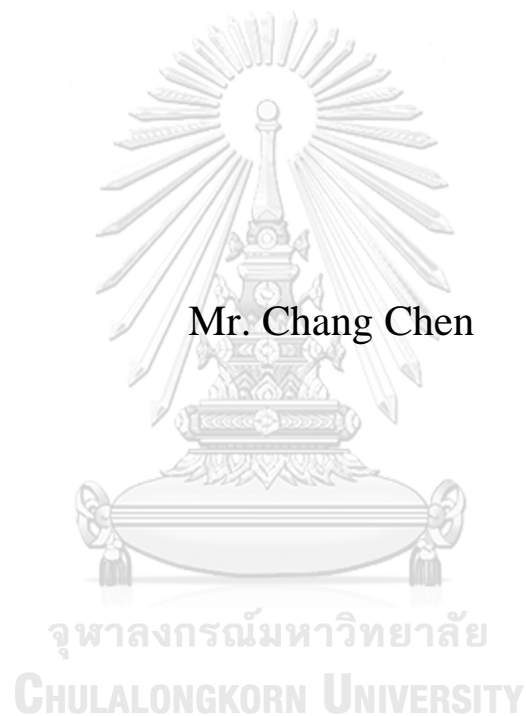


Investor's Sentiment and Stock Return: An Empirical Study on
the Thai Stock Market



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A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Science in Finance
Department of Banking and Finance
FACULTY OF COMMERCE AND ACCOUNTANCY
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ความรู้สึกรักของนักลงทุนและผลตอบแทนหุ้น:
การศึกษาเชิงประจักษ์ในตลาดหุ้นไทย



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ผลกระทบของความเชื่อมั่นของนักลงทุนที่มีต่อผลตอบแทนของหุ้นเป็นหนึ่งในพัฒนา
การทางการเงินล่าสุด วรรณกรรมเชิงประจักษ์ครอบคลุมตลาดหุ้นที่พัฒนาแล้ว อย่างไรก็ตาม
ตลาดเกิดใหม่ โดยเฉพาะตลาดหุ้นไทยยังขาดการศึกษาค้นคว้า จุดประสงค์ของงานนี้
คือการสร้างความเข้าใจความเชื่อมโยงระหว่างความเชื่อมั่นของนักลงทุนกับผลตอบแทนของ
ตลาดหุ้นไทย รวมทั้งจัดทำดัชนีความเชื่อมั่นของนักลงทุนที่สามารถอธิบายการเคลื่อนไหวของ
ดัชนีตลาดหุ้นไทย ประเมินความสามารถในการทำนายของดัชนีความเชื่อมั่นของนักลงทุน
ออกแบบกลยุทธ์การซื้อขายให้แก่นักลงทุน และให้คำแนะนำสำหรับการเลือกหุ้นในกลุ่ม

ในขั้นแรก การศึกษานี้ใช้การวิเคราะห์องค์ประกอบหลัก (PCA)
เพื่อจัดทำดัชนีคอมโพสิตที่เรียกว่าดัชนีความเชื่อมั่นของนักลงทุน
ทั้งในระดับท้องถิ่นและระดับโลกตามตัวบ่งชี้พื้นฐานแปดตัวที่ดึงมาจากการวิจัยก่อนหน้า
ประการที่สี่ ออง
งานนี้ตรวจสอบและเปรียบเทียบประสิทธิภาพการพยากรณ์ของแบบจำลองมาร์ติงเกล
แบบจำลองอัตตะถอดถอย และแบบจำลองอัตตะถอดถอยแบบมีเขตแดนหลายตัวแปร
(Multivariate Threshold Autoregressive)
โดยใช้ดัชนีความเชื่อมั่นระดับท้องถิ่นและระดับโลก ประการที่สาม
งานนี้พัฒนากลยุทธ์การซื้อขายโดยอิงจากแบบจำลองการคาดการณ์และการเคลื่อนไหวของ
ดัชนีความเชื่อมั่นของนักลงทุน ประการที่สี่
งานนี้จะศึกษาผลกระทบของความเชื่อมั่นของนักลงทุนที่มีต่อคุณลักษณะต่างๆ
ของอองพอร์ตหุ้นไทย

ผลการศึกษาวิจัยชี้ให้เห็นว่า 1)
ความเชื่อมั่นของนักลงทุนมีความสามารถในการอธิบายผลตอบแทนของดัชนีตลาดไทย 2)
ความเชื่อมั่นของนักลงทุนเป็นปัจจัยสำคัญที่มีอิทธิพลต่อตลาดหุ้นไทย 3)
ในกรณีทดสอบกับชุดข้อมูล
ความเชื่อมั่นของนักลงทุนสามารถคาดการณ์ผลตอบแทนของดัชนีตลาดหุ้นไทยได้อย่างแม่นยำ
มากกว่าแบบจำลองการคาดการณ์เชิงประจักษ์อื่นๆ 4)
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The effect of investor sentiment on stock returns is one of the most recent developments in finance. The empirical literature includes developed stock markets. However, emerging markets, notably the Thai stock market, lack study subjects. The purpose is to deeply comprehend the link between investor sentiment and Thai stock market return. The aims include customizing investor sentiment indices to explain the Thai stock market index's movement, estimating investor sentiment's predictive ability, providing stock investors with referable trading strategies, and providing suggestions for cross-section equity selection.

This study initially employs Principal Component Analysis (PCA) to customize the composite indices, called the *investor sentiment indices*, using the local and global levels based on eight underlying indicators extracted from prior research. Second, the paper examines and compares the forecasting performance of the Martingale model, the Autoregression model, and the Multivariate Threshold Autoregressive models (MTAR) using local and global sentiment indices. Thirdly, the paper develops trading strategies based on the predicting models and the fluctuating investor sentiment. Fourthly, the paper examines the impact of investor sentiment on the various features of the Thai stock portfolio.

The paper's results suggest that 1) the customized investor sentiment has researchable explanatory power to the Thai market index return. 2) the customized investor sentiments significantly cause the return of the Thai stock market. 3) using the rolling out-of-sample technique, the customized investor sentiment accurately forecasts the Thai market index returns more than other empirical predictive models. 4) the trading strategy based on the customized investor sentiment model provides higher predicted returns than trading strategies based on other empirical models. 5) Thai stocks with high dividends, high tangible assets, high liability, low profitability, and value premium are susceptible to customized investor sentiments.

Field of Study: Finance

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Year:

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INTRODUCTION

Background

Investors in major stock exchange markets worldwide have experienced wild fluctuations in stock prices since the stock market's initial day. The stock market fluctuations are difficult to explain rationally by the traditional finance model on the macroeconomic and corporate fundamentals. The prior researchers tried to find alternative theories to explain the stock market's irrational prosperity and abnormal panic. Behavior finance was one of the alternative theories that attempted to assist traditional finance in explaining the stock market's irrational financial phenomenon based on the human mental mechanism (BLACK, 1986; Kahneman & Tversky, 1979; Tversky & Kahneman, 1974).

Investor sentiment is crucial in studying the modern stock market nowadays. Investor sentiment is an elusive concept that is hard to define and measure. The researchers describe the investor's sentiment as investors' subjective overly optimism or pessimism about the stock market in general (Brown & Cliff, 2004). Another possible definition of investor sentiment is that the investor's speculative tendency causes investment demand (Baker & Wurgler, 2006). Investor sentiment is either the investor's subjective belief or noisy information that is unrelated to the value of stocks, which results in stock mispricing (underprice or overprice) in continuance, thereby affecting stock prices (Barberis et al., 1998). When short-selling impediments limit rational traders' ability to exploit overpricing, investor sentiment that contains a market-wide component with the potential will affect securities prices (Miller, 1977). When rational traders find it hard to exploit profit opportunities from mispricing, the

investor's self-valuation is the main effect on asset pricing (Stambaugh et al., 2012). In other words, high investor sentiment may misguide investors to distribute a lower discount rate in estimating the future impact of bad news on stock prices. In recent research, investor sentiment could define investor conservatism, which leads to a subjective preference to adhere to prior options regardless of new information (Seok et al., 2019). The traditional financial theory believes that investor emotions do not affect stock prices; the stock price should reflect the discounted value of expected cash flows (Fama, 1970). However, numerous early researchers consider that the market price can depart from sentiment-driven fundamental values (Keynes, 2018).

In the stock market, the investor's sentiment affects the stock price and return through the irrational investor's behavior. The investor's sentiment affects stock return by the main two dimensions. First, the irrational investor's sentiment could lead to overestimating or underestimating the entire stock market. Therefore, it affects aggregate market return (Bali et al., 2011; Da et al., 2011; Stambaugh et al., 2012). The irrational investors affected by sentiment factors express an optimistic (pessimistic) view of the entire stock price (overprice or under-price). Second, the investor's sentiment would affect every kind of stock, every section of the stock price, to a different degree, involves the cross-section stock return (Da et al., 2015; Harvey et al., 2016; Stambaugh et al., 2015). Some stock prices may fluctuate with investor sentiment change, while some are stable regardless of investor sentiment change. Generally speaking, the stock, which is more dependent on subjective assessment and less arbitrage chance, is easily affected by investor sentiment. Nowadays, The focus question is no longer whether investor sentiment will impact stock prices but how to better measure investor sentiment and quantify its

impact(Baker & Wurgler, 2007). Identifying and capturing a complete picture of investor sentiment is too broad and vague and contains many factors based on different research purposes. Therefore, the author creates a custom indicator, which calls this investor sentiment to capture a researchable effect of investor sentiment to study the Thai stock market.

The World Bank identified Thailand as Asian "Tiger cub" economy as an emerging capital market. With the widely accessible investor group and ASEAN trade development, like the central of ASEAN, the Thai financial market represents the ASEAN finance region(J. French, 2017). The Thai stock market has a high proportion of retail investors, and most do not have mature enough investment concepts (Phansatan et al., 2012). The speculative market activities are relatively high, which is more likely to cause "herding behavior" and market overreaction(Padungsaksawasdi, 2020). For such a capital market with a center of the region, unique market structure, and investor structure, the influence of investor sentiment in the Thailand stock market is more salient than the effect in the developed stock market. The research on the relationship between sentiment and stock returns will undoubtedly help obtain a deeper understanding of the influence mechanism of sentiment on stock deviating prices and a deeper understanding of the impact of sentiment on stock market values.

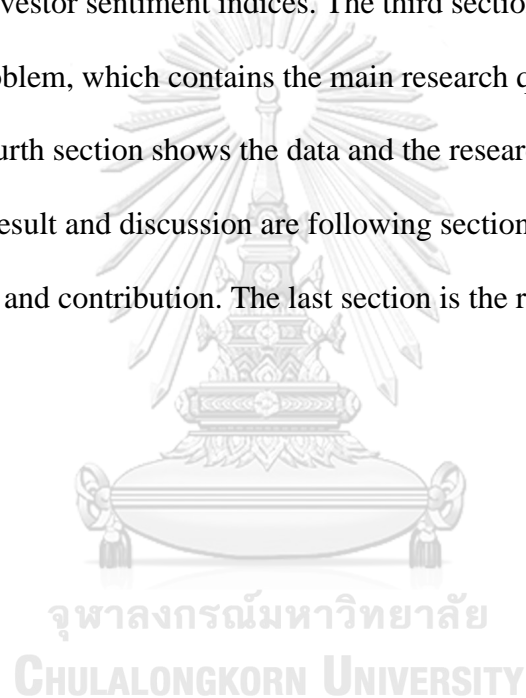
To further expand the existing regional financial market research, this paper endeavors to construct two comprehensive and customizing indicators for the Thai equity market: *the local sentiment index* and *the global sentiment index*. The method is the basis of the existing model(Baker & Wurgler, 2006, 2007), which studies the investor sentiment on the U.S. equity market with monthly data frequency. The Thai

equity market is relatively smaller than other developed equity markets. Furthermore, Thai market sentiment is quickly impacted by domestic and global cases. The author considers using the daily data to capture the rapid change of investor sentiment. Based on the previous research, this paper selects market turnover, the Thai T-bill rate, the RSI, and the local gold price index for constructing the local sentiment index. Also, this paper sets the U.S. T-bill rate, the S&P500 index, the Exchange rate, and VIX for building the global sentiment index. The choice of selective variables is the authors' subjective set of variables related to investors' sentiment. Furthermore, those particular variables could provide a researchable significant scale to the topic of investor sentiment.

To meet the objectives of this study, the local and global investor sentiment indices are separately customized and then constructed from a Principal Component Analysis (PCA), which selects the first principal component as the empirical indices. Then, the local investor sentiment index and the global investor sentiment index are applied to measure the Thai equity market's movement. Second, the two customized investor indices are implemented to classify the Thai equity market states using a multivariate threshold model. The customized indicators created by the author have potential market predictive power. Then, the authors test the predictive properties of those indicators. An out-of-sample predictive performance on the empirical models is evaluated by comparing the value of the Mean Squared Forecast Error (MSFE) and the Mean Absolute Forecast Error (MAFE) with the existing models. The third study uses sentiment indices to identify the characteristic stocks that impact investor sentiment. In this process, the Fama-French three factors model is considered to apply.

The author plan to study observations of the daily price of the index of the Stock Exchange of Thailand (.SETI) from January 1999 to January 2019. The majority of the sample expect from the Bloomberg DataStream and Reuters database and the Stock Exchange of Thailand.

The following section is the literature review. This section contains the study of theoretical and empirical research used to select the researchable variable for customizing the investor sentiment indices. The third section shows the significance of the research problem, which contains the main research question, motivation, and objectives. The fourth section shows the data and the research methodology's explanation. The result and discussion are following section. The following sections are the conclusion and contribution. The last section is the reference.



LITERATURE REVIEW

Theoretical Research

Since the development of behavioral finance, academic institutions have researched people's irrational psychology and behaviors under the irrational framework, and investor sentiment is one of the researchable contents. The research can trace Noise Trading's related theoretical research (BLACK, 1986; De Long et al., 1990).

According to noise trading theory, noise traders with strong subjective cognition will bring additional risks to the market, namely noise trading risks, thereby causing a restriction on rational arbitrageurs' behavior. Due to noisy information in investors' thoughts, the stock price reaction could explain how the market events affect firms' thoughts (BLACK, 1986). The noisy information in market activities and investor frictions restrict arbitrage opportunities (De Long et al., 1990). The traditional theories and models can also reasonably explain the irrational investor behaviors and abnormal stock price fluctuations in the financial market (Shiller, 2003; Stiglitz & Grossman, 1980). Since the noise trading theory was proposed, scholars have studied investor sentiment measurement and the relationship between investor sentiment and stock returns. Related theories have continuously improved, and meaningful conclusions have been obtained. The early scholars attempt to develop alternative theories and models to study the irrational phenomenon. The prior researcher indicated a link between an investor's confidence in the success of their early action causing overconfidence in the subsequent decision-making (Daniel et al., 1998). They based on two psychological biases to propose the securities market theory under and overreactions: investor overconfidence in private information and biased self-

attribution. They simulated an investment experiment and classified the investors into two groups: one receives a private information signal, but the others do not receive the signal. As a result, receiving a positive return on an investor's portfolio would strengthen their confidence, which may cause an overreaction in later investment, thereby incorporating biased self-attribution in their return prediction. Some scholars presented that isolation leads to different preferences, even with similar behavior choices (Kahneman & Tversky, 1979). They find that the excessive subjective cognition for particular stock selection perhaps led to overweight on low probabilities. A parsimonious theoretical model for studying investor sentiment has been presented (Barberis et al., 1998); the model argues the different reaction of investor sentiment to good or bad news. They classify the investors' sentiment by two behaviors, overreaction and underreaction on stock earnings. They capture the investors' reaction by comparing the average realized return following a positive or negative stock to earnings. When the investors view a series of positive earnings stocks, they expect the stock return to be positive again in the next period. Their theory also invented that increasing the news strength will generate an investor's overreaction and increase the stock price reaction, holding the weight of information constant. They also devised that the earnings would switch between two properties in investor view: the average reverting properties and momentum properties with market trend. Other behavior theories predicted that investors' sentiments affect asset price levels (Brown & Cliff, 2005). Then, they are motivated by the conditional asset pricing literature to capture the rational predictability of investment behaviors, which indicates that market price can differ from intrinsic value for a long horizon. The short end of interest rates predicts excess stock returns (Campbell, 1987).

The short-term Treasury bill return movement helps forecast the stock returns(Campbell, 1991; Hodrick, 1992). The term spread has a projection on the stock return movement, which is the difference between the T-bill yields on the 10-year and 3-month(Fama & French, 1989). The default spread predicts the return in bond markets based on the different yields on the corporate bond class(Keim & Stambaugh, 1986). The inflation effects on stock valuations and forecasts its long-run returns(Sharpe, 2001). Then, they measure the investor's sentiment by using interest rate, the difference on 3-month and 1-month returns of treasury bill, term spread, default spread and inflation rate. They suggest taking the role of investor sentiment into account when studying asset pricing models. Also, they suggest that retail investors consider the impact of sentiment on their investment strategies.

Empirical Research

Literature Question 1: Does the measurement of investor sentiment reflect the investor sentiment's effect on the entire market return and individual stock?

Interest in investor sentiment research is relatively recent among financial scientists, having developed in the past two decades. Early researchers used the closed-end fund discounts as a standard substitute to measure the investor sentiment, because most retail investors own closed-end funds and small stocks (Neal & Wheatley, 1998; Swaminathan, 1996). They argue that the average discount on closed-end equity funds may be a sentiment index; if more retail investors hold closed-end funds, the discount increases. Neal and Wheatley use other assistant proxies to measure the investor sentiment, such as the ratio of odd-lot sales to purchases, the ratio of mutual fund redemptions to fund assets, and the return on different sizes of the firm. They indicate

that the rapid stock purchases, the high volume of fund redemptions, and the imbalance in the return of different firm sizes would reflect the irrational demand on the stock market and irrational investor behaviors. After a few years, a well-known composite investor's sentiment was formed by the previous researchers (Baker & Wurgler, 2006) to test the effect of investor's sentiment on the cross-section of stock return. They explored investor sentiment measurement in 2006 by selecting six proxies: the closed-end fund discount, IPOs volume, first-day IPOs return, NYSE share turnover, new issuing equity share, and dividend premium. Then, they replace the NYSE share turnover with the detrended log turnover to test the aggregate sentiment effect on stock market return (Baker & Wurgler, 2007), holding other proxies constant. They indicate that the IPOs trading volume's performance and the first-day IPOs return reflect the investor's objective cognition of new stock, which contain irrational intuition. They provide evidence for the statement that the sentiment affects asset prices. They theoretically analyzed the influence mechanism of the sentiment on stock prices and clarified that stocks with high subjective valuations that are difficult to arbitrage are more speculative, therefore, more susceptible to investor sentiment and have higher sentiment beta. They find that the sentiment has a significant and important impact on individual stocks and overall market returns.

Another researcher uses the survey-based method to measure investor sentiments, such as the Michigan consumer confidence index, Investors Intelligence Sentiment index (II), the Individual Investor Association Index (AAII), and the Conference Board and UBS Gallup Survey. The surveys ask different questions to ordinary investors, such as employment, financial income, and current and future financial views. Some researchers believe that information from survey results is predictable to

stock returns. Otoo finds a positive movement between consumer sentiment and the excess stock returns at the aggregate level(Otoo, 1999). However, other recent papers find that consumer confidence as a proxy of retail investor sentiment negatively predicted aggregate stock market returns on average in 18 industrialized countries(Schmeling, 2009). Schmeling finds that future returns tend to be lower when consumer confidence is high and vice versa. The result holds value stocks, growth stocks, and small stocks in different investment horizons. They also find that the sentiment significantly affects the return for the countries with a low level of market integrity and perform herd behaviors and overreaction.

Additional study of investor sentiment's effect on the aggregate and the cross-sectional returns with varying characteristics has drawn wide attention. The market participants are generally concerned about the information veracity and recent funding points that increase investor sentiment with multiple nontransparent measures in the cross-section, such as the highly volatile stock(Berger & Turtle, 2012). They follow the sentiment index of Baker and Wurgler to test the excess return to the asset from January 1968 to December 2005 on the different firm characteristics, such as size, earnings, dividends, fixed assets, R&D expenditure, the ratio of book equity to market equity, the change of sales over the previous years. Their result shows that the stocks with hazy information provide solid marginal performance in the pessimism sentiment period. In other words, an opaque company with a less specific valuation exhibits common investor sentiment exposures. Therefore, the portfolio that forms from these stocks could be highly exposed to changes in investor sentiment. However, they find that the stocks with translucent information perform relatively constantly regardless of the sentiment change. Another recent research finds a significant positive relationship

between investor sentiment and the P/E ratio in the G7 countries (Bathia & Bredin, 2013). They measure the investor sentiment using the investor confidence survey, equity fund flow data, CEEF from Morningstar, and the Individual equity options volume of the U.S., Canada and Japan, Italy, Germany, France, and the UK, France from January 1995 to December 2007. Their result shows that the P/E ratio rises with an increase in the dividend payout ratio. Nevertheless, the P/E ratio falls in increasing the short-term interest rate and market volatility. They suggest that the P/E ratio increases with an upturn in investor confidence. The researcher measures the investor sentiment by using the American Association of Individual Investors survey and the Investors Intelligence survey to study investor sentiment and the sin stocks' conditional volatility (Liston, 2016). Liston finds that individual and institutional investor sentiment positively correlates with the return on companies listed in the tobacco, alcohol, and gaming industries. When the investor sentiment is optimistic, the return on equities with firm characteristics of small, young, more volatile, non-dividend-payment, and low-priced become more synchronous with the aggregate market movement (Chue et al., 2019). They use the Baker-Wurgler sentiment index as the empirical measurement of investor sentiment. Then they regress the Baker-Wurgler index on the T-bill rate (Sibley et al., 2016) and the liquidity risk factor (K. H. Lee, 2011) to decompose the index into a purged component from the economic fundamentals and a residual component that may truly capture investor's behavioral biases. The liquidity risk factor is the monthly percentage of equities with zero return trading days. Their regression result shows that both the positive correlation between the Sentiment index and the 3-months T-bill rate. However, its results show that the negative correlation between the Sentiment

index and market illiquidity is highly significant. They also find that investor sentiment affects those stocks that are difficult to value and have a more significant impact through arbitrage activity. The researcher measures the investor's sentiment by taking the survey-based data from the American Association for Individual Investors (AAII) with macroeconomic factors (GDP and Unemployment rate), firm characteristics, and earnings restatements into account on studying the US stock market (Bouteska, 2019). Bouteska finds that investor conservatism, the main factor in investor sentiment, affects cumulative abnormal returns.

Literature Question 2: Are there different predictive powers of investor sentiment for different investment horizons?

Investor sentiment is related to market returns in both short-term and long-term periods. In the short term, when the sentiment mainly drives investors to decide, they trade more aggressively during pessimistic sentiment periods (Ahmed, 2020). Ahmed measures investor sentiment using industrial production, the natural growth of durable consumption, the real growth of nondurable consumption, the real growth of services consumption, and employment growth. The existing noise traders drive intraday sentiment in the first half-hour, affecting the stock return in the last half-hour in the US stock market (Renault, 2017). Renault measures the Intraday investor sentiment by using the sentiment classifiers for all the published messages on StockTwits from January 2012 to December 2016, then computing the five average sentiment indicators at half-hour intervals. Even though the intraday momentum effects from noise traders are only active in the last half hour, the sentiment effect continues in at least the last two hours of a trading day (Sun et al., 2016). They measure the intraday

investor's sentiment based on the proprietary Thomson Reuters MarketPsych Indices (TRMI) by using the proxies from existing investor's sentiment, such Baker and Wurgler investor sentiment index, the University of Michigan consumer sentiment index, and the non-noise component investor sentiment index from the Baker and Wurgler index (Huang *et al.*, 2015). Therefore, to predict the short-term return, the noise traders' activities should be considered, but the predictive ability is highly uncertain due to the high frequency of noise trading. Also, the specified effect from investor sentiment would affect the return. Recent researchers point out that the Spatio-temporal effect from investor sentiment change has a more volatile influence on stock return than geographic and economic effects. For policymakers, studying the effect of Spatio-temporal investor sentiment would help them analyze the sentiment risk structures across the economic fundamentals (S. Jiang & Jin, 2020).

However, in terms of the long-term effect of sentiment on market returns, when the investor's behavior is consistent in co-movements with the market's direction, then knowing the investor's behavior could be an index for market forecasting. The researchers measure the investor's sentiment by calculating the bull-bear spread from third-party survey data, such as the American Association of Individual Investors (AAII) and Investors Intelligence (II) (Brown & Cliff, 2004). They find that the sentiment is positively correlated with asset mispricing and negatively correlated with returns in the next several years. Their other paper finds that the sentiment has a bearing on the stock market's long-term returns, and thereby the predictive power can explain the deviation of asset prices from the intrinsic value (Brown & Cliff, 2005). Another paper measure the investor's sentiment by using dividend-price ratio, dividend yield, earnings-price ratio, dividend payout ratio, Stock variance, Book-to-

market ratio, and net equity expansion(Gupta et al., 2014). They indicate that consumer sentiment predicts US stock returns in an economic recession. An Exhibiting mean-reverting behavior on the effect of investor sentiment on stock returns is negative but small in the long-term in the Chinese stock market(Ni et al., 2015). They employ opening account numbers and turnover ratio as the proxy of investor sentiment. A new European investor sentiment index recently measured by researchers with the new proxies of VSTOXX, gold, and the German bond yield spread finds that the new sentiment index is a strong predictor of market return and conditionally market volatility long-term(Reis & Pinho, 2020). Their result shows a negative correlation between the new sentiment index and gold price; the government bond yields spread, VSTOXX. Their research demonstrates a strong co-movement between the US and EU stock markets before the period of the global subprime crisis. During the non-crisis period, international investment is more active in a similar national institution, financial regulators. Therefore, the investor sentiment is co-movement in neighboring countries' markets.

Literature Question 3: Does the investor sentiment has the property of localization?

With the expansion of the research perspective, researchers are beginning to pay attention to investor sentiment in different regions. Some researchers construct global investor sentiment indices and forth local indices for six major stock markets: the volatility premium, the total volume of IPOs, first-day returns of IPOs, and market turnover(Baker et al., 2012). Their result shows that the selected variables positively correlate with the local market sentiment index. They discuss that global and local sentiments are contrarian predictors of the cross-sectional market returns, which

means the high sentiment has low future returns due to relatively complex value stock and conduct arbitrage. The evidence from their research is that investor sentiment is a considerable reference in international market volatility and has return predictability of a form consistent with corrections of overreaction.

In emerging Asian markets, the researchers examined the different effects of global and local sentiment on stock returns. Some researchers employ the local market turnover as a reference for local investors' sentiment and the world market turnover as a reference for the global sentiment (M. P. Chen et al., 2013). They find that the optimistic local sentiment leads to a higher return in some industries, but the global pessimism sentiment results in undervaluation in the total market return. Another researcher measured investor sentiment for the pre-market and aftermarket stages of Hong Kong IPO(L. Jiang & Li, 2013). They employ the subscription rate for the pre-market sentiment for the retail tranche and the abnormal Google Search Volume Index as the proxies. For the aftermarket sentiment, they employ the slight trade order imbalance and the turnover on the first trading day as the proxies. They indicate that the investment sentiment affects IPO pricing in both pre-market and aftermarket in Hong Kong. They find that the existing adjustment in the offer price by underwriters compensated the regular investor when the sentiment worsened. Another researcher uses the Chinese investor sentiment from the China Investor's Sentiment Index Research Database to study its predictive power on the Asia-Pacific stock market(Li, 2019). This sentiment is mainly measured by Baker and Wurgler's method. Li uses a nonparametric causality-in-quantiles test for the Chinese investor sentiment prediction on the Asia-Pacific stock market and finds a very weak contagion to the stock returns but a significant contagious effect on Australia's volatilities, Hong Kong and India.

The proportion of constructing investor sentiment in different countries is diverse to the stock market dynamics. Some researchers measure investor sentiment by three main factor groups (M. P. Chen et al., 2017). First factor group is the global factors, such as turnover of the world equity index, US federal funds rate, and Chicago Board Options Exchange Volatility Index (VIX). The second group is foreign country factors, such as equity market turnover, Foreign country GDP growth, Foreign country inflation, Foreign country current account balance, and Foreign country public debt. The US market share turnover is selected as the third-factor group, the US factor. Their result shows that the assets strongly relate to global sentiments, such as the single-country exchange-traded funds (ETFs). Other researchers customize a sentiment index for Hong Kong real estate market (Hei-Ling Lam & Chi-Man Hui, 2018). They select the proxies from the stock market, property market, capital market, global market, and Hong Kong representative property indices, such as the Hang Seng Property Index, the number of primary property transactions and secondary transactions, new bank loans to residential property and The University of Hong Kong Real Estate Index Series. They explain that the customized sentiment with local characteristics strongly predicts the Hong Kong residential market's future returns on aggregate and cross-sections. Therefore, selecting local- representative indices to construct the investor sentiment would be better for reflecting the market movement trend and being a reliable reference for market prediction. In studying investor sentiment prediction to asset pricing in ASEAN markets, the researcher combines the market-data-based behavioral factors with macroeconomic factors to measure the investor's sentiment, such as unexpected inflation and the expected inflation, the Industrial production, the difference rates between riskier and safer bonds and the

one-year Treasury bill (J. French, 2017). French finds that the dynamic relations between the aggregate trading of four investor groups and equity returns were highly significant in the ASEAN market, but the direct sentiment measures are insignificant. The sentiment reflecting local market movement would benefit retail investors with high trading frequency. French also finds that the current sentiment can predict tomorrow's returns with high accuracy in the ASEAN market. The investor sentiment has localization property (Wu et al., 2017); constructing a local sentiment index would better reflect the effect of local investor emotion on the equity market. However, the global impact would also consider the development of globalization.

Variables Selection

This paper selected a slight difference from Baker and Wurgler's research due to the nature of the Thai equity market and data availability to prepare customizing construction of local and global investor sentiment index.

The Customized Local Sentiment Index Selection

Market Turnover

The early research discusses a considerable value on turnover associates, typically with a soaring stock price, but a small turnover follows a falling price (Ying, 1966).

The bull markets have a high turnover ratio on the market horizon, but the bear markets have a lower turnover ratio (Karpoff, 1987). The early experimental evidence shows that financial bubbles are associated with high turnover due to abnormal trading activities (Smith et al., 1988). Other studies argue that sentimental investors are likely to trade aggressively when they are optimistic, increasing the aggregate volume (Baker et al., 2004). The market value turnover is a standard proxy of investor

sentiment(Baker & Wurgler, 2006, 2007). After, the researchers reviewed the tulip bubble period and found that the overpriced stocks are a pattern with a high trading volume(Baker et al., 2012). In studying the Chinese A-B securities market, the researchers found a correlation between trading and price differentials in the dual-class shares caused by the investor's speculative intentions (Mei et al., 2009). The previous literature suggests that turnover information is essential to investor sentiment index construction. The turnover ratio reports the share volume to average shares in the listed firms. Also, the turnover ratio could report the market liquidity, serving as a sentiment factor.

Treasury Bill Rate

The existing researcher uses the short-term Treasury bill rate to report capital borrowing costs(Brown & Cliff, 2004, 2005). The investors generally trade more and increase speculative investor activities at a relatively low-interest rate (Stambaugh et al., 2012). An increase in the government yield may cause an investment shift from a risky asset to a safety asset in an investor's portfolio, thereby calming the investor down on equity trading(Fong & Toh, 2014). Investors who are more risk-averse and seek safe assets, such as government bonds, indicate a low sentiment period(Gómez-Puig et al., 2014). Recent research points out an incredibly striking co-movement between the T-bill rate and the investor sentiment index(Chue et al., 2019; Sibley et al., 2016). The previous study on the ASEAN equity market argues that the yield curve and the term structure of the government's short-term T-bill reflect the market's expectations of future changes in interest rates, monetary policy, and the economy(J. French, 2017).

The Relative Strength Index

The relative strength index commonly examines whether the market is oversold/overbought is one factor that could reflect the investor overreaction/underreaction to the market in a recent study of investor sentiment(H. Chen et al., 2010; Kim & Ha, 2012). The Relative Strength Index (RSI) shows whether the market is oversold or overbought(Ryu et al., 2017). In the traditional interpretation of the RSI, an index of 70 indicates that the equities are overbought, while an index of 30 points that the equities are oversold(Chong & Ng, 2008). The researchers indicate that with a fluctuating relative strength index co-movement with the investor's abnormal trading behaviors, the price of sensitive-driven stocks is most likely volatile(Hudson & Green, 2015; Yang & Zhou, 2015).

Local Gold Price

As one of the natural commodities, gold represents a safe and risk-hedge instrument for the major equity markets by dropping before the extreme market downturn(Agyei-Ampomah et al., 2014). In the emerging equity market, golds are most like a haven against stock market volatility, as evidenced in the 1997 Asian Crisis(Baur & McDermott, 2010). When the investor increases the weight of the commodities, such as gold, the aggregate market returns are most likely to decline(Smales, 2014). The volatility of gold prices can reflect the intraday investor sentiment in the equity market(Balcilar et al., 2017). The recent literature argues that the change in gold price most negatively correlates with the investor sentiment index, then comes with the short-term government yields(Capie et al., 2005; Reis & Pinho, 2020). Thailand's stock markets are one of the financial and commodity markets that have been highly volatile with high capital mobility in recent years (Pastpipatkul et al., 2016).

Therefore, categorizing the gold price into local sentiment would better reflect the market movement index.

The Customized Global Sentiment Index Selection

Previous research points out that global sentiment is contagious across countries (Baker et al., 2012; M. P. Chen et al., 2017; J. J. French & Li, 2017). They suggest that high capital flows are a vital mechanism through which global sentiment develops and propagates.

US Treasury Bill Rate

The announcements related to the change of the US Federal interest rate significantly affect investor sentiment (M. P. Chen et al., 2017; Kurov, 2010). Similar to the effect of the government T-bill rate, the US treasury bill rate is more concerned for international investors (J. Gagnon et al., 2011; Schmeling, 2009). Other researchers argue that the federal interest rate is a primary concern for the international investor on the weight of capital in the overseas financial market (Alam & Uddin, 2009). The federal interest rates are a good indicator of financial crises, reflecting on recalling overseas capital and purchasing a safe asset (Zouaoui et al., 2011). The monetary policy actions in downturn periods have a more significant effect on stocks that are more sensitive to investor sentiment changes (Glick & Leduc, 2012). The U.S. federal funds rate is a standard proxy for global liquidity conditions, showing that a lower federal funds rate is associated with higher liquidity (Csontó, 2014; H. C. Lee et al., 2014).

The S&P 500 index

With the high degree of capital flow in the Thai financial market and the globalization development, domestic and international investors are eyes on the US financial market activity (Cheung & Mak, 2006). Other views from existing research show that foreign investors would increase capital allocations to emerging markets when global risk aversion decreases (J. J. French & Li, 2017). The volatility of the total return of the S&P500 would affect the Thai equity market and retail investors(Alfonso Perez, 2017). The US equity market's influence significantly impacts the value at risk in Asian markets(Shen, 2018). Therefore, the total return index of the S&P500 is a proxy to measure the global investor sentiment index.

The Exchange Rate

The exchange rate change would impact the investor's international asset allocation(Cushman, 1983; Viaene & de Vries, 1992). The early researchers argue that the effect of exchange rate movements of the local currency to U.S. dollars through high-frequency investor trading behavior positively influences the stock price(Richie, N., & Madura, 2006). Other research points out that the expected exchange rate of USD per HKD changes accounts for 40% of each H-class share's total variation in the Hong Kong market(Arquette et al., 2008). Many researchers take the change in the exchange rate and measure it(Chan et al., 2008; L. Gagnon & Andrew Karolyi, 2010) for the home equity market(Wu et al., 2017). The THB keeps an eye on the movement of USD(Bouraoui & Phisutthiwacharavong, 2015). Suppose the THB is appreciated, leading to higher investment demand and an optimistic sentiment. This research considers the exchange rate (THB per USD) as a proxy to measure Thai investor sentiment.

The Chicago Board Options Exchange Volatility Index

With the development of the global market, international factors play an essential role in influencing foreign investments. The early research indicates that an increasing proportion of individual ownership is associated with volatility (Sias, 1996).

Significantly, the VIX is the priority factor foreign investors consider (Baker et al., 2012) as the prior proxy for constructing the global sentiment index. A high-risk

aversion would like a decline investment flow to the stocks with the firm

characteristics of a small-cap, low tangible asset, thereby cause to an under-

price(Smales, 2014). The negative VIX reflects a global optimistic sentiment

investment in emerging markets (J. J. French & Li, 2017). Also, they discuss that the

VIX could forecast foreign equity flows into the SET. Recent research points out

sentiment has the most substantial effects on hard-to-value and hard-to-arbitrage

stocks in the international market((Marfatia, 2020). Therefore, the VIX is essential to

study the global sentiment on the equity market.

SIGNIFICANCE OF THE PROBLEM

Based on the background and previous research, studying investor sentiment is unified in theoretical or practical aspects. For the Asian market, investor sentiment has the property of localization. Hence, studying the local sentiment should take local market features into account. Understanding the investor sentiment would provide a healthy growing stock market and contribute to the development of the whole economy. The main reason for selecting Thailand as the laboratory is that Thailand's equity market has been one of the most resilient after the 1997 Asian financial crisis (J. J. French & Li, 2017). Thailand's equity market and the Thai Baht rebounded rapidly after the financial crisis. With a higher percentile of foreign equity issuers and a low entrance barrier, the Thai equity market have more capital diversification and a high degree of capital flow (Calomiris et al., 2020). However, additional financial uncertainty, combined with political instability, may increase the likelihood of such reversals in recent years. Therefore, studying the investor sentiment effect is better for predicting the movement of the Thai equity market.

Local investors have a micro informational advantage on security selection, but Foreign investors in the Thai equity market have a short-term market timing information advantage (Phansatan et al., 2012). Additionally, the Thai equity market investors have significant Herd-behavior with firm-specific information, especially during the financial downtrend (Padungsaksawasdi, 2020). Therefore, the gains in security selection are counteracted by losing market timing and herding behavior for retail investors. Studying investor sentiment better reflects the macro direction of the Thai equity market.

Many studies focus on the relationship between investor sentiment and stock market returns in developed markets, explaining how investor sentiment affects stock returns and price fluctuations. Nevertheless, there currently is a paucity of studies on behavioral finance in developing countries. The existing literature is far from understanding the investor sentiment issues in the Thai equity market. Besides the complexity of investor sentiment and its localization property, customizing a local investor sentiment better understand the Thai equity market movement.

The market's regulatory authorities' supervision and intervention do not fully consider the potential impact of irrational factors. As a result, the policies are often ineffective and have severe side-effects on the stock market's growth. Therefore, researching investor sentiments based on the theory and framework of behavioral finance has crucial practical significance.

Research Questions

Based on the previous literature review, this paper customizes and constructs two principal component-based composite indicators for the Thai equity market: *the local sentiment index* and *the global sentiment index*. This paper considers market turnover, the Thai T-bill rate, the RSI, and local gold price for customizing the local sentiment index. Then, this paper considers the U.S. T-bill rate, the S&P500 index, the Exchange rate, and VIX to customize the global sentiment index. Therefore, the author uses the local sentiment index and global investor sentiment index to answer the below specific research questions separately:

1. *Could the investor sentiment indices have significant explanatory power to the market index return in the Thailand?*

2. *In comparison with other econometric models, could the investor sentiment indices predict the Thai stock market movement using the out-of-sample method?*
3. *Do the investor sentiment indices significantly affect the cross-section stocks in Thailand?*

Motivation

Understanding the characteristics of stock market returns from the perspective of investor sentiment and understanding stock price behavior is the focusing issue of financial research. Researching investor sentiment has important guiding significance for improving behavioral finance theory, economic policy design, and investors' investment decisions.

Theoretical Significance

This research studies how investor sentiment affects the Thai equity market, which belongs to behavioral finance. It assists the traditional financial theory research in studying the abnormal market phenomenon and offers a deep understanding of investor decision-making and capital market operation. As investor sentiment research is an essential part of behavioral finance theory, studying this issue helps the researchers understand how investor sentiment affects market operation and helps researchers develop and improve behavioral finance theory in the Thai equity market. The finding of this paper is to offer an understanding of how investors' behavior affects the transmission mechanism of information in the equity market and asset prices.

Empirical Significance

The research on investor sentiment helps decision-making and supervision during the operation of the Thai stock market. Studying the investor sentiment helps investors understand the market business cycle and asset prices' actual characteristics. Besides, Studying investor sentiment helps investors to cultivate a rational and healthy investment mind. For regulatory authorities, researching the investor sentiment helps them develop a more complete and adequate regulatory system. Moreover, researching the investor sentiment helps them perform more targeted supervision functions, thus positively developing the Thai stock market.

Based on the above research motivation and research questions, this article will further investigate the relationship between the two investor sentiment indices and the Thai stock returns and list the objectives.

Objectives

1. Customizing two applicable comprehensive investor sentiment indices (local and global) to study the Thai equity market index return movement. If the investor sentiment index is significance in coefficients to the Thai market index, it could be a researchable index for studying the emerging stock market.
2. To estimate the investor's sentiment indices' predictive performance on the expected return of Thai stock. If the investor's sentiment index performs better significantly in predicting the stock price using the out-of-sample forecast method, it could be a valuable reference for investment timing.
3. To generate a trading strategy that uses the fluctuation of the investor sentiment indices. If the trading strategy based on the investor sentiment index has a higher

expected profit, it could be a precious reference for the investor's normal trading behaviors.

4. Based on the hypothesis, to test the effect of the change of sentiment indices on the cross-section of subsequent stock returns. If the investor's sentiment index significantly impacts the characteristic stock, it could be a helpful reference for equity selection.

Research Hypotheses

This paper customizes two-principal component-based composite sentiment indices (local and global) to test the effect of investor sentiment on the cross-section of subsequent stock returns in the Thai equity market. This paper uses the market turnover, the Thai T-bill rate, the RSI, and the local gold price to construct the local sentiment index. Also, this paper considers the U.S. T-bill rate, the S&P500 index, the Exchange rate, and VIX for constructing the global sentiment index.

The lack of accurate stock valuation models and the existing deviation of market prices from theoretical prices make it difficult for researchers to test asset pricing deviations empirically. Therefore, some researchers study the influence of investor sentiment on stock returns. They generally find that investors' irrational beliefs that are excessively optimistic or pessimistic drive the stock price to deviate from the intrinsic value. When the beliefs go back to normal, mispriced stocks are subsequently back to their intrinsic value. The high local sentiment will continuously drive the stock price to rise, positively impacting the market yield. Under globalization, the investor would seek other geographic markets to invest in when the local equity market bears more uncertainty. Thus, when other geographic investors are overly

pessimistic, the situation on local return is reversed. Based on the above, the author proposes the hypothesis of the relationship between sentiment and market returns:

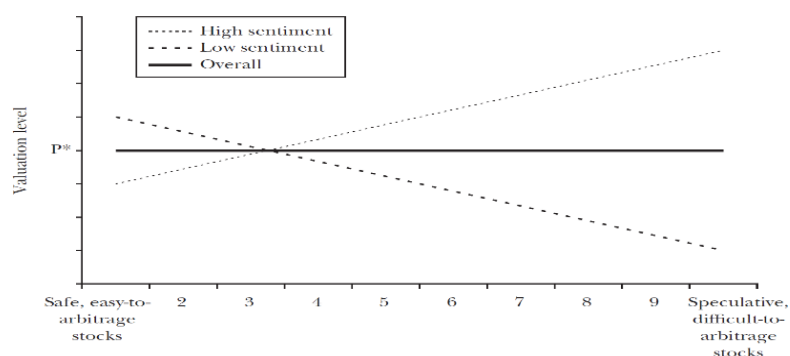
H1: The investor sentiment index positively correlates with market returns on the local horizon. The local optimistic (pessimistic) sentiment, the higher (lower) market returns.

H2: In the global horizon, the investor sentiment index negatively correlates with the market returns. When the global sentiment is optimistic (pessimistic), the market returns are lower (higher).

Knowing the varying between investors' speculative tendency and equities speculation is the primary study goal in the cross-sectional effect of investor sentiment on stock return. From the psychological perspective of behavioral finance, investors are more likely to have cognitive biases when uncertain equities' valuations, such as overconfidence, representative bias, and conservatism, even if investors have the same information, heterogeneous beliefs, and opinions (Tversky & Kahneman, 1974). Due to the high degree of divergence, this time-varying cognitive bias, market participants, changes in speculative tendencies, and stock returns reflect investors' systematic time-varying preferences.

According to the style investment theory (Barberis et al., 1998), equity traders generally split stocks into varying categories based on specific characteristics. Then, they allocate funds based on categories rather than individual stocks. Generally, stocks with higher subjective valuations are more costly and riskier for arbitrageurs on asset mispricing. Therefore, those stocks are considered highly speculative stocks, and vice versa.

Theoretical Effects of Investor Sentiment on Different Types of Stocks



Note: Stocks that are speculative and difficult to value and arbitrage will have higher relative valuations when sentiment is high.

Figure 1

Quoting the Baker's Sentiment study (Baker & Wurgler, 2007) to illustrate the influence of sentiment (Figure 1): the horizontal axis represents the speculative stock level divided into ten groups in ascending order; the vertical axis represents the valuation price; and P^* is the intrinsic value, which is time-varying.

Investors usually choose stocks that are compatible with their speculative propensity. They are more willing to hold highly speculative risky stocks during optimistic sentiment and offer a high price. A trend toward the upper right in Figure 1 shows that the valuation of highly speculative stocks deviates more from its intrinsic value. In similar, the pessimism sentiment period exhibits an opposite downward-to-right sloping trend. The price equals its intrinsic value regardless of the sentiment effect. The empirical evidence shows that stocks with high dividends, low tangible asset ratio, high financial risk, high profitability, and high growth potential are more challenging to implement valuation and arbitrage and draw more attention from the investor's eyes. The stock with more speculative and is more likely to be affected by sentiment. Therefore, the author proposes the hypothesis for effect on cross-section:

H3: the firms with low dividend ratios are more emotionally sensitive by investors than those with high dividend rates. Thus, the companies with low dividends are relatively more affected by the investor sentiment index.

H4: The firms with lower tangible assets have higher sentiment. Its return is relatively more affected by the investor sentiment index.

H5: Financial risk is positively related to investor sentiment. So, stocks with a high debt-asset ratio are more affected by the investor sentiment index.

H6: Firms with low profitability draw more attention from the investors sensitive than firms with low profitability. So, stocks with high P/E ratios are more affected by the investor sentiment index.

H7: The growth stocks are more sensitive in the change of investor sentiment than the value stocks. So, the equities of low price-to-book ratios are comparatively more affected by the investor sentiment index.

To examine the hypothesis, the author implements the regression of investor sentiments to the particular equity portfolio based on the above equities' characteristics.

DATA AND METHODOLOGIES

In this section, the author endeavours to separately customize two empirical investor sentiment indices for the Thai equity market. Studying the investor sentiment to the aggregate stock market is learned from the existing research (Baker & Wurgler, 2006, 2007). Compared with the US equity market, the size of the Thai equity market is relatively small. Thus, the stock valuation in Thailand is easily affected by the investor's subjective cognition with developing the national property. In this section, using the daily data captures the change of sentiment.

Empirical Sample

The author plans to study observations of the daily price index of the Stock Exchange of Thailand (.SETI) from January 1999 to January 2019 and the daily total return index of the Stock Exchange of Thailand (TRI) from January 2002 to January 2019. Most of the sample expect from Bloomberg DataStream, the Stock Exchange of Thailand's official website, and The Bank of Thailand.

Measurement to Variables

In the current research, the sentiment indicators can be classified into direct (subjective) investor sentiment indicators and indirect (objective) investor sentiment indicators according to investor sentiment measurement.

The direct investor sentiment is to understand investors' views and judgments on the market through questionnaire surveys and directly measure through data on bullish and bearish ratios, reflecting investors' optimistic or pessimistic views (benchmark index). Some index survey by third parties, such as *the investor's Intelligence Index*

(II), the Individual Investor Association Index (AII), and the Consumer Confidence Index, is favored as a direct proxy indicator of investor sentiment.

The Indirect indicators of the investor sentiment are research statistical data through market transactions, such as *Closed-End Fund Discount Rate*, *Mutual Fund Flows*, *IPO Volume*, *First-Day Return*, *Market Turnover Rate*, *Dividend Premium Rate*, *the Equity Issuance Ratio*, *Share Trading Volume*, *Market Volatility Index (VIX)*, *Put/Call Ratio* (Baker & Wurgler, 2007).

The direct indicators obtained by questionnaires or surveys may have problems, such as the sample bias selection and language barrier. Sometimes, investors seem wiser in their actual investment behavior when they do not take action based on their cognition or intuition. However, publicly available statistics data can accurately measure sentiment without explaining content that causes possible deviations from questionnaire surveys. Besides, Thailand is one of the emerging markets; the direct survey data sample period is relatively short. The continuity of data may also be a problem.

The following factors' principal component is expected to develop the Thai investor sentiment's local and global measurement based on the previous section of the literature review.

1. Market Value Turnover

The author defines a turnover ratio (*MVTN*) as follows:

$$MVTN_t = \frac{\text{The average turnover for the past 10 trading days}_t}{\text{The average turnover for the past 250 trading days}}$$

2. Thai Treasury Bill Rate

This research uses a daily Thai Government T-bill rate as a proxy for the localized investor sentiment index to capture the change of sentiment, “*TTB*” The daily T-bill rate in time t is expected to obtain from the BOT database.

3. The Relative Strength Index

The 14-day RSI is a standard measurement in the financial market, defined as follows:

$$RSI_t = \frac{\sum_{j=1}^{14} (P_{t-j} - P_{t-j-1})}{\sum_{j=1}^{14} |P_{t-j} - P_{t-j-1}|}$$

where $(P_{t-j} - P_{t-j-1}) = P_{t-j} - P_{t-j-1}$ if $P_{t-j} - P_{t-j-1} > 0$, otherwise = 0.

4. Gold Price

The Gold Price is the intraday price of one unit of gold in Thai currency. An uptrend in the local gold price would lead to pessimistic investor sentiment in the equity market. The author decides to use the price index of the Thai Gold, “*TGP*” at time t

5. The U.S. Treasury Bill rate

The daily Federal interest rate is the primary data to be the proxy of The U.S. Treasury bill rate to capture global investor sentiment change, defined as “*UST*”.

6. The S&P500 Index

The total daily return of the S&P500 index is selected in the sentiment measure. The time-zone difference defines the rate of return on the US equity market at time t :

$$SPX_t = \ln S\&P_{t-1} - \ln S\&P_{t-2}$$

7. Exchange Rate

The movement of the exchange rate closely relates the international capital flows.

A sustained appreciation of THB attracts more Thai assets from international investors, leading to a higher investor sentiment index. The daily series of THB per USD is defined as “ FX_t ”.

8. VIX

VIX is a well-known index to measure volatility's market expectation. The daily time series of VIX is considered to construct the global sentiment index, defined as “ VIX_t ”.

The author acknowledges that this paper might be missing some essential rational factors, but the author feels the set of measured variables is a reasonable effort to mitigate the research problems.

Methodologies

This paper customizes two compound investor sentiment indices (local and global) for the Thai equity market. First, the author prepares variables on the local and global investor sentiment index customization based on Baker and other existing research and then presents the statistics' description. Second, using the Stata to format the compound investor sentiment index and putting the selected variable data into Stata and following the Stata comment to calculate the principal components by Principal Component Analysis (PCA) function. After the Stata outputs have many principal components, selecting the first principal components as the compound investor sentiment index is the highest eigenvalue, namely the Thai compound investor

sentiment index, “*SENT_th*” and the Global Compound investor sentiment index “*SENT_gb*”. The PCA method's first principal component in econometrics represents the optimal combination of the selected proxies that maximizes its total variance (Reis & Pinho, 2020). The author then tests the correlation between the selected variables and the *SENT* indices by running multiple regression.

The effect of investor sentiments on Thai market index return

First, use Excel to examine the Customized Thai compound investor sentiment's effect on the market index return. The author inputs the R_m , R_f , and *SEN indices* into the Excel sheet and then follows the single-index model to inspect the relationship between the investor sentiment and market index return:

$R_{m,t} - R_f = \alpha + \beta_{i,t-j} SEN_{i,t-j} + \varepsilon_t$ Where the j is the lagged term daily, ε is the error term. Then the author checks the regression result with a significant test result of 5%. After, the author uses the Granger Causality Test by R program to estimate the causality relationship between the sentiment indices and the market return.

The results of regression method in the current term and The Granger Causality Test in the lagged terms show the correlation and coefficient between the investor sentiment and the market index return for answering the RQ1. The Granger causality test can test whether investor sentiment has impacted the value of returns in the lagged terms.

The predictive power of investor sentiments on Thai stock market movement

To answer the RQ2, the author uses the Multivariate Threshold Autoregressive model (Tsay, 1998) with the rolling sampling method. First, the author separately uses the customized sentiment indices (*SENT_th*, *SENT_gb*) to classify the market states, such as

the bear region, the natural region and the bull region. With the multivariate threshold autoregressive model, the author uses sentiment indices as the threshold factors to capture the nonlinear movement of the Thai equity market. The author input the data of the SET index of all the sample periods and then obtained the two threshold values for each sentiment index, X and Y , following the function:

$$R_t = \begin{cases} a_0 + a_1 R_{t-1} + a_2 R_{t-2} + \dots + a_q R_{t-q} + \epsilon_{1t}, & \text{if } Sen_{t-1} \leq X \\ \beta_0 + \beta_1 R_{t-1} + \beta_2 R_{t-2} + \dots + \beta_q R_{t-q} + \epsilon_{2t}, & \text{if } X < Sen_{t-1} \leq Y \\ \theta_0 + \theta_1 R_{t-1} + \theta_2 R_{t-2} + \dots + \theta_q R_{t-q} + \epsilon_{3t}, & \text{if } Y < Sen_{t-1} \end{cases}$$

where $R_t = 100 \ln \left(\frac{P_t}{P_{t-1}} \right)$, the Sen_{t-1} is the threshold variable, which constructs from the past date at time $t-1$. Note that the Sen_{t-1} is separately defined as the local sentiment index and the global sentiment index, namely $Sen_{th,t-1}$ and $Sen_{gb,t-1}$. ϵ_{it} refers the noise terms, the X and Y are the threshold variables linking with the local sentiment index, namely X_{th} and Y_{th} , and with the global sentiment index, namely X_{gb} and Y_{gb} .

The author uses the statistical method to calculate the threshold values, classify the bullish and bear market and compare the SET sentiment indices.

$$\text{Upper threshold value}_i = \text{mean}_i + \text{standard deviation}_i$$

$$\text{Lower threshold value}_i = \text{mean}_i - \text{standard deviation}_i$$

Note that i is the sentiment index.

Second, the author considers a rolling-sample size of $T=m+n$, where the n is the out-of-sample observations for the forecasting evaluation, and the m is the number of the in-sample observations. The entire observation is 4178. The author considers the sample size for testing the predictive ability of the multivariate threshold

Autoregressive model based on the investor sentiment indices ($MTAR_{Sen\ i,t}$) is

$T=m+n$, where $m=1000$, $n=200$. The author uses a rolling

sample $\{R_{t-m+1}, R_{t-m+2}, \dots, R_t\}$ of the size m to estimate model parameters (McCracken, 2000; West, 1996), where the series t starts from 2nd Jan 2002 to 29th Mar 2017.

Third, use the rolling sample to predict the following sample, then replace the rolling steps until the end of the sample. Therefore, the author obtains a series of one-step-forward predictions $\{\hat{R}_{t+1}\}_{t=m}^{T-1}$ (Hong & Lee, 2003). To set the forecasting criteria, the author compares the out-of-sample prediction with the criteria of the Mean Squared Forecast Error (MSFE) and the Mean Absolute Forecast Error (MAFE) between the Multivariable threshold autoregressive model based on *SENT indices* ($MTAR_{Sent\ i,t}$) with the Martingale model, and the simple Autoregression model (AR_p) where the order p choosing by a certain information criterion, Akaike Information Criterion (AIC).

$$MSFE_t = \frac{1}{n} \sum_{j=0}^{n-1} (R_{t-j} - \widehat{R}_{t-j})^2$$

$$MAFE_t = \frac{1}{n} \sum_{j=0}^{n-1} |R_{t+j} - \widehat{R}_{t+j}|$$

The martingale model $R_t = \mu_t + \varepsilon_t$, and its prediction is $\hat{R}_t = \frac{1}{m} \sum_{i=t-m}^{t-1} R_i$.

To determine whether the MTAR model with the sentiment-based performs better than the other two models, the author applies the average difference (AF) of MSFE and MAFE between the (1) Martingale model, (2) Autoregression model (AR), (3) Multivariable threshold autoregressive model with *SENT indices* (MTAR),

$$AF_{MSFE} = \frac{\sum(MSFE_{i,t} - MSFE_{j,t})}{T}, \quad AF_{MAFE} = \frac{\sum(MAFE_{i,t} - MAFE_{j,t})}{T}$$

, where i and j are different models, T is the count of the entire rolling sample, starting from 22nd Nov 2006 to 31st Jan 2019.

If the criteria value is greater than 0, model i has a time series statistical dominance over model j . Thus, model i have better forecast ability than model j , and vice versa.

Additionally, using the T-test with unequal variances estimates the significance of the average difference between the two models.

Fourth, most investors would prefer to utilize the economic either index or model to maximize their expected profit rather than to minimize its predictive errors. Thereby, the author evaluates the models base on their expected trading profits. The trading strategies are designed differently as the property of the customized sentiment indices. The paper provides two principles of the trading strategy based on the predictive models and the investor sentiment indices.

The first principle of a trading strategy based on the forecasting models is to use the forecasting return value from the Martingale model, the Simple Autoregression model, the Multivariate threshold autoregression model using the local sentiment index, and the Multivariate threshold autoregression model using the local sentiment index. If the forecasting return value in time t is positive, then the strategy should buy the benchmark index but should sell the benchmark index if the forecasting return value in time t is negative. The estimation for this trading strategy is the mean forecast trading return (MFTR), which defines below:

$$MFTR_i = \frac{1}{T - m} \sum_{t=m+1}^T \text{sign}(\hat{R}_{i,t}) R_t$$

, where T = Observation 4179, 31st Jan 2019. m =Observation 1000, 26th Jan 2006.

$t=m+1$, start from 27th Jan 2006. $\hat{R}_{i,t}$ is the forecasting returns a value from the model

i , $R_t = 100 \ln \left(\frac{P_t}{P_{t-1}} \right)$ of the Total returns index.

The second principle of a trading strategy based on sentiment indices is to use daily values from the sentiment indices to decide the buy and sell actions.

First, the trading strategy based on the local sentiment index is to follow the movement of the investor sentiment index. When the local investor sentiment index is higher, which means the investors are optimistic, the investor should buy the benchmark index, but when the investor sentiment index is lower, which means the investors are pessimistic, the investor should sell the benchmark index. Thus, the trading strategy would buy the Thai Total return index when the local sentiment index exceeds the lower threshold value but sell the Thai Total return index when the local sentiment index falls below the lower threshold value. The estimation for this trading strategy is the mean forecast trading return ($MFTR_{th}$), which defines below:

$$MFTR_{th} = \frac{1}{T-m} \sum_{t=m+1}^T \text{sign}(\text{Sen}_{th,t} - \text{the lower threshold value}_{th,t}) R_t$$

Second, the trading strategy based on the global sentiment index is opposite to the movement of the investor sentiment index. When the global investor sentiment index is higher, the global investors are optimistic so that they will seek other investment assets with better returns than Thai stocks. Thus, the trading strategy based on the global sentiment index should buy the benchmark index when the global sentiment index in time t is smaller than the upper threshold. However, the trading strategy

should sell the Thai Total return index when the global sentiment index in time t exceeds the upper threshold value. The estimation for this trading strategy is the mean forecast trading return ($MFTR_{gb}$), which defines below:

$$MFTR_{gb} = \frac{1}{T-m} \sum_{t=m+1}^T \text{sign}(\text{the Upper threshold value}_{gb,t} - Sen_{gb,t}) R_t$$

For the trading strategy of the buy-and-hold, the mean forecast trading return follows:

$$MFTR_{buy\&hold} = \frac{1}{T-m} \sum_{t=m+1}^T R_t$$

Note: T = Observation 4179, 31st Jan 2019. m =Observation 1000, 26th Jan 2006.

$t=m+1$, start from 27th Jan 2006. The lower threshold value in the local sentiment index is -0.7254, while the upper threshold value in the global sentiment index is 0.7754. $R_t = 100 \ln\left(\frac{P_t}{P_{t-1}}\right)$.

The author applies the T-test to test the significance of the mean forecast trading return, then compares its values—the higher value of the mean forecast trading return, the better the trading strategy.

The effect of investor sentiments on the cross-section stocks:

The first step is to answer RQ3, preparing the Fama-French SMB and HML factors model data. Second, the author ranks the listed stocks of the SET50 in ascending order and separates them into ten groups. Third, to construct a zero-cost arbitrage portfolio (buying one-unit stock portfolios with high eigenvalues and selling one-unit stock portfolios with low eigenvalues), the author examines the customized investor sentiment (local and global) on the returns of arbitrage portfolios using the regression

model. Last, following the equations to test the different characteristic stocks' return and current sentiment (Eq1), the effect of investor sentiment in the first lagged term (Eq2).

$$R_{i=High,t} - R_{i=Low,t} = \alpha + \beta_1 SEN_{t,th} + \beta_2 SEN_{t,gb} + \varepsilon_t \quad \text{Eq1}$$

$$R_{i=High,t} - R_{i=Low,t} = \alpha + \beta'_1 SEN_{t-1,th} + \beta'_2 SEN_{t-1,gb} + \varepsilon_t \quad \text{Eq2}$$

Note: i is the firm characteristic variable, the $R_{i=High,t}$ and $R_{i=Low,t}$ respectively refer the average daily returns of the first three groups and the latter three groups of equity portfolios, a specific characteristic variable of the firm. The sample period for RQ3 is from 2nd Jan 2002 to 31st Jan 2019.

According to the Fama and French (1993) paper, the SMB is the different portfolios' return of small and big market capitalization stocks separate from returns on HML, while the HML is different portfolios' returns between high and low book-to-market ratio stocks.

The characteristic variable set by hypotheses design:

$$\text{H3: Dividend yield} = \frac{\text{Annual Dividends per share}_{t-1}}{\text{last price}_t}$$

$$\text{H4: Tangible asset ratio} = \frac{\text{tanglibe asset}_t}{\text{Total assets}_t}$$

$$\text{H5: Debt ratio} = \frac{\text{Total liabilities}_t}{\text{Total assets}_t}$$

$$\text{H6: P/E ratio} = \frac{\text{Market price per share}_t}{\text{Earings per share}_t}$$

$$\text{H7: P/B ratio} = \frac{\text{Market price per share}_t}{\text{Book value per share}_t}$$

The author runs multiple regression to examine the customized investor sentiment on cross-section stocks. Therefore, the author can identify the characteristic stocks or sections more impacted by investor sentiment based on variable coefficients, answering the RQ3.



RESULTS AND DISCUSSIONS

Customized Investor sentiment indices

Collecting the database on the methodology section and running in Stata and Excel programs are customizing the investment sentiment indices for the Thai Equity market, then answering research questions. After data standardizing, the author applies the PCA method to the eight variables and develops two composite measures of investor sentiment for the Thai stock market. The Summary descriptive statistics and correlation matrix of the variables are reported in Table 1

<i>Variable</i>	<i>Mean</i>	<i>Std.Dev</i>	<i>Min</i>	<i>Max</i>
MVTN	108.634	47.483	30.527	427.531
TTB	4.190	1.355	1.540	8.750
RSI	53.296	13.567	14.640	91.229
TGP	14583.900	6765.735	4605.450	278868.810
UST	3.591	1.290	1.358	6.788
SPX	0.000	0.118	-0.095	0.110
FX	35.992	4.367	28.680	45.800
VIX	19.931	8.471	9.140	80.860

	<i>MVTN</i>	<i>TTB</i>	<i>RSI</i>	<i>TGP</i>	<i>UST</i>	<i>SPX</i>	<i>FX</i>	<i>VIX</i>
<i>MVTN</i>	1							
<i>TTB</i>	-0.698	1						
<i>RSI</i>	0.4897	-0.154	1					
<i>TGP</i>	-0.0716	-0.7241	0.1008	1				
<i>UST</i>	0.0172	0.8559	-0.1178	-0.9017	1			
<i>SPX</i>	0.006	-0.0227	0.1049	0.0219	-0.018	1		
<i>FX</i>	0.0159	0.4894	-0.0909	-0.8566	0.6815	-0.0244	1	
<i>VIX</i>	-0.0773	0.1511	-0.2398	-0.2032	0.1444	-0.1179	0.1535	1

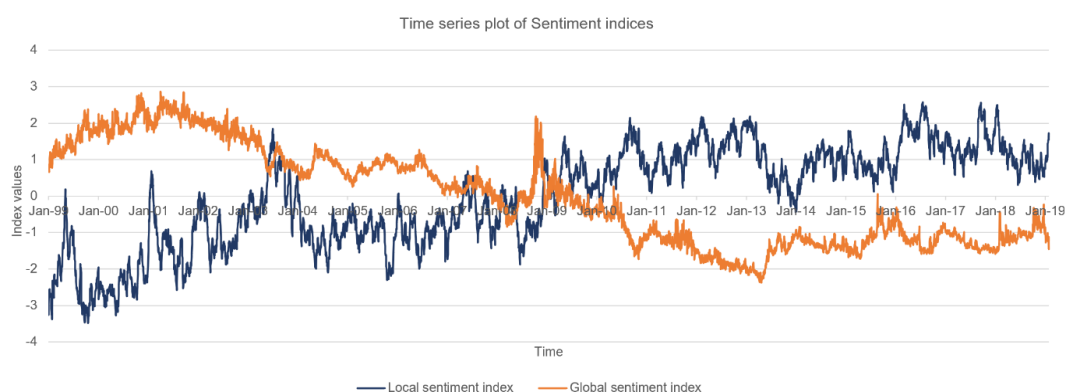
Table 1

The upper table shows each variable's average, standard deviation, and minimum and maximum values. The sample observations of all the factors are 4915. In the local sentiment horizon, the first factor is the market turnover rate (MVTN). The average of MVTN is 108.634, and its standard deviation is 47.483. The minimum of MVTN is 30.527, while its maximum is 427.531. The second factor is the Thai T-bill rate

(TTB). The average of TTB is 4.19, and its standard deviation is 1.355. The minimum of TTB is 1.54, while its maximum is 8.75. The third factor is the relative strength index rate (RSI). The average of RSI is 53.296, and its standard deviation is 13.567. The minimum of RSI is 14.64, while its maximum is 91.229. The last factor is the Thai local gold price index (TGP). The average of TGP is 14,583.9, and its standard deviation is 6,765.735. The minimum of TGP is 4,605.45, while its maximum is 278,868.81. In the global sentiment horizon, the first factor is the US T-bill rate (UST). The average of UST is 3.591, and its standard deviation is 1.29. The minimum of UST is 1.358, while its maximum is 6.788. The second factor is the return of the S&P500 index (SPX). The average of SPX is 0, and its standard deviation is 0.118. The minimum of SPX is -0.095, while its maximum is 0.11. The third factor is the exchange rate (FX). The average of FX is 35.992, and its standard deviation is 4.367. The minimum FX is 28.68, while its maximum is 45.8. The last factor is the VIX index (VIX). The average of VIX is 19.931, and its standard deviation is 8.471. The minimum of VIX is 9.14, while its maximum is 80.86.

The lower table shows the covariance between every two variables. The market turnover rate has positive covariance with the relative strength index, the US T-bill rate, the return of the S&P500 index, and the exchange rate. However, the market turnover rate has negative covariance with the Thai T-bill rate, Thai gold price, and VIX index. The Thai T-bill rate has positive covariance with the US T-bill rate, the exchange rate, and the VIX index, but it has negative covariance with the relative strength index, the Thai gold price, and the S&P500 index. The relative strength index has positive covariance with the Thai gold price and the S&P500 index, but it has native covariance with the US T-bill rate, the exchange rate, and the VIX index. The

Thai gold price has positive covariance with the S&P500 index but negative covariance with the US T-bill rate, the exchange rate, and the VIX index. The US T-bill rate has positive covariance with the exchange rate and VIX index but negative covariance with the S&P500 index. The S&P500 index has negative covariance with the exchange rate and VIX index. However, the exchange rate has positive covariance with the VIX index.



From the Time series plot of the sentiment indices, the local sentiment index is moving opposite the global sentiment index. When local investors are optimistic about the local equity market, they focus more on the local market and pay less attention to the global market. Therefore, the global sentiment declines. When the global sentiment is optimistic, which means the global equity market has more investment opportunities, the Thai local investor will shift their eyes to the global market. Thus the optimism of local sentiment is diminishing.

	Local sentiment index	Global sentiment index
Mean	<i>0.0000</i>	<i>0.0000</i>
Standard Error	<i>0.0191</i>	<i>0.0189</i>
Median	<i>0.2238</i>	<i>-0.1133</i>
Standard Deviation	<i>1.3383</i>	<i>1.3215</i>
Sample Variance	<i>1.7910</i>	<i>1.7464</i>
Minimum	<i>-3.4835</i>	<i>-2.3685</i>
Maximum	<i>2.5698</i>	<i>2.8619</i>

The factors used to customize the investor sentiment index are standardized.

Therefore, in the above statistic summary, both the local sentiment index and global sentiment have the same mean, which equals zero. Furthermore, both indices have 4915 overall observations. However, the standard error of the local sentiment index is 0.0191, while the standard error of the global sentiment index is 0.0189. Also, the median of the local sentiment index is 0.2238, but the median of the global sentiment index is -0.1133. The standard deviation of the local sentiment index is 1.3383, while the standard deviation of the global sentiment index is 1.3215. The sample variance of the local investor sentiment index is 1.791, but the sample variance of the global sentiment index is 1.7464. The minimum of the local sentiment index is -3.4835, but its maximum is 2.5698. The global sentiment index's minimum is -2.3685, but its maximum is 2.8619.

For each time t , the author names “ $SEN_{i,t}$ ” as the stock market sentiment index defines the first principal component of the variables as mentioned above. The $SEN_{th,t}$ represents the customized investor sentiment index constructed by Thai local variables, while the $SEN_{gb,t}$ represents the customized investor sentiment index constructed by global variables. The Stata program is used to estimate the principal component, and the PCA results are as follows,

The PCA result of the customized local investor sentiment

<i>Components</i>	<i>Eigenvalue</i>	<i>Proportion</i>	<i>Cumulative</i>
PC1	1.791	0.4478	0.4478
PC2	1.4444	0.3611	0.8089
PC3	0.5043	0.1261	0.9349
PC4	0.26	0.0651	1.0

The eigenvecotrs of principal compoents

<i>Variables</i>	<i>PC1</i>	<i>PC2</i>	<i>PC3</i>	<i>PC4</i>
MVTN	0.2127	0.6883	-0.6698	0.1799
TTB	-0.6631	0.2192	0.1993	0.6874
RSI	0.3413	0.6076	0.7136	-0.0714
TGP	0.6313	-0.3301	0.0492	0.70

Note: PC# represents the order number of principal component

In the PCA results of the customized local investor sentiment, the upper panel shows the eigenvalues, proportion, and cumulation of each principal component (PC1 to PC4) in descending order. The first principal component (PC1) dominates the highest eigenvalue, which is 1.791, while it has 44.78%, explaining the proportion of the total variance. Four principal components have a cumulative 100% explanation of the total variance. The lower panel shows the corresponding eigenvectors of each selective variable to the principal components. The eigenvectors show the directors of selective variables in each principal component. For instance, the PC1 dominates the highest eigenvalues, compared with the rest of the PCs. Then, the customized local sentiment index gets the most positive stretch from the Thai local gold price index but the most negative stretch from the Thai T-bill rate. Forwarding a similar interpretation to the PC2 to the PC4, the customized local sentiment index gets the most positive

stretch from the market turnover rate in the PC2. The customized local sentiment index gets the most positive stretched from the relative strength index in the PC3, and obtains the most positive stretched from the Thai T-bill rate in the PC4.

The PCA result of the customized global investor sentiment

<i>Components</i>	<i>Eigenvalue</i>	<i>Proportion</i>	<i>Cumulative</i>
PC1	1.7464	0.4366	0.4366
PC2	1.076	0.269	0.7056
PC3	0.8592	0.2148	0.9204
PC4	0.3185	0.0796	1.0

The eigenvecotrs of principal compoents

<i>Variables</i>	<i>PC1</i>	<i>PC2</i>	<i>PC3</i>	<i>PC4</i>
UST	0.6746	0.1741	-0.1272	0.706
SPX	-0.0832	0.7883	0.6096	-0.0051
FX	0.6768	0.1606	-0.1213	-0.7081
VIX	0.2828	-0.5779	0.7729	0.0091

Note: PC# represents the order number of principal component

In the PCA results of the customized global investor sentiment, the upper panel shows the eigenvalues, proportion, and cumulation of each principal component (PC1 to PC4) in descending order. The first principal component (PC1) dominates the highest eigenvalue, which is 1.7464, while it has 43.66%, explaining the proportion of the total variance. Four principal components have a cumulative 100% explanation of the total variance. The lower panel shows the corresponding eigenvectors of each selective variable to the principal components. The eigenvectors show the directors of selective variables in each principal component. For example, the PC1 dominates the highest eigenvalues, compared with the rest of PCs. Then, the customized global sentiment index gets the most positive stretch from the exchange rate and the second more extensive positive stretch from the US T-bill rate. Forwarding a similar interpretation to the PC2 to the PC4, the customized global sentiment index gets the most positive stretch from the S&P500 index in the PC2. The customized global

sentiment index gets the most positive stretch from the VIX index in the PC3 and obtains the most positive stretch from the US T-bill rate in the PC4.

Correlation matrix of the customized sentiment indices and its variables

	<i>MVTN</i>	<i>TTB</i>	<i>RSI</i>	<i>TGP</i>
<i>Local Sentiment index</i>	0.2846	-0.8875	0.4567	0.8449
	<i>USTz</i>	<i>SPXz</i>	<i>FXz</i>	<i>VIXz</i>
<i>Global Sentiment index</i>	0.8915	-0.1099	0.8944	0.3737

Additionally, referring to the correlation results of the customized sentiment indices (PC1) and its selective variables, the Thai gold price has the highest positive correlation to the customized local sentiment index. Thus, the Thai gold price positively influences the PCA construction of the local sentiment index. However, the Thai T-bill rate negatively correlates to the customized local sentiment index. Therefore, the Thai T-bill rate strongly negatively influences the PCA construction of the local sentiment index. On the global aspect, the exchange rate has the highest positive correlation to the customized global sentiment index. Thus, the exchange rate between THB and USD performs a more decisive positive influence on the PCA construction of the global sentiment index. Nevertheless, the return of the S&P500 index has the highest negative correlation to the customized local sentiment index. Thereby, the return of the S&P500 has a more decisive negative influence on the PCA construction of the global sentiment index.

The results of corresponding eigenvectors in the first principal component (as the customized investor sentiment indices) show that:

$$SEN_{th,t} = 0 + 0.2127MVTN_t - 0.6631TTB_t + 0.3413RSI_t + 0.6313TGP_t + \varepsilon_t$$

$$SEN_{gb,t} = 0 + 0.6746UST_t - 0.0832SPX_t + 0.6768FX_t + 0.2828VIX_t + \varepsilon_t$$

The primary positive driver for the customized local sentiment index is the local gold price, which has 0.6313 corresponding eigenvectors to the principal component. The relative strength index is the second positive driver for the local sentiment index, which dominates 0.3413 corresponding eigenvectors. The third positive driver for the local sentiment index is the market turnover rate, which dominates 0.2127 corresponding eigenvectors. However, the main adverse driver for the local sentiment index is the Thai T-bill rate, which occupies -0.6631 corresponding eigenvectors. The primary positive driver for the customized global sentiment index is the exchange rate between THB and USD, which has 0.6768 corresponding eigenvectors to the principal component. The US T-bill rate is the second positive driver for the global sentiment index, which dominates 0.6746 corresponding eigenvectors. The third positive driver for the global sentiment index is the VIX index, which dominates 0.2828 corresponding eigenvectors. Nevertheless, the main adverse driver for the global sentiment index is the S&P500 index, which occupies -0.0832 corresponding eigenvectors.

Notably, the turnover variable is positively related to the local investor sentiment index, but the Thai treasury bill rate is a negative coefficient with the local sentiment index. Both the RSI and Thai gold price have a positive effect on the local sentiment index. The positive coefficient between the sentiment index and the Thai gold price could be because 1) using the Thai gold price index as a selective variable, the proportion of Thai gold price would lead to a substantial statistical effect on the customized local sentiment index. Thus, the Thai gold price is the main contributor to

the principal component of the customized local sentiment index. 2) the local gold price follows the global gold price. Furthermore, the global sentiment negatively correlates with the local sentiment. Then the global gold price negatively correlated with the global sentiment index. Thus, the local gold price positively correlates with the local sentiment index.

On the global horizon, the US T-bill rate, the spot exchange rate (THB/USD), and the VIX index explain the most variation in global investor sentiment. An increasing rate of US T-bills leads to positive global investor sentiment. Nevertheless, the good performance of the US equity market leads to negative global investor sentiment. A depreciation of THB attracts global capital into Thailand and benefits Thai export, and the exchange rate variable appears to be positively related to the global sentiment index. The volatility index has a positive relationship with the global sentiment index.

The Market Index Effect

Could the investor sentiment indices have significant explanatory power to the market index return in the Thailand?

The first goal of the research is to analyze the correlation between the customized investor sentiment indices to the two returns of the Thai equity market index, namely, the return of the price index and the return of the total return index. After, the author estimates the lag terms of the customized investor sentiment indices to the two Thai market indices returns using the Granger Causality test.

1) The effect of Sentiment indices to SET Price index, Table 2

Sentiment index' s effect to SET Price index

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
<i>Intercept</i>	0.000	0.0124	0.0000	1
SEN_{th}	0.4439	0.0173	25.6264	5E-136
SEN_{gb}	0.0942	0.0175	5.3675	8E-08
<i>Multiple R</i>	0.4935			
<i>R Square</i>	0.2435			
<i>ANOVA Significance F</i>	2E-298		Observations	4915

$$R_{SETI,t} - R_{f,t} = 0 + 0.4439Sen_{th,t} + 0.0942Sen_{gb,t} + \varepsilon_t$$

Table 2

Both the local investor sentiment index and global sentiment index are a significant positive correlation with the market return of the SET Price index, which adjusts the risk-free rate. The local sentiment has a stronger effect on the Thai price.

2) The effect of sentiment indices to SET Total Return index, Table 3

Sentiment index' s effect to SET Total Return index

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
<i>Intercept</i>	-0.188	0.0128	-14.7137	0
SEN_{th}	0.7316	0.0188	38.9385	3E-283
SEN_{gb}	0.2038	0.0181	11.2364	7E-29
<i>Multiple R</i>	0.6213			
<i>R Square</i>	0.3860			
<i>ANOVA Significance F</i>	0		Observations	4179

$$R_{TRI,t} - R_{f,t} = -0.1881 + 0.7316Sen_{th,t} + 0.2038Sen_{gb,t} + \varepsilon_t$$

Table 3

A similar result from the Price index, both the local investor sentiment index and global sentiment index significantly positively correlate with the market return of the SET Total Return index, which adjusts the risk-free rate. Moreover, the more significant effect of the market return is generated from local investor sentiment.

3) Granger Causality Test

Equation	Excluded	lag 1	lag 5	lag 10	lag 21	lag 126	lag 252
<i>Price Index</i>	SEN_{th}	30.994***	55.319***	12.945***	5.5636***	2.077***	1.571***
<i>Total Return Index</i>	SEN_{th}	703.34***	45.681***	10.863***	3.55***	1.442***	1.2117**
<i>Price Index</i>	SEN_{gb}	209.72***	11.459***	5.0547***	2.4184***	1.3606***	1.3292***
<i>Total Return Index</i>	SEN_{gb}	290.07***	19.1***	7.5606	3.5137***	1.5809***	1.4584***

The null hypothesis: The Excluded dose not Granger-cause the Equation.

The values in the table are F statistics; ** represents the significance level of 5%, *** represents the significance level of 1%.

Tabl

The causality result shows in Table 4. The author tests the causality of the two investor sentiment indices to the return of two market indices by subtracting the risk-free using the Granger Causality Wald Tests. The author implements the lagged periods of 1, 5, 10, 21, 126, and 252. The results show that the lagged local investor sentiment does cause the market returns over a year. Similarly, the results show that the lagged global investor sentiment does cause the market returns over a year.

The P value results reject the null hypothesis of the granger causality test. Thereby, the causality results interpret that the past information of the investor sentiments significantly cause the return of the Thai Price index and Total return index, as corresponding those p-values are less than 0.05. However, the causal effects of investor sentiments are diminishing over the sample period, corresponding to the decreasing trend in the value of causality. Despite that, the results have a limitation, which ascertains whether the time series of investor sentiments help predicate the return of Thai market indices. The results do not show how well the investor sentiment index predicts the return of the Thai equity market index. Customized

investor sentiments significantly cause the Thai equity market to return in the near future.

From the results of the multivariate regression model, all the variables significantly correlate with the Thai equity market return. Therefore, the conclusion is that both customized investor sentiment indices have significant and researchable explanatory power to the market index return movement in the Thai equity market, emphasizing that the change in local investors' sentiments significantly affects Thai equity market movement. Additionally, the past information on customized investor sentiments has significant causality to the market index return.

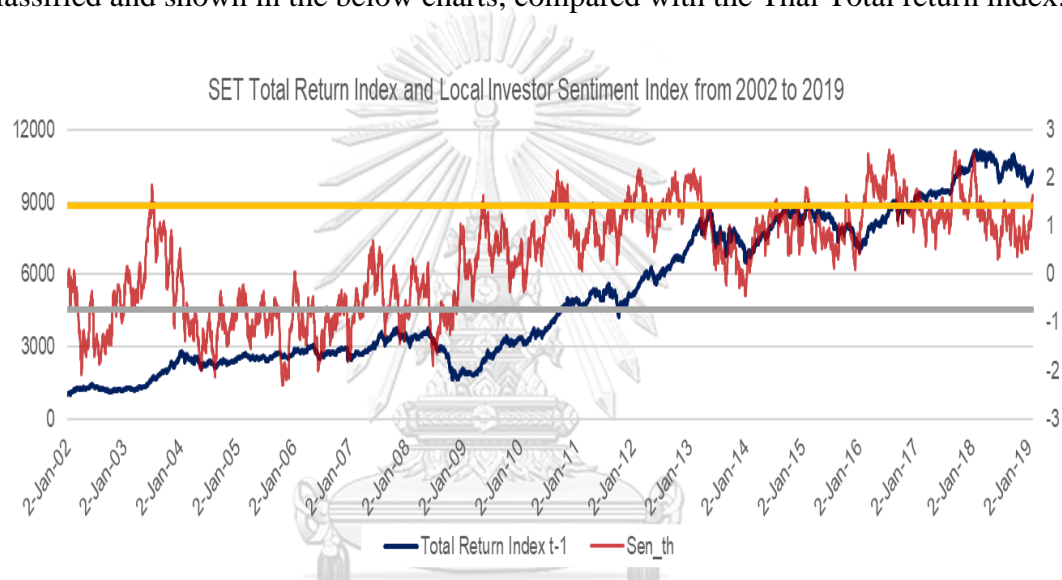
The Predictive Ability

In comparison with other econometric models, could the investor sentiment indices predict the Thai stock market movement using the out-of-sample method?

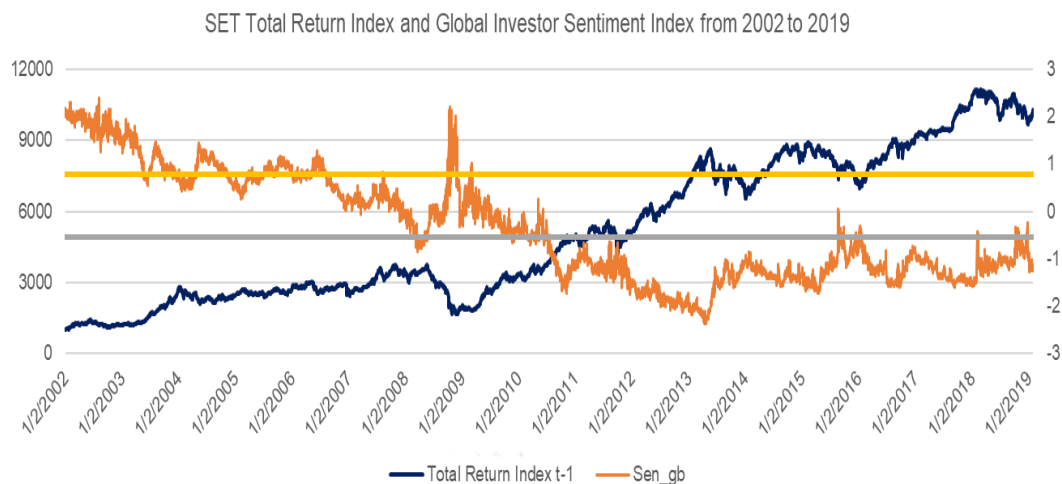
One of the goals of this section is that the sentiment indices could classify Thai equity market states, such as the bear states, the natural states, and the bull states. Then using the customized local investor sentiment index and global investor sentiment index separately as the threshold variable, the author constructs the multivariate threshold model, which estimates to capture the movement of the Thai stock market.

- 1) The Thai stock market classification using the threshold model

The sample period is from 3rd Jan 2002 to 31st Jan 2019 since the total return index of the SET is available starting from 2002. Using the statistical method, the upper threshold value of the local sentiment index is 1.4296, while the lower threshold value of the local sentiment index is -0.7255. The upper threshold value of the global sentiment index is 0.7754, while the lower threshold value of the global index is -1.457. Using those threshold values, three regions of the stock market have been classified and shown in the below charts, compared with the Thai Total return index.



The comparison between the local sentiment index and the SET total return index shows that the local sentiment index is moving with the benchmark index in the same direction. The graph shows that the local sentiment index can reflect the Thai stock market movement. Therefore, it supports this paper's first hypothesis(H1) that the investor sentiment index positively correlates with market returns. The local optimistic (pessimistic) sentiment, the higher (lower) market returns on the local horizon.



The comparison between the global sentiment index and SET total return index shows that the global sentiment index is moving oppositely with the benchmark index. This comparison could imply that when the global sentiment index is high, the global investors are more optimistic about chasing the hot flood of other assets with relatively higher returns and become more risk lovers of another high-stake asset rather than investing in Thai stocks. When global investors find it challenging to handle the uncertainty of the global financial market, they will seek assets that could be able against the loss rather than a financial environmental downtrend. Therefore, the global investors would shift their capital to the Thai equity market against partial uncertainty in the global financial market. In addition to the relatively lower inflation in the Thai goods market and small bubble in stock prices, this suggests that Thai listed stocks have “risk and loss resistance” in the downtrend of the global financial market than other assets with relatively higher national inflation and more giant value bubble. It supports this paper's second hypothesis(H2), where the investor sentiment index negatively correlates with market returns. The global optimistic (pessimistic) sentiment, the lower (higher) market returns on the global horizon.

The estimation result of the multivariate threshold models (MTARs) is as respectively follows:

$$R_t = \begin{cases} -0.052 - 0.0016R_{t-1} + 0.0645R_{t-2} - 0.0512R_{t-3} + \varepsilon_{2t}, & \text{if } Sen_{th,t-1} \leq -0.7255 \\ 0.0809 + 0.0491R_{t-1} + 0.0142R_{t-2} + \varepsilon_{2t}, & \text{if } -0.7255 < Sen_{th,t-1} \leq 1.4296 \\ 0.1035 - 0.032R_{t-1} + 0.017R_{t-2} - 0.0783R_{t-3} - 0.0435R_{t-4} - 0.113R_{t-5} + \varepsilon_{3t}, & \text{if } 1.4296 < Sen_{th,t-1} \end{cases}$$

$$R_t = \begin{cases} 0.1036 - 0.0489R_{t-1} + \varepsilon_{1t}, & \text{if } Sen_{gb,t-1} \leq -1.457 \\ 0.0533 - 0.0123R_{t-1} + \varepsilon_{2t}, & \text{if } -1.457 < Sen_{gb,t-1} \leq 0.7754 \\ 0.0287 + 0.0923R_{t-1} + 0.0847R_{t-2} - 0.0028R_{t-3} + 0.0109R_{t-4} - 0.0462R_{t-5} \\ -0.0902R_{t-6} + 0.0228R_{t-7} + 0.0491R_{t-8} - 0.0744R_{t-9} + 0.1046R_{t-10} + \varepsilon_{3t}, & \text{if } 0.7754 \leq Sen_{gb,t-1} \end{cases}$$

The AIC chooses the lag terms of the multivariate threshold autoregressive model.

Using the Ljung-Box test, all the autoregressive models within the MTAR are consistent with time series stationary. The residual errors look like white noise.

With the different threshold values, the forecast model of each autoregressive in the MTAR is different. Based on the local sentiment index, the auto-regression in the bear period chooses three lag terms ($Sen_{th,t-1} \leq -0.7255$). It implies that the local investors' sentiment index takes the past three days' information to forecast one day ahead of the stock market. Nevertheless, the auto-regression based on the global sentiment index chooses one lag term ($Sen_{gb,t-1} \leq -1.457$). It implies that the global investors' sentiment index takes yesterday's information to forecast today's stock market. In the natural period, auto-regression based on the local sentiment index chooses two lag terms ($-0.7255 < Sen_{th,t-1} \leq 1.4296$). It implies that the local investors' sentiment index takes the past two days' information to forecast one day ahead of the stock market. However, the auto-regression base on the global sentiment index chooses one lag term ($-1.457 < Sen_{gb,t-1} \leq 0.7754$). The result is similar to the bear period, and the global

investors' sentiment index takes yesterday's information to forecast today the stock market. In the bull period, the auto-regression base on the local sentiment index chooses five lag terms ($1.4296 < Sen_{th, t-1}$). It implies that the local investors' sentiment index takes more past days' information to forecast today's stock market. By contrast, the auto-regression base on the global sentiment index chooses ten lag terms ($0.7754 \leq Sen_{gb, t-1}$). For two trading weeks, the global sensitive investor is concerned with predicting the following stock market.

2) The predictive ability of models

The result of Average difference(AF)

	$AF_{(Martingale - AR(p))}$	$AF_{(Martingale - MTAR_{th})}$	$AF_{(Martingale - MTAR_{gb})}$	$AF_{(AR(p) - MTAR_{th})}$	$AF_{(AR(p) - MTAR_{gb})}$	$AF_{(MTAR_{th} - MTAR_{gb})}$
MSFE	0.359***	0.516***	0.353***	0.157***	-0.006	-0.163***
MAFE	0.122***	0.288***	0.183***	0.165***	0.061***	-0.104***

Note: $AR_{(p)}$ is Autoregression model with lag order p , $MTAR_i$ is the Multivariate threshold autoregression model.

The values in the table are averaging difference bwtween two models; ** represents the significance level of 5%, ***represents the significance level of 1%

Table 5

Table 5 shows the averaging difference of MSFE and MAFE compared between the two models. From the result MSFE, in ranking, the Multivariate threshold autoregressive model based on the local sentiment index has the most statistical dominance than the Martingale model, the Simply Autoregression model, and the Multivariate threshold autoregression based on the global sentiment index. The second statistical dominance model is the Multivariate threshold autoregressive model based on the global sentiment index, which has more minor forecast errors than the Martingale model. However, there is insignificance between the Autoregression model and the Multivariate threshold autoregressive model based on the global sentiment index. The least predictive ability is the Martingale model compared with

other models. The results from MSFE suggest that the local sentiment index, as a reference to the Multivariate threshold model, had the most statistical advantage for predicting the Thai market index movement. Additionally, the result suggests that the Multivariate threshold autoregressive model based on the global sentiment index has a better predictive ability to the Thai market index movement than the Martingale model. Nevertheless, the predictive ability of the Autoregression model and the Multivariate threshold autoregressive model based on the global sentiment index are indifferent.

From the results of MAFE, the Multivariate threshold autoregressive model based on the local sentiment index has the most statistical dominance in rank like the result of MSFE. However, The Multivariate threshold autoregressive model based on the local sentiment index is the second statistical dominance in rank, which has more minor forecast errors than the Autoregression model with statistical significance. The third model is the Autoregression model, and the last is the Martingale model. The results from MSFE imply that using the local sentiment index has a more vital statistical advantage in the market index movement projection of the Thai equity market. Then, the results imply that based on the global sentiment index has a better predictive ability on the Thai market index movement than the Autoregression model then the Martingale model.

Overall, the above results indicate that the customized investor sentiment indices act a better predictive ability of the Thai stock market movement, thus answering the second main research question of this paper, using the out-of-sample test, the investor sentiment index predicts the Thai stock market movement. Especially the local

sentiment index is least errors in forecasting the benchmark index based on MSFE and MAFE. The result implies that to predict the Thai stock market movement, the investor should pay more attention to the change in the local sentiment index. Furthermore, the author suggests taking the global sentiment index as the second reference when the investors predict the entire stock market because of the deep global connection in nowadays financial market and the high degree of the open economic environment in Thailand.

3) The trading strategies

As the results from MSFE and MAFE, the customized investor sentiment index can predict the movement of the Thai stock market with fewer predictive errors. The author applies the trading strategy for estimating the expected profit of the forecasting models, which includes the Martingale model, the simple Autoregression model, the Multivariate threshold autoregression model based on the customized local sentiment index, and the Multivariate threshold autoregression model based on the customized global sentiment index. The result shows in Table 6.

The Expected Profit Result of The Forecasting Models

<i>The Forecasting Models</i>	<i>Mean Forecast Trading Return</i>
<i>Martingale Model</i>	<i>3.313%***</i>
<i>Simple Autoregression Model</i>	<i>14.7%***</i>
<i>Multivariate Threshold Autoregression Model based on the Local Sentiment Index</i>	<i>33.779%***</i>
<i>Multivariate Threshold Autoregression Model based on the Global Sentiment Index</i>	<i>30.291%***</i>

*The ***represents the significance level of 1%*

Table 6

From the result of the mean forecast trading return of the forecasting models (Table 6), the Multivariate threshold autoregression model (MTAR) based on the customized

local sentiment index has a 33.779% expected return compared to the rest of the forecasting models. The multivariate threshold autoregression model (MTAR) based on the customized global sentiment index has a 30.291% of expected return. The Martingale and simple Autoregression models perform 3.313% and 14.7% of expected return, respectively. All the mean forecast trading returns are statical significant at the 1% level.

The expected profit results of trading strategies on the Total return index are shown in Table 7.



The Expected Profit Result of Trading Strategies

<i>Trading Strategies</i>	<i>Mean Forecast Trading Return</i>
<i>Total Returns Index based on the Local Sentiment Index</i>	<i>12.635%***</i>
<i>Total Returns Index based on the Global Sentiment Index</i>	<i>9.293%***</i>
<i>Total Returns Index based on the Buy-and-Hold</i>	<i>3.988%***</i>

*The ***represents the significance level of 1%*

From the expected profit of trading strategies, the trading results show that following the customized local sentiment index to buy or sell, the Total returns index gains a 12.635% trading return. The implementation of the opposing the customized global sentiment index to buy or sell the Total returns index gains 9.293% trading return. The buy-and-hold strategy gains a 3.998% trading return. The results suggest that with different customized sentiment indices, the trading strategy should keep different from chasing a higher profit than the trading strategy of buy-and-hold.

The result supports the principle of trading strategies. The investors who use the trading strategy based on the local sentiment index should buy the Thai benchmark

index when it exceeds its lower threshold, which means the local investors turn optimistic and buy the Thai stock market. When the local sentiment index falls below its lower threshold value, local investors turn pessimistic and have a higher probability of selling their Thai stocks. Then, selling the Thai stocks and moving the capital to other assets are recommendations. Therefore, following the local sentiment index could be more likely to gain a positive return.

Unlikely the local sentiment index on the trading strategy, the investors who prefer the trading strategy based on the global sentiment index should invest in the Thai stock market when the global sentiment index is less than its upper threshold, which means the global investor turn to pessimistic to the other assets and seek for the assets that have well uncertainty-resistance. When the global sentiment index turns optimistic, the global market becomes boom. Then, the global investor would seek other assets that have expected higher returns as they are willing to bear more risk. The Thai stocks may be less returns-attractive to global investors. Selling the Thai stocks and chasing other assets would be better. Overall, opposing the global sentiment index could generate a higher profit.

As the paper mentions above, the MTAR of the local sentiment index follows the trading strategy of local sentiment, while the MTAR of the global sentiment index follows the trading strategy of global sentiment. The author applies the Buy-and-Hold trading strategy to the Martingale and simple Autoregression models. Combining the results of the forecasting errors from the previous section, the paper suggests that the Multivariate threshold autoregression model based on the local sentiment index has the highest expected daily profit with the relatively lowest forecasting errors. The

paper also implies that the Multivariate threshold autoregression model based on the global sentiment index has better expected daily profit with fair predictive ability than the Martingale model and simple Autoregression model. In addition to the trading result on the Total returns index, both sentiment indices perform better than the Buy-and-hold strategy. Therefore, the paper recommends taking the customized investor sentiment indices into account for the projection of the Thai benchmark movement. Moreover, the paper suggests using the customized investor sentiment indices as a valuable reference to deal with daily trading.

The Cross-Section Effect

Do the investor sentiment indices significantly affect the cross-section stocks in Thailand?

The last main goal of the research is to identify which kind of Thai stock impacts more by the change in investors' sentiment, namely the cross-section stock analysts. Using the customized local investor sentiment index and global investor sentiment index separately to run the ordinary multivariate regression, estimate the variables' coefficient, and test their significance. Before estimating the regression coefficient, the author applies the Dickey-Fuller test to examine the time series unit root. The results of the Dickey-Fuller test show that all the time series reject the unit root at the 1% significant level. Thus, all the time series are stationary.

Regression results of the current sentiment indexes on the cross-section return

	<i>Intercept</i>	<i>Sentiment_{th,t}</i>	<i>Sentiment_{gb,t}</i>
<i>SMB_t</i>	0.002***	-0.0031**	-0.002
<i>R_{Dividend yield,t}</i>	0.0004*	0.0023**	0.0019**
<i>R_{Tangible asset,t}</i>	0.0006**	0.0025**	0.0015**
<i>R_{Debt ratio,t}</i>	0.0006**	0.003**	0.002**
<i>R_{P/E ratio,t}</i>	0.0003	0.0026**	0.002**
<i>R_{P/B ratio,t}</i>	0.0006**	0.0027**	0.0019**

The values in the table are coefficient.

** represents the significant level of 5%; ** represents significant level of 1%.*

Table 8

Table 8 demonstrates the multivariate regression results in the current time t of customized sentiment indices as the dependent variable to estimate the cross-sections.

The results provide partial support to the research hypothesis. First, the coefficient results of SMB show that when the investor sentiments, both local and global, are high, the returns on the small firms are relatively low over the sample period. However, only the local investor sentiment significantly affects the return of small firms.

Second, the result of dividend payment shows that there is a positive correlation between the dividend payment and investor sentiment. When the investor sentiments are high, a higher return on the high dividend firms. With the same 1% significant level, the local sentiment index has a greater effect on the high dividend stocks than the global sentiment index. Therefore, the result of dividend payment is discrepancy to the hypothesis three(H3), in which the companies with low cash dividends are relatively more affected by the sentiment index. The potential reason to the result of dividend payment is that the Thai firms with high dividend may not seek other reinvestment opportunities or growth opportunities to generate their capital expansion.

Then, the equity investors would reinvest their gained dividend back to the Thai equity market, which amplifies their future earnings. Therefore, the equity investor is more concerned about the Thai firm that pays high cash dividends.

Third, the result of tangibility characteristics shows similarity. The investor sentiments significantly affect the firms' return with a resourceful tangible asset.

However, the empirical result of tangible assets contradicts the fourth hypothesis(H4) in which the firms' return with the low tangible asset is more affected by the investor sentiment index. The potential implications for the result of the tangible asset are that the investors would sell the Thai firms with a high tangible asset in the condition of natural disasters, such as storms, typhoons, and heavy floods, or in the condition of investors anxious for a near future period, thus collect their cash back to hands.

However, in the bull period, investors are more likely to invest in firms with high tangible assets because they expect the blooming in real estate in the near future. In the bull period, the firms with high tangible assets perform less volatility and offer a constant investment to generate profit. The Thai firms with higher tangible assets would draw more attention from equity traders. Thus, when investors are optimistic, Thai firms with relatively heavy tangible assets perform better, as the investors expect the natural environment near the future is stable and more capital inflow to real estate.

Fourth, the result of debt ratios shows that the investor sentiments are generating with high liability proportion over the firm asset. Therefore, the result supports the fifth hypothesis(H5) that financial risk positively relates to investor sentiment. The impact of investor sentiments is low for firms with light liability proportion over their asset.

The result of the P/E ratio shows that the firms with low profitability have more

impact on investor sentiments. Thus, the result of the P/E ratio supports the sixth hypothesis(H6) that the investor sentiment index impacts equities of high P/E ratios.

However, the P/B result shows that the value premium equities are more sensitive than the growth equities. Therefore, equities with high price-to-book ratios are comparatively more affected by investor sentiments, which is against the last hypothesis(H7). The P/B result implies that when the investor sentiments are high, the return of firms with high market capitalization is relatively high over the sample period, as the condition that the investors are more willing to buy the Thai value premium stocks. The potential reason to buy a stock with a high P/B ratio is the stock returns, generally speaking, the return of value premium is higher than the growth stocks. Due to less growth space for value premium stocks, the value premium stock has less volatility than the growth stocks. Furthermore, the premium stock is likely to offer dividends more often than the growth stocks. A relatively high-frequency dividend would attract the investors to buy the value premium stocks.

Overall, the local investor sentiment is a more substantial effect on the cross-section. The effect of local investor sentiment is greater than that of global investor sentiment on the high-value premium firms, as both variables are a 1% economic significance. Moreover, the Thai listed stocks with high dividend payments, high tangible assets, high financial risk, low profitability, and value premium are more susceptible to changes in local sentiments and global sentiments.

Table 9 shows the regression results using the customized investor sentiment lag term($t-1$) to predict the different characteristic stocks' returns.

Regression results of the lag term of sentiment indexes on the cross-section return

	<i>Intercept</i>	<i>Sentiment_{th, t-1}</i>	<i>Sentiment_{gb, t-1}</i>
SMB_t	0.002***	0.0027**	0.0017
$R_{Dividend\ yield, t}$	0.0004*	0.0007*	0.0008**
$R_{Tangible\ asset, t}$	0.0006	0.0008**	0.0005
$R_{Debt\ ratio, t}$	0.0006**	0.0013**	0.0009**
$R_{P/E\ ratio, t}$	0.0003	0.0008**	0.0008*
$R_{P/B\ ratio, t}$	0.0006**	0.0007*	0.0006

The values in the table are coefficient.

** represents the significant level of 5%; ** represents significant level of 1%.*

Table 9

Most of the results shows similar to Table 8. The local investor sentiment has a significant predictive effect on the stocks' return. However, the global investor sentiment has an insignificant predictive effect on the firms with small market sizes, high tangible assets, and high price-to-book value. The local investor sentiment primarily affects the cross-section returns, similar to previous results. Overall, the portfolio with high dividend payment, high financial liability, and low profitability has excess returns in the one lag period when both investor sentiment indices are optimistic.

As the author mentioned, this section's purpose is to examine the theoretical effect of investor sentiment on the different characteristic firms. The empirical results answer the last research question that the investor sentiment index significantly affects the cross-sectional equities in Thailand. Individually, the local sentiment positively correlates with the big market size of Thai firms, high dividend payment, high tangible assets, high financial risk, low profitability, and the value premium firm, and vice versa. The global sentiment positively correlates with Thai firms with high

dividend payments, high tangible assets, relatively high financial liability, low profitability, and value premium firms regardless of the firms' size. Additionally, when the local investor sentiment is high, future returns are relatively high for small-size firms, high dividend-paying firms, the firms with resourceful tangible assets, high financial risk firms, low profitability firms and the value premium firms in the Thai stock market. On the other hand, when the global investor sentiment is high, the future returns are relatively high for dividend-paying firms, high financial risk firms, and low profitable firms, regardless of firm size, the proportion of tangible assets, and whether the Thai firms are valued stocks or growth stocks.

Overall, with the current period term, the Thai listed stocks with high dividend payment, high tangible assets, high financial risk, low profitability, and high market values are more susceptible to the change in the customized local sentiments and global sentiments. Although the results of predictions show that the customized investor sentiment has slightly weak effects on stocks that are hard to value and hard to arbitrage, as the small coefficient values, the portfolio with high dividend payment, high financial liability, and low profitability has excess returns in the one lag period when both customized investor sentiment indices are optimistic. Despite the weak performance of the coefficient test, this paper provides practical suggestions on which characteristic Thai stocks are more affected by the customized investor sentiments and the short-timing significant prediction of customized investor sentiments to the Thai cross-section stock.

CONCLUSIONS AND CONTRIBUTIONS

Studying the existing theories, the author knows there are noise traders in the stock market. The noise traders bring hazy information into the stock market and influence other investors through the social network. With the noisy information, keeping an entirely rational mind on investment behavior is challenging for investors.

This paper studies the effects of investor sentiment in the Thai stock market from the existing concept of behavioral finance theory, which supports the applicability of behavioral finance theory in the Thai stock market, thus filling the gap of such research in the emerging financial market.

Investors are usually affected by their subjective cognition or nearby people and economic environment in a financial decision. The prior literature has suggested the effect of investor sentiment on stock return. Learning the empirical research, the author knows that different researchers used different factors to measure investor sentiment. The author also knows that investor sentiment could forecast the market return movement in the short-term/long-term horizon. Most researchers follow the framework of the Baker-Wurgler model. The existing empirical research reveals that investor sentiment has localization property. However, there are few kinds of research focusing on the global effect. Moreover, the current research is insufficient to fill the gap in the investor sentiment effect on the emerging financial market.

Research Fundings

This paper reviews the existing research to customize the two indicators by compiling composite investor sentiment using the first component of the principal component

analysis (PCA). In addition to the result of the Granger Causality Wald Test, the findings of this paper are as follows:

1. Customized investor sentiment has a significant effect on the Thai equity market returns.
2. The customized local investor sentiment affects the market index returns more than the global investor sentiment over time.
3. The customized investor sentiment indices have significant time-delayed causality to the Thai equity market returns.

Furthermore, using the rolling out-of-sample method, the result from the estimation of predictive ability shows that the multivariate threshold autoregressive model based on the customized investor sentiment indices has fewer forecasting errors in the market index movement than other classical econometric models, such as the Martingale model and simple Autoregression model. Thus, the findings of this paper are as follows:

4. With a lagged term of customized sentiment indices, the local sentiment index is moving with the Total returns index of the Thai stock market in the same direction. However, the global sentiment index is moving with the Total return index in the opposite direction.
5. The customized investor sentiment performs a high accuracy to predict the Thai equity market index movement, compared with other empirical econometric models.

6. In an interval comparison of the customized sentiment indices, the local investor sentiment index has better forecast ability than the global investor sentiment index.

This paper designs a series of trading strategies to compare the average forecast return based on the forecasting models. The trading result shows that using the prediction returns of the Multivariate threshold autoregression model based on the customized local sentiment index achieves the highest expected trading profit than other empirical models. The Multivariate threshold autoregression model based on the customized global sentiment index achieves the second higher expected trading profit. Also, Using the change of customized investor sentiment indices have higher expected profit on the trading of the Total return index than the Buy-and-Hold strategy. Thus, the suggestions of this paper are as follows:

7. The daily equity traders should follow the trend of customized local sentiment to buy/sell the Thai benchmark index but oppose the trend of customized global sentiment to buy/sell the Thai benchmark index.
8. The daily equity traders should use the prediction from the multivariate threshold autoregression models based on the customized investor sentiment as a signal to buy/sell the Thai equity.
9. Compared with the passive trading method, following the change of customized investor sentiment indices to buy/sell the Thai equity on intraday is a recommended trading strategy.

After introducing the investor sentiments, the returns of characteristic stocks show apparent differences; thus, this paper has different findings than the existing literature:

10. There are differences in the sensitivity of stocks' returns from investor sentiments. The customized local investor sentiment has a more decisive effect on the Thai stocks' returns than the global investor sentiment.
11. The Thai listed stocks with big market sizes, high dividend payments, high tangible assets, high financial risk, low profitability, and high market values are more susceptible to the change in the customized local sentiments. On the other hand, the Thai listed stocks with high dividend payments, high tangible assets, relatively high financial liability, low profitability, and value premium are more susceptible to the change in customized global sentiments, regardless of firm size.

Under the condition that both indices are significant, the Thai listed stocks with high dividend payment, high tangible assets, high financial risk, low profitability, and value premium are more susceptible to the change in the customized local sentiments and global sentiments.
12. The customized investor sentiments have adequate explanatory and predictive power for the excess returns on the Thai cross-section stocks. When the local investor sentiment is optimistic, the Thai stocks portfolio with those characteristic values such as small market size, high dividend payment, resourceful tangible asset, high financial liability, low profitability, and value premium has excess returns in the one lag period. While the global investor sentiment is optimistic, the Thai stocks portfolio with those characteristic values such as high dividend payment, high financial liability, and low profitability has excess returns in the one lag period.

Under the condition that both customized investor sentiment indices are optimistic, the Thai stocks portfolio with high dividend payment, high financial liability, and low profitability has excess returns in the one lag period.

Research Contributions

This paper offers a small contribution to the growth of literature studying the role of investor sentiment:

1. As the lack of literature on the studying of investor sentiment in the emerging financial market, this paper customizes two indices using the local and global factors to study the movement of the Thai stock market's return, calling *the local sentiment index* and *the global sentiment index*, which are relatively more minor research focus. Also, this research extends the study of the global factors on the Thai market index returns.
2. The authors emphasize localized investor sentiment. The segmentation of the customized investor sentiment would have a more substantial predictive power on the Thai equity market's return movement, comparing the existing research that mainly focuses on the explanation power of general investor sentiment.

This paper contributes to the customized investor sentiments by focusing on factors that could reflect the local and global properties, respectively, based on the previous literature studies:

3. The variables for constructing the local sentiment index include the market turnover, the Thai T-bill rate, the relative strength index, and the local gold price index.

4. The variables of the global sentiment index include the U.S. T-bill rate, the S&P500 index, the Exchange rate between THB and USD, and the Chicago board options exchange volatility index (VIX).

Although the existing research provides evidence that investor sentiment can forecast the market return, it lacks the estimation of the predictive ability of investor sentiment in the stock market, thereby offering investment suggestions, especially the studies in the emerging market.

5. This paper estimates the predictive ability of customized investor sentiment compared with other classical econometric models. Customizing the investor sentiment is a valuable predictive reference for the Thai benchmark movement.
6. This research estimates the expected profit of customized investor sentiment on the Thai equity market and then offers a researchable investment strategy for investors who like to use investor sentiment as a signal to buy/sell equity, which follows the local investor sentiment but opposes the global investor sentiment.

Due to the different behavioral factors in finance and market integrity in various countries, the relationship between investor sentiments and cross-sectional returns has differences.

7. This paper examines the customized investor sentiments to different cross-section stock portfolios, then indicates which characteristic stock is more affected by the investor sentiments.

8. This paper suggests a slight prediction of customized investor sentiments on the Thai cross-section stocks. Nevertheless, the research on investor sentiments is still developing and needs further in-depth theoretical analysis and empirical estimation.

Limitation

The literature indicates that investor sentiment reflects individual investors' subjective preference for the financial market. Additionally, retail investors in different financial markets react differently to the financial market change. Researchers utilize various variables to estimate the investor sentiment based on their subjective background. Thus, identifying the full variables of the investor sentiment index is a long-term journey and needs horizontal and vertical study resources. The papers admits that there are inappropriate estimations on selective variables, such as the Thai gold price index, which dominates the significant effect on the customized local sentiment index, and the US T-bill rate, return of the S&P500 index, which may contain the systematic risk of US market, affecting the measurement of global sentiment index. Therefore, this paper enlightens future research exploring other potential variables with more market explanatory power, measuring the selective variables appropriately, and better reflecting the subjective preference of the retail investor.

Last but not least, using high-frequency data in this paper aim to capture the rapid reaction of investor sentiment to the change in the Thai stock market. The side-effect is that such high-data frequency customizes and estimates the effects of the investor sentiment could contain the volatile market noise. Therefore, further study may consider using comparable low-frequency data to construct the investor sentiment

index. Moreover, future research could expense other econometric models to examine, thereby improving investor sentiment's predictive accuracy.



REFERENCES



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