

AN ALTERNATIVE METHOD TO IDENTIFY INFORMED TRADERS
IN THE STOCK EXCHANGE OF THAILAND

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จุฬาลงกรณ์มหาวิทยาลัย
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วิธีทางเลือกในการบ่งชี้ตัวนักลงทุนผู้มีข้อมูลในตลาดหลักทรัพย์แห่งประเทศไทย



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต

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ฉัฐพงศ์ กิตติสุเมธา : วิธีทางเลือกในการบ่งชี้ตัวนักลงทุนผู้มีข้อมูลในตลาดหลักทรัพย์แห่งประเทศไทย (AN ALTERNATIVE METHOD TO IDENTIFY INFORMED TRADERS IN THE STOCK EXCHANGE OF THAILAND) อ.ที่ปริกษาวิทยานิพนธ์หลัก: อ. ดร. ฉัฐวุฒิ เจนวิทยาโรจน์, 45 หน้า.

การศึกษานี้ใช้ผลการศึกษาของ Bloomfield, O'Hara, and Saar (2005) เป็นวิธีทางเลือกในการบ่งชี้ตัวนักลงทุนผู้มีข้อมูลและไม่มีข้อมูลในตลาดหลักทรัพย์แห่งประเทศไทย ผลการศึกษาจากข้อมูลปี 2552 พบว่านักลงทุนทั้ง 4 ประเภทในตลาดหลักทรัพย์แห่งประเทศไทยมีพฤติกรรมที่คล้ายกับนักลงทุนที่ไม่มีข้อมูล อย่างไรก็ตามการศึกษาเพิ่มเติมพบว่านักลงทุนประเภทบัญชีบริษัทหลักทรัพย์และนักลงทุนสถาบันมีสัดส่วนของนักลงทุนที่ไม่มีข้อมูลต่ำกว่านักลงทุนต่างประเทศ นอกจากนี้ผลการศึกษาดังกล่าวยังคงสอดคล้องกันในทุกวิธีการคำนวณอัตราส่วนของคำสั่งซื้อขายแบบกำหนดราคาและในทุกสถานะตลาด



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pp.

This study uses the experimental findings of Bloomfield, O'Hara, and Saar (2005) as an alternative method to identify informed and uninformed traders in the Stock Exchange of Thailand. Based on a sample period from 2009, the results show that all four investor types in the Stock Exchange of Thailand appear to be dominated by uninformed traders. Further analyses, however, indicate that proprietary traders and institutional investors have relatively lower proportions of uninformed traders than foreign investors do. The robustness tests show that our main results are generally unchanged, regardless of the methods used to calculate limit order submission rates and stock market conditions.



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Student's Signature

Advisor's Signature

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CHAPTER 1

INTRODUCTION

1.1. Problem Review and Motivation

In economics, the concept of information asymmetry has been studied extensively for a long time.¹ By invalidating one of the key assumptions in the neoclassical economics, information asymmetry provides a room for the reexamination of many economic theories. Many seminal studies show that when one party to the transaction has more or better relevant information than the other parties, the economic problems become more complicated than they used to be. Initially, the concept of information asymmetry is not widely accepted.² The study of the auction markets in Vickrey (1961) is among the first studies that directly emphasize the asymmetry of information as a primary consideration. Later, the study of the information asymmetry has been officially introduced to the economic society by Akerlof (1970). Beginning with the case of an automobile market in 1970, nowadays, the concept of information asymmetry has been studied in most aspects of the markets.

The stock market is no exception. The situation that some traders have the relevant information that the others do not have is plausible. Given that having such information makes them able to earn abnormal returns, the efficient market hypothesis is at least partially ruined. So, it is imperative for all stakeholders to find out how to

¹ See Stiglitz (1987) and Stiglitz (2000) for the detail of the development.

² For more information, see Stiglitz (2000).

mitigate the problem and prevent the failure of the market which is the worst case scenario that could occur when the asymmetry is severe.³

To study the problem of information asymmetry in the stock market, three common branches of research methodology are used. Researchers search for the solutions by using theoretical models, empirical data, and laboratory experiments.

In the theoretical framework, setting some assumptions about the characteristics of the market and market participants seems to be unavoidable. As a result, the conclusions of these theoretical models are stylized. Supporting empirical evidence is required to make them more reliable. The classical examples of the studies of the information asymmetry are Glosten (1994) and Seppi (1997). They assume that the use of market orders is the result from the rational optimization of informed traders and informed traders are the only trader type who uses market orders while uninformed traders are assumed to be patient and use only limit orders because they are required to be the trading counterparts and the source of liquidity for informed traders. In these studies, the order choices of traders are assumed explicitly. However, there are some studies that find traders' order choices by setting the assumptions about the market. Harris (1998), for example, finds that the duration of private information is the primary determinant of informed traders' order choices as they tend to use more limit orders when their information is considered to be long-lived and use more market orders when

³ For more information, see Akerlof (1970) and Grossman and Stiglitz (1980).

their information is considered to be short-lived. However, his model ignores the price impact of trades making it applicable for only small size trades.⁴

Beside theoretical studies, many researchers like to use empirical data to study the same research questions. One of the objectives of these studies is to provide supporting or opposing evidence to related theoretical studies. Unfortunately, empirical researchers cannot identify informed and uninformed traders explicitly since there is no label of informed and uninformed traders attached to the empirical data. Therefore, researchers have to use some proxies to represent the informativeness of traders.

One of the proxies that are widely used is the trading performance. When this proxy is used, the informativeness of traders is represented by their trading performances. Traders whose performances are better will be classified as informed traders.⁵

For a comparative purpose, this proxy requires all traders to have the same investment holding period. This necessary assumption seems to be restrictive because the holding period of one trader is independent of other traders in the actual market. Setting one arbitrary holding period for all traders could lead to invalid conclusions.

Moreover, the results from this proxy are sometimes inconclusive. For example, Taechapiroontong and Suecharoenkit (2011) find that foreign investors have worse trade price performance than domestic investors in the Stock Exchange of Thailand

⁴ For more information, see Harris (1998, pp. 2, 62).

⁵ For example, see Grinblatt and Keloharju (2000), Kamesaka et al. (2003), Choe et al. (2005), Dvorak (2005), and Froot and Ramadorai (2008).

(SET) during the 1999 - 2004 period while Boonvorachote and Panyawattananon (2012) find the opposite result in the same market but with the different study period. His study is conducted using the data during the 2005 – 2010 periods. In addition, Phansatan et al. (2012) use 6 different holding periods to compute the trading performance of all trader types in SET and find that the result of one holding period is opposite to the results from other holding periods.

Apart from employing theoretical models and empirical data, an experimental design is another branch of the research methodology that is commonly used when dealing with complex problems. Bloomfield and Anderson (2010) mention that laboratory experiments can be used to avoid some common problems in theoretical and empirical studies such as the self-selection problem, the omitted variables, and the unobserved variables.

By utilizing experimental markets, Bloomfield et al. (2005) find that time of the trading period and value of private information are two factors which can be used to classify informed and uninformed traders.

By monitoring the order strategies of traders in simulated markets, Bloomfield et al. (2005) observe that trading strategies of both trader types change over time. During the beginning of the trading period, informed traders trade mainly via market orders because they want to capitalize on their private information by picking-off mispriced limit orders on the limit order book. As the trading progresses, these market orders move the security price towards its true value. When the true value of the security lies within the bid-ask spreads, informed traders are unable to profit from market orders anymore. Consequently, they continue to trade by using limit orders and earn the bid-

ask spreads. Uninformed traders who are required by the trading rule to trade at least a specific number of shares before the trading period is over, on the other hand, begin to trade via limit orders since they do not wish to pay the bid-ask spreads. However, as time progresses, they gradually change to use more market orders to meet their trading targets.

Beside the time of the trading period, Bloomfield et al. (2005) find that the value of information is another key determinant in the trading strategy of informed traders. When trading the security that has high value of information, informed traders are found to submit more market orders than they do when trading the security that has low value of information. This trading pattern is not found in the trading of uninformed traders.

There are some empirical studies that provide supporting evidence to the findings of Bloomfield et al. (2005). Anand et al. (2005) study the trading strategies of institutional investors and individual investors in the New York Stock Exchange (NYSE) from November 1990 to January 1991. In their study, institutional investors are assumed to be informed traders while individual investors are assumed to be uninformed traders. The result shows that the trading performances of both market and limit orders submitted by institutional traders are better during the first half of the day than during the second half of the day. This result indicates that the use of market and limit orders by institutional traders during the first half of the day comes from their informational advantages while the use of limit orders during the second half of the day comes from the liquidity purpose as they take the role of market makers to earn the bid-ask spreads. Kaniel and Liu (2006) develop a model to study the use of market and limit orders by informed traders. Consistent with Bloomfield et al. (2005), they find that

informed traders consider the value of their private information when they design their order strategies. The model shows that informed traders tend to use more market orders when the difference between the current price and the true value of the security is large and turn to use more limit orders when the difference is smaller. Ellul et al. (2007) study the order choices of traders in NYSE and find that traders are more likely to use limit orders towards the end of the trading day. Duong et al. (2009) study the order aggressiveness of institutional and individual investors in the Australian Stock Exchange (ASX). Institutional investors are found to use more aggressive during the first hour of the trading day while individual investors are found to use less aggressive orders during the beginning and switch to use more aggressive orders during the end of the trading day.

1.2. Statement of the Problem

Three problems have been addressed in the previous section. Firstly, there are some limitations on the use of trading performance as the proxy for the informativeness of traders, e.g., traders do not have the same investment holding period in general. Secondly, the results from prior studies on the trading performance of traders in the Stock Exchange of Thailand are inconsistent, i.e., they are varied with study periods and investment holding periods. Consequently, the broad conclusion cannot be reached. Lastly, despite having some supporting evidence, the experimental findings of Bloomfield et al. (2005) have never been used to classify informed and uninformed traders in an actual stock market.

1.3. Objective of the study

This study is intended to promote the experimental findings of Bloomfield et al. (2005) as an alternative method to identify informed and uninformed traders in the Stock Exchange of Thailand. Advantages and disadvantages of this alternative method are supposed to be discussed.

1.4. Scope of the Study

The data used throughout this study are provided by the Stock Exchange of Thailand (SET). Like the data from most financial markets, traders' identification numbers are excluded. As a consequence, the study in an individual level is not attainable. The trading strategies of traders will be investigated by investor types. In SET, there are 4 investor types, i.e., foreign investors, institutional investors, individual investors, and proprietary traders. Since foreign investors and institutional investors, in general, have restrictions on trading on low-liquidity and small-market capitalization stocks. Hence, this study will focus only on stocks that have sufficient liquidity and large-market capitalization.

1.5. Contributions

The alternative method to identify informed and uninformed traders has been utilized in this study. The use of limit and market orders by 4 investor types has been investigated. The strengths and limitations of this alternative method have been discussed. Empirical evidence has been added to the study of informed and uninformed traders in the Stock Exchange of Thailand.

1.6. Organization of the study

There are 5 chapters in this study. The next chapter provides a review of relevant literature. Chapter 3 explains the data and methodology. Chapter 4 presents the results. The conclusions are presented in the last chapter.



CHAPTER 2

LITERATURE REVIEW AND HYPOTHESES

2.1. Literature Review

2.1.1. Theoretical Studies of Traders' Order Choice

To study the problem of information asymmetry in the stock markets, many researchers focus their studies on the trading strategies of informed and uninformed traders. They realize that an understanding of the trading strategies of both informed and uninformed traders will contribute to an understanding of the market mechanism in which there is an information asymmetry problem.

In a theoretical framework, researchers conduct various theoretical models to study various aspects of the problem. By setting assumptions about trading determinants of informed and uninformed traders and the market as a whole, they come up with various explanations about the trading strategies of both trader types and how the market characteristics affect these strategies. However, the complete understanding about how informed and uninformed traders trade has not been reached due to the complexity of the market. Numerous theoretical studies use restrictive assumptions to make their models computable while the others completely ignore the problem of information asymmetry. For example, Cohen et al. (1981) study the trade-off between the execution certainty of market orders and a better price but with execution uncertainty of limit orders. Their gravitational pull model shows that the benefit of the better price provided by limit orders decreases when the spreads are narrower, making more investors to prefer the execution certainty provided by market orders. However, as more investors turn to use market orders, the spreads become wider and the benefit

of the better price provided by limit orders is higher, making investors to use more limit orders. To summarize, this model suggests that investors consider the relative costs of price improvement and execution risk when they design their trading strategies.

Apart from the studies that do not consider the issue of information asymmetry at all, there are some studies that consider it with restrictive assumptions. Glosten (1994) studies the competitiveness of an electronic limit order book system relative to competing markets. The results show that the electronic limit order book system is a competent system and has a potential to be a center of significant trading volume. In his model, market orders are assumed to be the result of rational optimization of informed traders, in other words, informed traders are assumed to be the only type of traders who use market orders. On the other hand, patient traders are the ones who keep submitting limit orders to the market are the source of liquidity. Seppi (1997) studies the significance of public limit orders by using the same assumptions that informed traders always use market orders while uninformed traders always use limit orders. These restrictive assumptions about the order choice of informed and uninformed traders make the results from these studies to be stylized.

Later, Harris (1998) allows traders in his model to use both limit and market orders. He finds that the duration of private information is the primary determinant of informed traders' order choices as they tend to use more limit orders when their information is considered to be long-lived and use more market orders when their information is considered to be short-lived. However, he does not consider the price impact in his model. As a result, his findings are applicable for only small size trades which have a small price impact.

2.1.2. Empirical Studies with the Trading Performance Method

Since researchers cannot identify informed and uninformed traders explicitly in actual stock markets, they have to use some proxies to represent the informativeness of traders. The trading performance of the traders is one of the proxies that are commonly used. This proxy is based on the important assumption that traders who finish the trading period with higher profits are the ones who are better informed and traders who finish the trading period with lower profits or higher losses are the ones who are worse informed.

In the studies of the trading performance of foreign investors, the results show that foreign investors have better trading performances than domestic investors in many markets. For example, Froot and Ramadorai (2008) study the trading performances of investors in 25 countries and find that foreign investors outperformed domestic investors in many markets especially in emerging markets. Grinblatt and Keloharju (2000) find that foreign investors in Finland have better trading performances than domestic individual investors. Kamesaka et al. (2003) find that foreign investors in Japan also have better trading performances than domestic individual investors. While Bae et al. (2006) find that foreign investors in Japan have good market timing abilities resulting in good trading performances.

Prior studies find that individual investors are uninformed traders most of the time. For example, Barber and Odean (2000) calculate the trading performances of individual investors in the U.S. and compare them to various benchmarks. The results show that individual investors have relatively poor trading performances. Barber et al. (2009) study the trading performances of individual investors in Taiwan and also find

that individual investors have worse trading performances than other investor types. Kamesaka et al. (2003) find that individual investors in Japan have the worst trading performances. However, there are some studies that find the opposite, for example, see Choe et al. (2005) and Dvorak (2005).

Institutional investors and proprietary traders are found to be informed traders in many studies. Cohen et al. (2002) and Barber et al. (2009) find that institutional investors have better trading performances than individual investors in the U.S. and Taiwan, respectively. Kamesaka et al. (2003) find that institutional investors and securities firms in Japan outperform individual investors during 1980 – 1997.

2.1.3. Related Experimental Studies

Bloomfield and Anderson (2010) argue that the experimental method can be used to avoid some common problems in the theoretical and empirical studies such as the self-selection problem, the omitted variables, and the unobserved variables. By relaxing some restrictive assumptions in the theoretical studies, this method allows researchers to find the results in the more general case. This method is appropriate for studying the problem that involves the human decision making under uncertainty which is difficult to be solved theoretically.

In the experimental study of Bloomfield et al. (2005), the differences between the trading strategies of informed and uninformed traders have been observed. The result shows that the trading strategies of both informed and uninformed traders change over time. At the beginning, informed traders use market orders to capitalize from their private information. When the trading period is passing by, these orders move the stock price towards its true value. When the stock price is close to its true value, market orders

are not worth using anymore. Informed traders then switch to use limit orders to earn the spreads. Uninformed traders or liquidity traders, on the other hand, use limit orders at the beginning of the trading period because of their information disadvantages. However, when the trading period is passing by, they gradually change to use more market orders because they have to meet their target before the trading period is over. Bloomfield et al. (2005) suggest that the market-making role of informed traders come from the information advantages they have over uninformed traders. In addition, the result shows that informed traders trade the stocks that have high value of information and the stocks that have low value of information differently. The value of information is calculated by the difference between the closing price of the stock and the expected value of the stock. In this experimental market, the stock closing price is told to informed traders before the trading period starts while the expected value of the stock is fixed at 25 laboratory dollars. So, the value of the private information that informed traders have is the difference between the closing price of the stock and 25. The result shows that informed traders use more market orders when they trade the stocks that have high value of information and use more limit orders when they trade the stocks that have low value of information. For uninformed traders, the result shows that there is no significant difference in their trading strategies when they trade the stock with different value of information.

2.1.4. Supporting Empirical Studies

Anand et al. (2005) study the order strategies of traders by using the unique data of stocks in the New York Stock Exchange (NYSE) during November 1990 – January 1991. They assume that institutional traders are informed traders while individual

traders are uninformed traders. The results show that institutional traders use more limit orders than do individual traders and the limit orders submitted by institutional traders perform better than those submitted by individual traders which is consistent with the findings of Bloomfield et al. (2005). Moreover, institutions' limit orders perform better in the morning than the afternoon indicates that they are more likely to be information motivated in the morning and be on the liquidity purpose in the afternoon. Kaniel and Liu (2006) develop a model to study the use of market and limit orders by informed traders. Consistent with Bloomfield et al. (2005), they find that informed traders consider the value of their private information when they design their order strategies. The model shows that informed traders tend to use more market orders when the difference between the current price and the true value of the security is large and turn to use more limit orders when the difference is smaller. Ellul et al. (2007) study the trader order choices by using the data of 148 sample stocks from NYSE during the week of April 30 – May 4, 2001. They find that traders in NYSE tend to use more limit orders towards the end of the trading day. Duong et al. (2009) study the order aggressiveness of institutional and individual investors in the Australian Stock Exchange (ASX) during August 1 – November 25, 2005. The results show that institutional investors use more aggressive orders than individual investors in the first hour of the trading day while individual investors use more aggressive orders towards the end of the trading day.

2.2. Research Hypotheses

Bloomfield et al. (2005) find that informed traders use less limit orders during the beginning of the trading period than during the end of the trading period while uninformed traders trade in the other way around by using more limit orders during the

beginning of the trading period than during the end of the trading. This finding is supported by some supporting evidence such as Anand et al. (2005) and Duong et al. (2009). According to the results from prior studies, e.g., Barber and Odean (2000), Grinblatt and Keloharju (2000), Kamesaka et al. (2003), Bae et al. (2006) and Barber et al. (2009), foreign investors, proprietary traders and institutional investors are found to have better trading performance than individual investors. So, this study hypothesizes that foreign investors, proprietary traders, and institutional investors in the Stock Exchange of Thailand trade like informed traders and hypothesizes that individual investors trade like uninformed traders in the study of Bloomfield et al. (2005).

Hypothesis 1.1: Foreign investors, proprietary traders, and institutional investors use less limit orders during the beginning of the trading period than during the end of the trading period while individual investors use more limit orders during the beginning of the trading period than during the end of the trading period.

The results of Bloomfield et al. (2005) also show that informed traders use less limit orders than uninformed traders during the beginning of the trading period and use more limit orders than uninformed traders during the end of the trading period. In this study, an investor type that uses less limit orders than other investor types during the beginning of the trading period and uses more limit orders than other investor types during the end of the trading period will be classified as an informed investor type while an investor type that uses more limit orders than other investor types during the beginning of the trading period and uses less limit orders than other investor types during the end of the trading period will be classified as an uninformed investor type. According to the results from prior studies, e.g., Barber and Odean (2000), Grinblatt

and Keloharju (2000), Froot and Ramadorai (2008), and Barber et al. (2009), foreign investors are found to have better trading performance than other investor types in the markets while individual investors are found to have worse trading performance than other investor types in the markets. So, this study hypothesizes that foreign investors in the Stock Exchange of Thailand trade like informed traders and individual investors trade like uninformed traders in the study of Bloomfield et al. (2005).

Hypothesis 1.2: Foreign investors use less limit orders than other investor types during the beginning of the trading period and use more limit orders than other investor types during the end of the trading period while individual investors use more limit orders than other investor types during the beginning of the trading period and use less limit orders than other investor types during the end of the trading period.

According to the study of Bloomfield et al. (2005), the value of information is another factor that can be used to classify informed and uninformed traders. The results show that informed traders use less limit orders when they trade stocks that have high value of information and use more limit orders when they trade stocks that have low value of information. Again, this study hypothesizes that foreign investors, proprietary traders, and institutional investors trade like informed traders in the study of Bloomfield et al. (2005).

Hypothesis 2: Foreign investors, proprietary traders, and institutional investors use less limit orders when they trade stocks that have high value of information and use more limit orders when they trade stocks that have low value of information.

CHAPTER 3

DATA AND METHODOLOGY

3.1. Data

This study uses the intraday data of 100 stocks listed in the SET100 Index from January 1, 2009 to December 31, 2009. The dataset is provided for an academic purpose by the Stock Exchange of Thailand. This study period is the latest period that has complete data. Sample stocks are used in the analyses to ensure sufficient liquidity and the participation of all investor types. At the beginning of the study period, the SET100 Index is 671.35 points. The index goes up to be 1,120.26 points at the end of the period. It is accounted for 66.87% increase during the study period. This study finds that there is a total of 34,693,903 orders submitted during the study period. These submitted orders are equal to 1,535,329,667,265 shares. According to Table 1, individual investors are the biggest investor type in the market both in term of submitted orders and shares. Their submission is accounted for 87.83% of the total submitted orders and 82.84% of the total submitted shares. Foreign investors are in the second place both in term of submitted orders and shares. Their submission is accounted for 7.16% of the total submitted orders and 8.17% of the total submitted shares. It was found that institutional investors submit more orders than proprietary traders, but their submitted orders are accounted for less shares. So, it can be concluded that, on average, the order size of institutional investors is smaller than the order size of proprietary traders.

Table 1: Percentage of limit orders used by each investor type

Investor Type	% of Total Orders	% of Total Shares
Foreign Investors	7.16%	8.17%
Proprietary Traders	1.75%	5.55%
Institutional Investors	3.26%	3.44%
Individual Investors	87.83%	82.84%

Note: This table reports the order submission of 4 investor types in the Stock Exchange of Thailand as a percentage of the total submitted orders and a percentage of the total submitted shares.

3.2. Methodology

3.2.1. Limit order submission rate

According to Bloomfield et al. (2005), the order preference of each investor type is measured by a limit order submission rate which is the proportion of the submitted limit orders to all submitted orders.

$$\text{Limit order submission rate} = \frac{\text{no. of submitted limit orders}}{\text{no. of total submitted orders}}$$

This definition of the limit order submission rate is suitable for the experimental markets since the order size is controlled, i.e., each order in the experimental study is equal to 1 share. However, in actual markets, the order size is not controlled. If this fact is not taken into account, an order of 100 shares and an order of 1,000,000 shares will be treated indifferently.

To overcome the order size problem, the number of shares is used to calculate the limit order submission rate instead of the number of orders.

$$\text{Limit order submission rate} = \frac{\text{no. of shares submitted via limit orders}}{\text{no. of total submitted shares}}$$

However, there is another difference between experimental markets and actual stock markets. In experimental markets, there is just one stock traded in each market. The stock price is restricted to be between 0 and 50 laboratory dollars. In actual stock markets, there are multiple stocks traded in the markets. In this study, there are 100 sample stocks. Their prices and impacts on the market are different. If this fact is overlooked, a share of 1 THB and a share of 300 THB will be treated indifferently.

To overcome this problem, the limit order submission rate is calculated for each sample stock by using the number of shares. Then, the overall limit order submission rate is calculated based on an average of the limit order submission rate of each sample stock.

$$\text{Limit order submission rate} = \frac{\sum_{i=1}^{100} \text{limit order submission rate}_{\text{stock } i}}{100}$$

In this study, the limit order submission rate will be obtained by all three methods. The limit order submission rate calculated from the number of shares, by averaging the limit order submission rate of each sample stock, will be referred as Methodology 1. The limit order submission rate calculated from the number of shares, by ignoring the difference in sample stocks' prices, will be referred as Methodology 2. And the limit order submission rate calculated from the number of orders will be referred as Methodology 3.

3.2.2. Time of the day effect

According to Hypothesis 1.1 and Hypothesis 1.2, the informativeness of each investor type will be decided by the limit order submission rates of that investor type

during the beginning and during the end of the trading period. Initially, this study sets the duration of the beginning of the trading period and the duration of the end of the trading period to be equal to 1 hour.⁶ After the limit order submission rates during the first hour and during the last hour of the trading day are calculated, Hypothesis 1.1 and Hypothesis 1.2 are tested using the t-test statistics.

In Hypothesis 1.1, foreign investors, proprietary traders, and institutional investors are hypothesized to trade like informed traders while individual investors are hypothesized to trade like uninformed traders in the experimental study. So, foreign investors, proprietary traders, and institutional investors are expected to use less limit orders during the first hour of the trading day than during the last hour of the trading day while individual investors are expected to use more limit orders during the first hour of the trading day than during the last hour of the trading day. If this hypothesis is correct, the result should be as follows.

- The limit order submission rates of foreign investors, proprietary traders, and institutional investors during the first hour of the trading day are lower than their limit order submission rates during the last hour of the trading day.
- The limit order submission rates of individual investors during the first hour of the trading day are higher than their limit order submission rates during the last hour of the trading day.

In Hypothesis 1.2, foreign investors are hypothesized to trade like informed traders while individual investors are hypothesized to trade like uninformed traders in

⁶ Duong et al. (2009) use the same duration for their study of traders' order aggressiveness.

the experimental study. So, foreign investors are expected to use less limit orders than other investor types during the first hour of the trading day and use more limit orders than other investor types during the last hour of the trading day. Individual investors, on the other hand, are expected to use more limit orders than other investor types during the first hour of the trading day and use less limit orders than other investor types during the last hour of the trading day. If this hypothesis is correct, the result should be as follows.

- Foreign investors have lower limit order submission rates than other investor types during the first hour of the trading day and have higher limit order submission rates than other investor types during the last hour of the trading day.
- Individual investors have higher limit order submission rates than other investor types during the first hour of the trading day and have lower limit order submission rates than other investor types during the last hour of the trading day.

3.2.3. The value of information effect

According to Hypothesis 2, foreign investors, proprietary traders, and institutional investors are hypothesized to trade like informed traders in the experimental study. They are expected to use less limit orders when they trade stocks that have high value of information and use more limit orders when they trade stocks that have low value of information. In the study of Bloomfield et al. (2005), all traders know that the expected final price of the stock is fixed at 25 laboratory dollars. The value of information is defined as the difference between the expected final price and

the final price of the stock. Informed traders are the only trader type who knows the final price of the stock. So, they are the only trader type who knows the value of information. In actual stock markets, the expected final price of each sample stock is different from one another. To imitate the experimental setting, the opening prices of all sample stocks are assumed to be their expected final prices. As a result, the value of information of each sample stock is equal to the difference between its opening price and its closing price. To compare the value of information of different sample stocks, the value of information of each sample stock is calculated in term of a percentage.

$$\text{Value of information}_{\text{stock } i} = \left| \frac{\text{closing price}_i - \text{opening price}_i}{\text{opening price}_i} \right|$$

To classify high and low value stocks, 30 sample stocks that have the highest values of information are considered as high value stocks while 30 sample stocks that have the lowest values of information are considered as low value stocks.

If this hypothesis is correct, the result should be as follows.

- The limit order submission rates of foreign investors, proprietary traders, and institutional investors when they trade high value stocks are lower than the limit order submission rates when they trade low value stocks.

3.2.4. Robustness Tests

In an empirical study, there is a chance that the conclusion will be changed when there is an adjustment for the proxy used, e.g., when the proxy is calculated by the different formula. In addition, results from many studies are found to be contrary when they are studied in the different market conditions. In this study, two robustness tests will be conducted to examine the robustness of the results.

In the first robustness test, the methodology will be replicated using the durations of 30 minutes and half a trading day instead of the duration of 1 hour in the calculation of the limit order submission rates.⁷ As a result, the first 30-minute and the last 30-minute limit order submission rates will be used to identify informed and uninformed traders in Robustness Test 1.1 while the limit order submission rates during the first half and during the second half of the trading day will be used in Robustness Test 1.2.

In the second robustness test, the methodology will be replicated using three continuous study periods that represent three different market conditions as can be seen in Table 2. In Robustness Test 2.1, the study period of 30 April 2005 – 31 December 2006, this study will analyze the results in the sideways market condition. The SET100 Index goes up by 3.34% during this period. In Robustness Test 2.2, the study period of 1 January 2007 – 31 December 2007, this study will examine another uptrend market condition in which the index goes up by 31.17%. And in Robustness Test 2.3, the study

⁷ The duration of half a day is similar to the study of Anand et al. (2005), who divide the trading hour of NYSE in half to investigate the difference in the performance of submitted orders.

period of 1 January 2008 – 31 December 2008, this study will investigate the downtrend market condition in which the SET100 Index drops more than half during the period.

Table 2: Percentage change of the SET100 Index during each study period

Study Period	At the Beginning Index	At the End Index	% Change
2005-2006	1000	1033.38	3.34%
2007	1033.38	1355.47	31.17%
2008	1355.47	671.35	-50.47%
2009	671.35	1120.26	66.87%

Note: This table reports the SET100 Index at the beginning, at the end, and the percentage change in each study period.



CHAPTER 4

RESULTS AND DISCUSSION

4.1. Results

4.1.1. Descriptive Statistics of the Limit Order Submission Rates

The descriptive statistics of the limit order submission rates calculated by three different methods are presented in Table 3. Individual investors are found to have the highest limit order submission rate in spite of the methodology used. The result shows that the limit order submission rates calculated by Methodology 1 have higher standard deviations than Methodology 2 and 3.

Table 3: Descriptive statistics of the limit order submission rate

Investor Type	Min	Q1	Mean	Median	Q3	Max	S.D.
Panel A: Methodology 1							
Foreign Investor	55.3%	63.9%	68.0%	67.6%	70.7%	90.8%	6.0%
Proprietary Traders	18.0%	52.5%	58.6%	58.9%	64.2%	84.0%	8.8%
Institutional Investors	36.6%	60.7%	64.1%	64.3%	68.1%	87.5%	7.3%
Individual Investors	65.2%	74.4%	77.5%	77.4%	79.8%	95.2%	5.0%
Panel B: Methodology 2							
Foreign Investor	31.5%	65.5%	68.5%	68.8%	71.7%	91.7%	5.2%
Proprietary Traders	43.6%	63.9%	66.7%	67.1%	69.8%	81.2%	5.0%
Institutional Investors	46.6%	58.8%	62.7%	62.4%	66.5%	78.6%	5.7%
Individual Investors	69.7%	77.6%	80.7%	80.8%	83.7%	91.6%	4.2%
Panel C: Methodology 3							
Foreign Investor	59.7%	68.9%	70.7%	71.2%	72.8%	81.7%	3.1%
Proprietary Traders	59.2%	65.7%	67.6%	67.5%	69.5%	78.2%	2.8%
Institutional Investors	57.5%	74.4%	75.8%	76.1%	77.5%	83.3%	2.8%
Individual Investors	72.7%	78.3%	79.8%	79.9%	81.3%	86.5%	2.2%

Note: This table reports the descriptive statistics of the limit order submission rates. Methodology 1 refers to the methodology that initially calculates the limit order submission rate of each sample stock by the number of submitted shares, and then calculates the cross-sectional limit order submission rate based on the limit order submission rate of each sample stock. Methodology 2 refers to the methodology that calculates the limit order submission rate from the number of submitted shares across all sample stocks. And Methodology 3 refers to the methodology that calculates the limit order submission rates from the number of submitted orders across all sample stocks.

4.1.2. Time of the Day Effect

When the limit order submission rate during the first hour and during the last hour of the trading day are compared for all investor types. Table 4 shows that the results from all methods are consistent. The limit order submission rates during the first hour of all investor types are higher than their limit order submission rates during the last hour of the trading day. According to Hypothesis 1.1, the results oppose the hypothesis about foreign investors, proprietary traders, and institutional investors because they do not use less limit orders during the first hour of the trading day than during the last hour of the trading day. However, the results support the hypothesis about individual investors since they use more limit orders during the first hour of the trading day than during the last hour of the trading day. The trading pattern of all investor types in the Stock Exchange of Thailand is similar to the trading pattern of uninformed traders in the experimental study of Bloomfield et al. (2005).

Table 4: Comparison between the limit order submission rates during the first hour and during the last hour of the trading day of each investor type using the data from 2009

Investor Type	First Hour	Last Hour	First Hour - Last Hour
Panel A: Methodology 1			
Foreign Investor	78.4%	53.9%	24.5%**
Proprietary Traders	66.1%	58.2%	7.9%**
Institutional Investors	68.8%	59.1%	9.7%**
Individual Investors	87.0%	60.1%	26.9%**
Panel B: Methodology 2			
Foreign Investor	81.4%	55.3%	26.1%**
Proprietary Traders	73.7%	63.0%	10.7%**
Institutional Investors	67.2%	60.5%	6.7%**
Individual Investors	89.1%	64.9%	24.2%**
Panel C: Methodology 3			
Foreign Investor	80.6%	58.4%	22.2%**
Proprietary Traders	73.3%	62.3%	11.0%**
Institutional Investors	82.6%	68.1%	14.5%**
Individual Investors	87.2%	65.5%	21.7%**

*t-test significant at 5%, **t-test significant at 1%

Note: This table reports the limit order submission rates during the first hour and during the last hour of the trading day of 4 investor types in the Stock Exchange of Thailand. Methodology 1 refers to the methodology that initially calculates the limit order submission rate of each sample stock by the number of submitted shares, and then calculates the cross-sectional limit order submission rate based on the limit order submission rate of each sample stock. Methodology 2 refers to the methodology that calculates the limit order submission rate from the number of submitted shares across all sample stocks. And Methodology 3 refers to the methodology that calculates the limit order submission rates from the number of submitted orders across all sample stocks. The intraday data from 2009 are used in the calculation. The significance of the differences between limit order submission rates during the first hour and during the last hour of the trading day is computed using the t-statistics.

When the limit order submission rates during the first hour and during the last hour of the trading day are compared between investor types. According to the findings of Bloomfield et al. (2005), informed traders are found to have lower limit order submission rates than uninformed traders during the beginning of the trading period and have higher limit order submission rates than uninformed traders during the end of the trading period. Table 5 shows that, in Comparison 1, proprietary traders have lower limit order submission rates than foreign investors during the first hour of the trading day and have higher limit order submission rates than foreign investors during the last hour of the trading day in all methods. In addition, the results show that, in Comparison 2, institutional investors have lower limit order submission rates than foreign investors during the first hour of the trading day and have higher limit order submission rates than foreign investors during the last hour of the trading day when Methodology 1 and 2 are used. Moreover, the results show that, in Comparison 6, institutional investors have lower limit order submission rates than individual investors during the first hour of the trading day and have higher limit order submission rates than individual investors during the last hour of the trading day when Methodology 3 is used. According to Hypothesis 1.2, the results oppose the hypothesis about foreign investors since they do not have lower limit order submission rates than proprietary traders during the first hour of the trading day in all methods and do not have lower limit order submission rates than institutional investors during the first hour of the trading day in Methodology 1 and 2. Moreover, they do not have higher limit order submission rates than other investor types during the last hour of the trading day in all methods. However, the results partially support the hypothesis about individual investors since they are found to have higher limit order submission rates than other investor types during the first

hour of the trading day in all methods. However, they do not have lower limit order submission rates than foreign investors and proprietary traders during the last hour of the trading day in all methods and do not have lower limit order submission rates than institutional investors during the last hour of the trading day when Methodology 1 and 2 are used. So, the results suggest that foreign investors do not trade like informed traders and individual investors do not trade like uninformed traders in the experimental study. In fact, proprietary traders and institutional investors appear to be more informed than foreign investors according to the results when Methodology 1 and 2 are used while proprietary traders appear to be more informed than foreign investors and institutional investors appear to be more informed than individual investors according to the results when Methodology 3 is used.

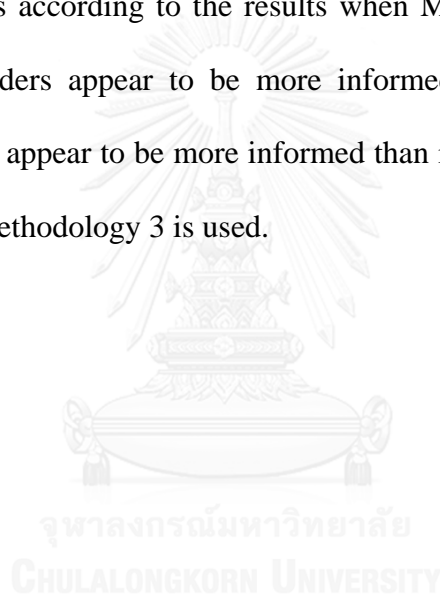


Table 5: Comparison of the limit order submission rates during the first hour and during the last hour of the trading day between each pair of investor types using the data from 2009

	Methodology 1		Methodology 2		Methodology 3	
	First Hour	Last Hour	First Hour	Last Hour	First Hour	Last Hour
Comparison 1						
Foreign Investor	78.4%	53.9%	81.4%	55.3%	80.6%	58.4%
Proprietary Traders	66.1%	58.2%	73.7%	63.0%	73.3%	62.3%
Foreign - Proprietary	12.3%**	-4.3%**	7.7%**	-7.7%**	7.3%**	-3.9%**
Comparison 2						
Foreign Investor	78.4%	53.9%	81.4%	55.3%	80.6%	58.4%
Institutional Investors	68.8%	59.1%	67.2%	60.5%	82.6%	68.1%
Foreign - Institutions	9.6%**	-5.2%**	14.2%**	-5.2%**	-2.0%**	-9.7%**
Comparison 3						
Foreign Investor	78.4%	53.9%	81.4%	55.3%	80.6%	58.4%
Individual Investors	87.0%	60.1%	89.1%	64.9%	87.2%	65.5%
Foreign - Individual	-8.6%**	-6.2%**	-7.7%**	-9.6%**	-6.6%**	-7.1%**
Comparison 4						
Proprietary Traders	66.1%	58.2%	73.7%	63.0%	73.3%	62.3%
Institutional Investors	68.8%	59.1%	67.2%	60.5%	82.6%	68.1%
Proprietary - Institutions	-2.7%**	-0.9%**	6.5%**	2.5%**	-9.3%**	-5.8%**
Comparison 5						
Proprietary Traders	66.1%	58.2%	73.7%	63.0%	73.3%	62.3%
Individual Investors	87.0%	60.1%	89.1%	64.9%	87.2%	65.5%
Proprietary - Individual	-20.9%**	-1.9%**	-15.4%**	-1.9%**	-13.9%**	-3.2%**
Comparison 6						
Institutional Investors	68.8%	59.1%	67.2%	60.5%	82.6%	68.1%
Individual Investors	87.0%	60.1%	89.1%	64.9%	87.2%	65.5%
Institutions - Individual	-18.2%**	-1.0%**	-21.9%**	-4.4%**	-4.6%**	2.6%**

*t-test significant at 5%, **t-test significant at 1%

Note: This table reports the limit order submission rates during the first hour and during the last hour of the trading day of 4 investor types in the Stock Exchange of Thailand. Methodology 1 refers to the methodology that initially calculates the limit order submission rate of each sample stock by the number of submitted shares, and then calculates the cross-sectional limit order submission rate based on the limit order submission rate of each sample stock. Methodology 2 refers to the methodology that calculates the limit order submission rate from the number of submitted shares across all sample stocks. And Methodology 3 refers to the methodology that calculates the limit order submission rates from the number of submitted orders across all sample stocks. The intraday data from 2009 are used in the calculation. The significance of the differences between limit order submission rates during the first hour and during the last hour of the trading day of all pairs of investor types is computed using the t-statistics.

4.1.3. The Value of Information Effect

When the limit order submission rates of high and low value stocks are compared. Table 6 shows that the results are inconsistent across investor types and methods. The limit order submission rates of high value stocks are sometimes higher and sometimes lower than the limit order submission rates of low value stocks. The experimental study of Bloomfield et al. (2005) finds that the limit order submission rates of informed traders when they trade high value stocks are lower than the limit order submission rates when they trade low value stocks. According to Hypothesis 2, the results partially support the hypothesis since the limit order submission rates of foreign investors and institutional investors when they trade high value stocks are lower than the limit order submission rates when they trade low value stocks according to the results when Methodology 1 is used. In addition, the results show that the limit order submission rates of foreign investors when they trade high value stocks are lower than the limit order submission rates when they trade low value stocks according to the results when Methodology 2 is used. However, the results seem to oppose the hypothesis when Methodology 3 is used. The limit order submission rates of foreign investors, proprietary traders, and institutional investors when they trade high value stocks are found to be higher than the limit order submission rates when they trade low value stocks. Since the results are varied when the method used to calculate the limit order submission rate is changed, this study fails to conclude about the informativeness of each investor type when considering the value of information perspective.

Table 6: Comparison between the limit order submission rates of high and low value stocks of each investor type using the data from 2009

Investor Type	High Value	Low Value	High Value - Low Value
Panel A: Methodology 1			
Foreign Investor	67.4%	69.5%	-2.1%**
Proprietary Traders	63.3%	61.7%	1.6%**
Institutional Investors	63.6%	65.7%	-2.1%**
Individual Investors	77.2%	77.7%	-0.5%**
Panel B: Methodology 2			
Foreign Investor	68.2%	73.2%	-5.0%**
Proprietary Traders	67.6%	63.5%	4.1%**
Institutional Investors	62.6%	63.2%	-0.6%
Individual Investors	81.1%	80.7%	0.4%
Panel C: Methodology 3			
Foreign Investor	71.8%	70.1%	1.7%**
Proprietary Traders	68.1%	65.8%	2.3%**
Institutional Investors	76.4%	74.8%	1.6%**
Individual Investors	80.2%	79.0%	1.2%**

*t-test significant at 5%, **t-test significant at 1%

Note: This table reports the limit order submission rates of high and low value stocks of 4 investor types in the Stock Exchange of Thailand. Methodology 1 refers to the methodology that initially calculates the limit order submission rate of each sample stock by the number of submitted shares, and then calculates the cross-sectional limit order submission rate based on the limit order submission rate of each sample stock. Methodology 2 refers to the methodology that calculates the limit order submission rate from the number of submitted shares across all sample stocks. And Methodology 3 refers to the methodology that calculates the limit order submission rates from the number of submitted orders across all sample stocks. The intraday data from 2009 are used in the calculation. The significance of the differences between limit order submission rates of high and low value stocks is computed using the t-statistics.

4.1.4. Robustness Test Results

4.1.4.1. Durations used in the calculation of the limit order submission rate

The results in Table 7 and 8 suggest that the conclusions about the time of the trading day effect remain unchanged in spite of the durations used in the calculation of the limit order submission rate. The trading pattern of all investor types in the Stock Exchange of Thailand is still similar to the trading pattern of uninformed traders in the experimental study of Bloomfield et al. (2005). While proprietary traders and institutional investors still appear to be more informed than foreign investors according to the results when Methodology 2 is used.

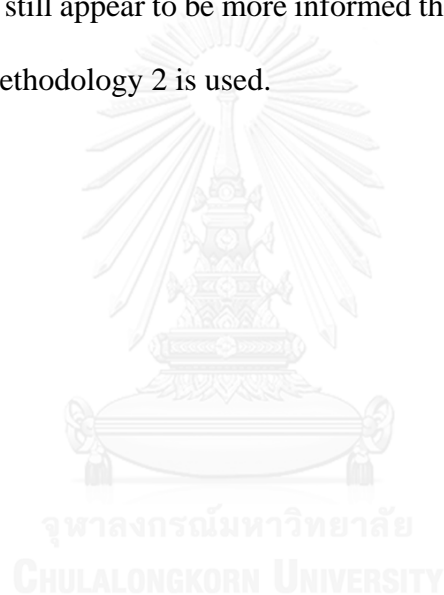


Table 7: Comparison between the limit order submission rates during the first 30 minutes and during the last 30 minutes of the trading day and the comparison between the limit order submission rates during the first half and during the second half of the trading day of each investor type using the data from 2009

Panel A: Robustness Test 1.1			
Investor Type	First 30 Minute	Last 30 Minute	First 30 Minute - Last 30 Minute
Foreign Investor	81.1%	52.3%	28.8%**
Proprietary Traders	68.5%	58.3%	10.2%**
Institutional Investors	68.0%	57.2%	10.8%**
Individual Investors	89.5%	58.2%	31.3%**
Panel B: Robustness Test 1.2			
Investor Type	First Half	Second Half	First Half - Second Half
Foreign Investor	73.7%	57.1%	16.6%**
Proprietary Traders	63.9%	59.0%	4.9%**
Institutional Investors	67.7%	61.3%	6.4%**
Individual Investors	83.1%	64.1%	19.0%**

*t-test significant at 5%, **t-test significant at 1%

Note: This table reports the limit order submission rates during the first hour and during the last hour of the trading day of 4 investor types in the Stock Exchange of Thailand. They are computed using Methodology 1 which refers to the methodology that initially calculates the limit order submission rate of each sample stock by the number of submitted shares, and then calculates the cross-sectional limit order submission rate based on the limit order submission rate of each sample stock. Robustness Test 1.1 refers to the limit order submission rates calculated using the duration of 30 minutes while Robustness Test 1.2 refers to the limit order submission rates calculated using the duration of half a trading day. The intraday data from 2009 are used in the calculation. The significance of the differences between limit order submission rates during the first hour and during the last hour of the trading day is computed using the t-statistics.

Table 8: Comparison of the limit order submission rates during the first 30 minutes and during the last 30 minutes of the trading day and the comparison of the limit order submission rates during the first half and during the second half of the trading day between each pair of investor types using the data from 2009

	Robustness Test 1.1		Robustness Test 1.2	
	First 30 Minute	Last 30 Minute	First Half	Second Half
Comparison 1				
Foreign Investor	81.1%	52.3%	73.7%	57.1%
Proprietary Traders	68.5%	58.3%	63.9%	59.0%
Foreign - Proprietary	12.6%**	-6.0%**	9.8%**	-1.9%**
Comparison 2				
Foreign Investor	81.1%	52.3%	73.7%	57.1%
Institutional Investors	68.0%	57.2%	67.7%	61.3%
Foreign - Institutions	13.1%**	-4.9%**	6.0%**	-4.2%**
Comparison 3				
Foreign Investor	81.1%	52.3%	73.7%	57.1%
Individual Investors	89.5%	58.2%	83.1%	64.1%
Foreign - Individual	-8.4%**	-5.9%**	-9.4%**	-7.0%**
Comparison 4				
Proprietary Traders	68.5%	58.3%	63.9%	59.0%
Institutional Investors	68.0%	57.2%	67.7%	61.3%
Proprietary - Institutions	0.5%	1.1%**	-3.8%**	-2.3%**
Comparison 5				
Proprietary Traders	68.5%	58.3%	63.9%	59.0%
Individual Investors	89.5%	58.2%	83.1%	64.1%
Proprietary - Individual	-21.0%**	0.1%	-19.2%**	-5.1%**
Comparison 6				
Institutional Investors	68.0%	57.2%	67.7%	61.3%
Individual Investors	89.5%	58.2%	83.1%	64.1%
Institutions - Individual	-21.5%**	-1.0%**	-15.4%**	-2.8%**

*t-test significant at 5%, **t-test significant at 1%

Note: This table reports the limit order submission rates during the first hour and during the last hour of the trading day of 4 investor types in the Stock Exchange of Thailand. They are computed using Methodology 1 which refers to the methodology that initially calculates the limit order submission rate of each sample stock by the number of submitted shares, and then calculates the cross-sectional limit order submission rate based on the limit order submission rate of each sample stock. Robustness Test 1.1 refers to the limit order submission rates calculated using the duration of 30 minutes while Robustness Test 1.2 refers to the limit order submission rates calculated using the duration of half a trading day. The intraday data from 2009 are used in the calculation. The significance of the differences between limit order submission rates during the first hour and during the last hour of the trading day of all pairs of investor types is computed using the t-statistics.

4.1.4.2. Study periods and market conditions

When the methodology is replicated using three different study periods. The results in Table 9 suggest that the conclusions about Hypothesis 1.1 remain the same since all investor types still use more limit orders during the first hour than during the last hour of the trading day. The results in Table 10 suggest that proprietary traders and institutional investors still appear to be more informed than foreign investors. However, there are some additional findings. The results suggest that proprietary traders appear to be more informed than institutional investors during the 2007 and 2008 study periods. In addition, proprietary traders appear to be more informed than individual investors during all study periods in this robustness test. In the study of the value of information effect, according to the results in Table 11, individual investors appear to be informed traders when three additional study periods are used in the analyses. In addition, foreign investors and institutional investors appear to be informed traders when the data from 2005 – 2006 are used in the analysis.

Table 9: Comparison between the limit order submission rates during the first hour and during the last hour of the trading day of each investor type using the data from 2005 – 2008

Investor Type	First Hour	Last Hour	First Hour - Last Hour
Panel A: Robustness Test 2.1			
Foreign Investor	82.0%	56.1%	25.9%**
Proprietary Traders	72.5%	61.3%	11.2%**
Institutional Investors	73.3%	57.3%	16.0%**
Individual Investors	91.2%	60.2%	31.0%**
Panel B: Robustness Test 2.2			
Foreign Investor	80.4%	54.4%	26.0%**
Proprietary Traders	71.0%	61.4%	9.6%**
Institutional Investors	73.7%	57.4%	16.3%**
Individual Investors	90.0%	59.0%	31.0%**
Panel C: Robustness Test 2.3			
Foreign Investor	77.5%	52.8%	24.7%**
Proprietary Traders	69.3%	60.8%	8.5%**
Institutional Investors	71.4%	58.5%	12.9%**
Individual Investors	87.7%	59.0%	28.7%**

*t-test significant at 5%, **t-test significant at 1%

Note: This table reports the limit order submission rates during the first hour and during the last hour of the trading day of 4 investor types in the Stock Exchange of Thailand. They are computed using Methodology 1 which refers to the methodology that initially calculates the limit order submission rate of each sample stock by the number of submitted shares, and then calculates the cross-sectional limit order submission rate based on the limit order submission rate of each sample stock. Robustness Test 2.1 refers to the limit order submission rates calculated using the data from 2005 – 2006. Robustness Test 2.2 refers to the limit order submission rates calculated using the data from 2007. And Robustness Test 2.3 refers to the limit order submission rates calculated using the data from 2008. The significance of the differences between limit order submission rates during the first hour and during the last hour of the trading day is computed using the t-statistics.

Table 10: Comparison of the limit order submission rates during the first hour and during the last hour of the trading day between each pair of investor types using the data from 2005 – 2008

	Robustness Test 2.1		Robustness Test 2.2		Robustness Test 2.3	
	First Hour	Last Hour	First Hour	Last Hour	First Hour	Last Hour
Comparison 1						
Foreign Investor	82.0%	56.1%	80.4%	54.4%	77.5%	52.8%
Proprietary Traders	72.5%	61.3%	71.0%	61.4%	69.3%	60.8%
Foreign - Proprietary	9.5%**	-5.2%**	9.4%**	-7.0%**	8.2%**	-8.0%**
Comparison 2						
Foreign Investor	82.0%	56.1%	80.4%	54.4%	77.5%	52.8%
Institutional Investors	73.3%	57.3%	73.7%	57.4%	71.4%	58.5%
Foreign - Institutions	8.7%**	-1.2%**	6.7%**	-3.0%**	6.1%**	-5.7%**
Comparison 3						
Foreign Investor	82.0%	56.1%	80.4%	54.4%	77.5%	52.8%
Individual Investors	91.2%	60.2%	90.0%	59.0%	87.7%	59.0%
Foreign - Individual	-9.2%**	-4.1%**	-9.6%**	-4.6%**	-10.2%**	-6.2%**
Comparison 4						
Proprietary Traders	72.5%	61.3%	71.0%	61.4%	69.3%	60.8%
Institutional Investors	73.3%	57.3%	73.7%	57.4%	71.4%	58.5%
Proprietary - Institutions	-0.8%	4.0%**	-2.7%**	4.0%**	-2.1%**	2.3%**
Comparison 5						
Proprietary Traders	72.5%	61.3%	71.0%	61.4%	69.3%	60.8%
Individual Investors	91.2%	60.2%	90.0%	59.0%	87.7%	59.0%
Proprietary - Individual	-18.7%**	1.1%*	-19.0%**	2.4%**	-18.4%**	1.8%**
Comparison 6						
Institutional Investors	73.3%	57.3%	73.7%	57.4%	71.4%	58.5%
Individual Investors	91.2%	60.2%	90.0%	59.0%	87.7%	59.0%
Institutions - Individual	-17.9%**	-2.9%**	-16.3%**	-1.6%**	-16.3%**	-0.5%

*t-test significant at 5%, **t-test significant at 1%

Note: This table reports the limit order submission rates during the first hour and during the last hour of the trading day of 4 investor types in the Stock Exchange of Thailand. They are computed using Methodology 1 which refers to the methodology that initially calculates the limit order submission rate of each sample stock by the number of submitted shares, and then calculates the cross-sectional limit order submission rate based on the limit order submission rate of each sample stock. Robustness Test 2.1 refers to the limit order submission rates calculated using the data from 2005 – 2006. Robustness Test 2.2 refers to the limit order submission rates calculated using the data from 2007. And Robustness Test 2.3 refers to the limit order submission rates calculated using the data from 2008. The significance of the differences between limit order submission rates during the first hour and during the last hour of the trading day of all pairs of investor types is computed using the t-statistics.

Table 11: Comparison between the limit order submission rates of high and low value stocks of each investor type using the data from 2005 – 2008

Investor Type	High Value	Low Value	High Value - Low Value
Panel A: Robustness Test 2.1			
Foreign Investor	69.3%	71.1%	-1.8%**
Proprietary Traders	68.3%	63.4%	4.9%**
Institutional Investors	65.4%	66.7%	-1.3%**
Individual Investors	80.6%	81.4%	-0.8%**
Panel B: Robustness Test 2.2			
Foreign Investor	69.0%	69.3%	-0.3%
Proprietary Traders	65.1%	63.0%	2.1%**
Institutional Investors	66.3%	66.4%	-0.1%
Individual Investors	79.8%	80.9%	-1.1%**
Panel C: Robustness Test 2.3			
Foreign Investor	65.4%	65.9%	-0.5%
Proprietary Traders	66.1%	64.8%	1.3%**
Institutional Investors	65.5%	64.7%	0.8%
Individual Investors	76.8%	78.3%	-1.5%**

*t-test significant at 5%, **t-test significant at 1%

Note: This table reports the limit order submission rates of high and low value stocks of 4 investor types in the Stock Exchange of Thailand. They are computed using Methodology 1 which refers to the methodology that initially calculates the limit order submission rate of each sample stock by the number of submitted shares, and then calculates the cross-sectional limit order submission rate based on the limit order submission rate of each sample stock. Robustness Test 2.1 refers to the limit order submission rates calculated using the data from 2005 – 2006. Robustness Test 2.2 refers to the limit order submission rates calculated using the data from 2007. And Robustness Test 2.3 refers to the limit order submission rates calculated using the data from 2008. The significance of the differences between limit order submission rates of high and low value stocks is computed using the t-statistics.

4.2. Discussion

One should not expect that there are only informed or uninformed traders in any investor types. So, this study try to find that either informed traders or uninformed traders are the major investors in each investor type.

In the first part of the methodology, the informativeness of each investor type is investigated using the difference between the limit order submission rates during the first hour and during the last hour of the trading day. All investor types are found to use more limit orders during the first hour than during the last hour of the trading day. This trading strategy is similar to the strategy of uninformed traders in the experimental study. This finding is robust to the change in methods and durations used in the calculation of the limit order submission rate. Moreover, it is also robust to the change in market conditions. So, this study concludes that all investor types in the Stock Exchange of Thailand are dominated by uninformed traders.

In the second part of the methodology, the limit order submission rates of each investor type are compared with the limit order submission rates of other investor types to find that which investor type has a relatively lower proportion of uninformed traders. Foreign investors are expected to trade like informed traders while individual investors are expected to trade like uninformed traders in the experimental study. However, the results show that proprietary traders and institutional investors use less limit orders than foreign investor during the first hour of the trading day and use more limit orders than foreign investor during the last hour of the trading day. These results indicate that proprietary traders and institutional investors appear to have less proportion of uninformed traders than foreign investors. In addition, the robustness test suggests that proprietary traders appear to have lower proportions of uninformed traders than both

institutional investors and individual investors when the methodology is done in other market conditions. However, these results are not robust to the change in the durations used to calculate the limit order submission rate.

In the third part of the methodology, the limit order submission rates of each investor type when they trade high and low value stocks are compared. The results show that foreign investors, institutional investors, and individual investors are three investor types that trade like informed traders when Methodology 1 is used, foreign investors is the only investor type that trades like informed traders when Methodology 2 is used, and there is no investor type that trades like informed traders when Methodology 3 is used. So, this study cannot conclude about the informativeness of each investor type when considering the value of information perspective.

This study uses the experimental findings of Bloomfield et al. (2005) as an alternative method to identify informed and uninformed traders in the actual stock market. The similarity between the experimental market settings and the actual market settings is important. This study has to design the methodology to be similar to the experimental market as much as possible to make the proper inferences. For example, this study does not use the same definition of the limit order submission rate as the experimental market due to the different market settings. In the experimental market, the effect of the order size is controlled by setting every order to be equal to one share. In the actual stock market, the effect of the order size is not controlled. As a result, this study has three methods to calculate the limit order submission rate to control the effect of the order size.

The duration of the private information is another factor that has to be controlled. In the experimental market, informed traders have 120 seconds to capitalize on their private information before the trading period is over and the information is revealed to the public. In the actual market, it is difficult to define the duration of the private information.

The duration of one trading day is used in this study. It can be viewed in two aspects. In the first aspect, the private information of informed traders is assumed to be short-lived and revealed at the end of every trading day. This assumption seems to be too restrictive. In the second aspect, the private information of informed traders is considered to be long-lived, but the value of the private information is assumed to decrease with time. With this assumption, there is a room for the duration of the private information to be varied while the results remain correct. When the value of the information is decreasing, the limit order submission rate of informed traders is expected to be increasing. The limit order submission rates of informed traders during the first hour of the trading day are expected to be lower than the limit order submission rates during the last hour of the trading day every day until the information is disclosed to the public. The aggregate differences between the limit order submission rate during the first hour and during the last hour of the trading day during this period can be used to represent the value of the private information.

When the duration of the private information is considered in the second aspect, the similarity between the experimental market setting and the actual market setting has been maintained. However, it can be violated if the information event occurs during the trading day. There is a chance that the value of the private information during the first

hour of the trading day is lower than the value of the private information during the last hour of the trading day if there is an information event occurs during the trading day. So, this study has to assume that there is no information event occurs during the trading day. This assumption is quite consistent with the data from the Stock Exchange of Thailand since most of the company announcements take place either before the market opens in the morning or after the market closes in the afternoon.

In the study of the value of information, however, it is a lot more difficult to imitate the experimental market settings. In the experimental market, there is only one stock traded in the market. The expected final price of the stock is constant at 25 laboratory dollars while the final price is limited between 0 – 50 laboratory dollars. The actual market settings are more complicated than the experimental market settings. There is more than one stock traded in the market. These stocks have different trading prices. Their prices can increase or decrease up to 30% of their previous closing prices in general. As a result, this study cannot measure the value of the information as the difference between the expected final price and the final price as the experimental study does. The opening price is used instead of the expected final price and the closing price is used instead of the final price. With these substitutions, the assumptions used in the study of the value of information effect become more restrictive than those used in the study of the time of the day effect. When the opening and closing prices are used, the duration of the private information has to be considered as the first aspect. Since the high and low value stocks are recalculated every trading day, the duration of the information is assumed to be one trading day. In fact, there is a chance that the duration of the information is longer than one day. Some traders may gradually trade the target stock throughout a few days after obtaining the information while some traders may set

the target price and traded only at or below this specific price. The restrictive assumption about the duration of the private information and complicated trading strategies of traders in the actual stock market are the limitations of this study.



CHAPTER 5

CONCLUSIONS

In the economics of information, the concept of information asymmetry has been studied widely. It deals with the situation when one party to the transaction has more relevant information than the other parties or has the relevant information that other parties do not have. To study the problem of information asymmetry in the stock market, trading strategies of informed and uninformed traders have been investigated. However, researchers cannot identify informed and uninformed traders explicitly in actual stock markets. So, the trading performance method has been applied to classify traders. Traders who have better trading performances are classified as informed traders and those who have worse trading are classified as uninformed traders. In the Stock Exchange of Thailand (SET), the prior results are found to be inconsistent. The conclusions are contrary when different study periods and investment holding periods are used.

This study uses the experimental findings of Bloomfield et al. (2005) as an alternative method to classify informed and uninformed traders in SET. The result shows that all investor types use more limit orders during the beginning of the trading period and change to use more market orders during the end of the trading day. This order strategy is similar to the order strategy of uninformed traders in Bloomfield et al. (2005). So, this study concludes that all investor types in SET are dominated by uninformed traders.

Further analyses emphasize on the relative use of limit and market orders among investor types. Bloomfield et al. (2005) find that informed traders use more market orders than uninformed traders during the beginning of the trading period and use more limit orders than uninformed traders during the end of the trading period. In SET, proprietary traders and institutional investors are found to use more market orders than foreign investors during the beginning of the trading day and use more limit orders during the end of the trading day. This result indicates that proprietary traders and institutional investors have lower proportions of uninformed traders than foreign investors in SET.

In the study of the value of information, Bloomfield et al. (2005) find that informed traders use more market orders when they trade high value stocks and use more limit orders when they trade low value stocks. However, the analysis on the value of information in this study provides an inconclusive result.

Finally, two robustness tests are conducted. First, the durations of 30 minutes and half a trading day are used instead of the duration of one hour in the calculation of the limit order submission rate. Second, the same methodology is used in three additional study periods, which represent three different market conditions. Under the two robustness tests, the overall results remain unchanged.

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APPENDIX



จุฬาลงกรณ์มหาวิทยาลัย
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VITA

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