsequent hypotheses based on this assumption.

The same sentiment also has an asymmetric impact on firms of different types. Overall, sentiment has a greater impact on small stocks, growing stocks, young stocks, high volatility stocks, unprofitable stocks and non-dividend-paying stocks [23, 15, 18, 53].

Without a sufficient history of earnings and a high degree of uncertainty about the future, the true value of such stocks is difficult to define, while stocks of companies with a long history of earnings, tangible assets and stable dividends are less sensitive to sentiment. The more optimistic the market sentiment, the more likely small stocks are to be overvalued, while bond-like stocks are likely to be undervalued [23]. This observation is the base of my second hypothesis. Since state-owned firms generally belong to traditional industries with large asset scales, I infer that sentiment's impact on price informativeness of state-owned firms' stocks should be less than on other stocks.

2.1.6 Sentiment's Impacts on China's Stock Market

Although the impact of sentiment on stock markets is similar in general, it may still show some differences depending on the markets, while the research are mainly concentrating on the advanced markets situation. As the second largest stock market and an emerging market, there are institutional differences between the China stock market and the U.S. and European stock markets, which can be used for sentiment studies. On the one hand, China's information disclosure system is not as developed as that of the advanced markets while investors may blindly rely on relevant information and the majority opinion to make decisions [70, 63], and on the other hand, there are more limitations on short-selling mechanisms [69], IPOs [71], and the price limits [65] in the China stock market, while these constraints have been proved that interrupt markets from improving information environment and allowing arbitrage, and therefore increasing the noise trader risk [19]. These special market characteristics and the institutional changes that have taken place in the Chinese market over time are likely to provide us with new insights into how sentiment affects stock prices and investor judgment.

Based on the above theoretical foundations, measurement approaches and empirical evidence, we can generally infer that, in addition to public and private information about firm fundamentals, noise information about firms' value and investors' over- or under-reaction to fundamental information can also affect stock prices, returns and volatility through investor sentiment. These non-fundamental contents or irrational reactions contained by sentiment can lead to deviation of stock prices from company fundamentals, resulting in excessively high or low returns and market volatility that cannot be explained by fundamental information. Thus, based on the prior literature, the objective of my research is related to the work of Li et al. [54], focusing on how investor sentiment influences stock return and pricing, to what extent that sentiment affects the explanatory power of firms' future earnings over the stock return, and how state-owned shareholding affect this interaction in China stock market.

Meanwhile, the limitations and shortcomings of the literature also bring me advice on my methodology and measurement. For example, Wang et al. pointed out that sentiment could be caused by market return [50], which is ignored by many prior studies, and Chen, Chong and Duan illustrated that using daily data to construct the sentiment measure leads to excessive volatility and noise in their research [16]. Therefore, I employ lagged stock return as the control variable and yearly panel data for measure of sentiment, to avoid endogeneity and noise problems in my analysis.

2.1.7 Gaps and Limitations in the Current Literature

Current studies have conveyed multiple aspects of the market that could be affected by investor sentiment. However, there are also limitations and gaps in the literature. First, some of the regression analyses addressing the impact of investor sentiment are considered to be insufficiently rigorous. For example, studies that deny the impact of investor sentiment argue that investor sentiment is caused by prior stock returns and volatility [50], and therefore is just the investors' feeling, rather than a cause of market changes. Meanwhile, many studies illustrating the sentiment effect have not considered previous stock returns and volatility as the control variables, and thus, their models may

have endogeneity problems. Second, most of the studies did not use the same data and measurement standards.

Although Baker and Wurgler constructed a methodology for calculating the investor sentiment index [19], some studies still use their approaches to calculate the corresponding investor sentiment, which may also lead to inconsistencies in their findings. In addition, differences in the duration and frequency of observation of studies may lead to opposing conclusions. Chen, Chong and Duan mention that using high-frequency data could lead to excessive volatility and noise of sentiment measures [16]. Finally, the empirical literature mainly focuses on the effects brought about by sentiment to different market signals, it but seldomly studies how market sentiment influences the asset pricing process and results of the stock market. This question relates to the extent to which market sentiment affects the efficiency and accuracy of market pricing and the results may provide policymakers implications about how to implement reforms to improve the efficiency of stock markets in allocating financial resources.

2.2 Hypothesis Development

The hypotheses of this paper mainly stem from the discrepancy between theory and reality as well as from the conclusions of studies that partially reread each other.

Theoretically, the value of shares is determined by the cash return that a company pays to its shareholders. This in turn is directly related to the profit that the company can realise, and therefore the company's profit determines the pricing of shares and the rate of return. When the firm's earning prospect is constant, the higher the bid, the lower the rate of return realised. According to the Gordon Growth Model, the share price is:

$$P = \frac{Div}{R-G}, \text{ while } R = \frac{Div}{P} + G$$

R equals rate of return, G equals to the growth rate of dividend, and Div is the dividend in the first period [3]. Because dividend is decided by firm's earning ability, the return of stock is also determined by firm's current and future earnings.

In an efficient market, current stock returns reflect a firm's profitability, which is partly determined by unexpected profits realised by the firm in the current period and partly by investors' expectations of the firm's future earnings prospects. Furthermore, news and shocks that may affect the firm's future earnings prospects, but not its current profits, will cause investors to reevaluate their expectations of the firm's future profits [4, 5]. Since investors evaluate the stock prices based on firms' earning information, the price informativeness level, which means how much information stock prices contain about future earnings, determines the effectiveness of asset pricing in the stock market. When more information about firms' future earnings is included in the current stock return, the higher informativeness and informational efficiency of the stock price, which leads to a more efficient allocation of resources [2].

Stock prices contain a wide range of information that is not entirely public, including both public and private information derived from insider or personal analysis. By analysing the explanatory power of the traditional asset pricing model, Roll argued that the low R2 statistic for common asset pricing models is due to strong firm-specific return variation unrelated to public information [58]. He considered that this implies both private information and else occasional frenzy unrelated to concrete information.

The sentiment analysis researches support the latter conjecture, which proposes that the sentiment and noise trader frenzy will twist the price of shares, drive it away from the fundamentals, and lead to excess market fluctuations or turmoil. When sentiment is positive, investors are more sensitive to good earning news, while negative sentiment will bring higher sensitivity to bad earning news. There is an asymmetric effect of different market sentiments on stock returns, market pessimism would exert a greater impact on stock returns than optimism and drive prices downward. Investors also react more violently to negative news, including both fundamental and noisy information [15, 14, 22, 53, 72].

However, for the assertion by Roll [58], Durnev et al. believed that greater firm-specific stock return variation is brought by the incorporation of private information and arbitrage instead of the investors' synchronous frenzy causing deviation of prices from stocks' fundamentals, and therefore, is associated with more informative stock prices and more efficient market [2]. This argument is consistent with Wurgler, arguing that synchronicity of stock return is negatively correlated with the quality of capital allocation [74] and Durnev et al., who argue that industries and firms for which firm-specific stock price variation is larger use more external financing and allocate capital more efficiently [73]; it also partially supported by Morck et al. [56], illustrating that property right protection is linked with the firm-specific variation compared to the systematic variation in the developed markets. However, the association between variations in emerging markets and the noise trader risk is still considerable.

Considering the above arguments and that negative sentiment has a stronger impact on the market than positive sentiment, investors pay more attention to good earning news during optimism and are more sensitive to bad news and non-statistical news during pessimism [53, 47], I infer and test the following hypothesis:

Hypothesis 1: Positive sentiment increases the explanatory power of future earnings on its stock return, while negative sentiment reduces the explanatory power of future earnings on stock returns.

The underlying theory of the first hypothesis is that asymmetry influences sentiment on investors' cognition, making investors hold more expectations of profitable firms during optimism, while underestimating firms' earning prospects during pessimism. However, it is also proved that characteristics of the market, such as openness degree, would influence the impact of cultural factors effect on stock price informativeness and efficiency [59]. In order to corroborate my first hypothesis regarding the effect of country and market characteristics, I test how state-owned shareholding influences the sentiment's impact on stock price informativeness.

Unlike many former socialist countries, China still retains a large part of its state-owned enterprises (SOEs) and on that basis has carried out a series of reforms to improve the operational efficiency and competitiveness of state-owned enterprises. Those reforms include the separation of ownership and operating rights (1978-1992) and mixed ownership reform (2003-). The first of these allows SOEs to make their own operating decisions according to the market situation and the latter allows private capital to own and trade the share of the SOEs, gradually loosening the control of the state and transforming Chinese SOEs from what was originally the arm of the state to a profit-driven economic entity [55, 75].

Generally, contrary to the pessimistic opinions, the reforms concentrating on SOEs and financial markets have made significant progress by increasing the quality of information and corporate transparency, and therefore, leading to higher state-owned firms' share price informativeness [31]. For example, the Split Share Structure Reform (2005-2006) that converted non-tradable shares owned by the state into tradable shares strengthened the corporate governance incentives of state shareholders to reduce the information asymmetry in Chinese listed firms and massively increased the earning information contained by the price of listed SOEs [25]. Although these reforms make solid improvements in SOEs' management, competitiveness, and stock price informativeness, it is argued that the price informativeness of SOEs is still relatively lower than the informativeness of privately owned firms' stock prices.

Carpenter et al. attributed this to the unpredictability at the policy level, as the SOEs are more affected by national policies and government decisions than the private sector [31]. Goodell et al. also found the price synchronicity of SOEs is about 9.0% to 15.4% larger than that of non-SOEs, indicating that SOEs have less informative stock prices [26]. However, it is also proved that the effect of investor sentiment is weaker on bond-like stocks, which mainly belong to traditional industries with a history of long and stable earnings, dividends and large amounts of

tangible assets. Such companies may instead be undervalued when market sentiment is optimistic (see, for example, [23, 15, 18, 54]. Most of the Chinese state-owned enterprises (SOEs) are involved in traditional industries, such as energy, transport and public utilities and their stocks have bond-like characteristics [55]. In line with the above research and arguments, I propose and test the second hypothesis:

Hypothesis 2: An increase in state ownership will reduce stock price informativeness, while the influence of sentiment on the relation between current stock returns and firm future earnings is expected to be weaker (stronger) with higher (lower) firms' state-owned shareholding.

3. Methodology

The model used to test the hypothesis was originally designed by Collins et al. to test the lack of timeliness of earning reports and the weak contemporaneous return-earnings association [4]. It was later modified by Lundholm and Meyers to measure how disclosure quality affects the association between stock return and current and future earnings of the firm [6]. The rationale and also the advantage of this method is to introduce the moderation effect to test whether the examined variables affect the explanatory power of a company's future earnings over current stock returns, thus directly demonstrating whether the variables affect the market's ability to predict a company's future earnings and, accordingly, its ability to accurately price the stocks base on firms' profitability.

However, this method has potential limitations. Namely, when the examined variables enhance the explanatory power of earnings over the current stock returns, it is still not clear that this enhancement increases the stock price informativeness and market efficiency since the enhancement could be explained in different ways. For example, the empirical results show that positive market sentiment enhances the relation between current stock returns and firms' future earnings, while this enhancement may be due to the investors' excessive expectation of profitable firms in a bullish market and may eventually lead to an asset bubble and market crisis instead of higher pricing accuracy and market efficiency.

An alternative method to measure the price information content is stock price synchronicity, which is illustrated by Morck et al. [56], Piotroski and Roulstone [57] and Goodell et al. [26]. Price synchronicity measures the degree to which individual stock prices move together with the market and industry indexes and it is used as an inverse measure of stock price informativeness. However, as mentioned by Roll [58], stock price idiosyncratic or synchronic variance is generated by both noise and new information, while the price synchronicity caused by the latter does not necessarily imply lower price informativeness, and thus, it is considered a problematic measure [31, 59]. Besides, compared with the methodology of Lundholm and Meyers [6], the approach to price synchronicity cannot visualise how the tested variables affect the ability of the market to evaluate the profitability of a firm, which is key to the discussion of how the tested variables affect the effectiveness of market pricing.

The idea of the model by Lundholm and Meyers is that investors in the market are thought to price stocks by considering the unexpected portion of current earnings, $UE(E_{i,t})$ and expectations of future earnings, $E(E_{i,t+1,+3})$ together; thus leading the investment to a corresponding return [6].

$$R_{i,t} = a_0 + b_1 UE(E_{i,t}) + b_2 E(E_{i,t+1,+3}) + e_{i,t}$$

The modified version of the model uses earnings in the last year as the proxy of the expected portion of the current earnings and uses realised current earnings minus the past earnings to get the unexpected part of the current earnings, while realised future earnings serve as the proxy of expected future earnings at the current period. It expresses the current return as a function of future, current and past earnings and noise information as follows:

$$R_{i,t} = a_0 + b_1 E_{i,t-1} + b_2 E_{i,t} + b_3 E_{i,t+1,+3} + b_4 R_{i,t+1,+3} + e_{i,t} \quad (1)$$

The left hand is the dependent variable, $R_{i,t}$, indicating the annual stock return of firm i for period

t, measured over 12 months from 8 months before the fiscal year t end to 4 months after the fiscal year t end and showed at the end of period t, since the listed companies in China are required to illustrate the annual financial report before April 30th. On the righthand are explanatory factors: $E_{i,t-1}$ denotes the firm i's earnings for the last fiscal year illustrated by the annual report (at the end of period t-1, when 4 months later the fiscal year t-1), $E_{i,t}$ is the earning for current fiscal year (illustrated at the end of period t), and $E_{i,t+1,+3}$ indicates the sum of future earnings of the firm i for the three years following the current fiscal year t (illustrated at the end of period t+1, t+2, and t+3). Because adding more periods only brings little explanatory power, the future earnings only cover 3 periods [4]. All the current and future earnings are scaled by the market value of equity four months after the t − 1 fiscal year-end (at the end of period t-1 and also the starting point of $R_{i,t}$ measurement). $R_{i,t+1,+3}$ denotes the sum of stock return for the three years following year t, starting four months after the year t fiscal year-end and serving as the control variable.

The reason behind it is that realised earnings after the current period t are not equal to the expected future earnings at period t. Using the realised future earnings as the proxy of currently expected future earnings introduces the measurement error generated by ignoring shock events that would happen in future periods but are not anticipated in the current period. Such events would affect earnings in the future and lower the accuracy of current anticipation. Since unexpected shock to future earnings should affect investors' expectations in future and also generate future returns, $R_{i,t+1,+3}$ can be used as the instrumental variable measuring the future shock events and as the control variable to the regression equation, ensuring that irrelevant components positively related to future returns are removed from future earnings and therefore control for this measurement error. Therefore, $E_{i,t+1,+3}$ and $R_{i,t+1,+3}$ together measure the market's current expectation on future earnings [6]. $e_{i,t}$ is the error term including the noise information.

In line with Lundholm and Myers [6] and Collins et al. [4], the coefficient of $E_{i,t-1}$, b_1, captures how market response to prior earning as the benchmark of current earning anticipation or the already anticipated portion of current earnings and is expected to be negative. The coefficient of $E_{i,t}$, b_2, represents the market response to the unexpected portion of current earnings compared to the prior earnings and is predicted to be positive. The coefficient of $E_{i,t+1,+3}$, b_3, which is predicted to be positive, captures the market response to information about future earnings that is anticipated but not reflected in current and past earnings. Lastly, future returns, $R_{i,t+1,+3}$, reflect the currently unexpected shock events which do affect a firm's fundamentals and brings a surprise component to the future earnings. When the effect of shock events happening in the following three years is positive overall, it would increase the return in the future, $R_{i,t+1,+3}$, and the current return, $R_{i,t}$ would tend to be undervalued, otherwise, the current return would tend to be overvalued. Therefore, the coefficient of $R_{i,t+1,+3}$, b_4, is expected to be negative.

The reason for the final adoption of the Lundholm and Myers [6] methodology in this paper is that, unlike the Five Factors Model illustrated by Fama and French [60] and the SYN method, this method introduces firms' future earnings as the explanatory variable, and allows the addition of interaction factors to test the effect of multiple variables on the explanatory power of earnings over stock returns, thus, directly demonstrating how these factors influence stock price informativeness. This attribute is highly consistent with my topic. However, the shortcoming of this method is that researchers cannot obtain future earnings data or investors' expectations directly, making this approach unable to be used for predicting stock returns.

This approach has also been extensively used by prior studies to test the impact of various factors on the market's ability to anticipate the firms' future earnings and the efficiency of the market's incorporation of the companies' future profits into the stock price.

Various studies have shown that while markets can set stock prices and returns based on the fundamentals and profitability of firms, this ability is

often influenced by other factors, some are institutional and others are behavioural. For example, Tucker and Zarowin showed that income smoothing can raise the stock price informativeness [24]. The change in the current share price of higher smoothing firms contains more information about their future earnings than the change in the share price of lower smoothing firms. Haw et al. [27] and Dasgupta et al. [29] showed that a more transparent market environment with better financial disclosure, earnings quality and information dissemination with media is significantly associated with the stock price that is more informative about firms' future earnings. Additionally, unexpected shocks in the future should be less surprising when they actually happen.

Chou also prevented credit ratings from conveying information about the firm's future earnings to the capital markets [30]. The current stock returns of rated firms reflect more future earnings than the stock returns of non-rated firms and the informativeness level would be higher if the firm obtained a better rating. As for the behavioural factors, Tsalavoutas and Tsoligkas illustrated that uncertainty avoidance, as an important aspect of national culture, influences stock price informativeness negatively [59]. Where people show higher ambiguity and uncertainty avoidance, the information about future earnings included by stock price tends to be less. Luckily, this effect can be neutralised by market openness.

Consistent with former studies, to test my hypothesis, I extended the equation by adding the sentiment variable in Eq. (1), as a main effect and as an interaction with future earnings and future returns. Eq. (2) is as follows:

$$R_{i,t} = a_0 + b_1E_{i,t-1} + b_2E_{i,t} + b_3E_{i,t+1,+3} + b_4R_{i,t+1,+3} + b_5S_t + b_6S_t * E_{i,t+1,+3} + b_7S_t * R_{i,t+1,+3} + Controls_{i,t} + \text{Indstry FE} + \text{Year FE} + e_{i,t} \quad (2)$$

Among the added variables, S_t indicates the value of investors' sentiment index during the period t, measured by the average number of monthly sentiment index in period t (S_t describes the market sentiment throughout the whole period t, while $R_{i,t}$ indicates the realised stock return at the end of period t). Since $E_{i,t+1,+3}$ and $R_{i,t+1,+3}$ together measure the expected future earnings, to test the hypothesis, S_t should also interact with both $E_{i,t+1,+3}$ and $R_{i,t+1,+3}$. In line with the consensus arguing that sentiment negatively forecasts aggregate market return on average [17, 37, 23, 48, 18], the coefficient of S_t, b_5, is expected to be negative. $S_t * E_{i,t+1,+3}$ is the interaction between sentiment and the sum of future earnings.

The coefficient of these factors, b_6, describes the incremental impact that sentiment, S_t, has on the explanatory power of $E_{i,t+1,+3}$ over $R_{i,t}$. In line with the first hypothesis, b_6 is expected to be positive, indicating that more extreme sentiment is associated with a lower market ability to anticipate and consider the firms' earning prospects during stock value estimation. $R_{i,t+1,+3}$ is used as the instrumental factor describing the portion of future shocking unexpected events and indirectly affects the current stock return. Although sentiment may affect investors' expectations about future events and reactions to unexpected shock, this influence is not covered by my research question and hypothesis. Therefore, I have no prediction on the coefficient of this variable.

To test my second hypothesis, I extended Eq. (2) by introducing $SOE_{i,t}$ as the proxy of state-owned shareholding proportion, as the main effect, the interaction with:

$E_{i,t+1,+3}$, $R_{i,t+1,+3}$, $S_t * E_{i,t+1,+3}$, and $S_t * R_{i,t+1,+3}$.

The modified equation is as follows:

$$R_{i,t} = a_0 + b_1E_{i,t-1} + b_2E_{i,t} + b_3E_{i,t+1,+3} + b_4R_{i,t+1,+3} + b_5S_t + b_6S_t * E_{i,t+1,+3} + b_7S_t * R_{i,t+1,+3} + b_8SOE_{i,t} + b_9SOE_{i,t} * E_{i,t+1,+3} + b_{10}SOE_{i,t} * R_{i,t+1,+3} + b_{11}SOE_{i,t} * S_t * E_{i,t+1,+3} + b_{12}SOE_{i,t} * S_t * R_{i,t+1,+3} + Controls_{i,t} + \text{Indstry FE} + \text{Year FE} + e_{i,t} \quad (3)$$

Where $SOE_{i,t}$ is the percentage of state-owned shares among the total shares, $SOE_{i,t} * E_{i,t+1,+3}$ measures how state-owned shareholding impacts the association between current return

and future earnings, $SOE_{i,t}$ * S_t * $E_{i,t+1,+3}$ indicates how state ownership affects sentiment's impact on relation between $E_{i,t+1,+3}$ and $R_{i,t}$ (i.e. stock price informativeness). Consistent with Goodell et al. [26] and Carpenter et al. [31], state-owned shares reduce the price informativeness of the stock price. Therefore, I predict that b_9, the coefficient of $SOE_{i,t}$ * $E_{i,t+1,+3}$, to be negative. In line with the second hypothesis, which predicted the effect of sentiment would be reduced as the firm has more state-owned shareholding, I expect b_{11}, the coefficient of $SOE_{i,t}$ * S_t * $E_{i,t+1,+3}$, to be negative.

Finally, I employed panel data analysis with OLS regressions and introduced year and industry fixed effects in both regression equation (1) and (2), in order to make sure that the result was not driven by industrial characteristics or any particular sub-period during the sample period.

I also introduced a series of control variables, including total equity market value at the end of each period t (the measurement period is the same as $R_{i,t}$), $MV_{i,t}$, firms' last period price to earnings ratio, $PE_{i,t-1}$, price to book value ratio, $PB_{i,t-1}$, Tobin's Q, *Tobin's* $Q_{i,t-1}$, return on equity ratio, $SOE_{i,t-1}$, book value of total equity, $TE_{i,t-1}$, and finally, stock return for the last period, $R_{i,t-1}$.

4. Sample Selection and Data

I selected all listed A-shares of the Shanghai Stock Exchange (SHSE), and Shenzhen Stock Exchange (SZSE) in the China stock market as the sample. The China stock market was chosen for the sample because its characteristics fit well with the issues discussed in this paper. Firstly, the China stock market has become the second largest in the world, accounting for 10% of the global equity market, and has reached a level of price informativeness comparable to that of the United States market. This means that the ability of the China stock market to reflect information about companies' future profits has improved dramatically, which provides an important prerequisite for my discussion [31]. In addition, China's stock market consists mainly of domestic individual investors, of which the share of individual investor trading volume exceeds 80% in 2021, which makes China's stock market sensitive to domestic investor sentiment, while reducing the interference of foreign investor factors [31, 62, 63].

I started my sample period in 2004 since the investor sentiment index started in mid-2003. As the 2024 financial reports of sample companies had not yet been released during the study, I ended the sample period by 2020 as the 'current period', to be able to calculate the sum of future earnings for the following three years (from 2021 to 2023). The sample period contains three Chinese stock market crises, in 2008, 2015 and 2020, respectively, all witnessing massive stock market turmoil. In addition to being divided by exchange, the Chinese stock market is also divided by trading boards containing different types of listed companies and listing requirements. Among them, the Main Board has a more stringent profit records requirement for IPO companies and contains many large listed companies and state-owned listed companies. ChiNext board has a lower profit records requirement for IPO firms, mainly serving firms with innovative businesses and higher growth rates. In addition to different requirements for IPO and types of listed firms, the trading boards adopt different price limits, while the main board allows 20% of daily share price fluctuation (+/- 10%), ChiNext allows 40% of daily share price fluctuation (+/-20%) after 2020. Moreover, the ChiNext Board changed the listing regime from the previous approval-based system to a registration-based system in 2020, while the Main Boar did not complete this reform until 2023.

To measure the market sentiment, I used the standard Investor Sentiment Index (ISI) as the proxy of investor sentiment in China, which was created by Wei et al. [64] according to the sentiment instructor formula proposed by Baker and Wurgler, to describe the market sentiment during the sample period [19]. The negative and lower ISI number indicates the more pessimistic market sentiment, while the positive and higher number indicates the more optimistic sentiment and 0 indicates the neutral level. In line with the annual return and earning data, I calculated the annual average of this monthly

indicator (ISI) to measure the annual investor sentiment over the sample period (over 12 months, the starting and ending points are the same as the measured period of return).

For the state-owned shareholding proportion, I used the number of state-owned shares compared to the total number of shares disclosed in the annual reports of companies listed on the main board of the A-share market as an indicator of the proportion of state-owned shares. For the remaining key variables, firms' earnings and stock returns, I used the figures illustrated by annual financial reports and stock price, to calculate the firm's profits scaled by each firm's last market value of equity and the stock return at the end of each period. As the Science and Technology Innovation Board (STAR) and Beijing Stock Exchange (BSE) have only just been established in recent years, there is insufficient data available and therefore they are not included in the discussion.

Finally, I retrieved all the data on the key variables, control variables and fixed effects from the China Stock Market and Accounting Research database (CSMAR). After excluding firms with observation gaps larger than 3 periods, my final sample covered 27,051 firm-year observations, corresponding to 3,709 listed firms across 312 industrial categories.

5. Empirical Results

5.1 Descriptive Statistics

Table 1 illustrates the description of the statistics for all earnings, stock returns, sentiment index, state-owned shareholding and firm-specific control variables used in the model. According to the results, the last earnings, current earnings and future earnings are all left-skewed, given that the mean value of these variables is lower than the median number and all of the mean and median numbers of earnings are higher than 0, indicating that the majority of listed companies on A share are able to maintain or realise profits while few companies face relatively significant losses. Meanwhile, the last, current and future returns are all right-skewed, having mean values higher than the median value, while the mean values of the last and current returns are positive and median values are negative. This indicates that the returns of most stocks are concentrated in the lower range and even have negative returns in the long term but a few stocks have very high returns. These attributes of firms' earnings and stock returns are in line with the prior literature [27, 59].

As for the two influencing factors, the sentiment index is right-skewed, with a mean value above the median, and the median value is negative, showing that more than half the time investor sentiment is pessimistic or cautious about the market during the sample period. However, there are certain periods when sentiment is extremely positive and these extremes of positive sentiment pull up the overall average since the absolute value of the max sentiment index is 57.6% higher than the minimum value. These periods maybe when the market is experiencing significant gains or when there is significant positive news. The state-owned shareholding proportion is also right-skewed, showing that the majority of companies listed on the China stock market are private; state-owned enterprises, on the other hand, generally have a mix of state and private capital holdings. However, as can be seen from the maximum value of state ownership, there are still a small number of companies that are almost exclusively owned by state capital.

To describe and compare the characteristics of shares listed in different boards, I further separated the description of the statistics into Main Board and ChiNext Board. **Table 2** presents the firm-level descriptive statistics for all main board-listed firms. As more than four-fifths of A-share listed companies are listed and traded on the Main Board, the characteristics of profits and stock returns of Main Board listed companies are the same as those of A-shares, firms' earnings are left-skewed and stock returns are right-skewed. In addition, the level of state ownership, the size of the market capitalisation of companies, the valuation level and the growth rates of various aspects of the listed companies on the Main Board are similarly in line with those of the A-shares as a whole.

Table 1. Firm-level descriptive statistics for all listed A shares.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	**N**	**mean**	**Std**	**min**	**median**	**max**
CompanyNumber	41,262	1,667	1,056	1	1,677	3,709
Year	41,262	2,014	4.663	2,004	2,014	2,020
StockCode	41,262	303,338	278,321	1	300,277	603,999
R_t	41,250	0.201	0.846	-0.905	-0.0324	21.23
E_{t-1}	37,963	0.0156	0.159	-9.159	0.0213	5.659
E_t	37,963	0.0212	0.139	-4.897	0.0233	6.001
$E_{t+1,+3}$	37,963	0.120	0.422	-4.984	0.0810	18.56
$R_{t+1,+3}$	41,250	0.524	1.232	-2.326	0.209	18.54
S_t	41,262	0.0187	1.110	-2.045	-0.0100	3.223
$S_t * E_{t+1,+3}$	37,963	-0.0267	0.452	-21.38	-0.00131	19.45
$S_t * R_{t+1,+3}$	41,262	-0.525	1.763	-35.90	-0.0686	49.40
SOE_t	41,262	0.0864	0.184	0	0	0.971
$SOE_t * E_{t+1,+3}$	37,963	0.0132	0.0917	-2.282	0	7.155
$SOE_t * R_{t+1,+3}$	41,262	0.0844	0.396	-0.965	0	11.86
$SOE_t * S_t * E_{t+1,+3}$	37,963	-0.00766	0.118	-7.796	0	3.426
$SOE_t * S_t * R_{t+1,+3}$	41,262	-0.111	0.682	-22.41	0	19.21
$logMV_t$	39,973	22.42	1.124	18.15	22.29	28.70
PE_{t-1}	33,775	120.6	1,889	0	41.53	331,674
PB_{t-1}	37,292	5.446	70.00	0	2.904	9,382
Tobin's Q_{t-1}	37,744	2.804	80.03	0.621	1.588	14,787
$gROE_{t-1}$	29,598	0.493	23.07	-1,512	-0.308	1,816
gTE_{t-1}	37,286	0.0516	0.400	-19.82	0.0135	28.60
R_{t-1}	37,552	0.202	0.860	-0.905	-0.0417	18.44
IndustryFE	41,262	60.43	48.85	1	59	312
YearFE	41,262	2,014	4.663	2,004	2,014	2,020

Table 2. Descriptive statistics for all Main Board listed shares.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	**N**	**mean**	**Std**	**min**	**Median**	**max**
CompanyNumber	35,586	1,296	801.4	1	1,413	2,981
Year	35,586	2,013	4.765	2,004	2,014	2,020
StockCode	35,586	303,824	299,695	1	600,011	603,999
R_t	35,574	0.206	0.858	-0.905	-0.031	21.230
E_{t-1}	33,074	0.017	0.166	-9.159	0.022	5.659
E_t	33,074	0.023	0.147	-4.897	0.024	6.001
$E_{t+1,+3}$	33,074	0.131	0.446	-4.984	0.086	18.560
$R_{t+1,+3}$	35,574	0.540	1.236	-2.114	0.222	18.540
S_t	35,586	-0.004	1.145	-2.045	-0.010	3.223
$S_t * E_{t+1,+3}$	33,074	-0.028	0.480	-21.380	-0.001	19.450
$S_t * R_{t+1,+3}$	35,586	-0.555	1.845	-35.900	-0.074	49.400
SOE_t	35,586	0.098	0.193	0.000	0.000	0.971
$SOE_t * E_{t+1,+3}$	33,074	0.015	0.098	-2.282	0.000	7.155

Table 2 continued

VARIABLES	(1) N	(2) mean	(3) Std	(4) min	(5) Median	(6) max
$SOE_t * R_{t+1,+3}$	35,586	0.097	0.424	-0.965	0.000	11.860
$SOE_t * S_t * E_{t+1,+3}$	33,074	-0.009	0.127	-7.796	0.000	3.426
$SOE_t * S_t * R_{t+1,+3}$	35,586	-0.128	0.732	-22.410	0.000	19.210
$logMV_t$	34,486	22.450	1.161	18.150	22.320	28.700
PE_{t-1}	29,261	121.500	2,010	0.000	39.050	331,674
PB_{t-1}	32,439	5.522	75.030	0.000	2.770	9,382
Tobin's Q_{t-1}	32,886	2.861	85.730	0.621	1.531	14,787
$gROE_{t-1}$	25,642	0.464	21.690	-1,512	-0.289	1,359
gTE_{t-1}	32,432	0.044	0.383	-19.820	0.014	28.600
R_{t-1}	32,604	0.206	0.869	-0.905	-0.040	18.440
IndustryFE	35,586	66.300	48.290	1.000	75.000	312
YearFE	35,586	2,013	4.765	2,004	2,014	2,020

Table 3 illustrates the ChiNext Board listed firm's attributes. Although the firms' earnings and stock return features are similar to the A-share and the Main Board, listed companies on the ChiNext are significantly different from those on the Main Board in terms of the state-owned percentage and the characteristics described by the other control variables. The average state ownership on the ChiNext is 1.3%, much lower than the 9.81% for companies listed on the Main Board. Secondly, the average market capitalisation of Main Board companies is approximated to be 5,622 million, while the average market capitalisation of GEM companies is approximated to be 4,557 million, which is almost 18.94% lower than the average value of Main Board. What's more, the overall valuation of ChiNext listed companies is also lower, while the average price-to-earnings ratio and price-to-book ratio were both lower than the Main Board by approximately 5.68% and 10.59%, respectively. Considering that the ChiNext allows higher intra-day price fluctuation and a lower price limit brings a better market arbitrage mechanism and incorporates more information into prices [65, 66, 67, 68, 32], I presume stock prices on GEM will be more informative and less susceptible to market sentiment than on the Main Board.

5.2 Hypothesis 1: Investor Sentiment Affects Stock Price Informativeness

Table 4 illustrates the empirical results of Equations (1) and (2), mainly testing how realised the sum of future earnings for 3 periods is associated with the current return, and how sentiment affects this association. In line with the prior literature, column (1) shows that there is a significant positive correlation between the future earnings of the company and current stock returns, showing that stock returns and prices reflect the profitability of the company to some extent [6, 27, 59]. The coefficient of $E_{i,t+1,+3}$ is significant and positive, reflecting that the market shows positive feedback on information about anticipated future earnings. The second column of **Table 4** shows the empirical implementation of Equation (2), added sentiment factors, moderation effect and firm-level controls. The presented results confirm my hypothesis 1. As expected, the coefficient of $S_t * E_{i,t+1,+3}$ is positive and significant, indicating that during market optimism (sentiment index $>$ 0), information about future earnings tends to be highly valued and incorporated into stock prices, companies with stronger future profitability have greater stock price increases and higher stock returns. While during market pessimism (sentiment index $<$ 0), the positive correlation

between a company's future earnings and stock returns is weakened, even though some firms have relatively strong profitability and realized future earnings, pessimistic investor sentiment can also put downward pressure on its stock price, leading to lower or even negative stock return.

Thus, stock price informativeness is reduced. The coefficient of S_t is negative and significant, proving that over-optimistic market sentiment over a period can cause overvalued stock prices and lower returns realised in the end, while over-pessimistic market sentiment can lead to higher returns at the end of the period. These two conclusions are consistent with prior literature which argues that market sentiment negatively relates to stock return, and the impact of sentiment on stock prices and returns are greater when market sentiment is low, and investors are more susceptible to noise unrelated to the fundamental value of a company than when they are optimistic [17, 37, 14, 20, 15, 18, 19]. Brown and Cliff [49] and Wang et al. [50] mentioned that lagged returns may affect the relationship between sentiment and current returns, my regression also includes lagged return, $R_{i,t-1}$, as a control, finding that sentiment's influence on stock return remain significant and negative.

Table 3. Descriptive statistics for all ChiNext Board listed shares.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	**N**	**mean**	**Std**	**min**	**Median**	**max**
CompanyNumber	5,676	289.600	196.100	1	261	728
Year	5,676	2,016	2.962	2,009	2,017	2,020
StockCode	5,676	300,291	197.800	300,001	300,262	300,739
R_t	5,676	0.169	0.766	-0.818	-0.042	17.630
E_{t-1}	4,889	0.007	0.090	-3.010	0.016	0.201
E_t	4,889	0.009	0.068	-1.682	0.018	0.571
$E_{t+1,+3}$	4,889	0.046	0.182	-2.506	0.053	4.070
$R_{t+1,+3}$	5,676	0.419	1.203	-2.326	0.128	18.080
S_t	5,676	0.164	0.845	-1.383	0.133	1.653
$S_t * E_{t+1,+3}$	4,889	-0.017	0.160	-3.145	-0.001	2.595
$S_t * R_{t+1,+3}$	5,676	-0.336	1.102	-23.620	-0.046	4.959
SOE_t	5,676	0.013	0.068	0.000	0.000	0.722
$SOE_t * E_{t+1,+3}$	4,889	0.001	0.007	-0.161	0.000	0.255
$SOE_t * R_{t+1,+3}$	5,676	0.007	0.079	-0.601	0.000	1.889
$SOE_t * S_t * E_{t+1,+3}$	4,889	-0.001	0.006	-0.266	0.000	0.137
$SOE_t * S_t * R_{t+1,+3}$	5,676	-0.005	0.055	-1.201	0.000	0.609
$logMV_t$	5,487	22.240	0.829	20.260	22.150	26.610
PE_{t-1}	4,514	114.600	710.400	5.366	55.430	43,068
PB_{t-1}	4,853	4.937	5.176	0.777	3.880	241.300
Tobin's Q_{t-1}	4,858	2.421	1.525	0.897	1.998	26.430
$gROE_{t-1}$	3,956	0.686	30.530	-49.150	-0.414	1,816
gTE_{t-1}	4,854	0.106	0.493	-2.638	0.0130	8.021
R_{t-1}	4,948	0.175	0.792	-0.818	-0.050	17.630
IndustryFE	5,676	23.630	34.000	2.000	15.000	278
YearFE	5,676	2,016	2.962	2,009	2,017	2,020

Table 4. Relation between sentiment and price informativeness.

	(1)	(2)
VARIABLES	R_t	R_t
E_{t-1}	-0.448***	-2.091***
	(-17.67)	(-30.34)
E_t	0.121***	0.557***
	(1.00)	(9.72)
$E_{t+1,+3}$	0.487***	0.384***
	(35.61)	(30.82)
$R_{t+1,+3}$	-0.147***	-0.081***
	(-33.96)	(-19.38)
S_t		-0.124***
		(-15.66)
$S_t * E_{t+1,+3}$		0.019**
		(2.38)
$S_t * R_{t+1,+3}$		-0.013***
		(-3.50)
$logMV_t$		0.096***
		(31.03)
PE_{t-1}		0.000**
		(2.38)
PB_{t-1}		0.000
		(0.41)
Tobin's Q_{t-1}		-0.001
		(-1.31)
$gROE_{t-1}$		-0.000
		(-0.05)
gTE_{t-1}		-0.027***
		(-2.94)
R_{t-1}		-0.082***
		(-16.61)
Constant	0.215***	-2.178***
	(47.00)	(-7.53)
Observations	37,952	27,051
R-squared	0.059	0.583
IndustryFE	YES	YES
YearFE	YES	YES
F	594.4	125.7

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5.3 Hypothesis 2: State Ownership Reduces Price Informativeness and Influence of Sentiment on Stock Price Informativeness

Column (3) of **table 5** shows the empirical results of the implementation of Equation (3), introducing state-owned shareholding variable and interaction terms. The results show that the coefficient of S_t and $S_t * E_{i,t+1,+3}$ still remains positive and significant after introducing $SOE_{i,t}$, $SOE_{i,t} * E_{i,t+1,+3}$, and $SOE_{i,t} * R_{i,t+1,+3}$, suggesting that market sentiment still significantly affects stock returns and price informative content in stock markets with the presence of state capital. Further, the results show that the coefficient of $SOE_{i,t} * E_{i,t+1,+3}$ and $SOE_{i,t} * S_t * E_{i,t+1,+3}$ are all negative and significant, which is in line with my hypothesis 2 and prior studies. These indicate that, on the one hand, in line with Goodell et al. [26] and Carpenter et al. [31], a higher proportion of state-owned shares reduces the stock price informativeness; on the other hand, stock prices of companies with higher state ownership are less vulnerable to market sentiment. However, compared to the opinion arguing that state ownership directly affects the price information volume, I believe that state ownership may indirectly affect price informativeness through the attributes of bond-like stocks. Based on this speculation, I designed the second robustness test.

Table 5. Relation between sentiment and price informativeness under SOE.

	(1)	(2)	(3)
VARIABLES	R_t	R_t	R_t
E_{t-1}	-0.448***	-2.091***	-2.141***
	(-17.67)	(-30.34)	(-30.66)
E_t	0.121***	0.557***	0.581***
	(1.00)	(9.72)	(10.14)
$E_{t+1,+3}$	0.487***	0.384***	0.397***
	(35.61)	(30.82)	(30.38)
$R_{t+1,+3}$	-0.147***	-0.081***	-0.083***
	(-33.96)	(-19.38)	(-18.89)
S_t	0.215***	-0.124***	-0.145***
	(47.00)	(-15.66)	(-17.10)
$S_t * E_{t+1,+3}$		0.019**	0.031***
		(2.38)	(3.57)
$S_t * R_{t+1,+3}$		-0.013***	-0.015***
		(-3.50)	(-3.75)
SOE_t			-0.185***
			(-7.82)
$SOE_t * E_{t+1,+3}$			-0.217***
			(-4.61)
$SOE_t * R_{t+1,+3}$			0.008
			(0.37)
$SOE_t * S_t * E_{t+1,+3}$			-0.174***
			(-4.08)
$SOE_t * S_t * R_{t+1,+3}$			0.013
			(0.97)
$logMV_t$		0.096***	0.101***
		(31.03)	(32.32)
PE_{t-1}		0.000**	0.000**

Table 5 continued

VARIABLES	(1) R_t	(2) R_t	(3) R_t
		(2.38)	(2.51)
PB_{t-1}		0.000	0.000
		(0.41)	(0.62)
Tobin's Q_{t-1}		-0.001	-0.001*
		(-1.31)	(-1.66)
$gROE_{t-1}$		-0.000	-0.000
		(-0.05)	(-0.14)
gTE_{t-1}		-0.027***	-0.027***
		(-2.94)	(-2.99)
R_{t-1}		-0.082***	-0.084***
		(-16.61)	(-17.04)
Constant		-2.178***	-2.314***
		(-7.53)	(-8.01)
Observations	37,952	27,051	27,051
R-squared	0.059	0.583	0.586
IndustryFE	YES	YES	YES
YearFE	YES	YES	YES
F	594.4	125.7	124.7

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5.4 Robustness Tests

To test the sensitivity of my findings, I carried out the robustness tests from three perspectives to examine different results. The first robustness test addresses Hypothesis 1 and the conclusions about the effect of sentiment on price informativeness. I replaced the measure of market sentiment in equation (3) from ISI to China Investor Confidence Composite Sentiment Index (CICSI), which is also an index measuring investor sentiment in China's stock market based on another model constructed by Yi and Mao (2009). Although both indicators are based on Baker and Wurgler's calculation methodology [19], in contrast to the ISI, which is a more biased indicator of market activity, Yi and Mao (2009) also take into account sentiment analysis of the content of news media reports and uses questionnaires to collect data on investor perceptions of the current market, which are also included in the CICSI. Furtherly, I add the Entrepreneurial Confidence Index, CCI_t, and the Consumer Confidence Index, CCI_t, into the equation (3) as controls, which are also behavioural factors and may affect investor sentiment. Due to missing CICSI data, the new regression analyses only cover the years 2004 to 2013.

Table 6 illustrates the empirical results for the adjusted equation. Despite the decrease in the significance level, the results still indicate that investor sentiment reduces price informative content when the market is pessimistic and that market sentiment and returns are still significantly negatively correlated. In addition, the results of this regression also show that the proportion of state ownership cuts price informativeness but at this point, the effect of state ownership on the association between sentiment and price information is not significant. I speculate that this could be due to the reduced observation period of the sample. While the sample observation period of the original regression analysis contains market turmoil in 2008, 2015, and 2020, the new regression analysis includes only the market turmoil in 2008.

For hypothesis 2 and the corresponding

regression results, to test whether the weakening effect of the state-owned shareholding on the sentiment's impact on price informativeness is caused by other characteristics of the state-owned firms, I added tangible assets ratio, $TAR_{i,t}$, dividend payout rate, $DPR_{i,t}$, and the size of the total assets, $logTA_{i,t}$ in equation (3) as the new control variables. **Table 7** shows the robustness test results. After adding attributes of the bond-like stock traditional industry as controls, the coefficients and significance levels of the core variables are generally consistent with those presented in **Table 5**. Most importantly, the coefficient of $SOE_{i,t} * S_t * E_{i,t+1,+3}$ remains negative and significant. Therefore, my conclusion is unchanged: an increase in state-owned shares will reduce the effect of sentiment on price informativeness.

The third robustness test focuses on the impact of different trading rules on the Main Board and the GEM in the Chinese stock market, I regress equation (3) on the data of the Main Board and ChiNext Board separately. **Table 8** presents the results of the Main Board data regression. From the regression results, the direction and significance of the main explanatory variables' effect on stock returns are unchanged and my conclusion remains the same.

Regarding regression results based on equation (3) on ChiNext data, referring to **Table 9**, the main variable coefficients and significance are dramatically different from the previous findings. Although $E_{i,t+1}$ and $E_{i,t}$ still have a significantly positive relation with return, the variables about sentiment and SOE are all insignificant except $SOE_{i,t} * E_{i,t+1,+3}$, leading to uncertainty in ChiNext with respect to earlier conclusions. This result partly shows that a more relaxed price limit and the registration-based system are more conducive to more informative stock prices, creating higher market efficiency. However, this view can only be considered as a guess instead of an accurate conclusion since, compared to the Main Board, the ChiNext existence is much shorter (created in 2009), and it has been reformed frequently (currently, about 5 times), and the most important reforms of the price limit and registration systems were completed in 2020.

Table 6. Relation between investor sentiment and price informativeness: Robustness Test 1.

	(1)
VARIABLES	R_t
E_{t-1}	-2.531***
	(-19.15)
E_t	0.729***
	(7.30)
$E_{t+1,+3}$	4.778***
	(5.67)
$R_{t+1,+3}$	-0.051***
	(-7.39)
S_t	-134.146***
	(-6.09)
$S_t * E_{t+1,+3}$	0.051*
	(1.33)
$S_t * R_{t+1,+3}$	0.044***
	(6.15)
SOE_t	-0.086***
	(-2.81)

Table 6 continued

	(1)
VARIABLES	R_t
$SOE_t * E_{t+1,+3}$	-0.291***
	(-3.37)
$SOE_t * R_{t+1,+3}$	-0.053*
	(-1.95)
$SOE_t * S_t * E_{t+1,+3}$	0.050
	(0.64)
$SOE_t * S_t * R_{t+1,+3}$	-0.054***
	(-3.21)
$logMV_t$	0.046***
	(9.23)
PE_{t-1}	0.000*
	(1.80)
PB_{t-1}	0.002
	(1.42)
Tobin's Q_{t-1}	-0.004
	(-1.47)
$gROE_{t-1}$	0.001***
	(2.74)
gTE_{t-1}	-0.058***
	(-3.79)
ECI_t	4.226***
	(6.07)
$ECI_t * E_{t+1,+3}$	0.003
	(1.12)
CCI_t	30.794***
	(6.07)
$CCI_t * E_{t+1,+3}$	-0.046***
	(-7.52)
R_{t-1}	-0.069***
	(-10.23)
Constant	-3,735.858***
	(-6.08)
Observations	11,591
R-squared	0.661
IndustryFE	YES
YearFE	YES
F	75.41

Table 7. How state-owned proportion affects price informativeness and effect of sentiment on price informativeness: Robustness test 2.

	(1)
VARIABLES	R_t
E_{t-1}	-2.239***
	(-22.91)
E_t	1.388***
	(14.45)
$E_{t+1,+3}$	0.332***
	(23.18)
$R_{t+1,+3}$	-0.071***
	(-16.13)
S_t	-0.147***
	(-17.33)
$S_t * E_{t+1,+3}$	0.034***
	(3.96)
$S_t * R_{t+1,+3}$	-0.021***
	(-5.14)
SOE_t	-0.147***
	(-6.25)
$SOE_t * E_{t+1,+3}$	-0.119**
	(-2.56)
$SOE_t * R_{t+1,+3}$	0.017
	(0.78)
$SOE_t * S_t * E_{t+1,+3}$	-0.161***
	(-3.71)
$SOE_t * S_t * R_{t+1,+3}$	0.027*
	(1.96)
$logMV_t$	0.310***
	(60.17)
PE_{t-1}	0.000
	(0.81)
PB_{t-1}	-0.000
	(-0.22)
Tobin's Q_{t-1}	-0.006***
	(-6.28)
$gROE_{t-1}$	0.000
	(1.14)
gTE_{t-1}	-0.033***
	(-3.77)
DPR_t	0.003
	(0.70)
TAR_t	0.143***
	(4.20)
$logTA_t$	-0.196***
	(-51.26)

Table 7 continued

	(1)
VARIABLES	R_t
R_{t-1}	-0.123***
	(-24.96)
Constant	-2.320***
	(-8.28)
Observations	25,163
R-squared	0.624
IndustryFE	YES
YearFE	YES
F	136.0

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 8. Relation between sentiment, price informativeness and state-owned shareholding: Robustness test 3 based on the Main Board.

	(1)
VARIABLES	R_t
E_{t-1}	-1.957***
	(-27.92)
E_t	0.504***
	(8.61)
$E_{t+1,+3}$	0.375***
	(28.49)
$R_{t+1,+3}$	-0.091***
	(-18.88)
S_t	-0.146***
	(-17.07)
$S_t * E_{t+1,+3}$	0.024***
	(2.81)
$S_t * R_{t+1,+3}$	-0.010**
	(-2.29)
SOE_t	-0.185***
	(-7.96)
$SOE_t * E_{t+1,+3}$	-0.171***
	(-3.72)
$SOE_t * R_{t+1,+3}$	0.017
	(0.77)
$SOE_t * S_t * E_{t+1,+3}$	-0.163***
	(-3.94)
$SOE_t * S_t * R_{t+1,+3}$	0.007
	(0.51)
$logMV_t$	0.092***
	(28.60)
PE_{t-1}	0.000*

Table 8 continued

	(1)
VARIABLES	R_t
	(1.72)
PB_{t-1}	0.000
	(0.39)
Tobin's Q_{t-1}	-0.001
	(-1.26)
$gROE_{t-1}$	0.000
	(0.07)
gTE_{t-1}	-0.031***
	(-3.11)
R_{t-1}	-0.086***
	(-16.54)
Constant	-2.061***
	(-7.33)
Observations	23,303
R-squared	0.615
IndustryFE	YES
YearFE	YES
F	122.0

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 9. Relation between sentiment, price informativeness and state-owned: Robustness test 3 based on the ChiNext Board.

	(1)
VARIABLES	R_t
E_{t-1}	-5.488***
	(-7.23)
E_t	0.868***
	(4.30)
$E_{t+1,+3}$	0.707***
	(12.70)
$R_{t+1,+3}$	-0.071***
	(-6.63)
S_t	-0.003
	(-0.05)
$S_t * E_{t+1,+3}$	-0.024
	(-0.35)
$S_t * R_{t+1,+3}$	-0.030**
	(-2.44)
SOE_t	-0.221
	(-1.19)
$SOE_t * E_{t+1,+3}$	-2.718*
	(-1.72)
$SOE_t * R_{t+1,+3}$	0.037

Table 9 continued

	(1)
VARIABLES	R_t
	(0.20)
$SOE_t * S_t * E_{t+1,+3}$	-1.637
	(-0.71)
$SOE_t * S_t * R_{t+1,+3}$	-0.024
	(-0.09)
$logMV_t$	0.281***
	(22.37)
PE_{t-1}	0.000***
	(4.55)
PB_{t-1}	-0.025***
	(-5.37)
Tobin's Q_{t-1}	-0.022**
	(-2.13)
$gROE_{t-1}$	-0.000
	(-0.31)
gTE_{t-1}	-0.018
	(-0.83)
R_{t-1}	-0.054***
	(-3.53)
Constant	-5.884***
	(-14.36)
Observations	3,748
R-squared	0.493
IndustryFE	YES
YearFE	YES
F	44.52

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

6. Conclusion

In this study, I analysed how sentiment influences future earnings' explanatory power over stock returns, also named stock price informativeness, and how the influence of sentiment on price informativeness is affected by the firms' state ownership proportion. By investigating investor sentiment, stock returns, listed firms' earnings and state ownership situations, I found that investor sentiment has an asymmetric impact on the informativeness of stock prices and market pricing efficiency. During market optimistic periods, sentiment enhances the explanatory power of firms' future earnings over stock returns and stocks with higher firms' realised earnings in the future tend to witness higher returns. During market depression, the negative sentiment weakens the relation between future earnings and current returns, reducing stock price informativeness about firms' profitability.

This result implies that under negative sentiment, investors tend to ignore or underestimate the true earning ability and prospect of firms, leading to relatively lower stock returns, and thus, stock price informativeness is reduced. While under positive sentiment, investors seem to be better able to correlate future company earnings with stock returns, allowing companies that realise more profits

in the future to have higher stock returns in the current period. However, although positive sentiment enhances the relation between return and future earnings, I still cannot conclude that compared to when the market was sentimentally neutral (S=0) stock price informativeness or market efficiency is improved during market optimism.

It is proved that during market bullishness, investors tend to overestimate the profitability of firms in the future, leading to increasing share prices and stock returns [17, 37]. Consequently, rising share prices, accompanied by growing market optimism, may eventually reach an asset bubble at a time of extreme market fervour, leading to subsequent price collapses and stock market crises. Both standard ISI and CICSI (two measurements of sentiment in China stock market) have reached interval maximum value in 2007 and 2015, a half to one year before the market crisis. This result is in line with the prior literature arguing that sentiment's effect on stock returns is asymmetric, and investors tend to be influenced more by negative sentiment and noise information during pessimism [15, 53, 54].

When considering state ownership, I found that, although state ownership reduces price information efficiency, it also reduces sentiment's effect on price informativeness. The price informativeness of firms with a higher state-owned proportion tends to be affected less by sentiment, with no regard to whether this is during market optimism or pessimism. Furthermore, this effect is a direct result of the percentage of state ownership, not only because of the traditional industrial attributes or bond-like stock characteristics. It implies that the shares of firms with favourable earnings prospects but high state-owned shareholding are usually relatively out of favour with investors when markets are bullish, however, when markets are bearish, the profitability of these companies has been re-emphasised and valued accordingly. These findings are in line with Baker and Wurgler [23], illustrating that stocks of firms with higher tangible assets and traditional business are less influenced by sentiment, while the SOEs in the sample also belong to this category. Meanwhile, the findings are also in line with the research studying SOEs in China, which argues that the policy burdens of state-owned enterprises call into question their profitability, but their national security nature and government support mean that state-owned enterprises do not go bankrupt easily, explaining why SOEs are treated differently during bullish and bearish markets [55, 26, 31].

Finally, this article still has a lot of room for improvement. Firstly, although the positive sentiment enhances the relationship between future earnings and current stock returns, I still cannot conclude that positive sentiment increases price informativeness and market efficiency due to the existence of asset bubbles. This may indicate the limitations of the methodology I have used in determining the impact of positive sentiment on stock price informativeness, and the relation between sentiment and price informativeness during market optimism still needs to be further analysed. In addition, as ChiNext has been reformed very frequently since its creation, involving various aspects of the listing system, disclosure system and price limit, and the price limit and registration reforms have taken place in recent years (in 2020), the conclusion that ChiNext registration-based system and wider price limits improve price information is likely to lack robustness. Meanwhile, since the research is based only on data from the China stock market and listed companies, the validity of its conclusions in other markets has yet to be verified.

Based on the conclusions and limitations of this paper, my paper recommends that future studies analyse the impact of market sentiment and state ownership on stock market effectiveness based on cross-regional data and compare findings across countries. Research on the China stock market could focus on new market boards (such as the Science and Technology Innovation Board and Beijing Stock Exchange) and reforms and could discuss whether the reform measures have improved market rationality and pricing efficiency.

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Appendices

Appendix 1. Definition of variables

VARIABLES	DEFINITIONS
Dependent variable	
R_t	Annual stock return for each firm at the end of current period t, measured from four months later the fiscal year onward
Main independent variables	
E_{t-1}	Firm's net profit during the last period t-1, scaled by the market value of equity measured at the period t-1
E_{t-1}	Firm's net profit during the current period t, scaled by the market value of equity measured at the period t-1
$E_{t+1,+3}$	The sum of future net profits of firm i for the 3 years following the current year, scaled by the market value of equity measured at the period t-1
$R_{t+1,+3}$	The sum of stock return in three periods following
S_t	Investor sentiment index during each period, measured by standard Investor Sentiment Index (ISI)
SOE_t	State-owned shareholding of each firm, measured by percentage
Control variables	
$logMV_t$	Firm's market value of total equity at the end of period t, measured by natural logarithm
PE_{t-1}	Stock's price-to-earnings ratio at the end of period t-1
PB_{t-1}	Stock's price-to-book value ratio at the end of period t-1
Tobin's Q_{t-1}	Firm's Tobin's Q value at the end of period t-1
$gROE_{t-1}$	Firm's growth rate of return on equity ratio at the end of period t-1
gTE_{t-1}	Firm's growth rate of total equity at the end of period t-1
R_{t-1}	Stock annual return at the end of period t-1

Appendix 2. Correlation between different variables

	R_t	E_{t-1}	E_t	$E_{t+1,+3}$	$R_{t+1,+3}$	S_t	$S_t * E_{t+1,+3}$
R_t	1.000						
E_{t-1}	-0.032***	1.000					
E_t	0.061***	0.421***	1.000				
$E_{t+1,+3}$	0.153***	0.293***	0.454***	1.000			
$R_{t+1,+3}$	-0.136***	-0.022***	-0.021***	0.141***	1.000		
S_t	-0.156***	-0.014***	0.008	-0.058***	-0.391***	1.000	
$S_t * E_{t+1,+3}$	-0.098***	0.036***	0.000	-0.200***	-0.175***	0.296***	1.000
$S_t * R_{t+1,+3}$	0.058***	0.033***	0.045***	-0.060***	-0.633***	0.541***	0.293***
SOE_t	0.078***	0.007	0.019***	0.038***	0.173***	-0.129***	-0.065***
$SOE_t * E_{t+1,+3}$	0.124***	0.043***	0.119***	0.383***	0.136***	-0.076***	-0.291***
$SOE_t * R_{t+1,+3}$	-0.056***	-0.025***	-0.024***	0.069***	0.559***	-0.257***	-0.167***
$SOE_t * S_t * E_{t+1,+3}$	-0.106***	0.005	-0.023***	-0.230***	-0.200***	0.209***	0.499***
$SOE_t * S_t * R_{t+1,+3}$	0.030***	0.022***	0.025***	-0.064***	-0.455***	0.336***	0.197***
$logMV_t$	0.159***	0.170***	0.228***	0.161***	-0.358***	0.230***	0.083***
PE_{t-1}	-0.009	-0.020***	-0.011**	-0.007	-0.011*	0.011**	0.006
PB_{t-1}	-0.004	-0.013**	-0.017***	-0.006	-0.014***	0.015***	0.001
Tobin's Q_{t-1}	-0.005	-0.006	-0.001	-0.001	-0.002	0.006	0.007
$gROE_{t-1}$	0.008	0.003	0.013**	0.008	0.004	-0.004	0.002
gTE_{t-1}	-0.026***	0.038***	0.039***	-0.004	-0.001	0.000	0.000
R_{t-1}	-0.035***	0.024***	0.036***	-0.010**	-0.131***	0.502***	0.114***
	$S_t * R_{t+1,+3}$	SOE_t	$SOE_t * E_{t+1,+3}$	$SOE_t * R_{t+1,+3}$	$SOE_t * S_t * E_{t+1,+3}$	$SOE_t * S_t * R_{t+1,+3}$	$logMV_t$
$S_t * R_{t+1,+3}$	1.000						
SOE_t	-0.204***	1.000					
$SOE_t * E_{t+1,+3}$	-0.158***	0.328***	1.000				
$SOE_t * R_{t+1,+3}$	-0.567***	0.490***	0.279***	1.000			
$SOE_t * S_t * E_{t+1,+3}$	0.289***	-0.165***	-0.620***	-0.357***	1.000		
$SOE_t * S_t * R_{t+1,+3}$	0.711***	-0.399***	-0.255***	-0.839***	0.407***	1.000	
$logMV_t$	0.301***	-0.029***	0.049***	-0.230***	0.050***	0.200***	1.000
PE_{t-1}	-0.001	-0.003	-0.006	-0.001	0.004	0.001	-0.005
PB_{t-1}	0.005	-0.012**	-0.005	-0.007	0.004	0.007	-0.013**
Tobin's Q_{t-1}	0.010*	-0.007	-0.002	-0.003	0.003	0.004	-0.005
$gROE_{t-1}$	-0.001	0.002	0.000	0.004	0.001	-0.001	0.010*
gTE_{t-1}	-0.007	-0.009*	-0.002	-0.019***	0.000	0.001	0.022***
R_{t-1}	0.205***	0.087***	0.005	-0.051***	0.084***	0.134***	0.125***
	PE_{t-1}	PB_{t-1}	*Tobin's* Q_{t-1}	$gROE_{t-1}$	gTE_{t-1}	R_{t-1}	
PE_{t-1}	1						
PB_{t-1}	0.031***	1.000					
Tobin's Q_{t-1}	0.021***	0.210***	1.000				
$gROE_{t-1}$	0.005	-0.019***	-0.001	1.000			
gTE_{t-1}	0.002	-0.027***	-0.009*	0.003	1.000		
R_{t-1}	0.019***	0.025***	0.006	0.006	0.011**	1.000	