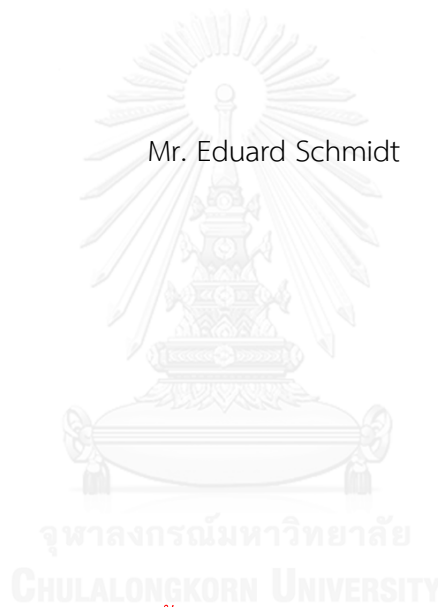


The Impact of Attention on Investors: Evidence from the Stock Exchange of Thailand.

Mr. Eduard Schmidt



บทคัดย่อและแฟ้มข้อมูลฉบับเต็มของวิทยานิพนธ์ตั้งแต่ปีการศึกษา 2554 ที่ให้บริการในคลังปัญญาจุฬาฯ (CUIR)
เป็นแฟ้มข้อมูลของนิสิตเจ้าของวิทยานิพนธ์ ที่ส่งผ่านทางบัณฑิตวิทยาลัย

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ผลกระทบของความสนใจต่อนักลงทุน: หลักฐานจากตลาดหลักทรัพย์แห่งประเทศไทย



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต

สาขาวิชาการเงิน ภาควิชาการธนาคารและการเงิน

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วิทยานิพนธ์ฉบับนี้ศึกษาอิทธิพลของความสนใจต่อการลงทุนของนักลงทุน 3 ประเภท ได้แก่ นักลงทุนรายย่อย นักลงทุนสถาบัน และนักลงทุนต่างชาติ ในตลาดหลักทรัพย์แห่งประเทศไทย ระหว่างปี 2554 ถึง 2557 เพื่อที่จะวัดผลกระทบของความสนใจ ข้าพเจ้าทำการจัดกลุ่มหุ้นเป็นรายวัน โดยใช้เกณฑ์ผลตอบแทนรายวัน และเกณฑ์ปริมาณการซื้อขายรายวัน การซื้อหุ้นที่ได้รับความสนใจ เป็นวิธีการที่ใช้แก้ปัญหาในการเลือกซื้อหุ้นจากหุ้นจำนวนมากในตลาด ข้าพเจ้าทดสอบและยืนยันสมมติฐานที่ว่านักลงทุนรายย่อยเป็นผู้ซื้อสุทธิในกลุ่มหุ้นที่ได้รับความสนใจ นอกเหนือจากนั้นข้าพเจ้ายังตั้งสมมติฐานว่าความสนใจส่งผลกระทบต่อทางเลือกซื้อหุ้นของนักลงทุนแต่ละกลุ่มต่างกัน ข้าพเจ้าพบว่าทางเลือกซื้อหุ้นของนักลงทุนรายย่อยเกี่ยวข้องมากที่สุดกับกลุ่มหุ้นที่ได้รับความสนใจ และการทดสอบยังแสดงว่าทางเลือกซื้อหุ้นของนักลงทุนสถาบันก็จะเลือกซื้อกลุ่มหุ้นที่ได้รับความสนใจเช่นกัน อย่างไรก็ตามนักลงทุนต่างชาติไม่ได้แสดงอย่างชัดเจนว่ามีการเลือกซื้อหุ้นจากกลุ่มหุ้นที่ได้รับความสนใจ

จุฬาลงกรณ์มหาวิทยาลัย
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ภาควิชา การธนาคารและการเงิน

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This paper examines the influence of attention on three investor groups: individual investors, institutional investors and foreign investors in the setting of the Thai stock market between 2011 and 2014. To measure the impact of attention I sort stocks by their extreme daily returns and by their abnormal trading volume on a certain day. Purchasing stocks that grabbed ones attention earlier is a way to deal with the problem of having to choose from thousands of stocks that one could potentially buy. I test and confirm the hypothesis that individual investors are net buyers of attention grabbing stocks. Furthermore I hypothesize that attention affects different investor groups to a different degree in their buying behavior. I confirm that individual investors engage the most in attention driven buying behavior. Surprisingly I find strong evidence for attention driven buying behavior for institutional investors as well. Foreign investors merely show tendencies for purchases driven by attention grabbing stocks.



Department: Banking and Finance

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CHAPTER 1

INTRODUCTION

1.1 Background and Significance of the Problem

Modern finance is based on theories and principles that assume the market and their agents act efficient and systematic. The efficient market hypothesis (EMH) states that the asset prices in the markets reflect all available information and investors behave rationally (Fama, 1970). However, findings of Kahneman and Tversky (1979) show results which are inconsistent with EMH. Behavioral finance (BF) introduces psychological aspects to traditional economics and finance. BF suggests that the investment decision-making process is influenced by various behavioral biases that cause investors to deviate from rationality and therefore lead to systematic errors. Common systematic errors are overconfidence, herding behavior, the disposition effect and the home bias. It is well established by the literature that the degree to which certain investors are influenced by those biases may vary depending on sophistication, experience, culture and other personal attributes. Therefore it is worth to divide

investors into different groups regarding their characteristics when analyzing behavioral biases. Studies on the home bias, the disposition effect, herding and other biases found that institutional investors are much less likely to show irrational behavior than individual investors do.

This logic applies to the effect of attention on investment decisions, too. Odean (1999) suggests that investors that are faced with the decision to purchase stocks, limit their search by choosing from stocks that recently attracted their attention. By examining the U.S. market, Barber and Odean (2008) show that many investors indeed only purchase stocks from a choice set that was determined by attention - evidence for the existence of another systematic error I will refer to as the attention bias. However, the attention bias only occurs among individual investors as their attention is a scarce resource and they face huge search problems when deciding to buy common stocks. This basically means that they can't evaluate hundreds of stocks in the market especially since they differ in many attributes. After the option set gets limited by attention, contrarians might buy previous losers while trend chasers buy previous winners. When they decide to sell, however, they commonly only consider

stocks that they already own, because they rarely engage in short selling. Therefore they only face the search problem when buying, not when selling. Resulting from this they have been found to be net buyers of attention grabbing stocks.

Professional investors deviate from attention driven purchase behavior as they have more time, resources and experience on their hand. Furthermore they are more likely to enter short sell positions. However, the Stock Exchange of Thailand might bear deviations regarding short selling as other papers suggest that even institutional investors seem not to engage in short selling actively due to regulations (Sawad, 2010). But even without short selling, institutional investors avoid the search problem by focusing on certain industries or sectors (*e.g.* high-growth stocks, certain ratios). Chen *et al.* (2007) find evidence that behavioral biases differ between markets as well. Their research found that Chinese investors seems to be more overconfident and have a stronger disposition effect than U.S. investors. This makes studies of behavioral biases in emerging markets even more interesting.

1.2 Objectives of the Study

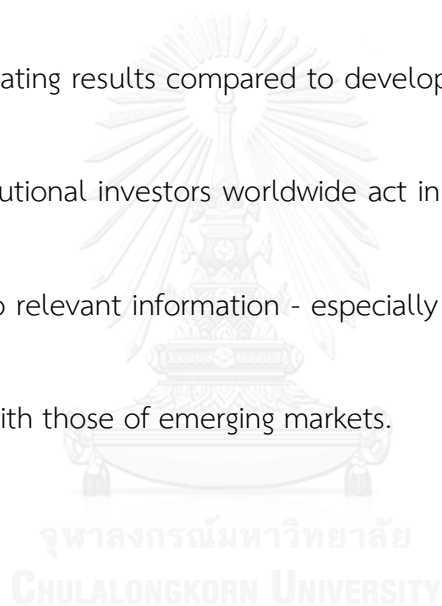
This paper aims to examine the influence of attention on the buying and selling behavior of different investor groups - including foreign investors, individual investors, and institutional investors - in the setting of the Stock Exchange of Thailand (SET). The motivation behind it is to see if the ability to behave rational of sophisticated institutional investors decreases when they invest out of their field of expertise - their domestic market. Or in other words: do institutional investors experience an increase in irrational behavior when they become foreign investors? This would be the case if the results show evidence for the attention bias within foreign investors but not within domestic institutional investors. The resulting implication would be that the attention bias can be explained by sophistication, experience and resources.

To meet my objectives, I apply the following framework: After separating the investor groups from each other, I use my proxies for attention to sort the stocks depending on how much attention they created on a particular day. Once I group the stocks regarding their level of creating attention, I can analyze how the buying and

selling behavior of each investor group is varying between high and low attention stocks. This can be done by examining their buy-sell imbalances.

Analyzing the attention bias in the setting of the Thai market is interesting because an emerging market yields high growth options and a different cultural setting which is proven to be relevant when it comes to behavioral biases (Chen *et al.*, 2007).

This might cause deviating results compared to developed markets. Furthermore it is unlikely that all institutional investors worldwide act in the same rational manner or have similar access to relevant information - especially when comparing agents from developed markets with those of emerging markets.



1.3 Contribution

This study has three main contributions to the current literature. So far, researchers haven't focused on behavioral biases for foreign investors even though they differ in several attributes from domestic institutional investors. I take the Barber and Odean (2008) idea and develop it by adding the group of foreign investors. It is

reasonable to assume that the additional amount of problems and difficulties that foreign investors face contribute to the development of biases.

Furthermore this paper also adds to the stream of research on behavioral biases in emerging markets where the results of other studies indicate that biases are more pronounced compared to developed markets. Especially in Thailand the research on behavioral biases is quite scarce.

Lastly, my findings might give insights regarding the home bias. In case I find proof for the attention bias within foreign investors but not within domestic institutional investors, they support the information asymmetry theory rather than the bounded rationality theory. This means that the overinvestment in domestic assets has rather rational reasons.

CHAPTER 2

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 Behavioral Biases

Behavioral biases are a form of bounded rationality. They are cognitive biases that impact the decision-making process of market participants in a way that makes them deviate from acting fully rational. There are a number of biases mentioned in this research to illustrate the relationship between biases and investors characteristics. The disposition effect is a bias in which the investor tends to hold on to losing stocks (reluctance to realize losses) for too long while realizing gains too early. Shefrin and Statman (1985) firstly came up with a model that has been supported by empirical evidence ever since. Herding deals with market participants following the judgments of others. Analysts might engage in imitating others due to reputational reasons whereas individual investors just follow the decisions of a large group of noise traders (Goyal, 2015). The home bias puzzle stands for the empirical finding that market participants overinvest in domestic stocks relative to the theoretically optimal

investment portfolio which suggests to diversify internationally (Sercu and Vanpée, 2007).

2.2 Biases and Individual and Institutional Investors

When studying behavioral biases, investors' characteristics play an important role. This is well established for sophistication and experience. As those attributes decrease, behavioral biases generally increase. However, this does not mean that sophisticated investors are excluded from showing biases. Feng and Seasholes (2005) prove that investors sophistication and experience eliminate the reluctance to realize losses (but only decrease the tendency to realize gains too early), also known as the disposition effect. Similar results are documented for herd behavior and the home bias puzzle. Lee *et al.* (2004) could establish that individual investors are more prone to engaging in liquidity trades and herd behavior compared to institutional investors which represent informed traders. Grinblatt and Keloharju (2001), Goetzmann and Kumar (2004), and Karlsson and Nordén (2007) provide research on portfolio compositions of

individual investors and find a tendency to overinvest in domestic assets - the home bias - based on investor characteristics like sophistication and experience.

From this we can infer that agents that choose to invest in a foreign market are predominantly the sophisticated, experienced type - institutional investors.

2.3 Biases and Foreign Investors

Previous research on foreign investors mostly focuses on their impact on market efficiency, stock prices and volume. Unfortunately the literature lacks of research for behavioral biases impacting foreign investors. This might be due to the fact that foreign investment characteristics are generally aligned with those of institutional investors. This paper tries to fill this gap. Especially in an emerging market foreign investor behavior could be of importance. If foreign investors are mainly from developed countries they are likely to have deviating investment behavior compared to domestic institutional investors of an emerging market.

As mentioned before, findings of research of the home bias teach us that the unexperienced, unsophisticated investor type is prone to invest in their domestic market whereas institutional investors are much more likely to invest in foreign markets. Dahlquist and Robertsson (2001) analyze the Swedish stock market and find that foreign investors have similar portfolio preferences as domestic institutional investors. This teaches us that we can assume foreign investors to (i) be mostly institutional investors rather than individual investors which is also supported by Dziuda and Mondria (2008) and (ii) not be net buyers of high attention stocks as they actively engage in short selling. But despite that, this paper argues that they are stronger impacted by the search problem than institutional investors are. Reasons why the search problem arises within foreign investors while lacking for domestic institutional investors are (i) the fact that we are looking at an emerging market - the high growth prospects of emerging markets alone might be the reason for an investor's decision to hold foreign stocks. If this is the case we would expect the results to be increasingly significant in bull markets. (ii) institutional investors holding stocks in a foreign market do not have the same resources and abilities they have in their

domestic market. This applies to experience and resources like time and software/databases but also refers to information asymmetries - as being considered a major reason for causing the home bias (Sercu and Vanpée, 2007; Dziuda and Mondria, 2008). (iii) they might decide to choose to invest in a foreign market for diversification purposes.

2.4 Attention Bias

Attention is limited, especially for individual investors. Stocks that attract attention are more likely to be chosen while stocks that don't attract attention might not even be considered. It is hardly surprising that information releases as well as unusual abnormal returns increase a stocks trading volume (Bamber, Barron, and Stober, 1997; Karpoff, 1987), which makes it a good proxy to measure attention. Hence, attention impacts volume, volatility and stock prices (Andrei and Hasler, 2014) . From the narrow number of studies that focus on investors' attention, only a few do this with respect to different investor groups. Lee (1992) finds that small traders that place

market orders below 10.000 US\$ are net buyers of stocks subsequent to both positive and negative earnings surprises. Hirshleifer *et al.* (2003) confirm this results for individual investors. Seasholes and Wu (2004) examine individual investors within the Shanghai Stock Exchange. They find that retail investors are net buyers of stocks that hit an upper price limit the day before. In addition to that, they observe that the percentage of first time buyers is higher on those days compared to other days. The authors argue that the event of hitting a price limit attracts individual investors and within this group especially first time buyers.

Barber and Odean (2008) analyze the effect of attention on individual and institutional investors within the U.S. market and find strong evidence for attention influencing individual investors while lacking statistical significant impact on institutional investors. The authors explain that the reason for this difference between the two groups is (i) the lack of short sale engagement by individual investors (ii) the search problem which is much more severe in a domestic market for individual investors than for institutional investors. First let's look at short sale engagement: theory treats buying similar to selling when in reality they can be fundamentally

different for agents. The authors contend that individual investors are mostly impacted by attention when they are buying since they rarely engage in short selling. If they sell, they mostly consider only stocks that they already own. When buying, however, they face a huge search problem as theoretically they would have to evaluate hundreds of stocks in order to act rationally. As time and resources are scarce for this type of investors, they have to focus their attention on a few stocks. Concluding that they are likely to consider buying stocks that grabbed their attention earlier, but not selling them. Therefore individual investors become net buyers of attention grabbing stocks. Contrary to this institutional Investors face the search problem also when selling since they actively engage in short sales. Whether they engage in short sales or not, however, just plays a minor role in my research as this mostly affects net buying which - regarding my hypothesis - should still hold for individual investors as they face the highest degree of the search problem. What I am looking for is how the search problem impacts market agents. Barber and Odean (2008) add that institutional investors face a lower degree of the search problem for several reasons. First, investing is their profession, therefore they devote much more time into the evaluation of stocks. Second, they

have extensive software/databases to evaluate a large number of stocks and monitor them. Third, they are focusing on certain industries or sectors (e.g. high-growth stocks, certain ratios).

My research builds on this by hypothesizing that foreign investors face a higher degree of search problem (which triggers the attention bias) compared to domestic institutional investors because (i) most of their investment is focused within their domestic market (Dziuda and Mondria, 2008), therefore they can't devote most of their time to foreign markets (ii) they have less experience in a foreign market which results in a lower level of skill - this should be especially true if foreign investors are from developed countries investing in an emerging market that could be less predictable (iii) the likelihood that they have similar software/databases (as they have for their domestic market) to evaluate a large number of stocks is lower (iiii) they face a higher degree of information asymmetry compared to domestic investors (Faruqee *et al.*, 2004). Similar to points (ii), (iii), and (iiii) there is an informational disadvantage that is attached to foreign investment. Research on portfolio performance shows that local investments of individual investors outperform their foreign investments (Ivkovic and

Weisbenner, 2005). Furthermore Dvorak (2005) could establish that domestic investors indeed have higher profits than foreign investors caused by informational advantage.

In conclusion we can see that the literature supports my argument that foreign investors actually face more problems (e.g. search problem) than domestic institutional investors despite the fact that most of the foreign investors are actually institutional investors. This paper acknowledges those problems and argues that they are likely to cause the attention bias. Most of the research analyzing the impact of attention, focuses on stock prices within developed markets. To this day the literature lacks of results in emerging markets or including foreign investors in the analysis.



2.5 Attention Bias in the Thai Market and Short Sale Constraints

The main deviations of my paper compared to Barber and Odean (2008) is that I am adding the group of foreign investors and I am analyzing an emerging market instead of a developed market. This is likely to cause deviating results. In the U.S. individuals do not engage in short selling while institutional investors do.

This does not hold in the Thai market though as the average short sale volume is only 1.29% of the overall trading volume compared to 31.33% and 23.89% in the U.S. for NASDAQ and NYSE respectively (CMRI, 2014). As suggested by Bris *et al.* (2007), Saffi and Sigurdsson (2011), and Reed (2007) reasons are higher fees and scarcity of supply in SBL (Securities Borrowing and Lending). However, Barber and Odean (2008) could clearly establish that their results are not caused by short sell constrains. They could prove that even when an individual investor already owns a stock (*i.e.* can sell without selling short), attention influences buying more than selling. The buy-sell imbalance of a stock that an investor already owns is higher on days on which the stock attracted attention. Hence concluding that short sale constraints contribute to net buying, while the search problem is causing the attention bias.

Actually the fact that short selling is used very rarely throughout all investor groups in the Thai market is an even better atmosphere to analyze the impact of the search problem of each group and therefore the attention bias. As mentioned earlier, Chen *et al.* (2007) provide evidence that investors in the Chinese market show more

overconfidence and have a stronger disposition effect. It remains to be seen if this paper is able to establish similar results for the attention bias in another Asian market.

2.6 Hypothesis Development

Merton (1987) finds that retail investors only hold a few stocks in their portfolios. He argues that they just follow a few stocks in order to save resources. Building on this, Odean (1999) suggests that investors that are faced with the decision to purchase stocks, limit their search by choosing from stocks that recently attracted their attention. Moreover Barber and Odean (2008) established that daily abnormal trading volume and extreme daily return are useful measurements of attention. Tachasirodom (2015) studies the Thai market and finds retail investors to be net buyers of stocks that have been searched for online by using Google Trend as a measure of attention. If the tested investor groups in this study really react to attention, it will be shown in their buy-sell imbalances subsequent to an event that is most likely to reach a large number of investors. I predict that individual investors face the highest amount

of search problem, therefore their buy-sell imbalance should be the highest for high attention stocks. Given the strong short-sale constraints in the Thai market, they are expected to be influenced the most by the attention bias and become the net buyers (measured by value of the buy-sell imbalance) of stocks that grab investors' attention. In other words: this group should buy (measured by value) more of stocks that grab their attention than they sell them as a reaction to the "attention grabbing event". The result is a positive buy-sell imbalance. Therefore:

***Hypothesis 1:** The buying behavior of individual investors is more heavily influenced by attention than is their selling behavior.*

If imbalances increase from low attention stocks to high attention stocks investors prefer stocks that attract attention. If this is established it raises the question how much each investor group is influenced in comparison to others. As previous studies have shown that individual investors are more prone to the development of behavioral biases and the attention bias in particular, I hypothesize:

Hypothesis 2: The buying behavior of individual investors is more heavily influenced by attention than the buying behavior of foreign investors

The second hypothesis is trying to measure the effect of attention on the investment decision of the investors in those two groups. The buy-sell imbalance calculated by number of trades should be higher for individual investors than for foreign investors following an "attention grabbing event".

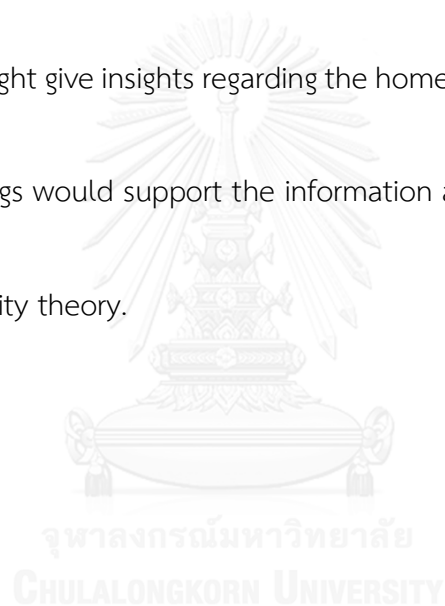
Lastly I predict the smallest reaction to attention by the group of institutional investors:



Hypothesis 3: The buying behavior of foreign investors is more heavily influenced by attention than the buying behavior of institutional investors.

I consider foreign investors as informed institutional investors which has been found in previous studies and I predict that their level of sophistication and experience

decreases to some extent as they invest in a foreign market. This is simply because they have less resources, knowledge and experience in a foreign market compared to their domestic market and face more information asymmetry. Therefore they should be more prone to showing the attention bias which means that their BSI should be higher than those of domestic institutional investors for stocks that generated attention earlier. My findings might give insights regarding the home bias as well. If my predictions are correct, my findings would support the information asymmetry theory rather than the bounded rationality theory.



CHAPTER 3

DATA

3.1 Market Microstructure Data

The dataset includes all individual, institutional and foreign investors' transaction data that has been executed on stocks listed in the Stock Exchange of Thailand (SET) between January 2011 and December 2014. This is market microstructure data that has been provided by the Stock Exchange of Thailand (SET) and includes anonymized deal-level data. The fact that all executed trades are included makes it a unique dataset that is representative for the market as a whole and therefore fundamentally different to similar studies which usually only include the trades of certain brokerage houses. This data is providing the optimal circumstance to test my hypotheses whether individual investors are net buyers of attention grabbing stocks and how each investor group is affected by the attention bias. Each transaction in the data set is marked with a flag by the SET depending on who is

executing the transaction, *i.e.* institutional investors, retail investors or foreign investors.

Therefore I can clearly differentiate between each investor group.

I am going to use all executed trades on SET100 stocks included in this dataset as a basis for the calculation of the buy-sell imbalances. To test my first hypothesis whether individual investors are net buyers of attention grabbing stocks, I am going to use the value of the trades when calculating the buy-sell imbalance. For hypothesis two and three I am concerned about the influence of attention on investment decisions, therefore I am using the number of trades to calculate the buy-sell imbalances. I am not including stocks out of the SET100 since they are not traded frequently enough by foreign investors.

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3.2 Return, Volume and Dates

Daily prices as well as volume amount of all stocks are obtained from Thomson

Reuters Datastream. Daily return is calculated as:

$$R_{i,t} = \ln\left(\frac{P_{i,t}}{P_{i,t-1}}\right)$$

where $R_{i,t}$ = return for stock i on day t

$P_{i,t}$ = price for stock i on day t

$P_{i,t-1}$ = price for stock i on day $t-1$

While earnings announcement days have been retrieved from Bloomberg, dividend announcement days have been collected via Thomson Reuters Datastream.



CHAPTER 4

METHODOLOGY

Following the Barber and Odean (2008) approach, I sort stocks daily based on their trading volume and extreme returns respectively into deciles (10% groups from highest to lowest volume/return) which gives me ten partitions for each of the three investor types. For each of those partitions, I calculate the buy-sell imbalance as described below. There are two ways of calculating the buy-sell imbalance: using the number of trades and using the value of trades. Since I am trying to analyze the influence on investors' decisions, using the number is more appropriate. However, using the value is important to measure the economic importance of my findings but has the disadvantage that trades of wealthy investors are weighted more heavily. Furthermore using the value of trades is important to verify my first hypothesis whether individual investors are net buyers of attention grabbing stocks. If the imbalance calculated by the value of trades turns out to be positive, the investor group is considered to be a net buyer. This paper is using both methods.

The influence of attention is measured by the buy-sell imbalance. Is the BSI for a certain investor group for stocks that grab attention higher than for stocks that don't, it indicates that this investor groups' buying behavior is influenced by attention. If this is the case I proceed to test for hypotheses two and three. The objective of my hypotheses two and three are to verify whether the imbalances (calculated by number of trades) for high attention stocks are 1. higher for retail investors than for foreign investors and 2. higher for foreign investors than for domestic institutional investors. To test for hypothesis two, I conduct a two sample t-test comparing imbalances for the high attention stocks in group ten between retail and foreign investors. To test for hypothesis three, I conduct a two sample t-test comparing the imbalances for the high attention stocks in group ten between foreign and institutional investors. The difference in mean between two groups that are tested is expected to be statistically significant greater than zero. My proxies for attention are volume and extreme returns which have proven to be effective despite the fact that they are only indirect proxies.

4.1 Stocks Sorted by Volume

Stocks that are traded more frequently on a particular day compared to their average trading volume must have attracted investors' attention. It is interesting to find out which of the investor groups' buying behavior will increase on those days.

In the first step I take for each stock the trading volume for each day and divide it by the average trading volume over the last year (last 252 trading days) for that stock. Stocks that entered the market and joined the SET100 before having been traded for a year, will have an average of less than 252 trading days. Therefore I am able to calculate abnormal trading volume for stock i on day t as:

$$AV_{it} = \frac{V_{it}}{\bar{V}_{it}}$$

where V_{it} is the volume for stock i traded on day t as reported by Thomson Reuters Datastream for the Stock Exchange of Thailand (SET) and $\bar{V}_{it} =$

$\sum_{d=t-252}^{t-1} \frac{V_{id}}{252}$. This gives me 100 stocks that can be ranked regarding how much

they were traded on that particular day compared to their usual trading volume. If a stocks abnormal trading volume is high, it is traded by an unusual number of investors

and must by definition have attracted more attention compared to other stocks. For each day I sort the stocks into deciles regarding their abnormal trading volume on that day.

In the second step, I sum up all executed buys and sells for the stocks in each volume decile separately for my three investor groups (*i.e.* individual investors, institutional investors, foreign investors) on day t (the same day in which their abnormal trading volume occurred) so I can calculate the buy-sell imbalance (BSI) as:

$$BSI_{pt} = \frac{\sum_{i=1}^{n_{pt}} NB_{it} - \sum_{i=1}^{n_{pt}} NS_{it}}{\sum_{i=1}^{n_{pt}} NB_{it} + \sum_{i=1}^{n_{pt}} NS_{it}}$$

where n_{pt} is the number of stocks in partition p on day t

NB_{it} is the number of buys of stock i on day t

NS_{it} is the number of sells of stock i on day t

Following this I calculate the time series mean of the daily buy-sell imbalances

(BSI_{pt}) for each of the volume deciles and investor groups. Not all stocks listed in the SET are traded frequently, therefore I exclude the sample that has less than three trades on that particular day for one of the partitions and only consider stocks that

are reported in the SET100. This will ensure that the results are not primarily driven by small capitalization stocks. Only executed trades will be considered when calculating the BSI.

I am using an additional way to calculate the BSI which is using the value of the trades rather than the number of the trades. The calculation for this remains unchanged, with the difference that NB_{it} denotes the value that has been purchased of stock i and NS_{it} the value that has been sold of stock i . So for each investor group the table reports the mean of time series of the daily buy-sell imbalances for every decile. The standard errors are calculated using the Newey-West model with a lag of 5 to prevent serial correlation of the error term.

After calculating the time series mean for every volume and investor partition they are tested by t-statistics and are expected to be statistically significant greater than zero. I compare the time series means of different investor groups by conducting a two sample t-test. The difference between two groups that are tested is expected to be statistically significant greater than zero.

4.2 Stocks Sorted by Extreme Return

Stocks that generate extremely high or low returns on a given day are likely to attract investor attention. These returns are mostly caused by the publication of new information. Therefore news create extraordinary high or low daily returns which in turn become news and generate attention. It follows that investors which are impacted the most by the attention bias, will be more likely to purchase stocks that experienced huge price movements no matter if positive or negative.

Similar to the method used in 4.1, I sort the SET100 stocks regarding their daily log returns which are calculated based on the daily closing prices reported by Thomson Reuters Datastream for SET stocks into deciles. This will give me ten partitions for each investor group starting with the 10% of stocks that have the highest positive percentage returns on a certain day until the 10% of stocks that have the highest negative percentage return on a certain day. In between those extreme return partitions there are the ones with less significant returns compared to the SET100 stocks on that day. I am not using abnormal returns in a conventional way as the

difference to the expected rate of return because I am only interested in returns that grab attention. These returns are likely those that do very well/bad on a particular day (percentage change in closing price compared to closing price of the day before). If an investor looks at a certain stock and sees that the percentage return of this stock is very high on one particular day (compared to other stocks on that same day), then it might be due to the release of important information regarding that stock. If this is not the case, then just the fact that this stock did so well/bad compared to other stocks in the market on that day means that this stock is more likely to be mentioned in news or certain rankings ("daily winners", "daily losers"). This grabs the attention of investors and they are therefore more likely to buy those stocks compared to stocks that did not change much in price on a particular day. Trend chasers might want to buy stocks that experienced a high positive return on the day before while contrarians might want to buy stocks that experienced high negative returns. The time series mean of the buy-sell imbalance is calculated in the same way as for the volume:

$$BSI_{pt} = \frac{\sum_{i=1}^{n_{pt}} NB_{it} - \sum_{i=1}^{n_{pt}} NS_{it}}{\sum_{i=1}^{n_{pt}} NB_{it} + \sum_{i=1}^{n_{pt}} NS_{it}}$$

where n_{pt} is the number of stocks in partition p on day t

NB_{it} is the number of buys of stock i on day t

NS_{it} is the number of sells of stock i on day t

The only difference to the BSI of the volume sorting is that the BSI is calculated on the following day as it is more likely for people to recognize extreme returns after the market closed. Furthermore there is the possibility for an endogeneity problem if BSI is calculated on the same day because the BSI might cause price changes by itself. As for the volume sorting, standard errors are calculated using the Newey-West model with a lag of 5 to prevent serial correlation of the error term.

After calculating the time series mean for every return and investor partition they are tested by t-statistics and are expected to be statistically significant greater than zero. I compare the time series means of different investor groups by conducting a two sample t-test. The difference between two groups that are tested is expected to be statistically significant greater than zero.

4.3 Return and Volume Sorting

To test for interaction between my two proxies for attention, I sort stocks first on their previous day's returns and then on their current day's abnormal trading volume. I sort the SET100 stocks independently as described in 4.1 and 4.2 but group them differently. As grouping into deciles for each group would leave many groups empty, I sort stocks into high return (top 30%), low return (bottom 30%) and medium return (the 40% in between). I do the same grouping for the current day's abnormal trading volume. As this sorting is used for identifying potential problems or unanticipated interactions I limit the calculation of imbalances to the number of trades to check for consistency with the separate return and volume sorting.

4.4 Most Extreme Returns

Many stocks – even those in the SET100 – are not traded frequently by all investor groups on a daily basis. Additionally to that, high capitalization stocks are less likely to experience extreme one day returns. If there are many stocks in the daily

sample that did not experience extreme price moves but returns close to zero, it opens the possibility for stocks that did not attract much attention to be included in high attention groups.

Therefore I will test if the results differ if I take only the most extreme returns.

I am doing this by analyzing only 5% of the most positive returns, 5% of the most negative returns and all others returns during the whole sample period. The order imbalances are calculated using the number of trades.

4.5 Earnings Announcements and Dividend Announcements

To make sure my results are robust and not driven by other factors, I include earnings announcement days and dividend announcement days in my analysis. In particular, I calculate the buy-sell imbalances for earnings announcement days, dividend announcement days and all other days for every partition of volume and extreme return respectively. The imbalances calculated for days which are not earnings announcement days or dividend announcement days are expect to be similar to those

of the return and volume sorting in 4.1 and 4.2. Similar to the sorting in 4.3 I group stocks in three categories – low, medium and high – separately based on their previous days return or their current days abnormal trading volume. Imbalances have been measured by number of trades. If the results are qualitatively similar, it follows that neither earnings announcements nor dividend announcements - which would make the investment decision rather rational than irrational - can explain the investors behavior.



CHAPTER 5

EMPIRICAL RESULTS

5.1 Descriptive Statistics

Stocks are grouped regarding their volume and return specifications for each investor group separately. Table 1 reports number of observed days for each group of volume and return and their most positive as well as most negative imbalances calculated by number of trades.

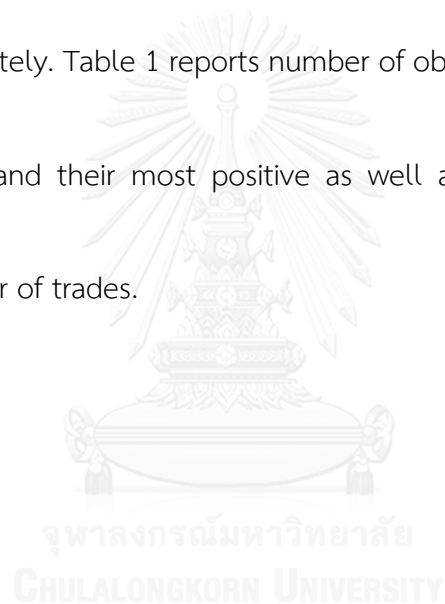


Table 1

Minimum BSI, maximum BSI and number of observations for each investor group and return/volume decile.

	Group	Volume			Return		
		N (days)	Minimum BSI	Maximum BSI	N (days)	Minimum BSI	Maximum BSI
RETAIL	1	978	-52%	36%	970	-30%	54%
	2	978	-49%	37%	950	-40%	48%
	3	978	-74%	46%	884	-47%	65%
	4	978	-54%	51%	829	-67%	58%
	5	978	-46%	51%	771	-89%	75%
	6	978	-44%	49%	817	-81%	63%
	7	978	-41%	39%	878	-69%	69%
	8	978	-44%	49%	921	-75%	69%
	9	978	-36%	55%	963	-56%	43%
	10	978	-38%	43%	969	-50%	46%
INSTITUTIONS	1	883	-99%	94%	967	-99%	92%
	2	940	-99%	96%	948	-99%	98%
	3	963	-98%	96%	879	-92%	94%
	4	970	-97%	93%	824	-99%	99%
	5	975	-95%	96%	764	-99%	97%
	6	975	-94%	96%	806	-99%	92%
	7	978	-86%	98%	866	-97%	95%
	8	978	-98%	89%	909	-97%	98%
	9	978	-91%	92%	955	-98%	97%
	10	977	-95%	96%	958	-98%	97%
FOREIGN	1	977	-94%	87%	970	-79%	79%
	2	978	-88%	87%	950	-74%	71%
	3	978	-76%	71%	884	-97%	82%
	4	978	-86%	82%	829	-89%	95%
	5	978	-79%	80%	767	-97%	89%
	6	978	-65%	77%	812	-69%	93%
	7	978	-77%	78%	877	-97%	75%
	8	978	-91%	68%	919	-82%	78%
	9	978	-65%	70%	863	-71%	73%
	10	978	-77%	69%	969	-58%	73%

5.2 Volume Sorting

Table 2 presents the average buy-sell imbalances for stocks that have been sorted into ten groups based on the current day's abnormal trading volume. The buy-sell imbalances are reported based on the traded value and based on the number of trades for retail investors, institutional domestic investors and foreign investors. The trading volume of a stock serves as a proxy for attention. Stocks that experience an unusual amount of volume are receiving more attention by investors. How this increased amount of attention influences the investment decision of different investor groups is the objective of this paper. To measure how many investors' decisions were impacted by attention, using the number of trades as a basis for calculating the BSI is more convenient. However, the calculation of the BSI by value gives additional insights on the findings regarding their economic importance.

Consistent with the results obtained in the U.S. market, the buying behavior of retail/individual investors is influenced the most by attention. For stocks that experience a low abnormal trading volume on the current day, individual investors are

Table 2

Buy-sell imbalances by investor type for SET100 stocks sorted by their abnormal trading volume on the current day.

Decile	RETAIL		INSTITUTIONAL		FOREIGN	
	BSI Value	BSI Number	BSI Value	BSI Number	BSI Value	BSI Number
1 (Lowest volume)	-15.41%*** (0.0064)	-10.04%*** (0.0057)	-6.65%*** (0.0150)	-10.62%*** (0.0142)	-1.33% (0.0114)	-4.50%*** (0.0129)
2	-10.88%*** (0.0068)	-6.20%*** (0.0057)	-4.90%*** (0.0124)	-9.78%*** (0.0119)	-1.23% (0.0118)	-3.99%*** (0.0132)
3	-8.69%*** (0.0063)	-4.39%*** (0.0054)	-6.12%*** (0.0117)	-10.46%*** (0.0120)	-0.43% (0.0097)	-2.95%** (0.0119)
4	-6.01%*** (0.0061)	-2.25%*** (0.0055)	-3.98%*** (0.0109)	-8.63%*** (0.0110)	-0.37% (0.0103)	-2.88%** (0.0117)
5	-4.36%*** (0.0064)	-0.87%* (0.0053)	-4.77%*** (0.0101)	-9.58%*** (0.0103)	0.32% (0.0097)	-2.35%** (0.0112)
6	-2.79%*** (0.0060)	0.72%* (0.0053)	-1.39% (0.0104)	-6.98%*** (0.0106)	-0.16% (0.0093)	-1.94%* (0.0108)
7	-1.06%* (0.0060)	1.81%*** (0.0051)	0.29% (0.0094)	-4.77%*** (0.0096)	-0.76% (0.0098)	-3.19%*** (0.0110)
8	0.57%* (0.0059)	3.27%*** (0.0052)	3.70%*** (0.0097)	-1.45%* (0.0097)	-0.82% (0.0098)	-3.03%*** (0.0109)
9	3.66%*** (0.0054)	5.78%*** (0.0050)	4.89%*** (0.0104)	-0.44%* (0.0108)	0.21% (0.0100)	-2.29%** (0.0115)
10 (Highest volume)	8.56%*** (0.0055)	10.54%*** (0.0049)	11.10%*** (0.0108)	6.27%*** (0.0117)	1.93%* (0.0101)	-0.30%* (0.0111)

Stocks are sorted daily into deciles of the basis of their current day's abnormal trading volume. Abnormal trading volume is calculated as the ratio of the current day's volume (as reported by Thomson Reuters Datastream for SET stocks) divided by the average volume over the previous year. Buy-sell imbalances are reported for the trades of three groups of investors. These are individual investors, domestic institutional investors and foreign investors as classified by the SET. For each day/partition/investor group, I calculate number imbalance as number of purchases minus number of sales divided by total number of all trades. Value imbalance is calculated as the value of purchases minus the value of sales divided by the total value of all trades. The table reports the mean for each time series of daily imbalances for a particular investor group and partition. Standard errors are calculated using the Newey-West model to prevent serial correlation of the error term and appear in parentheses.

on average selling those stocks. This is reflected by a BSI of -10.04% calculated by number of trades for volume group one (group of stocks with lowest abnormal trading volume). Contrary to that, the BSI for the group of stocks with the highest abnormal trading volume is +10.54%. Please note that the imbalances rise monotonically with the volume. If the BSI is calculated based on the value of trades, it is -15.41% for the lowest volume decile and +8.56% for the highest volume decile. Therefore hypothesis one cannot be rejected and makes retail investors net buyers of attention grabbing stocks. All those results are statistically significant at the 1% level. As before, the BSI increases with the volume monotonically.

While my findings are consistent with those of the U.S. market for individual investors, the opposite is the case for institutions like mutual funds. The BSI ranges from -10.62% for the lowest volume group to +6.27% for the highest volume group with a statistical significance at the 1% level. Surprisingly, this indicates that domestic institutional investors in Thailand engage in attention driven buying behavior as well. Note that the increase in BSI is not as monotonically as for individual investors. There is only a strong indication for the lowest and highest volume groups which underlines

the fact that they only react to stocks that grab the most attention. These BSI calculated by number of trades are smaller than that of individual investors while the BSI calculated by value is higher for institutions. This means that while a lower number of institutional investors is affected by attention driven buying behavior, their economic impact is in fact higher. Resulting from this institutional investors are net buyers of attention grabbing stocks, too. Given the size and trading volume of the Thai market, liquidity concerns might very well contribute to an investor's decision to sell stocks that have low abnormal trading volume. Most of the obtained results are statistically significant with a p-value of less than 0.01.

Buy-sell imbalances for foreign investors are slightly negative for all volume groups. While they are influenced by the daily fluctuation in volume of SET100 stocks, the impact is weaker. Their BSI calculated by the number of trades ranges only between -4.5% for the low volume group to -0.3% for the highest volume group. Even though foreign investors sell low attention stocks on average, this is the only investor group that does not show a positive BSI for stocks that are associated with attention grabbing (highest abnormal trading volume group). When calculated by number of

trades, all of the observations are statistically significant, however, there is almost no indication of economic impact as most of the results calculated by value of trades are not statistically significant.

Despite my expectations, the findings indicate that even though a bigger number of individual investors are engaging in attention driven behavior, both institutional and retail investors are net buyers of attention grabbing stocks. Surprisingly, foreign investors have shown to be influenced the least out of the three investor groups tested.

As the BSI of retail investors for high attention stocks exceeds those of foreign investors by 10.83% with a statistical significance at the 1% level, we cannot reject hypothesis two. However, as the BSI of domestic institutional investors exceeds the BSI of foreign investors by 6.57% we cannot accept hypothesis three.

The fact that domestic institutional investors show strong attention driven buying behavior makes it difficult to judge the rather weak results for foreign investors. Clearly the search problem is not more severe for domestic institutional investors compared to foreign investors. If we compare the low attention group to the high

attention group, there is a difference of 4.2%, which indicates preference for high attention stocks within foreign agents. However, even the high attention stocks (on average) do not motivate them to buy more than they sell as the BSI measured by number is only -0.3%. The fact that institutional investors are strongly influenced by the attention bias but foreign investors are weakly influenced leaves room for two interpretations.

First, as mentioned in section 1.2, it is unlikely that institutional investors around the world act in the same rational manner or have similar access to relevant information. This is especially the case when comparing institutional investors of developed markets with institutional investors in emerging markets. Therefore it is likely that domestic institutional investors in Thailand simply are more prone to showing the attention bias. As established earlier, sophistication and experience play an important role for the development of biases. An increase in those characteristics generally decreases biases although it does not mean that institutional investors don't show behavioral biases. This raises the question whether institutional agents in Thailand act less sophisticated and experienced than those in the United States.

Another interpretation for the unexpected findings for institutional investors can be that there are specific market mechanism (e.g. short sale constraints) within the SET that contribute or encourage trading behavior which is associated with the attention bias. This will be further discussed in section 5.5.

The results are visualized in Figure 1 and 2 for imbalances calculated by number of trades and value of trades respectively.

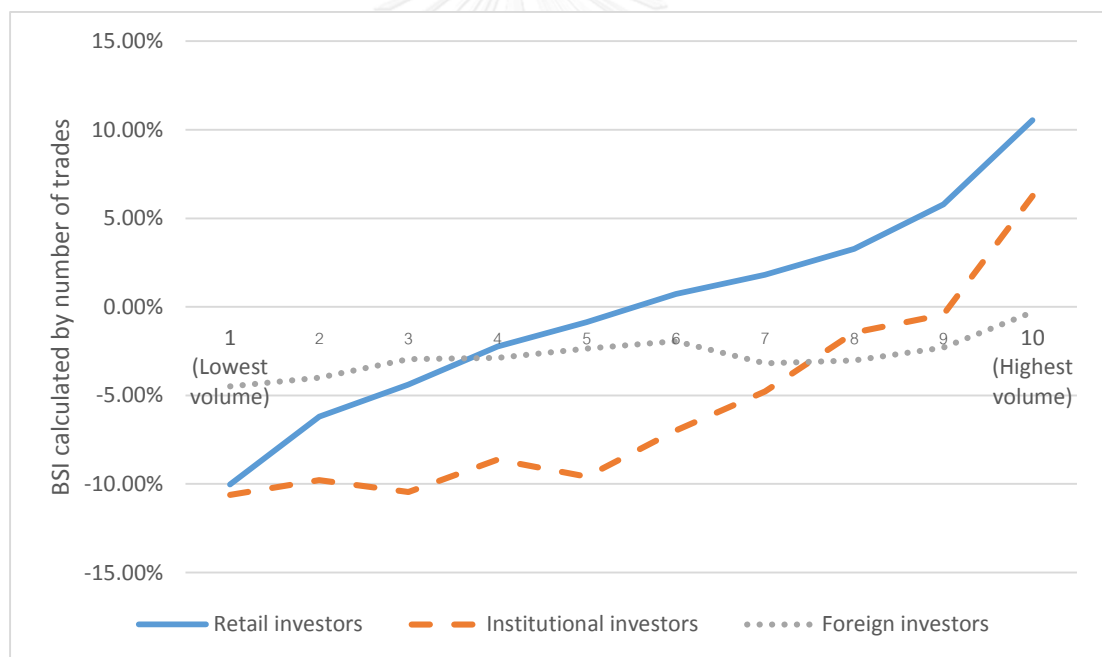


Figure 1

Buy-sell imbalances calculated by number of trades by investor type for SET100 stocks sorted by their abnormal trading volume on the current day.

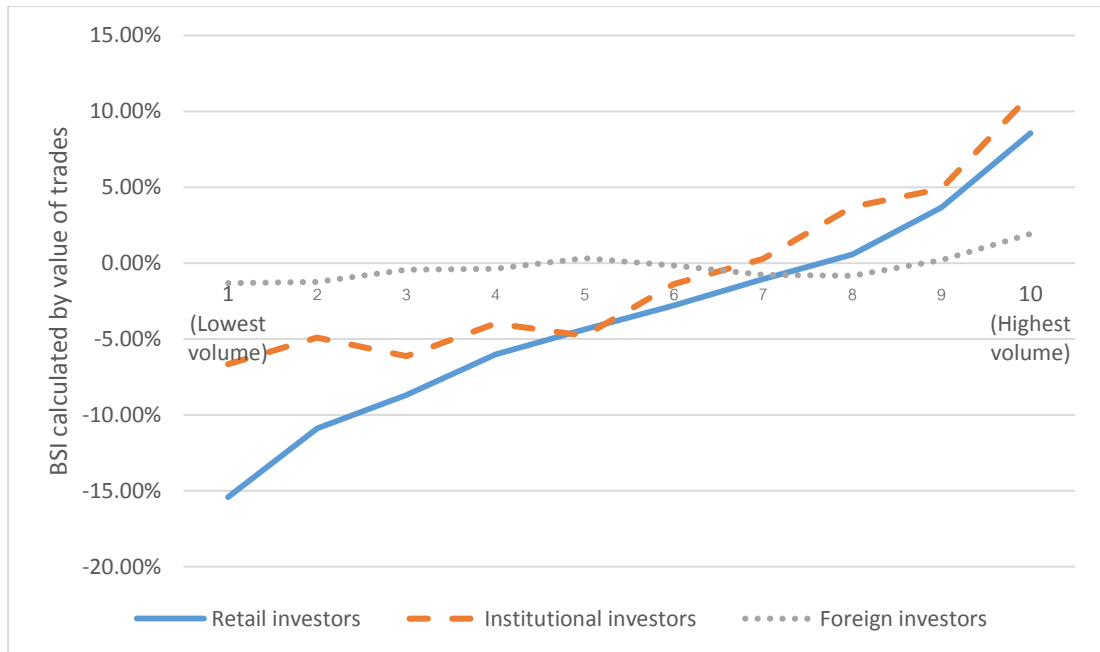


Figure 2

Buy-sell imbalances calculated by value of trades by investor type for SET100 stocks sorted by their abnormal trading volume on the current day.

Table 3

Two sample t-test for comparison of imbalances between retail and foreign investors and foreign and institutional investors.

Hypothesis 2

	Retail	Foreign
Mean	10.54%	-0.30%
Observations	978	978
t-Statistics	12.42***	

Hypothesis 3

	Institutional	Foreign
Mean	6.27%	-0.30%
Observations	977	978
t-Statistics	5.49***	

Results of the two sample t-test. Imbalances of attention-grabbing stocks (group 10) between retail and foreign investors are compared to test for hypothesis two. Imbalances of attention-grabbing stocks (group 10) between institutional and foreign investors are compared to test for hypothesis three. Imbalances calculated by the number of trades have been used for this comparison.

5.3 Return Sorting

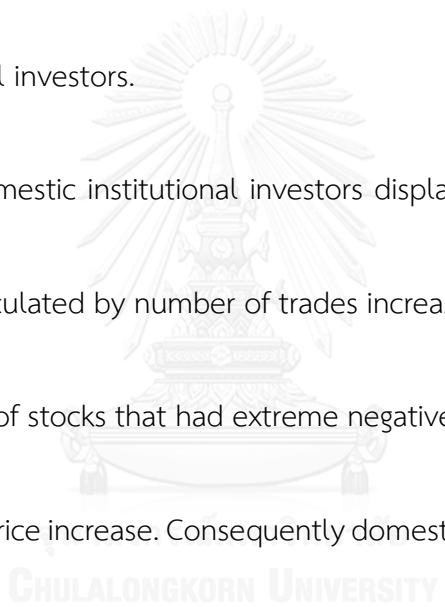
Table 4 shows the buy-sell imbalances following the stock's previous day's returns. The BSI are presented for the previous three investor groups consisting of individual investors, domestic institutional investors and foreign investors and are calculated based on the trade value and the number of trades. Extreme price

movements are likely to catch the attention of a large group of investors. Whether positive or negative, those price movements are usually caused by the release of new information about the company. Any group that is influenced by this proxy for attention is expected to show a U-shaped BSI form, meaning that the BSI numbers should be the highest for group one (extreme negative daily returns) and group ten (extreme positive daily returns) and decrease for the groups in between. Reason for this is that contrarian traders buy when stock prices fall drastically and momentum traders are expected to buy when prices increase. At the same time short sale constraints prevent those traders from selling stocks they don't own. Therefore the BSI is expected to show the highest positive numbers for group one and ten with a drastic decrease for groups four to six.

However, my results deviate from these expectations. The BSI for retail investors is calculated at +6.52% for extreme negative returns but then surprisingly continues to decrease monotonically with a BSI of -4.91% for the stocks with the highest daily returns. This means that individual investors are buying when stock prices fall and selling when stock prices increase which is exactly what contrarian investors

do. Furthermore the results resemble those obtained by Barber and Odean (2008) for value managers (contrarians). While contrarian investors might sell stocks that experienced a strong increase in return the previous day, investors following the momentum strategy are expected to buy. However, the buying of the momentum traders is not supported by the data which leads to the conclusion, that individual investors in Thailand must be predominantly following a contrarian investment style. The proportion of momentum traders that should balance out the selling of contrarians is so small, that even without short sales, the number of contrarians owning and selling the winning stocks is higher. This is consistent with the findings of Lohitanon (2015) and Sukkasem (2014) for the Thai market. Sukkasem (2014) studies trade persistence and finds that institutions and foreigners follow momentum strategy and retail investors follow negative feedback strategy. Lohitanon (2015) examined the style trading behavior of four investor types in Thailand and comes to the conclusion that individual investors prefer to invest in lowest past stock returns. Evidence for individual investors following negative feedback trading is also reported by Kaniel *et al.* (2008) and Choe *et al.* (1999) for the U.S. and the Korean market. As before, the decrease in

BSI is monotonous. Even though it is possible to interpret the purchase of previous losers by contrarians and the purchase of previous winners by momentum traders as attention driven, it is more likely that the events that caused the price movements just collided with the stock selection criteria of contrarian/momentum strategy. Therefore the return sorting doesn't allow for the conclusion of attention driven buying behavior for individual investors.



The BSI of domestic institutional investors displays the opposite of individual investors. The BSI calculated by number of trades increases almost monotonous from -10.97% in the group of stocks that had extreme negative returns to +2.14% for stocks that had the highest price increase. Consequently domestic institutional investors seem to follow the momentum strategy - they tend to buy stocks that increased in price but they strongly sell those stocks that declined in price - to the individual investors. In fact, the results for these return sorts are similar to those of the U.S. market for momentum managers. The BSI based on value are more balanced. We find imbalances of -3.42% for group one and +6.02% for group ten. Repeatedly this is consistent with Lohitanon (2015) who finds evidence that the momentum strategy is the preferred

investing style of institutional investors in Thailand. As for individual investors, we can't reason that these domestic institutional investors engage in attention driven buying as those stocks might naturally fall into the selection criteria of their trading style.

Foreign investors show similar behavior to domestic institutional investors. They sell stocks that decline strongly in prices to individual investors and buy some of the well-performing stocks the individual contrarians are selling. Their imbalance based on the number of trades is -9.66% for extreme negative return stocks and increases monotonous to +4.53% for extreme positive return stocks. That foreign investors engage in positive feedback trading (momentum strategy) has been found by Froot *et al.* (2001) as well. They analyzed international portfolio flows in and out of 44 countries between 1994 and 1998.

The results are visualized in Figure 3 and 4 for imbalances calculated by number of trades and value of trades respectively. The obtained figures are predominantly significant at the 1% level, details can be found in Table 4.

As these results suggest, extreme daily returns seem not to be an optimal proxy for attention. Reason for this is the homogeneity of beliefs within each group. The

tested investor groups seem to largely follow one strategy - either positive or negative feedback - with minimal deviations from it. Therefore this proxy is very likely to interact with the stock selection criteria for each investor group. Resulting from this we cannot certainly conclude attention driven behavior.



Table 4

Buy-sell imbalances by investor type for SET100 stocks sorted by extreme returns on the previous day.

Decile	RETAIL		INSTITUTIONAL		FOREIGN	
	BSI Value	BSI Number	BSI Value	BSI Number	BSI Value	BSI Number
1 (Negative return)	4.08%*** (0.0054)	6.52%*** (0.0050)	-3.42%*** (0.0106)	-10.97%*** (0.0103)	-9.30%*** (0.0092)	-9.66%*** (0.0106)
2	1.76%*** (0.0058)	4.53%*** (0.0052)	-4.10%*** (0.0116)	-11.39%*** (0.0112)	-6.60%*** (0.0097)	-7.81%*** (0.0111)
3	-1.31%** (0.0064)	1.79%*** (0.0056)	-1.83%* (0.0107)	-7.68%*** (0.0109)	-4.80%*** (0.0100)	-5.99%*** (0.0118)
4	-1.65%** (0.0070)	1.18%* (0.0061)	-3.15%** (0.0122)	-8.81%*** (0.0122)	-2.73%** (0.0119)	-5.12%*** (0.0137)
5	-3.57%*** (0.0070)	-0.10% (0.0062)	-0.11% (0.0119)	-5.71%*** (0.0122)	-1.57% (0.0125)	-4.21%*** (0.0132)
6	-4.84%*** (0.0065)	-1.52%*** (0.0058)	0.35% (0.0113)	-4.40%*** (0.0114)	0.45% (0.0111)	-2.13%* (0.0126)
7	-5.53%*** (0.0066)	-2.12%*** (0.0058)	1.47% (0.0105)	-2.42%** (0.0107)	2.26%** (0.0105)	-0.21% (0.0122)
8	-9.44%*** (0.0064)	-5.13%*** (0.0058)	2.28%** (0.0107)	-1.03% (0.0109)	4.96%*** (0.0105)	2.03%* (0.0120)
9	-9.86%*** (0.0056)	-5.40%*** (0.0049)	5.81%*** (0.0095)	3.92%*** (0.0097)	7.16%*** (0.0102)	3.59%*** (0.0114)
10 (Positive return)	-9.59%*** (0.0056)	-4.91%*** (0.0051)	6.02%*** (0.0100)	2.14%** (0.0100)	10.42%*** (0.0096)	4.53%*** (0.0101)

Stocks are sorted daily into deciles on the basis of their previous day's returns calculated on the basis of their reported prices by Thomson Reuters Datastream for SET stocks. Buy-sell imbalances are reported for the trades of three groups of investors. These are individual investors, domestic institutional investors and foreign investors as classified by the SET. For each day/partition/investor group, I calculate number imbalance as number of purchases minus number of sales divided by total number of all trades. Value imbalance is calculated as the value of purchases minus the value of sales divided by the total value of all trades. The table reports the mean for each time series of daily imbalances for a particular investor group and partition. Standard errors are calculated using the Newey-West model to prevent serial correlation of the error term and appear in parentheses.

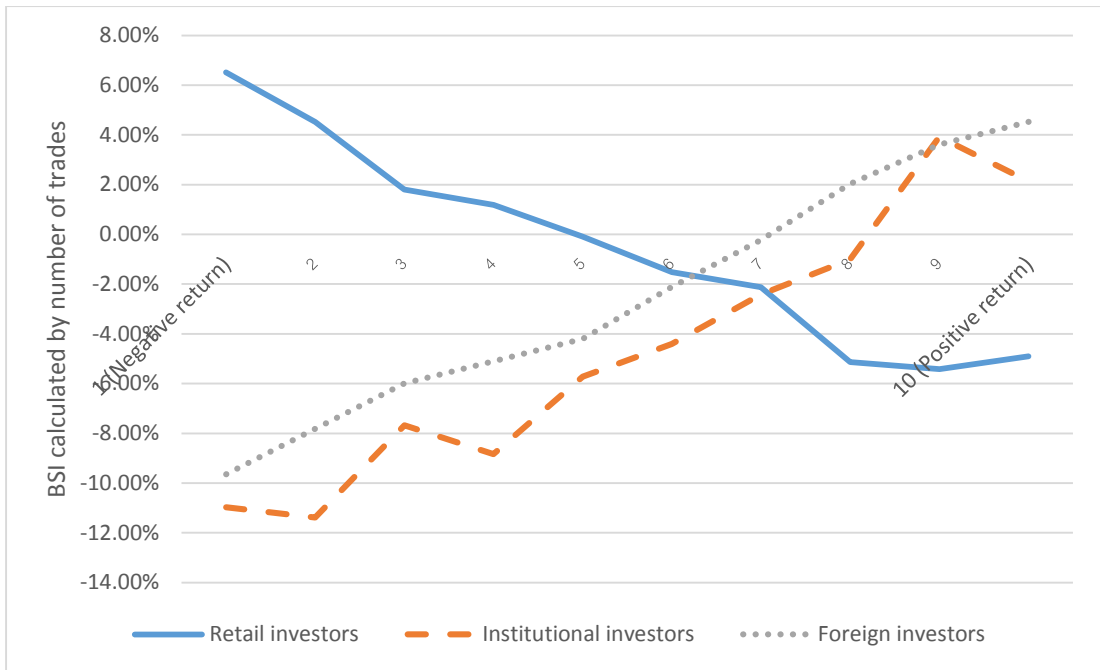


Figure 3
Buy-sell imbalances calculated by number of trades by investor type for SET100 stocks sorted by their previous day's extreme returns.

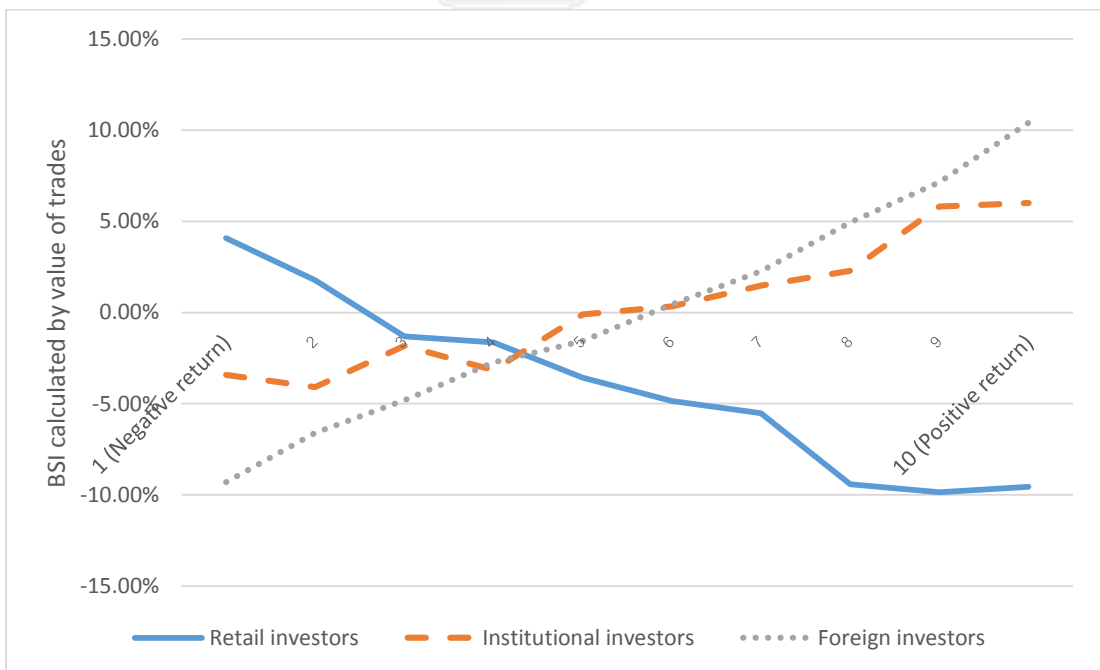


Figure 4
Buy-sell imbalances calculated by value of trades by investor type for SET100 stocks sorted by their previous day's extreme returns.

5.4 Return and Volume Sorting

To check whether there is any kind of interaction between the results of the return sorting and those of the volume sorting, I sort stocks first on their previous day's returns and then on their current day's volume. The stocks are sorted independently into three categories for returns and volume. The lowest 30%, the middle 40%, and the highest 30% depending on their return and volume. The buy-sell imbalances are calculated on the number of trades for these partitions. The results for this sorting is presented in Table 5. Imbalances increase with abnormal volume for each of the return groups. This is consistent with the previous findings and indicates attention driven buying behavior. Retail investors show the greatest BSI for low return stocks. For each volume partition, imbalances decrease with an increase in return. The same is true for institutional investors in the opposite direction. They have the highest imbalances for high return stocks. For each volume partition BSI increase with return and similarly within each return partition BSI increase with volume. The BSI for foreign investors do not follow the same trend as for retail and institutional investors as imbalances do not

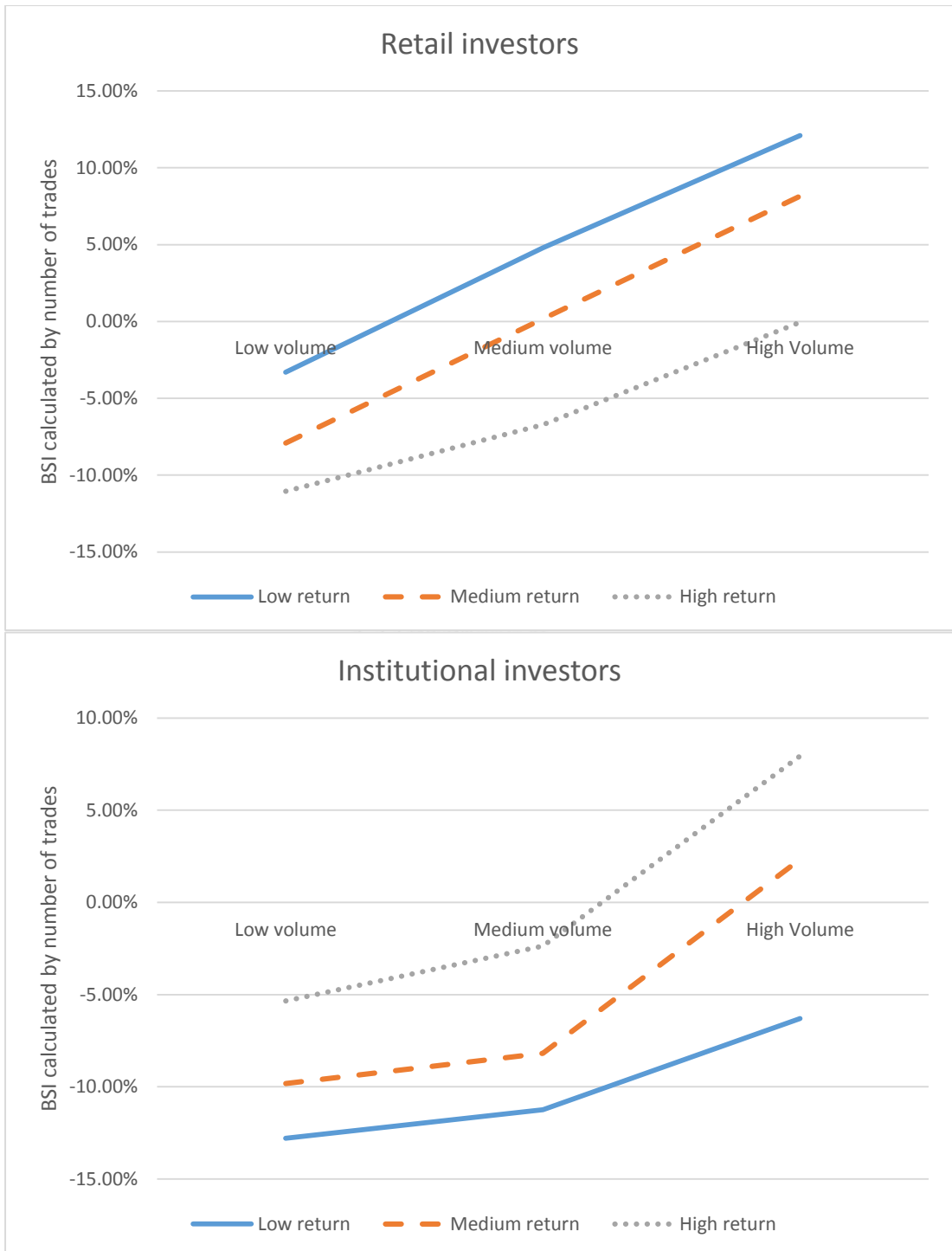
increase with volume for every return group. Similar to the weak findings of previous sorting in 5.2 and 5.3 this suggests that foreign investors are not always focused on purchasing stocks that grab the most attention. Another insight that can be extracted from Table 5 for retail and institutional investors is that within each return group, investors clearly react to volume and therefore to attention. While the results obtained for the return sorting leave room for explanations with trading strategy, this sorting clearly shows that while those groups might follow their personal strategies, they clearly prefer attention grabbing stocks. As before, most of the results are statistically significant at 10% or less. Overall the results confirm the picture of the volume sorting. If retail and institutional investors would merely follow their trading strategies, they should not show a consistent reaction to the increase in volume.

Table 5

Buy-sell imbalances by investor type for SET100 stocks sorted first by the previous day's return and then on the current day's volume.

First sorting	Second sorting	RETAIL BSI Number	INSTITUTIONAL BSI Number	FOREIGN BSI Number
Low return				
	Low volume	-3.30%*** (0.0056)	-12.79%*** (0.0127)	-6.31%*** (0.0125)
	Medium volume	4.80%*** (0.0052)	-11.24%*** (0.0103)	-6.60%*** (0.0101)
	High Volume	12.10%*** (0.0056)	-6.30%*** (0.0111)	-11.39%*** (0.0114)
Medium return				
	Low volume	-7.90%*** (0.0059)	-9.83%*** (0.0124)	-2.70%** (0.0134)
	Medium volume	0.17% (0.0052)	-8.19%*** (0.0102)	-3.11%*** (0.0117)
	High Volume	8.16%*** (0.0057)	2.33%** (0.0116)	-1.10% (0.0122)
High return				
	Low volume	-11.04%*** (0.0059)	-5.34%*** (0.0132)	-1.94% (0.0137)
	Medium volume	-6.72%*** (0.0051)	-2.37%** (0.0097)	3.16%*** (0.0109)
	High Volume	-0.05% (0.0049)	7.94%*** (0.0100)	5.64%*** (0.0109)

Stocks are sorted daily into deciles on the basis of their previous day's returns calculated on the basis of their reported prices by Thomson Reuters Datastream for SET stocks. Afterwards they are sorted by their current day's abnormal trading volume. Abnormal trading volume is calculated as the ratio of the current day's volume (as reported by Thomson Reuters Datastream for SET stocks) divided by the average volume over the previous year. Buy-sell imbalances are reported for the trades of three groups of investors. These are individual investors, domestic institutional investors and foreign investors as classified by the SET. For each day/partition/investor group, I calculate number imbalance as number of purchases minus number of sales divided by total number of all trades. The table reports the mean for each time series of daily imbalances for a particular investor group and partition. Standard errors are calculated using the Newey-West model to prevent serial correlation of the error term and appear in parentheses.



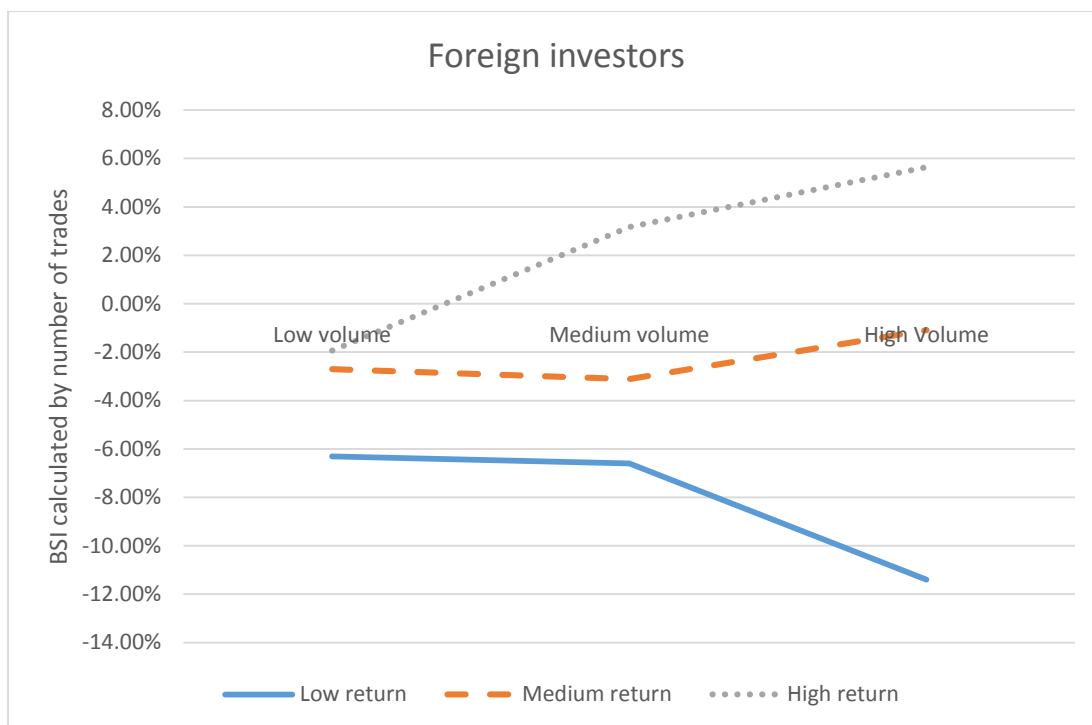


Figure 5

Imbalances calculated for SET100 stocks sorted first on the previous day's extreme returns then on the current day's abnormal trading volumes separated by investor type.

5.5 Most Extreme Returns

With the return sorting described in 5.3, stocks were sorted by their previous day's returns. However, the return distribution in Figure 5 shows, that most of the returns range close to 0%. Therefore it is possible that on many days the 10% of the daily highest returns are actually not high enough to attract much investor attention.

To diminish the chance of this distorting my results, I split all daily returns during the

sample period into three buckets. The most positive 5% (returns $> 1.62\%$) of all returns, the most negative 5% (returns $< -1.46\%$) and all other returns. Therefore only the most extreme returns are captured. Buy-sell imbalances are calculated by the number of trades. The results are presented in Table 6. While being consistent with previous results, we find much stronger imbalances for foreign investors than before, especially for extreme negative returns. This indicates that generally foreign investors follow their trading strategies but react very sensitive to price decreases. This seems reasonable as their main focus is most likely on their domestic market. This is a result I would expect from a skillful investor that is investing in the SET for diversification purposes and is aware of greater difficulties he faces in another market (e.g. less experience in the market, possible informational disadvantage).

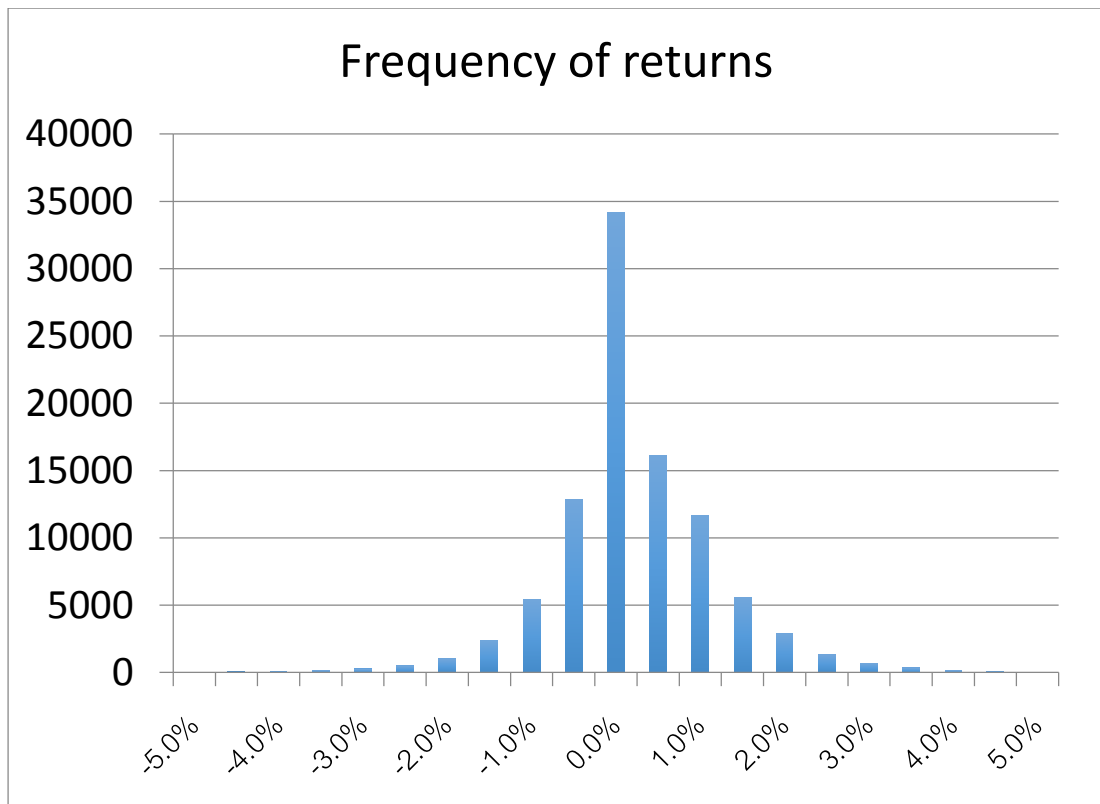


Figure 5

Return distribution of daily returns of SET100 stocks between 2011 and 2014.

Table 6

Buy-sell imbalances by investor type for SET100 stocks sorted by the previous day's returns.

	RETAIL	INSTITUTIONAL	FOREIGN
	BSI Number	BSI Number	BSI Number
Low return	8.27%*** (0.0097)	-12.41%*** (0.0199)	-17.37%*** (0.0167)
Normal return	-0.61% (0.0043)	-4.92%*** (0.0069)	-2.44%** (0.0096)
High return	-3.18%*** (0.0062)	2.66%* (0.0145)	4.36%*** (0.0135)

Stocks are sorted daily into three groups on the basis of their previous day's returns calculated on the basis of their reported prices by Thomson Reuters Datastream for SET stocks. Buy-sell imbalances are reported for the trades of three groups of investors. These are individual investors, domestic institutional investors and foreign investors as classified by the SET. For each day/partition/investor group, I calculate number imbalance as number of purchases minus number of sales divided by total number of all trades. The table reports the mean for each time series of daily imbalances for a particular investor group and partition. Standard errors are calculated using the Newey-West model to prevent serial correlation of the error term and appear in parentheses.

5.6 Thai Market and Short Sale Constraints

My findings within the volume sorting show less pronounced buy-sell imbalances for retail investors compared to the U.S. market. This is rather surprising as other papers suggest a stronger effect of behavioral biases like the disposition effect and overconfidence within emerging markets and especially Asia (Chen *et al.*, 2007). One reasonable explanation is that the inflow of new unexperienced traders in the

Thai market is substantially lower than in the U.S. market. Seasholes and Wu (2004) found that stocks which hit an upper price limit the day before attract individual investors and within those especially first time buyers.

The big surprise of my results lies within domestic institutional investors. Barber and Odean (2008) explain that the main difference for their findings between institutional and individual investors is the amount of search problem. The lack of short sale engagement by individual investors is rather a contributing factor as their buy-sell imbalances for stocks that they already own are higher when those stocks were grabbing attention. The findings of my research are questioning this fact as institutional investors have been found to react strongly to the volume proxy at the 1% significance level. One possible explanation can be that domestic institutional investors follow their momentum strategy but within this strategy they buy what catches their attention (as suggested by the results in Table 5). Another plausible explanation is that the short sale constraints that restrict potentially selling institutions from doing so, have a stronger impact than assumed. An increase in volume is associated with the release of new information about a firm. This release of information

is much likely to increase the heterogeneity of beliefs about a firm. While bullish investors are purchasing those stocks, bearish investors cannot sell them given the short sale constraints. This line of argumentation has its flaws too. If short sale constraints are in fact driving the results, we would expect similar results for foreign investors which we don't see.

5.7 Earnings Announcements and Dividend Announcements

To make sure my results are robust and not driven by other factors, I include earnings announcement days (EAD) and dividend announcement days (DAD) in my analysis. In particular, I calculate the buy-sell imbalances for earnings announcement days, dividend announcement days and all other days for every partition of volume and extreme return respectively. I do this by sorting the stocks similar to 5.2 and 5.3 into three groups (lowest 30%, middle 40% and highest 30%) of return/volume. Buy-sell imbalances are calculated by the number of trades. These results are presented in Table 7. Unfortunately many of the obtained results lack statistical significance as

the sample size turned out to be quite low especially for dividend announcement days. However, the results for all other days confirm previous findings. Retail investors buy stocks that decreased in value previously and sell those that increased. They buy predominantly stocks that experience high abnormal trading volume. Institutional investors buy stocks that gained momentum and sell stocks that declined in price. They strongly sell stocks that experienced low abnormal trading volume but buy the ones that show high abnormal trading volume. Foreign investors sell stocks that decreased in price and buy the ones that increased. Their buy-sell imbalances increase slightly with volume.

Where results are statistically significant for earnings announcements or dividend announcements they almost always indicate the trend obtained within all other days. Therefore neither dividend announcements nor earnings announcements can explain my findings.

Table 7

Buy-sell imbalances for SET100 stocks separated by earnings announcements, dividend announcements and all other days.

RETAIL							
	Return sorting				Volume sorting		
	EAD	DAD	All other		EAD	DAD	All other
Low return	7.17%*** (0.0188)	4.43% (0.0343)	4.26%*** (0.0044)	Low volume	-8.34%*** (0.0195)	-2.35% (0.0459)	-7.04%*** (0.0049)
Medium return	0.96% (0.0207)	10.39%** (0.0407)	-0.89%* (0.0046)	Medium volume	1.73% (0.0215)	2.00% (0.0352)	-0.14% (0.0043)
High return	-6.92%*** (0.0219)	-2.43% (0.0428)	-5.20%*** (0.0042)	High Volume	8.09%*** (0.0197)	8.26%** (0.0335)	6.48%*** (0.0042)

INSTITUTIONAL							
	Return sorting				Volume sorting		
	EAD	DAD	All other		EAD	DAD	All other
Low return	-7.33%** (0.0366)	-6.02% (0.0836)	-10.30%*** (0.0085)	Low volume	0.09% (0.0465)	-10.70% (0.0811)	-10.30%*** (0.0094)
Medium return	-4.40% (0.0379)	-17.74% (0.0515)	-5.40%*** (0.0081)	Medium volume	-4.61% (0.0352)	-16.08% (0.0814)	-7.56%*** (0.0080)
High return	1.93% (0.0335)	-8.95% (0.0788)	1.81%** (0.0073)	High Volume	-1.30% (0.0352)	0.35% (0.0710)	1.57%* (0.0084)

FOREIGN							
	Return sorting				Volume sorting		
	EAD	DAD	All other		EAD	DAD	All other
Low return	-10.97%*** (0.0315)	2.27% (0.0685)	-7.78%*** (0.0098)	Low volume	-7.30%* (0.0398)	-13.57% (0.0814)	-3.58%*** (0.0110)
Medium return	-4.40% (0.0328)	-19.13%*** (0.0623)	-2.00%* (0.0107)	Medium volume	-0.19% (0.0315)	0.72% (0.0552)	-2.60%*** (0.0099)
High return	3.55% (0.0370)	10.15% (0.0632)	3.30%*** (0.0097)	High Volume	-6.40%** (0.0317)	-2.35% (0.0590)	-1.76%* (0.0100)

Stocks are sorted daily into three groups on the basis of their previous day's returns and current day's abnormal trading volume, respectively. Buy-sell imbalances are reported for the trades of three groups of investors. These are individual investors, domestic institutional investors and foreign investors as classified by the SET. For each day/partition/investor group, I calculate number

imbalance as number of purchases minus number of sales divided by total number of all trades. The table reports the mean for each time series of daily imbalances for a particular investor group and partition. Standard errors are calculated using the Newey-West model to prevent serial correlation of the error term and appear in parentheses.



CHAPTER 6

CONCLUSION

When it comes to making decisions, we are dependent on information. But what happens if there is an oversupply of choices and information without enough time to process it? This paper assumes that investment choices are fighting for the investors' attention. Only after the choice set has been limited by attention, our personal preferences decide which decision to make. Therefore attention grabbing stocks have a higher chance of getting picked, while other stocks have not even been considered in the first place. This is referred to as attention bias. Similar to the effect of herding, this can lead a large number of investors to focus on a certain option set, increasing the prices of each asset in this option set and therefore decrease future returns. This attention bias decreases the utility of all the investors much like a travel guide that promises a secret tourist-free beach which will attract a large number of tourists which leaves all tourists disappointed.

Attention based decision making is omnipresent in day-to-day life. This paper aims to prove that this is the case for investors faced with the decision which stock to buy. The investor is confronted with a search problem that arises as a result of a huge option set. Many investors don't have the resources and time to evaluate thousands of stocks. Moreover this search problem only arises when investors buy stocks as short sale constraints prevent market participants in Thailand from selling stocks they do not own. Or in simple words: investors only sell stocks that they already own. Therefore they only face the search problem when buying stocks, but not when selling them. The assumption here is not that investors buy every stock that catches their attention, but that those stocks have a bigger chance of being considered and evaluated in contrast to inconspicuous stocks that were not even considered for evaluation given the scarceness of time and resources. Once attention limited the option set, personal preferences influence the decision. For example negative feedback traders might buy stocks that have declined in price while positive feedback traders purchase stocks that just appreciated. Regardless of their preferences, however, they are more likely to buy stocks that attracted their attention.

The data suggest that this is true for retail and institutional investors. Even though the economic impact of institutional investors is slightly stronger, a larger portion of individual investors is affected by attention. This is possible because institutional investors usually trade higher amounts than retail investors do. Retail investors show the same pattern as value managers for the return sorting in the U.S. market. One could conclude that this merely means that the majority of retail investors are just negative feedback traders and not affected by attention, but the results obtained in this study do not justify their excessive buying for stocks that generated attention through their abnormal trading volume. The volume sorting clearly demonstrates that the number of the trades of individual investors rises monotonously with volume. In fact, their buying behavior has found to be influenced the most by attention. Furthermore the sorting by returns and volume showed, that for each group of returns, retail investors prefer high attention stocks. It would clearly be interesting to see how big the portion of new inexperienced traders is for each volume partition. Unfortunately this was not possible with the given dataset and therefore leaves room for future research.

Professional investors like mutual funds follow their investment rules regardless of how popular certain stocks might be. Many of these strategies have exact purchase criteria based on the stocks fundamental value. Furthermore they have more resources and time to evaluate and monitor a large number of stocks. Regarding previous studies these reasons minimize the search problem for this investor group and prevent them from making attention driven decisions. However, this is not consistent with my results for institutional investors in Thailand. While the results for the return sorting alone are inconclusive, considering the volume sorting I find evidence that institutional investors react to stocks that grab attention. If they would only follow the positive feedback strategy as suggested by the findings of the return sorting, they should buy stocks regardless of their volume on a particular day. But the findings suggest that on average they buy stocks with the highest abnormal trading volume which is unrealistic to collide with a wide range of trading strategies. As a big surprise they turn out to be net buyers of attention grabbing stocks as well. This group was expected to be influenced the least of all investor groups. If we look at the number of trades we see that they are influenced less than individual investors, but much more than foreign investors.

Foreign investors are the last group of investors and the focus of this paper. Being professional investors, they are facing greater challenges than domestic institutional investors and are therefore expected to face a higher degree of search problem. However, this does not result in an increase of attention driven buying behavior. While their buy-sell imbalances react to returns similar to those of institutional investors, their reaction to an increase in abnormal trading volume is quite weak. The results of the return sorting alone leaves space for an explanation based on the momentum trading strategy. When sorted by returns and volume, their imbalances do not consistently increase with volume for each group of returns. Having said this, I come to the conclusion that foreign investors are influenced the least by attention from all tested groups. This might be due to two reasons.

First, results from developed markets have shown, that institutional investors - those that are likely to be foreign investors in Thailand - are not influenced by attention grabbing stocks. If this is the case it would contradict my third hypothesis and mean that none of the additional challenges they face (e.g. less resources, experience and informational disadvantage) compared to institutional investors actually increase the

search problem. Secondly, foreign investors are probably long term investors in Thailand as they focus on their domestic market and therefore don't react to daily changes in volume and prices in the same manner. They might hold SET stocks for diversification purposes which would also explain their strong selling to price decreases.

It is difficult to judge whether my findings have implications regarding the home bias. The two most common explanations for the home bias are the information asymmetry theory and the bounded rationality theory. If I could not reject hypothesis three it would indicate that foreign investors face a higher degree of search problem compared to institutional investors. This would point to information asymmetry as an explanation. As a way of dealing with this increased search problem in foreign markets, agents avoid investing outside of their domestic market. This is contradictory to the bounded rationality explanation which argues that the home bias puzzle is caused by psychological familiarity issues. The results obtained in the Thai market leave both options equally possible.

The surprising results for institutional investors in the Thai market are likely to be caused simply by attention driven purchases within this investor group and not by short sale constraints. As this indicates a lower level of sophistication and experience by institutional investors compared to the United States, it is an interesting topic for future research.

Studies on behavioral biases in Thailand are scarce. The obtained results add to the stream of behavioral biases and show why it is important to study behavioral phenomenon in different markets and different cultures as they often bear surprises. The research on foreign investors is far less developed than other investor groups, probably because they are usually aligned with domestic institutional investors. My findings suggest that even though they seem to be similar, their trading behavior can be very different.

Despite their additional difficulties (e.g. lower level of experience in a foreign market, less resources, information asymmetry and informational disadvantage) this paper could not establish that institutional investors experience an increase in irrational behavior when they become foreign investors.

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APPENDIX

Table 8

List of SET100 stocks during sample period 2011-2014.

AJ	CK	KYE	NOK	GLOBAL	ERW
ADVANC	CPF	KBANK	PDI	MAKRO	LANNA
AOT	CHG	KCE	PHATRA	SGP	SCC
AMATA	CPALL	KGI	PTL	STEC	SCB
AP	DELTA	KSL	PSL	SAT	TTA
AAV	DEMCO	KBS	PF	SPCG	TICON
ASP	DCC	KKP	PS	STA	TASCO
BBL	EGCO	KTB	PTTAR	SRICHA	TISCO
BCH	EARTH	KTC	PTTCH	SMT	TMB
BGH	ESSO	KKC	PTTEP	STPI	DTAC
BECL	GJS	LPN	PTTGC	SPALI	TTCL
BLAND	GSTEL	LH	PTT	SVI	TPIPL
BLA	GFPT	LHBANK	QH	TSTH	TRUE
BMCL	GLOW	LOXLEY	RML	THAI	UV
BAY	GOLD	MCS	RATCH	TFD	VNG
BANPU	GUNKUL	MDX	RCL	TOP	VGI
BEC	HANA	MAJOR	ROBINS	TPC	WHA
BJC	HEMRAJ	MALEE	ROJNA	THRE	WORK
BIGC	HMPRO	MBK	RS	TTW	SF
BJCHI	IVL	MC	SSI	TUF	
BTS	INTUCH	MCOT	SAMART	TVO	
BH	IRPC	MEGA	SAMTEL	THCOM	
CCET	ITD	MINT	SIRI	THREL	
CPN	JAS	M	SC	TCAP	
CENDEL	JMART	NYT	SCCC	BCP	

VITA

Eduard Schmidt was born in Alma-Ata, Kazakhstan on November 1st in 1986. After finishing his bachelor degree in Information Science and Engineering at the Hochschule Darmstadt in Germany, he started to work as a Credit Analyst where he discovered his passion for finance and the stock market. Consequently he decided to expand his skill set by joining the Master of Science in Finance program of the well-respected Chulalongkorn University in Bangkok, Thailand. For any questions or suggestions please feel free to contact him via E-mail at Eduard.Schmidt86@web.de.

