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ปีการศึกษา 2552

CORPORATE GOVERNANCE AND TRADING BEHAVIOUR

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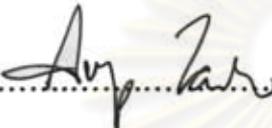
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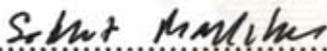
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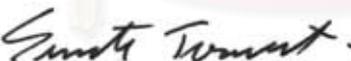
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ชัยอมร ตระการกุลพันธ์ : บรรษัทภิบาลและพฤติกรรมการซื้อขาย. (CORPORATE GOVERNANCE AND TRADING BEHAVIOUR) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: รศ.ดร. สันติ ถิรพัฒน์, 50 หน้า.

งานวิจัยชิ้นนี้ศึกษาผลกระทบของบรรษัทภิบาลต่อพฤติกรรมการซื้อขายของนักลงทุนแต่ละ ประเภท (นักลงทุนรายย่อยภายในประเทศ นักลงทุนสถาบันภายในประเทศ นักลงทุนต่างชาติ) ในตลาด เงินทุนของประเทศไทย ด้วยวิธีการหาอัตราการมาของนักลงทุนที่ไม่มีข้อมูลในกลุ่มนักลงทุนแต่ละ ประเภทจากแบบจำลองความน่าจะเป็นของการซื้อขายที่อิงข้อมูล (PIN) ของ Easley et al. (1998) จาก กลุ่มตัวอย่างอันได้แก่บริษัทจดทะเบียนในตลาดหลักทรัพย์ของประเทศไทยในช่วงปี 2543-2550 ผลการ ทดลองพบว่ามีความสัมพันธ์เชิงบวกระหว่างระดับบรรษัทภิบาลและอัตราการมาของนักลงทุนที่ไม่มี ข้อมูลของนักลงทุนสถาบันและนักลงทุนต่างประเทศ แต่อย่างไรก็ตามไม่พบความสัมพันธ์ระหว่างระดับ บรรษัทภิบาลและอัตราการมาของนักลงทุนรายย่อยที่ไม่มีข้อมูล ผลการทดลองถูกยืนยันด้วยความสัมพันธ์ ระหว่างการเริ่มต้นซื้อขายและระดับบรรษัทภิบาลในกลุ่มนักลงทุนแต่ละประเภท ผลการทดลองทั้งหมด สอดคล้องกับความเห็นที่ว่านักลงทุนสถาบันและนักลงทุนต่างชาติให้ความสนใจในระดับของบรรษัทภิ บาลของหุ้นที่ทำการซื้อขาย ในขณะที่นักลงทุนรายย่อยไม่สนใจ

ภาควิชา......การธนาคารและการเงิน...... ลายมือชื่อนิสิต ชัยอมร ตระการกุลพันธ์

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KEYWORDS : LIQUIDITY /CORPORATE GOVERNANCE /PROBABILITY OF INFORMATION-BASED TRADING (PIN) /LOCAL INVESTOR /FOREIGN INVESTOR /THAILAND

CHAIAMORN TRAKARNKOOLAPUN : COPORATE GOVERNANCE AND TRADING BEHAVIOUR. THESIS ADVISOR : ASSOC. PROF. SUNTI TIRAPAT, PH.D., 50 pp.

This study investigates the effect of corporate governance and trading behaviour of various investor types (local retail, local institution and foreign investors) in Thai capital market. By extending the probability of information-based trading (PIN) model by Easley et al. (1998), the study estimates the uninformed arrival rates for each types of investor. Using a sample of firms listed on Stock Exchange of Thailand during 2000-2007, the result shows that there is a positive relation between the corporate governance level and the arrival rates of uninformed trader for local institution and foreign investors. However, there is no association between the corporate governance level and the arrival rate of uninformed local retail investors. These results are confirmed by the associations between the initiated trades and the corporate governance level for these investor types. Overall the results of the study are consistent with the notion that institutional and foreign investors do pay attention to corporate governance of a firm in their trading while retail investors do not.

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# ACKNOWLEDGEMENTS

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# CHAPTER I
# INTRODUCTION

## Background of the Study

The Corporate governance is a system of protecting the minority shareholders from being exploited by the managers or major shareholders. It prohibits managers from using the firm resource for their own benefits, such as building their own empire or investing in pet project. As the result, the corporate governance decreases agency and monitoring cost. Therefore, investors should be more likely to trade the high shareholder protection stock than that of the poor. There is substantial empirical evidence in this area, Brockman and Chung (2002) show that the market which has higher shareholder protection regulation will have better liquidity. Similarly, Chung, Elder and Kim (2009) find that the corporate governance has a positive relationship with liquidity. These studies claim that the observed evidence is resulting from an improvement in financial and operational transparency which provides more information to the market. The low information asymmetry among investors is so encourages the investors to trade more on stocks.

Although these studies provide us an insight on the relation between the corporate governance and trading/liquidity, they do not distinguish the effect of governance among the types of investors in the market. The effect of the corporate governance may be different among each type of investors because of the difference in information set and sophistication between the domestic and foreign investors. The evidence documented by Choe, Kho and Stulz (2005) show that the resident investors are more informed than the foreign investors. They show that the domestic investors buy and sell at a better price, anticipate events better and have more price impact than the foreign investors. Additionally, Thurlin (2009) Warren Mao, and Sirodom (2004) and Dvorak (2005) find that the local investors are more informed by using the price discovery method. In the contrary, Bacmann and Bolliger (2001) state that foreign financial analysts outperform the local analysts. This can indirectly imply that foreign investors are more informed. From these studies, it can be concluded that each type

of investors is not homogeneous. Hence the effect of the corporate governance among them should not be the same.

To understand the effect of corporate governance among the different type of investors provid us with further insight on this issue. It will benefit regulators in designing and developing good corporate governance for the Thai capital market. For instance, if foreign investors do not care about the corporate governance, it is ill conceited to argue otherwise. Additionally, if the result shows that some groups of investor are not interested in the corporate governance, then there should be a problem behind. May be the regulation is too weak or may be the investors do not fully understand the corporate governance. So, it helps regulator to detect the problem thereon. The focus of this research is to investigate the impact of the corporate governance on each type of investors in the Thai capital market; namely foreign, local retail, and local institutional investors.

**Statement of Problem**

Even though the corporate governance decreases the agency and the monitoring cost, the effect of the corporate governance towards each group of investors may be totally different. In some kinds of investors, their trading behavior may be highly related to the corporate governance. In the contrary, some kinds of investors may not concern with the corporate governance positively. They may treat the poor corporate governance firms to the same as those of the high corporate governance firms. This difference in such behavior occurs because of the difference in information set and the sophistication between each investors group. Since the relationship between the corporate governance and trading behavior in each group of investors is still vague, especially in the emerging market which individual investors are not well experienced, so it is a worthwhile question that which group of investors trading behavior is affected by the corporate governance, and which group is not. In particular, my research question is, "Does the corporate governance affect the trading behavior differently among each type of investors in Thai market?"

**Objective**

The purpose of this paper is to investigate the relationship between the corporate governance and investor trading behavior for several types of investors which are local retailers, institutional and foreign investors. The result provides us with further insight to which type of investors is affected by the level corporate governance.

**Scope of the Study**

In order to examine the relationship between the corporate governance and the investor trading behavior, my sample include all the listed firms in Thailand stock market that having more than 60 trading active days and having financial data during the year 2000-2007, to which are approximately 400 firms in my sample.

**Contribution**

There is empirical evidence showing investors are more likely to invest in the high governance firms. Chung, Elder and Kim (2009) find that the corporate governance has a positive relationship with liquidity. This empirical evidence shows us the overall effect of corporate governance but it does not show a specific relation between the corporate governance and each type of investors. In other words, we do not know whether all investors are interested in the corporate governance significantly. Consequently, the contribution of this study is to examine the effect of the corporate governance and trading behavior in each type of investors.

There are also some studies examine the corporate governance towards some specific kinds of investor. Leuz, Lins and Warnock (2008) show that foreign investors avoid investing in the firms residing in low outsider protection and having a low corporate governance level. However, the result from this study may be bias because, in Leuz, Lins and Warnock (2008) paper, their sample includes only to the American investors. Consequently, their result may not be consistent with other national investors. Chung and Zhang (2009) show that the proportion of institutional share holding increases with the share governance quality. Nevertheless, their study is focused only on the American stock market, and their result may not be truly held in other stock market.

Therefore I reinvestigate the relationship between the corporate governance and the institution investor behavior to confirm the previous study.

In conclusion, I believe that the effect of the corporate governance towards each investor group should be different and may not be followed by the former research, so I have re-examine the effect of the corporate governance towards each investor group by using the new method.

**Methodology in brief**

In the previous research, they use a regression method by taking the percentage ratio of the ownership as a dependent variable and the corporate governance as an independent variable. Nonetheless, this method cannot be used for examine the effect of the corporate governance towards each kind of investors. This is due to the fact that the decreasing in percentage of the ownership may result from the increasing in percentage of the ownership from another party. For example, Chung and Zhang (2009) show that the proportion of institution share holding will increase with the share governance quality. If the proportion of institutional share holding increases, then the proportion of local and foreigner retailer will also be decreased. This decrease can be interpreted in three different ways: First, they are not interested in the corporate governance. Second, they tend to invest less in the high corporate governance firm. And finally, they are interested in the corporate governance but less than the other group of investors. Since we do not know how the result really exists, so this regression method is not proper.

In order to solve this problem, this study can use the arrival rate of the uninformed traders as a proxy for the investor trading behavior and using the corporate governance index as a proxy for the level corporate governance. In other words, I use the arrival rate of the informed trader as a dependent variable instead of the proportion of the institutional share holding, because the arrival rate of uninformed trader in each investor group is independent from the arrival rate of the other investor groups. The arrival rate of uninformed trader in each type of investors can be obtained through the new PIN model which is adjusted from Easley et al. (1998) approach. This new model is fully explained in Chpater 4. The corporate governance index is created

following Ananchotikul (2006) approach which is decomposed into 5 factors which are: 1. Board Structure. 2. Conflicts of Interest. 3. Board Responsibility. 4. Shareholder Rights and 5. Disclosure and Transparency.

After obtaining the arrival rate of the uninformed trader and the corporate governance index, I apply the regression method by using the arrival rate of uninformed trader as a dependent variable and the corporate governance index as an independent variable. The control variable in regression model between the corporate governance index and the arrival rate of uninformed trader is inspired by Chung, Elder and Kim (2009). However, I drop some control variables that could not be collected.

**Organization of the Study**

This paper comprises of five Chapters. Chapter 1 is the introduction which provides a general knowledge on this research, such as the background, objective, contribution and methodology in brief. Chapter 2 is the literature review. This chapter represents the previous research that is relevant to the study, for instance, the corporate governance impact and the difference between the local and foreign investors. Chapter 3 represents the statistic description, scope and the source of my data. Chapter 4 is the methodology. It shows the analytical framework which includes the new PIN model and regression model, and the robustness check. Chapter 5 represents the regression result from the model in Chapter 4, and also interprets the result. This Chapter is the final chapter, which is the conclusion of all important findings in this study.

# CHAPTER II
# LITERATURE REVIEW

## 2.1 The Determinants of Corporate Governance

The corporate governance is a system of protecting the shareholders from being expropriated by the major shareholders or manager. There are two reasons in supporting this idea: First, is the corporate governance mitigates information asymmetry among the investors by increasing the accounting and the operation transparency. Subsequently, the managers cannot expropriate the shareholders' wealth without being detected, and the major shareholders are less likely to trade on the stock by using their private information. Second, is the corporate governance decreases some conflicts of interest between each party. For instance, it lowers the conflicts of interest between the manager and the shareholders by providing the shareholders with rights, compensation and intensive monitoring. For this, the managers are less likely to spend the firm resource uselessly because their wealth is in line with the firm wealth and they can be dismissed by the vote of the shareholders.

From these reasons, the high corporate governance companies should have the better share price and the firm value because they have a lower agency cost. Furthermore, the corporate governance also plays an important role in encouraging investors to trade the stock with no discount because it mitigates the information asymmetry problem. As the result, stocks with the high corporate governance shall also have better cost of equity to capital and liquidity. In this section, I would discuss some researches that representing the difference between the high and low corporate governance companies.

**Corporate Governance and Firm Value**

There are numerous studies indicating the corporate governance raises the stock value even they use a different proxy for the corporate governance level. Drobetz, Schillhofer and Zimmermann (2003) discover the positive relation between the corporate governance level and the firm value in German stock market by using board

corporate governance as a proxy for the corporate governance level. In the same way, Gompers, Ishii and Metrick (2003) also find that firms with stronger corporate governance will have a higher firm value, higher profits and higher sales growth with lower capital expenditures, and make fewer corporate acquisitions by using the shareholder rights as a proxy for the corporate governance level. Beiner, Drobetz, Schmid and Zimmermann (2004) re-examine the relation between the corporate governance and the firm's value. Instead of using a single variable to measure the corporate governance level, they integrate various variables, which are the board corporate governance, ownership structure, board characteristics, and leverage to provide a comprehensive description, to evaluate the firm-level corporate governance. Nonetheless, the result from this study is also similar to the previous researches, that the corporate governance would enhance the firm value properly. Florackis and Ozkan (2004) investigate the relation between each corporate governance component and agency cost. Their result reveals that the managerial ownership, managerial compensation and ownership concentration seem to play an important role in mitigating the agency costs. Klapper and Love (2004) study the effect of the corporate governance in the emerging market with different legal country systems. They show that better corporate governance is highly correlated with better operating performance and market valuation, and the firm-level corporate governance provisions will matter more in the countries with weak legal environments. Finally, Farber (2004) analyze the effect of the corporate governance in the firm that fraudulently manipulating their financial statements. They indicate that the fraud firms who take actions to improve the governance have a superior stock price performance, even after controlling for the earning performance.

**Corporate Governance and Liquidity**

Many researches support the idea that the high corporate governance firm has more liquidity than the lower one. Brockman and Chung (2002) show that when everything is equal, the market that has higher shareholder protection regulation will have better liquidity. Their study find that among the companies listed on the Hong Kong Stock Exchange, the firms based in Hong Kong have more liquidity than those that based in China. They interpret that low shareholder protection provides low liquidity. Heflin, Shaw and Wild (2000) mention that the high quality accounting

disclosure, i.e. publicly available to all investors, improves liquidity and reduces the likelihood of informed trading. The results of these two papers are consist with the fact that investors are encouraged by the shareholder protection and the disclosure system which are parts of the corporate governance level.

Moreover, Chung, Elder and Kim (2008) examine the relation between the liquidity and the corporate governance by using 24 governance standards in six categories which reflex transparency and shareholder protection. Their result indicates that the high corporate governance will lead to high liquidity. They suggest that the firm can improve liquidity by adopting the corporate governance standards which mitigate the information uncertainty.

**Corporate Governance and Cost of Equity Capital**

Many empirical studies show that high corporate governance firm has lower cost of capital. For the cost of equity capital, Reverte (2007) show that the better governed firms will have a lower cost of equity capital in the Spanish capital market. In the same context, Chen et al. (2009) find that the firm-level corporate governance has significant negative effect on the cost of equity capital in the emerging market. This lower cost of equity can be resulted from the low information asymmetry and/or the high firm performance.

**2.2 The behavior of each type of Investor**

There is a difference among each kind of investors because each group has his own risk tolerance, sophistication, and experience and investment capital. In this section, I will discuss the former research that demonstrate the personality of each individual investor.

**Difference in Foreign Investor and Local Investor**

There are number of studies focusing on the difference between the foreign and local information set, but there has been no general agreement yet. Choe, Kho and Stulz (2005) and Dvorak (2005) find that the foreigners trade their shares in worse prices,

Thurlin (2009) shows that domestic investors dominate the price discovery process, Warren Mao, and Sirodom (2004) show the reducing foreign trading in the pre announcement period and increasing their trading after the announcement and Bae, Stulz, and Tan (2007) mention that the local analysts outperform foreign investors but the level of the local advantage is inversely related to the quality of the information provided by the firms. These studies can be interpreted that domestic investors are more informed. On the other hand, many studies argue that there is no difference in information between the domestic and foreign investors. Bacmann and Bolliger (2001) mention that foreign financial analysts outperform local analysts, Seasholes (2000) find that foreign investors buy (sell) ahead of good (bad) earnings announcement in Taiwan while the domestic investors do the opposite.

## Institutional Behavior

From the previous studies, institutional investors have their own preference. They prefer on high liquidity and low return volatility stocks (Badrinath, Kale, and Ryan (1996), Falkenstein (1996), and Huang (2008)), stocks of the companies that pay cash dividends or repurchase shares (Grinstein and Michaely (2005), good disclosure stocks (Bushee and Noe (2000), larger companies stocks (Gompers and Metrick (2001), and stocks of companies with better managerial performance (Parrino, Sias, and Starks (2003). Some of these characteristics are unique and are not observed in other groups of investor.

## Foreign Institutional Behavior

Aggarwal, Klapper and Wysocki (2003) examine the portfolio preference of the foreign institutional investors by using the U.S. funds as a proxy for foreign institutional investors. They find that the foreign institutions invest more in the open emerging markets with legal frameworks, stronger shareholder rights and accounting policies. For firm-level characteristics preference, the foreign institutional investors tend to invest in the large, growing firms with high analyzing following and accounting the policies. The impact of an analyzing following and accounting the policies is more determinate in the weak investor protection country.

**2.3 The Determinants of Corporate Governance toward each Group of Investors**

There is also little research that investigates the effect of the corporate governance towards each group of investors. Most of them show that the corporate governance encourages investors to trade or hold their stock. However, there is also a gap in these studies which I will explain later in this section.

**Corporate Governance and Foreign Investor**

Leuz, Lins and Warnock (2008) show that the foreign investors avoid investing in the firms that residing at low outsider protection and having low corporate governance level. They study the American investor behavior when investors purchase the stock in oversea countries. Using the regression method analyzes relation between the percentage of American shareholder in the free float and corporate governance level. Their data is a survey conducted by the U.S. Treasury Department and the Federal Reserve Board in 1997. They use the American investors as a proxy for foreign investors and the control structure as a proxy for the corporate governance. The firm's free float is defined as a percentage of shares not holding by 5%, or there are more block holders. For the control structure valuation, they use percentage of the share held by the people who conduct to an agency problem with varies criteria. They also examine the influence of the country-level governance. As the result, there is a positive relation between the corporate governance and the foreign investment substantially in the poor share holder protection country.

**Corporate Governance and Institutional Investor**

Chung and Zhang (2009) show the proportion of institution share holding increases with the corporate governance quality. Their data is collected from New York Stock Exchange (NYSE), the American Stock Exchange (AMEX) and NASDAQ. They use the ratio of the number of shares held by the institutional investors to the total number of shares outstanding as a dependent variable and the corporate governance level as independent variable in the regression model. They apply various regression methods which are OLS, Two-Stage Least Squares, Changes in Variable and Fix effect regression. The results from all method are consistent with the hypothesis that

institution share holding increases with the corporate governance quality. They are also robust to their result by adding more control variables which are number of analysis following or institutional herding. The robustness result is still significant and consistent with the hypothesis. Nevertheless, this study still has some limitation. Since their data is obtained from the mature and intensive regulation market, so their result may be not holding true in the emerging market. For this reason, I reinvestigate the fact by using another method to verify the previous study.

From all of these studies, we know the effect of the corporate governance towards the overall investors, but we do not know its effect towards the individual group of investors. The relationship between the trading decision and the corporate governance can be dissimilar among each investor type. Some groups of investor may ignore the corporate governance, while some groups may concern on the corporate governance because of the dissimilarity in sophistication and information advantage, as represented by the studies above. The proposal of this study is to find the effect of the corporate governance towards each group of investors which are local and foreign retailers, and institutional investors.
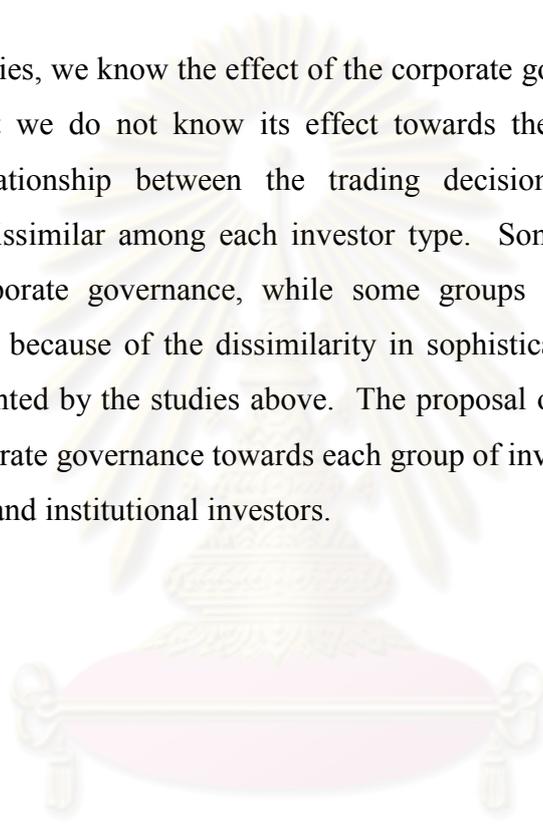
# CHAPTER III
# SAMPLE AND DATA DESCRIPTION

**Sample Selection**

In this study, my sample is the companies that listed in the Stock Exchange of Thailand (SET) during the period of January 2000 to December 2007. I exclude all the stocks that do not have financial data or intra-day data. Since Easley et al (2002) mention the result from PIN model is not accurately for the stocks that have less than 60 trading active days, so I drop all the stocks that have less than 60 trading active days. In addition, I also drop all the result that having corner solution problem. The corner solution problem is the result from the maximum likelihood model that is unrealistic because the alpha or delta is close to zero or one. To illustrate, if the result shows that alpha is equal to zero, then it means that during that year this stock did not have any bad event which is very rare to occur. Thus, to mitigate the corner solution, I eliminate all the firms that having alpha or delta greater than 0.99 or lower than 0.01. As the result, there are 389 stocks or 1,835 observations in the regression model.

**Sources of Data**

Financial data is collected from Datastream. While CGI is obtained from the previous research (the Corporate Cash Holdings, Earnings Management and Corporate Governance: Evidence from Thailand by Suchon) with an evaluate base on Ananchotikul (2007) approach. Following this approach, CGI is segmented into 5 factors which are: 1. Board Structure. 2. Conflicts of Interest. 3. Board Responsibility. 4. Shareholder Rights and 5. Disclose and Transparency. This index is constructed from the Annual Disclosure Report (Form 56-1), the company annual reports, the corporate websites, the web-based on SET Market Analysis and Reporting Tool (SETSMART), and the SET's Director Database. The buying and selling orders are obtained from the Thai stock market intraday data.

## Data Description

Table 1 reports the descriptive statistic of the control variables used in the regression model which are: price, return volatility, total asset, trading volume, tangible asset, company age, institutional ownership and analysis recommendation. These variables are collected over the period during 2000 to 2007.

**Table 1**

**Descriptive Statistics on Control Variables**

This table represents the descriptive statistic of all control variables in the regression model which are: price, return volatility, total asset, trading volume, tangible asset, company age, institutional ownership and analysis recommendation in my sample over the years 2000-2007 period, where Price is the mean of daily stock price, Total asset is the book value of total asset (million bahts), Trading volume is the mean daily baht trading volume (thousand bahts), Return volatility is the variance of daily return, Tangibility asset is a book value of asset tangibility (million bahts), Age is the age of the firm from the establishment date, Institution ownership is the percentage of shares held by the institution, and Recommendation is the number of the analysis following the company in each year.

| Variable | Mean | Median | Max | Min | Std. |
|---|---|---|---|---|---|
| Price | 21.824 | 7.785 | 518.697 | 0.075 | 46.534 |
| Total asset | 20306 | 2866 | 1551958 | 69 | 104755 |
| Trading volume | 4147 | 491 | 124025 | 0.01 | 11485 |
| Return volatility | 0.0022 | 0.0006 | 0.1974 | 0.0000 | 0.0345 |
| Tangible asset | 4845 | 1491 | 165979 | 0.26 | 11941 |
| Age | 28.38 | 25.00 | 131.92 | 1.42 | 16.80 |
| Institutional ownership | 43.499 | 45.190 | 97.885 | 0.000 | 27.656 |
| Recommendation | 3.261 | 1.000 | 25.000 | 0.000 | 5.251 |

## Hypotheses Development

From the previous study, we find that the corporate governance that increasing liquidity which can be implied that investors are concerned on the corporate governance level. However, this fact might not be truly held for some kind of investors.

For the local retailer, they might not fully understand the advantage of high corporate governance stock or might not be able to distinguish the good governance firms from the bad governance firms. As the result, they are not interested in the corporate governance and treat a good governance firm as the same as bad governance firm.

For these reasons, my first assumption is that the retailer investors are not interested in corporate governance.

For the institutional investors, Chung and Zhang (2009) show that the proportion of institutional share holding will increase with the share governance quality. Although the result from Chung and Zhang (2009) studies may not hold true in other capital market because this study focus on the American stock market only. The institutional investor can behave differently in other stock markets. Therefore, I reinvestigate the relation between the corporate governance and the behavior of institutional investor and my second assumption is that the institutional investors are likely interested in the corporate governance.

For the foreign investors, there is empirical evidence from Leuz, Lins and Warnock (2008) show that foreign investors avoid investing in the firms that reside in low outsider protection and have low corporate governance level. However, somebody may argue that the result from Leuz, Lins and Warnock (2008) paper is not reliable, because in this research, their data only contains the American investor ownership. Accordingly, their result may be bias; the other nation foreign investors may behave in a different way. As the result, I reinvestigate the relation between the corporate governance and the behavior of the foreign investors. So, my third assumption is that the foreign investors are interested in corporate governance. According to these three assumptions, the hypotheses in the null form are as follows:

$H_1$:    There is no relation between the corporate governance and the local retailer investor trading behavior.

$H_2$:    There is positive relation between the corporate governance and the local institutional investor trading behavior.

$H_3$:    There is positive relation between the corporate governance and the foreign investor trading behavior.

To measure the impact of the corporate governance towards each investor group, I use the arrival rate of the uninformed trader as a proxy for the investor interest. I do not use the arrival rate of the total investor or the arrival rate of the informed trader because the arrival rate of the informed trader does not reflex the investor interest

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towards the corporate governance. The high arrival rate of the informed trader is caused from the information asymmetry not from the corporate governance, since their decision is based on their private information. In conclusion, I test each hypothesis by measuring the CGI and arrival rate of uninformed initiated trader. If investors are interested in corporate governance, then the arrival rate should be increased when the CGI is increased.

# CHAPTER IV
# METHODOLOGY

Chapter 4 can be separated into 2 sections, i.e. variable estimation and relation analysis. The variable measurement section shows how to measure the corporate governance index (CGI) and the arrival rate of uninformed trader. The second section represents the methods to examine the relation between the corporate governance and the investor behavior.

## 4.1. Measurement of the CGI and the Arrival Rate of Informed Trader

### 4.1.1. CGI

To measure the CGI, I use the CGI data obtained from the prior research, which are constructed and based on the approach of Ananchotikul (2007). To avoid bias from self-evaluated questionnaire, the constructed CGI uses information that is obtained from the public sources, such as mandatory Annual Disclosure Report (Form 56-1), company annual reports, corporate websites, the web-based on SET Market Analysis and Reporting Tool (SETSMART), and the SET's Director Database. There are 87 questions for each firm which can be grouped into five governance components: 1. Board Structure. 2. Conflicts of Interest. 3. Board Responsibility. 4. Shareholder Rights and 5. Disclose and Transparency. Each index can be explained as followed:

The first sub-index, Board Structure provides the information about the board size and board independence. The good corporate governance firm should allow directors to make a decision independently for the benefits of the shareholder. The second sub-index, Conflicts of Interest reflexes the characteristic of CEO, Directors, Committees, Chairman. The CEO should not be a Chairman of the Board; otherwise the CEO will be overpowered and will dominate the Board. Moreover, the Committee should exist to mitigate the conflicts of interest between the shareholders and the manager. The third sub-index, Board Responsibility index measures the action, monitoring and support made by the Board for example, the number of Board meeting, number of

Committee meeting and the meeting attendance. The forth sub-index, Shareholder Rights index represents the shareholder voting rights and dividend policy. In the high corporate governance firm, shareholder should have proper voting rights and the dividend policy should be fully disclosed. The last sub-index, Disclose and transparency determine the financial and operational transparency. After each index is scored, the CGI is calculated by combining each index. Table 2 represents the descriptive statistic of the CGI and its sub-indices in my sample for each year.

**Table 2**

**Descriptive Statistics on Corporate Governance Index and Sub-Corporate Governance Indices**

This table represents the descriptive statistic of corporate governance index and sub-corporate governance indices in my sample over each period. These sub-corporate governance indices are: 1. Board Structure. 2. Conflicts of Interest. 3. Board Responsibility. 4. Shareholder Rights and 5. Disclosure and Transparency. The corporate governance index and sub-corporate governance are ranged from 0 to 1. The higher number indicates the better corporate governance level.

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2000-2007 |
|---|---|---|---|---|---|---|---|---|---|
| Panel A: Corporate Governance Index (CGI) | | | | | | | | | |
| Mean | 0.281 | 0.386 | 0.428 | 0.482 | 0.547 | 0.538 | 0.576 | 0.586 | 0.502 |
| Median | 0.278 | 0.384 | 0.424 | 0.480 | 0.548 | 0.541 | 0.581 | 0.670 | 0.503 |
| Maximum | 0.433 | 0.641 | 0.696 | 0.809 | 0.855 | 0.813 | 0.920 | 0.875 | 0.920 |
| Minimum | 0.131 | 0.165 | 0.186 | 0.215 | 0.215 | 0.260 | 0.196 | 0.203 | 0.131 |
| Std. Dev. | 0.053 | 0.068 | 0.087 | 0.105 | 0.122 | 0.108 | 0.122 | 0.126 | 0.142 |
| Panel B: Board Structure | | | | | | | | | |
| Mean | 0.392 | 0.393 | 0.343 | 0.373 | 0.474 | 0.527 | 0.599 | 0.628 | 0.493 |
| Median | 0.076 | 0.357 | 0.459 | 0.454 | 0.438 | 0.433 | 0.497 | 0.681 | 0.500 |
| Maximum | 0.667 | 0.833 | 0.833 | 0.833 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Minimum | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.167 | 0.167 | 0.000 |
| Std. Dev. | 0.141 | 0.153 | 0.161 | 0.167 | 0.205 | 0.209 | 0.212 | 0.199 | 0.216 |
| Panel C: Conflict of Interest | | | | | | | | | |
| Mean | 0.317 | 0.386 | 0.374 | 0.412 | 0.437 | 0.430 | 0.468 | 0.493 | 0.428 |
| Median | 0.333 | 0.333 | 0.333 | 0.333 | 0.500 | 0.500 | 0.667 | 0.833 | 0.393 |
| Maximum | 0.561 | 0.646 | 0.856 | 0.878 | 0.878 | 0.918 | 1.000 | 1.000 | 1.000 |
| Minimum | 0.084 | 0.141 | 0.105 | 0.105 | 0.126 | 0.125 | 0.126 | 0.126 | 0.105 |
| Std. Dev. | 0.088 | 0.088 | 0.124 | 0.134 | 0.148 | 0.155 | 0.158 | 0.184 | 0.154 |
| Panel D: Board Responsibilities | | | | | | | | | |
| Mean | 0.183 | 0.329 | 0.518 | 0.588 | 0.660 | 0.598 | 0.668 | 0.601 | 0.549 |
| Median | 0.334 | 0.383 | 0.355 | 0.355 | 0.418 | 0.398 | 0.436 | 0.608 | 0.567 |
| Maximum | 0.600 | 0.633 | 0.848 | 0.964 | 0.960 | 0.959 | 0.993 | 0.960 | 0.993 |
| Minimum | 0.033 | 0.000 | 0.167 | 0.033 | 0.267 | 0.277 | 0.100 | 0.133 | 0.000 |
| Std. Dev. | 0.078 | 0.111 | 0.141 | 0.149 | 0.147 | 0.132 | 0.203 | 0.183 | 0.212 |
| Panel E: Shareholder Rights | | | | | | | | | |
| Mean | 0.078 | 0.311 | 0.431 | 0.438 | 0.441 | 0.431 | 0.476 | 0.577 | 0.427 |
| Median | 0.200 | 0.333 | 0.533 | 0.588 | 0.663 | 0.594 | 0.660 | 0.733 | 0.438 |
| Maximum | 0.129 | 0.648 | 0.723 | 0.723 | 0.723 | 0.756 | 0.790 | 1.000 | 1.000 |
| Minimum | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.052 | 0.000 | 0.000 |
| Std. Dev. | 0.039 | 0.138 | 0.170 | 0.164 | 0.158 | 0.158 | 0.159 | 0.145 | 0.197 |
| Panel F: Disclosure and Transparency | | | | | | | | | |
| Mean | 0.318 | 0.455 | 0.478 | 0.574 | 0.665 | 0.647 | 0.634 | 0.638 | 0.575 |
| Median | 0.300 | 0.500 | 0.500 | 0.600 | 0.700 | 0.700 | 0.600 | 0.800 | 0.600 |
| Maximum | 0.600 | 0.900 | 0.900 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Minimum | 0.000 | 0.000 | 0.100 | 0.100 | 0.100 | 0.100 | 0.100 | 0.100 | 0.000 |
| Std. Dev. | 0.105 | 0.174 | 0.141 | 0.172 | 0.181 | 0.162 | 0.168 | 0.167 | 0.193 |

**4.1.2. Arrival Rate of the Informed Trader**

I adjust the original PIN model that based on Easley et al. (1998) approach to measure the arrival rate of the uninformed initiate trader. The underlying assumption of this model is; there are two groups of investor who are informed and uninformed traders. The uninformed trader arrival rate is irrelevant to an event but the informed trader arrival rate is related to an information event. If a bad event occurs, the informed traders will go to the market and sell their stock, and vice versa. The informed and uninformed trader can be classified according to the investor type into three sub groups, which are: local retailer, local institutional investor and foreign investor. In other words, there are six kinds of investor who are: informed retailer, uninformed retailer, informed institutional investor, uninformed institutional investor, informed foreigner and uninformed foreigner. This adjusted model also assumes the same assumption, no more than one information event per day (more details of this model is explained in the appendix.). The PIN model for firm $i$ over trading day $j$ of investor type $k$ is represented by the likelihood function as follows:

$$L_i\big[B_{i,j,k}, S_{i,j,k}/\theta_i\big]$$

$$= \big(\delta_i(1-\alpha_i)\big)\prod_{k=1}^{3}\left(e^{-\varepsilon_{i,k}}\frac{(\varepsilon_{i,k})^{B_{i,j,k}}}{B_{i,j,k}!}\,e^{-(\mu_{i,k}+\varepsilon_{i,k})}\frac{(\mu_{i,k}+\varepsilon_{i,k})^{S_{i,j,k}}}{S_{i,j,k}!}\right)$$

$$+\ (\delta_i\alpha_i)\prod_{k=1}^{3}\left(e^{-(\mu_{i,k}+\varepsilon_{i,k})}\frac{(\mu_{i,k}+\varepsilon_{i,k})^{B_{i,j,k}}}{B_{i,j,k}!}\,e^{-\varepsilon_{i,k}}\frac{(\varepsilon_{i,k})^{S_{i,j,k}}}{S_{i,j,k}!}\right)$$

$$+\ (1-\delta_i)\prod_{k=1}^{3}\left(e^{-\varepsilon_{i,k}}\frac{(\varepsilon_{i,k})^{B_{i,j,k}}}{B_{i,j,k}!}\,e^{-\varepsilon_{i,k}}\frac{(\varepsilon_{i,k})^{S_{i,j,k}}}{S_{i,j,k}!}\right)$$

(Equation 1)

**Define**: $\varepsilon_{i,k}$     is an arrival rate of uninformed investor $k$ for firm $i$.

         $\mu_{i,k}$     is an arrival rate of informed investor $k$ for firm $i$.

         $B_{i,k}$     is the number of investor $k$ initiated buy order over day $j$.

         $S_{i,k}$     is the number of investor $k$ initiated sell order over day $j$.

         $\delta_i$     is a probability of information event that occur.

         $\alpha_i$     is a probability of occurring event, is good news.

$\theta_i$      is the vector of parameters to be estimated. ($\alpha_i$, $\delta_i$, $\varepsilon_{i,k}$, $\mu_{i,k}$).

Estimate these parameters $\theta_i$ of firm $i$ in each year by maximizing the joint likelihood over the $J$ trading days in a calendar year. The formula is shown below:

$$L_i(M_i/\theta_i) = \prod_{j=1}^{J} L_i\big(B_{i,j,k}, S_{i,j,k}/\theta_i\big)$$

(Equation 2)

However, this Equation 1 cannot be calculated directly by SAS program because it encounters the factorial problem. To handle this factorial problem, I transform Equation 1 to Equation 3 by using the log function. After excluding all these constant terms, the Equation 3 is shown as followed:

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**Define:**      $M_{i,j,k}$    =    $(\min(B_{i,j,k}, S_{i,j,k}) + \max(B_{i,j,k}, S_{i,j,k})) / 2$

                   $X_{i,k}$    =    $\varepsilon_{i,k} / (\mu_{i,k} + \varepsilon_{i,k})$

$L_i[(B_{i,j,k}, S_{i,j,k})/\theta_i]$

$$= \sum_{k=1}^{3}\left(-2 \times \varepsilon_{i,k} + M_{i,j,k}\log(X_{i,k}) + \big(B_{i,j,k} + S_{i,j,k}\big)\log\big(\mu_{i,k} + \varepsilon_{i,k}\big)\right)$$

$$+ \big(\delta_i(1-\alpha_i)\big)\prod_{k=1}^{3} e^{\mu_{i,k}} X_{i,k}^{(S_{i,j,k}-M_{i,j,k})}$$

$$+ (\delta_i\alpha_i)\prod_{k=1}^{3} e^{\mu_{i,k}} X_{i,k}^{(B_{i,j,k}-M_{i,j,k})} + (1-\delta_i)\prod_{k=1}^{3} X_{i,k}^{(B_{i,j,k}+S_{i,j,k}-M_{i,j,k})}$$

(Equation 3)

To measure the arrival rate of uninformed trader, I maximize Equation 2 through Equation 3 and estimate $\varepsilon_1$, $\varepsilon_2$ and $\varepsilon_3$ which are the arrival rate of retailer, institution and foreign investor, after excluding all the corner solution as mention earlier. Table 3 represents the descriptive statistic of the arrival rate of uninformed trader for each investor type in my sample, which is classified by year.

**Table 3**

**Descriptive Statistic of Arrival Rates of Uninformed Trader**

This table represents the descriptive statistic of the arrival rates of uninformed trader in my sample during the period of 2000-2007. These arrival rates of uninformed trader show the number of initiated order per day by the uninformed trader estimated from my PIN model. The arrival rates of the uninformed trader are classified into 3 groups, which are the arrival rates of uninformed retailer, the arrival rate of the uninformed institutional investor and the arrival rate of the uninformed foreigner.

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2000-2007 |
|---|---|---|---|---|---|---|---|---|---|
| Panel A: Retailer | | | | | | | | | |
| Mean | 17.20 | 33.37 | 44.14 | 49.78 | 38.74 | 41.69 | 39.84 | 35.23 | 38.034 |
| Median | 3.32 | 10.23 | 11.94 | 16.13 | 17.87 | 16.83 | 19.03 | 16.25 | 14.48 |
| Maximum | 124.46 | 188.09 | 365.58 | 368.68 | 239.47 | 244.25 | 305.85 | 318.80 | 368.67 |
| Minimum | 0.02 | 0.12 | 0.07 | 0.07 | 0.11 | 0.13 | 0.02 | 0.11 | 0.02 |
| Std. Dev. | 27.58 | 46.44 | 64.57 | 70.86 | 49.73 | 55.26 | 50.77 | 48.06 | 53.46 |
| Panel B: Institutional investor | | | | | | | | | |
| Mean | 1.00 | 1.23 | 2.30 | 3.63 | 2.29 | 2.62 | 2.28 | 2.26 | 2.27 |
| Median | 0.02 | 0.06 | 0.14 | 0.46 | 0.34 | 0.17 | 0.12 | 0.05 | 0.11 |
| Maximum | 19.02 | 16.12 | 25.55 | 50.51 | 29.38 | 37.05 | 41.09 | 37.68 | 50.51 |
| Minimum | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Std. Dev. | 2.75 | 2.80 | 4.67 | 7.57 | 4.33 | 6.28 | 5.25 | 6.07 | 5.41 |
| Panel C: Foreigner | | | | | | | | | |
| Mean | 3.14 | 4.23 | 5.86 | 7.78 | 5.33 | 6.93 | 6.33 | 6.61 | 6.00 |
| Median | 0.52 | 0.65 | 1.23 | 1.21 | 1.41 | 1.06 | 1.18 | 1.03 | 0.98 |
| Maximum | 78.09 | 63.43 | 63.86 | 96.52 | 64.21 | 121.69 | 96.64 | 102.87 | 121.69 |
| Minimum | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Std. Dev. | 8.52 | 9.34 | 10.57 | 14.79 | 9.64 | 16.11 | 12.72 | 15.27 | 12.97 |

After obtained arrival rate of uniformed trader, I compare the total arrival rate of uninformed trader from my PIN model and Easley, O Hara and Paperman (1998) model to check the validity of my model. The total arrival rates of uninformed trader are the estimated number of the initiated order from all investor types. If the correlation of the total arrival rate obtained from these two models is high, then my model should be reliable. Easley, O Hara and Paperman (1998) model_is shown below:

$$L_i\big[B_{i,j}, S_{i,j}/\theta_i\big]$$

$$= (1 - \alpha_i)\left(e^{-\varepsilon_i T_{i,j}} \frac{\left(\varepsilon_i T_{i,j}\right)^{B_{i,j}}}{B_{i,j}!} e^{-\varepsilon_i T_{i,j}} \frac{\left(\varepsilon_i T_{i,j}\right)^{S_{i,j}}}{S_{i,j}!}\right)$$

$$+ (\alpha_i \delta_i)\left(e^{-\varepsilon_i T_{i,j}} \frac{\left(\varepsilon_i T_{i,j}\right)^{B_{i,j}}}{B_{i,j}!} e^{-(\mu_i + \varepsilon_i) T_{i,j}} \frac{[(\mu_i + \varepsilon_i) T_{i,j}]^{S_{i,j}}}{S_{i,j}!}\right)$$

$$+ (\alpha_i(1 - \delta_i))\left(e^{-(\mu_i + \varepsilon_i) T_{i,j}} \frac{[(\mu_i + \varepsilon_i) T_{i,j}]^{B_{i,j}}}{B_{i,j}!} e^{-\varepsilon_i T_{i,j}} \frac{\left(\varepsilon_i T_{i,j}\right)^{S_{i,j}}}{S_{i,j}!}\right)$$

(Equation 4)

**Define**: $B_{i,j}$  is the number of buyer-initiated trades for the day.

$S_{i,j}$  is the number of seller-initiated trades for the day.

$\mu_i$  is the probability that a trade comes from an informed trader when an event has occurred.

$\varepsilon_i$  is the probability that the uninformed traders will actually trade.

$\alpha_i$  is the probability that an information event has occurred.

$\delta_i$  is the probability of a low signal given an event has occurred.

$T_{i,j}$  is total trading time for the day.

$\theta_i$  is the vector of parameters to be estimated ($\alpha_i$, $\delta_i$, $\varepsilon_i$, $\mu_i$).

Estimate these parameters $\theta_i$ of firm $i$ in each year by maximizing the joint likelihood over the *J* trading days in a calendar year. The formula is shown below:

$$L_i(M_i/\theta_i) = \prod_{j=1}^{J} L_i\big(B_{i,j}, S_{i,j}/\theta_i\big)$$

(Equation 5)

From Easley, O Hara and Paperman (1998) model, the total arrival rate of uninformed trader is equal to $\varepsilon_i$. In the new PIN model, the total arrival rate of uninformed trader is equal to the summation of the arrival rate of the retailer, institution and foreign investor. In other words, the total arrival rate of uninformed trader is equal to the following equation:

$$\varepsilon_{i,total} = \varepsilon_{i,retailer} + \varepsilon_{i,institution} + \varepsilon_{i,foreigner}$$

(Equation 6)

**Define**: $\varepsilon_{i,total}$      is the total arrival rate of uninformed trader for firm $i$

$\varepsilon_{i,retailer}$      is the arrival rate of uninformed retailer for firm $i$

$\varepsilon_{i,institution}$      is the arrival rate of uninformed institutional investor for firm $i$

$\varepsilon_{i,foreigner}$      is the arrival rate of uninformed foreigner for firm $i$

The statistic description of the total arrival rates of uninformed trader from both models is represented in Table 4. From Table 4, the total arrival rate from new model and Easley, O Hara and Paperman (1998) model are very similar. The mean, median and standard deviation from each model is very close and the correlation is very high. Consequently, the robustness result ensures the validity of my PIN model.

**Table 4**

**Descriptive Statistic of total Arrival Rate of Uninformed Trader**

This table represents the descriptive statistic of the total arrival rate of uninformed trader in my sample during the year period of 2000-2007. These total arrival rates of uninformed trader are computed from my PIN model and Easley, O Hara and Paperman (1998) model.

|  | New model | Easley et.al. model |
|---|---|---|
| Total arrival rate of uniformed  trader |  |  |
| Mean | 33.03 | 32.87 |
| Median | 12.03 | 11.19 |
| Maximum | 380.8 | 393.29 |
| Minimum | 0.39 | 0.08 |
| Std. Dev. | 49.16 | 50.39 |
| Correlation | 0.95 | |

## 4.2. Measurement of the Relationship between the Corporate Governance and Investor Behavior

I measure the relation between the corporate governance and the investor behavior by using two methods which are univariate tests and regression analyses. I apply univariate test to see an overview relation between the corporate governance and the investor behavior and apply the regression method to ensure the correlation between the

corporate governance and the investor behavior. Details of each method are presented as followed:

### 4.2.1. Univariate Test

In each year, I sort the firms according to the governance scores and group them into governance-score quartiles. I then aggregate all the firm-year observations within each quartile across the six-year study period. Then I calculate the mean and median daily number of the initiated order for each investor type to observe the overview of relation between the corporate governance and the investor behavior. Table 5, panel A shows the mean and median daily number of the initiated order for each investor type in each quartile. The result shows that the firm with high corporate governance level exhibits higher initiated order for all groups of investor, which supports an idea that all investor types favor the corporate governance and more likely to invest in the high corporate governance firm than a low governance firm.

However, we cannot conclude that all investors are interested in the corporate governance, because of high initiated order can be resulted from a stock manipulation or private informed base trading. To handle this problem, I calculate the arrival rates of the uninformed trader for each investor type in each quartile by the new PIN model (Equation 2 and Equation 3). This result is represented in Table 5, panel B. From Table 5, panel B, there is a considerable difference in the arrival rates of uninformed trader between the high corporate governance firm and the poor corporate governance firm. For example, the rate of the uninformed foreigner is three times in the first quartile is three times higher than the last quartile. This result also supports the idea that all investor types are in favor of the corporate governance.

**Table 5**

**Corporate Governance, Initiated Trade Order and Arrival Rates of Uninformed Trader**

In each year, I sort the firms according to the governance index and group them into governance-score quintiles. I, then, aggregate all the firm-year observations within each quintile across the eight-year study period. For panel A, the first column shows the mean and median daily initiated order from retailer within each quartile. The second and third column shows the mean and median daily initiated order from the institutional and foreign investor within each quartile. Similarly, in panel B, the first column shows the mean and median arrival rates of informed retailer within each quartile, the second and third column show the mean and median arrival rates of the uninformed institutional and foreign investors within each quartile.

| CGI | Retailer | | Institution | | Foreign | |
|---|---|---|---|---|---|---|
| | Mean | Median | Mean | Median | Mean | Median |
| Panel A: Initiated order | | | | | | |
| 1 | 46.66 | 8.04 | 1.35 | 0.05 | 4.72 | 0.49 |
| 2 | 52.02 | 15.51 | 2.13 | 0.12 | 6.37 | 1.20 |
| 3 | 57.68 | 24.19 | 3.28 | 0.20 | 9.83 | 1.55 |
| 4 | 94.72 | 53.76 | 6.50 | 1.11 | 19.02 | 4.11 |
| Panel B: Arrival rate of uninformed trader | | | | | | |
| 1 | 26.05 | 4.62 | 0.99 | 0.03 | 2.89 | 0.35 |
| 2 | 31.84 | 10.12 | 1.43 | 0.07 | 4.03 | 0.83 |
| 3 | 34.54 | 14.40 | 2.16 | 0.14 | 6.04 | 0.90 |
| 4 | 54.21 | 33.77 | 3.99 | 0.59 | 10.07 | 2.64 |

**4.2.2. Regression Model**

Nonetheless, we still cannot conclude that all the investor types are encouraged to buy/sell stock by the corporate governance because this increasing in the arrival rates of the uninformed trader may be driven by correlation with other variables, such as the size of the firm. To confirm the relation between the trading activity and the corporate governance level, I apply the regression method by using the corporate governance index as an independent variable and the arrival rates of uninformed trader as a dependent variable. The arrival rates of the uninformed trader are a proxy for the investor trading behavior. If the arrival rate is positively related to the corporate governance level, it implies that investors are encouraged by the corporate governance. The regression model is shown as follow:

$\varepsilon_{i,k} = \beta_0 + \beta_1 \, \text{Log(Gov-Index}_{i,t}) + \beta_2 \, (\text{Price}_{i,t}) + \beta_3 \, \text{Return Volatility}_{i,t}$
$+ \beta_4 \, \text{Log(Trading Volume}_{i,t}) + \beta_5 \, \text{Log(Assets}_{i,t}) + \beta_6 \, \text{Age}_{i,t} + \beta_7 \, \text{Number of Analysts}_{i,t}$
$+ \beta_8 \, \text{Institutional Ownership}_{i,t} + \beta_9 \, \text{Asset Tangibility}_{i,t} + \beta_{10} \, \text{S\&P 50 Dummy}_{i,t} +$
$\beta_{11} \text{Dummy Variables for One-Digit SIC Industry Code}_{i,t} + \zeta_{i,t}; \text{(error term)}$

(Equation 7)

Where price is an average daily price, return volatility is a standard deviation of daily return, trade volume is a dollar trading volume, assets and asset tangibility is a quarterly average, age is a period from registration to year $t$, number of analysts is the number of analysts following the company, and institution ownership is a percentage of shares held by the institution. Each variable is measured annually (i = firm i and t = year t).

To test the first hypothesis, I count the number of the buying and selling in each group of investors for each firm in each day, and then I substitute the number of buy and sell in Equation 3 to maximize Equation 2. I use the arrival rates of the uninformed retailer ($\varepsilon_{i, retailer}$), obtained through Equation 2, as a dependent variable in Equation 7. Hence, the regression model to evaluate the impact of the corporate governance level towards the retailer behavior is represented as follow:

$\varepsilon_{i,retailer} = \beta_0 + \beta_1 \, \text{Log(Gov-Index}_{i,t}) + \beta_2 \, (\text{Price}_{i,t}) + \beta_3 \, \text{Return Volatility}_{i,t}$
$+ \beta_4 \, \text{Log(Trading Volume}_{i,t}) + \beta_5 \, \text{Log(Assets}_{i,t}) + \beta_6 \, \text{Age}_{i,t} + \beta_7 \, \text{Number of Analysts}_{i,t}$
$+ \beta_8 \, \text{Institutional Ownership}_{i,t} + \beta_9 \, \text{Asset Tangibility}_{i,t} + \beta_{10} \, \text{S\&P 50 Dummy}_{i,t} +$
$\beta_{11} \text{Dummy Variables for One-Digit SIC Industry Code}_{i,t} + \zeta_{i,t}; \text{(error term)}$

(Equation 8)

If $\beta_1$ is significantly positive, then the corporate governance encourages retailer to trade stocks. For the second and third hypothesis, I use the arrival rates of the uninformed institutional investor and foreigner, obtained through Equation 2, as a dependent variable in Equation 8 instead of the arrival rate of uninformed retailer. I expect to find no relation between the corporate governance and retailer investor arrival rate but find positive relation between the corporate governance and the institution and foreign investor arrival rate. In other words, $\beta_1$ should be

insignificantly different from zero at 95 percent confident level for local retailer investor and vice versa for other investor groups.

# CHAPTER V
# EMPIRICAL RESULT

This chapter represents the empirical result of the regression analysis between the corporate governance level and the investor's behavior for each kind of investor. The dependent variable is the investor behavior, which is a proxy used by the arrival rate of the uninformed trader, while the independent variable is the corporate governance level. The regression method is fixed period effect regression method. Moreover, this chapter also reports robustness tests as well.

## 5.1. Empirical Result

*Corporate Governance and Local Retailer Behavior*

Table 6, first column, shows the regression result between the arrival rate of the uninformed trader and the corporate governance. The estimated model is Equation 8. The result shows that the CGI is not statically significant. The adjusted $R^2$ is around 0.49. This is evidence supporting an idea that the retailers are not interested in the corporate governance and do not tend to invest more in the high corporate governance firm.

For other independent variables, the Return Volatility, Total Asset SET50 Dummy, Volume and Company Age are positively significant. The positive sign of trading volume, total asset, SET50 Dummy and company age are consisted with the prior research by Chung, Elder and Kim (2009). The positive sign of return volatility can be interpreted that there are price disagreement among the investors for high volatility stock because future cash flows are very ambiguous. When the price disagreement is high, some investors will buy the stock and some investor will sell the stock, and lead to a high arrival rate.

On the other hand, the arrival rates of the uninformed retailer are inversely related to the institutional holding. Price and analysis recommendation are negatively significant. The negative correlation of price and analysis recommendation are in line

with the previous study by Chung, Elder and Kim(2008) and Van Ness, Van Ness and Warr (2001). Van Ness, Van Ness and Warr (2001) mention that the number of analysis is increased with the level of information asymmetry in which discourages the uninformed investors to trade. The negative sign of institutional holding can be implied that the retailer investors are aware of the nominee, in which the owner of the nominee is unknown. Tangible asset is not considerable significant for the retailer group. This result is in line with Chung, Elder and Kim (2008), who report that the asset and tangible asset sign are varied on the market.

*Corporate Governance and Local Institutional Behavior*

Table 6, second column, reports the regression result between the arrival rates of the uninformed local institution and the corporate governance level. The estimated model is shown as followed:

$\varepsilon_{i,institution} = \beta_0 + \beta_1$ Log(Gov-Index$_{i,t}$) + $\beta_2$ (Price$_{i,t}$) + $\beta_3$ Return Volatility$_{i,t}$
+ $\beta_4$ Log(Trading Volume$_{i,t}$) + $\beta_5$ Log(Assets$_{i,t}$) + $\beta_6$ Age$_{i,t}$ + $\beta_7$ Number of Analysts$_{i,t}$
+ $\beta_8$ Institutional Ownership$_{i,t}$ + $\beta_9$ Asset Tangibility$_{i,t}$ + $\beta_{10}$ S&P 50 Dummy $_{i,t}$ +
$\beta_{11}$Dummy Variables for One-Digit SIC Industry Code $_{i,t}$ + $\zeta_{i,t}$; (error term)

(Equation 9)

From Table 6, second column, the coefficient of CGI is positively related to the arrival rate of the uniformed institutional investors at 1% significant level. The adjusted $R^2$ is 0.58. This evidence suggests that the institutional investors are interested in the corporate governance and tend to invest more in the high corporate governance firm.

Furthermore, the regression result indicate that the arrival rates of the uninformed institutional investor is positively related to price, analysis recommendation, return volatility, trading volume, tangible asset and SET50 Dummy. All of these variables are significant at 1% level, except the tangible asset that significant at 10%. The positive sign of price and analysis recommendation in institutional group is opposite to the retailer group. The positive coefficient of price can be implied that the institutional investors prefer big capital stock and price is not an obstacle for the

institutional investors. Whereas the positive sign of analysis recommendation can be implied that the institutional investor can utilize some public information that provided from the analysis recommendation more efficient than the retailer. This sophistication may lead to more confidence in investing in high information asymmetry stock.

The sign of tangible asset is significantly positive while the sign of the total asset is not significantly different from zero point out that the institutional investors are interested only on the tangible asset. This may be caused by the fact that the intangible asset is easily to be manipulated especially in weak regulation so, they do not concern on intangible asset, such as goodwill or research and development expense. Company age is positively related to the arrival rate of the uninformed retailer but is not related to the arrival rate of the uninformed institutional investors. This can be viewed as the retailer decision which is relied heavily on the historical data. In other words, the retailers have more confidence in more historical data. On the other hand, the institutional investors are more sophisticated and relied less on historical data because the future performance may not be similar to the historical performance. The institutional holding coefficient is significantly negative at 10% confident level. This result merely reflects the institutional investors which are also aware of the nominee.

*Corporate Governance and Foreign Behavior*

From Table 6, third column, reports the regression result between the arrival rate of the uninformed foreigner and corporate governance level. The estimated equation is similar to Equation 8 but instead of using the arrival rate of local retailer, I use the arrival rate of the uninformed foreigner which is represented below:

$\varepsilon_{i,foreigner} = \beta_0 + \beta_1 \text{Log}(\text{Gov-Index}_{i,t}) + \beta_2 (\text{Price}_{i,t}) + \beta_3 \text{Return Volatility}_{i,t}$
$+ \beta_4 \text{Log}(\text{Trading Volume}_{i,t}) + \beta_5 \text{Log}(\text{Assets}_{i,t}) + \beta_6 \text{Age}_{i,t} + \beta_7 \text{Number of Analysts}_{i,t}$
$+ \beta_8 \text{Institutional Ownership}_{i,t} + \beta_9 \text{Asset Tangibility}_{i,t} + \beta_{10} \text{S\&P 50 Dummy}_{i,t} +$
$\beta_{11} \text{Dummy Variables for One-Digit SIC Industry Code}_{i,t} + \zeta_{i,t}; \text{(error term)}$

(Equation 10)

From Table 6, third column, the regression result shows that CGI is significant at 10% confident level. The adjusted $R^2$ is 0.61. This empirical evidence suggests that the corporate governance is important to the foreign investors, they prefer more in the high corporate governance firm.

The regression result in the third column is very parallel to the second column. The arrival rate of the uninformed foreigner is positively related to price, analysis recommendation, and return volatility, trading volume, tangible asset and SET50 Dummy. All of these variables are significant at 1% confident level. It is identical to the institutional investor; asset and age coefficient is not statically significant. However, the institution holding coefficient is not significantly different from zero. This can be interpreted that the foreigners are not aware of the nominee.
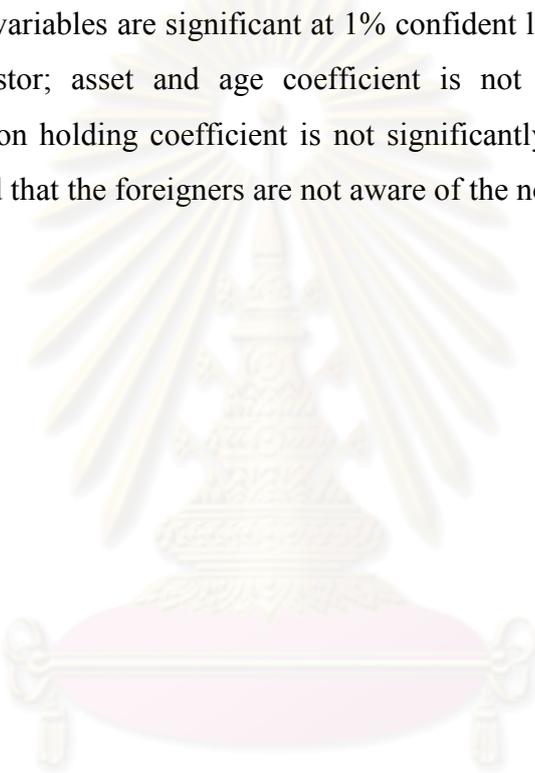
**Table 6**

**Arrival Rates of Uninformed trader, Corporate Governance Index (CGI) and other Control Variables**

This table shows the regression result of the Equation 8, 9 and 10. The arrival rate of the uninformed trader is the dependent variable which is obtained through new PIN model. There are three kinds of traders which are retailers, institution investors and foreigners. The independent variables are the CGI, price, and return volatility, total asset, trading volume, tangible asset, company age, institutional ownership and analysis recommendation. CGI stands for Corporate Governance Index which is estimated from the previous research (Corporate Cash Holdings, Earnings Management and Corporate Governance: Evidence from Thailand by Suchon). My sample is over the year period of 2000 to 2007.

| Independent Variables | Arrival rate of uniformed trader | | |
|---|---|---|---|
| | Retail | Institution | Foreign |
| Intercept | -67.71*** | -1.05 | -3.41 |
| | (-3.76) | (-0.63) | (-0.89) |
| Log(CGI) | 2.69 | 1.43*** | 1.60* |
| | (0.60) | (3.46) | (1.68) |
| Log(Price) | -2.33*** | 0.44*** | 0.46*** |
| | (-2.79) | (5.64) | (2.59) |
| Analysis Recommend | -0.63** | 0.46*** | 1.10*** |
| | (-1.95) | (15.30) | (16.06) |
| Log(Return volatility) | 8.13*** | 0.31*** | 0.93*** |
| | (7.11) | (2.89) | (3.82) |
| Log (Total Asset) | 3.37** | -0.12 | -0.43 |
| | (1.90) | (-0.73) | (-1.15) |
| SET50 Dummy | 25.43*** | 3.63*** | 8.46*** |
| | (6.01) | (9.25) | (9.37) |
| Log(Tangible Asset) | 1.70 | 0.26* | 0.92*** |
| | (0.95) | (1.58) | (2.44) |
| Log (Volume) | 7.92*** | 0.18*** | 0.54*** |
| | (16.97) | (4.09) | (5.38) |
| Institutional Holding | -0.22*** | -0.01* | -0.01 |
| | (-5.47) | (-1.67) | (-1.20) |
| Company Age | 0.13*** | 0.01 | 0.02 |
| | (2.03) | (1.19) | (1.44) |
| Observations | 1835 | 1835 | 1835 |
| $R^2$ | 0.4939 | 0.5756 | 0.6090 |

**5.2. Robustness Check**

To ensure the correlation between the corporate governance and the investor behavior, I use the alternative variable as a proxy for investor behavior which is the initiated trading volume. I use the initiated trading volume instead of using the arrival rate of uninformed trader as a dependent variable in the regression model. The initiated volume is a yearly total number of shares executed from the initiated order. The descriptive statistic of the initiated trading volume is reported in Table 7.

**Table 7**

**Descriptive Statistics on Initiated Trading Volume**

This table represents the descriptive statistic of the initiated trading volume in three kinds of investor which are local retailer, local institution and foreign investor. My sample is over the year period of 2000-2007. The initiated trading volume is a yearly total number of the shares executed from the initiated order (million stocks).

| Variable | Mean | Median | Max | Min | Std. |
|---|---|---|---|---|---|
| Local retailer | 415 | 39.72 | 19,097.68 | 0.02 | 1274.44 |
| Local institution | 20.57 | 0.52 | 1,608.01 | 0 | 76.85 |
| Foreigner | 70.61 | 4.31 | 2,787.66 | 0 | 235.89 |

If the regression result turns out that the CGI is positively related to the initiate trading volume, then it can be interpreted as the investors are interested in the corporate governance, because more initiate trading volume will reflect more interest. I use the same set of independent variable in Equation 7. The regression model for investor type $k$ is shown below:

Initiated trading volume$_{i,k}$ = $\beta_0$ + $\beta_1$ Log(Gov-Index$_{i,t}$) + $\beta_2$ (Price$_{i,t}$) + $\beta_3$ Return Volatility$_{i,t}$ + $\beta_4$ Log(Trading Volume$_{i,t}$) + $\beta_5$ Log(Assets$_{i,t}$) + $\beta_6$ Age$_{i,t}$ + $\beta_7$ Number of Analysts$_{i,t}$ + $\beta_8$ Institutional Ownership$_{i,t}$ + $\beta_9$ Asset Tangibility$_{i,t}$ + $\beta_{10}$ S&P 50 Dummy $_{i,t}$ + $\beta_{11}$Dummy Variables for One-Digit SIC Industry Code $_{i,t}$ + $\zeta_{i,t}$; (error term)

(Equation 11)

The regression result is represented in Table 8. In the retailer group, the coefficient of CGI is not significant. This evidence is also in line with the fact that the retailers are

not interested in corporate governance level. From Table 8, second and third column, the regression result shows a positive correlation between the CGI and the initiate trading volume at 1% confident level in both institutional and foreign investors groups. This result is parallel with an idea that local institutional and foreign investors are affected by the corporate governance level and prefer to invest in the high corporate firm.

Nonetheless, the coefficients of control variables in Table 8 are quite different from Table 6. This dissimilarity may be occurred because the difference between the arrivals rate of the uninformed trader and the initiate trading volume. The arrival rate of uninformed trader is slightly impacted by the informed trader but the initiate trading volume is heavily increased from the informed trader.

In summary, this robustness check provides evidence supporting the fact that foreign investor and institutional investor are concerned on the corporate governance level.
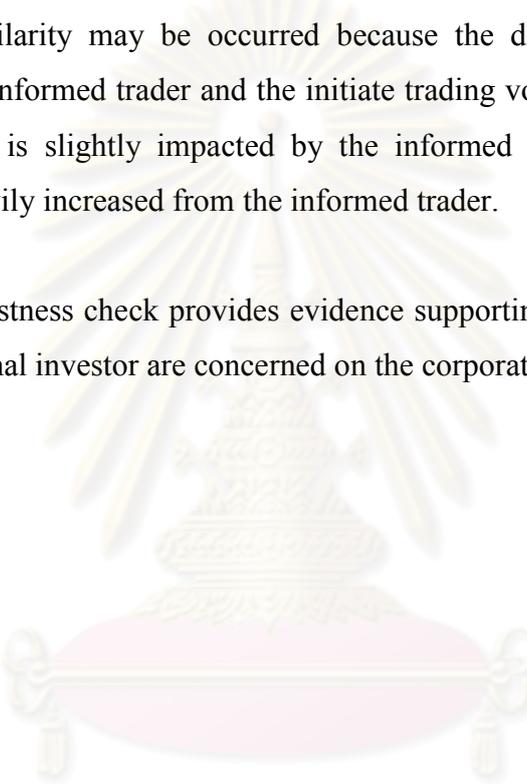
**Table 8**

**Initiated Trading Volume, Corporate Governance Index (CGI) and other Control Variables**

This table shows the regression result of the equation 11. The initiated volume of the local retailer is a yearly total number of shares in the initiated order from retailer. The independent variables are the CGI, price, and return volatility, total asset, trading volume, tangible asset, company age, institutional ownership and analysis recommendation. CGI stands for Corporate Governance Index estimated from the previous research (Corporate Cash Holdings, Earnings Management and Corporate Governance: Evidence from Thailand by Suchon). My sample is over the year period of 2000 to 2007.

| Independent Variables | Arrival rate of uniformed trader | | |
| | Retail | Institution | Foreign |
|---|---|---|---|
| Intercept | -2,592.27*** | -79.84*** | -523.00*** |
| | -4.87 | (-2.54) | (-5.60) |
| Log (CGI) | 122.41 | 27.45*** | 56.85*** |
| | 1.24 | (4.72) | (3.29) |
| Log (Price) | -200.69*** | -5.01*** | -26.59*** |
| | -8.23 | (-3.48) | (-6.21) |
| Analysis Recommend | -48.71*** | 3.16*** | 4.73*** |
| | -5.10 | (5.62) | (2.82) |
| Log(Return Volatility) | 116.67*** | 1.50 | 4.26 |
| | 3.55 | (0.77) | (0.74) |
| Log (Total Asset) | 2.91 | 2.26 | 8.44 |
| | 0.05 | (0.73) | (0.92) |
| SET50 Dummy | 2.64.69** | 17.87** | 60.59*** |
| | 2.10 | (2.41) | (2.75) |
| Log (Tangible Asset) | 228.27*** | 4.26 | 32.03*** |
| | 4.32 | (1.37) | (3.46) |
| Log (Volume) | 80.86*** | 1.69** | 6.06*** |
| | 5.91 | (2.10) | (2.53) |
| Institutional Holding | -5.70*** | -0.01 | -0.21 |
| | -4.87 | (-0.07) | (-1.02) |
| Company Age | 6.65*** | -0.03 | 0.28 |
| | 3.55 | (-0.26) | (0.86) |
| Observations | 1835 | 1835 | 1835 |
| $R^2$ | 0.2074 | 0.2406 | 0.2873 |

# CHAPTER VI
# CONCLUSION

This study investigates the relationship between the corporate governance and the investor behavior. I separate investors into three groups which are local retailer, local institutional investor and foreigner. This is due to the fact that each investor has individual characteristic, I estimate the relation between the corporate governance and the investor behavior from the regression model, by using the corporate governance index (CGI) as a proxy for the governance level and using the arrival rate of uninformed trader as a proxy for the investor behavior. The CGI is conducted following Ananchotikul (2007) approach and the arrival rate of uninformed trader is obtained from the new PIN model.

After a control for other variable, the regression result shows a positive relation between the corporate governance level and the arrival rate of uninformed trader in the institution and the foreign investor group, but leaving no relation in the retailer group. This result can be interpreted that institution and foreign investors are effected by the corporate governance but the retailer is not likely to be effected. The result is still consistent even after the robust by using the initiated trading volume as a dependent variable in the regression model. This result is in line with Chung, Elder and Kim (2008), Leuz, Lins and Warnock (2008) and Chung and Zhang (2009). In summary, my study shows that the institution and foreign investor are effected by the corporate governance level but the retailer is less likely to be effected by the corporate governance level.

Nevertheless, my study has some limitation, first is that my study encounters in a computation problem. Many arrival rate data are missing because the computer is not effective enough to function it. This missing variable can considerably impact the result. Second is that, there is a corner solution problem in my result, which makes my sample size being very small. Lastly, following Chung, Elder and Kim (2008) approach, some control variables are missing from my regression model because of the unavailable data. Eventually, I would recommend that for further study, a parallel computer should be used to estimate my model.

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**APPENDICES**

# APPENDIX A

**PIN model Explanation**

In Easley, D., M. O'Hara, and J. Paperman (1998) PIN model, they assume two groups of investors, which are the informed and uninformed traders.  The uninformed trader arrival rate is irrelevant to an event whereas the informed trader arrival rate is relevant to an information event.  If a bad event occurs, the informed trader will go to the market and sell their stock and vice versa.  This model also assumes no more than one information event per day.  To demonstrate, the Picture 1 explains a possible outcome in each day.
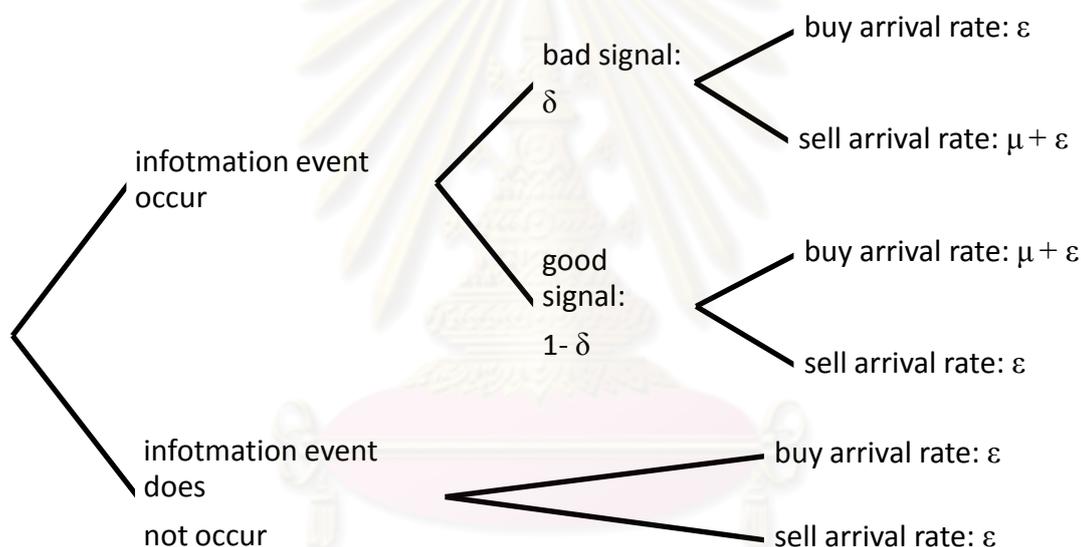


(Figure 1, Pin Tree)

The PIN model based on EKOP approach for firm $i$ over trading day $j$ is represented by the below likelihood function:

$$L_i\left[B_{i,j}, S_{i,j} / \theta_i\right]$$

$$= (1 - \alpha_i)\left( e^{-\varepsilon_i T_{i,j}} \frac{\left(\varepsilon_i T_{i,j}\right)^{B_{i,j}}}{B_{i,j}!} e^{-\varepsilon_i T_{i,j}} \frac{\left(\varepsilon_i T_{i,j}\right)^{S_{i,j}}}{S_{i,j}!} \right)$$

$$+ (\alpha_i \delta_i)\left( e^{-\varepsilon_i T_{i,j}} \frac{\left(\varepsilon_i T_{i,j}\right)^{B_{i,j}}}{B_{i,j}!} e^{-(\mu_i + \varepsilon_i) T_{i,j}} \frac{[(\mu_i + \varepsilon_i) T_{i,j}]^{S_{i,j}}}{S_{i,j}!} \right)$$

$$+ (\alpha_i (1 - \delta_i))\left( e^{-(\mu_i + \varepsilon_i) T_{i,j}} \frac{[(\mu_i + \varepsilon_i) T_{i,j}]^{B_{i,j}}}{B_{i,j}!} e^{-\varepsilon_i T_{i,j}} \frac{\left(\varepsilon_i T_{i,j}\right)^{S_{i,j}}}{S_{i,j}!} \right)$$

(Equation 12)

**Define**: $B_{i,j}$     is the number of buyer-initiated trades for the day.

$S_{i,j}$     is the number of seller-initiated trades for the day.

$\mu_i$     is the probability that a trade comes from an informed trader when an event has occurred.

$\varepsilon_i$     is the probability that the uninformed traders will actually trade.

$\alpha_i$     is the probability that an information event has occurred.

$\delta_i$     is the probability of a low signal given an event has occurred.

$T_{i,j}$     is total trading time for the day.

$\theta_i$     is the vector of parameters to be estimated, ($\alpha_i$, $\delta_i$, $\varepsilon_i$, $\mu_i$).

Estimate these parameters $\theta i$ of firm $i$ in each year by maximizing the joint likelihood over the $J$ trading days in a calendar year. The formula is shown below:

$$L_i(M_i / \theta_i) = \prod_{j=1}^{J} L_i\left(B_{i,j}, S_{i,j} / \theta_i\right)$$

(Equation 13)

In the adjusted PIN model, I also assume two groups of investors who are informed and uninformed traders. Each group can be classified into three sub groups which are retailer, institutional investor and foreign investor. In other words, there are six kinds of investor which are informed retailer, uninformed retailer, informed institutional investor, uninformed institutional investor, informed foreigner and uninformed foreigner. The uninformed trader arrival rate is irrelevant to an event but the

informed trader arrival rate is relevant to an information event. If a bad event occurs, the informed trader will go to the market and sell their stocks and vice versa. This model also assumes no more than one information event per day. To demonstrate, Picture 2 explains a possible outcome in each day.

**Define**: $\mu_1$  is an arrival rate of informed retailer.

$\quad\quad\quad\varepsilon_1$  is an arrival rate of uninformed retailer.

$\quad\quad\quad\mu_2$  is an arrival rate of informed institutional investor.

$\quad\quad\quad\varepsilon_2$  is an arrival rate of uninformed institutional investor.

$\quad\quad\quad\mu_3$  is an arrival rate of informed foreigner.

$\quad\quad\quad\varepsilon_3$  is an arrival rate of uninformed foreigner.



(Figure 2, Adjusted Pin Tree)

**Define**: $\varepsilon_{i,k}$  is an arrival rate of uninformed investor $k$ for firm $i$.

$\quad\quad\quad\mu_{i,k}$  is an arrival rate of informed investor $k$ for firm $i$.

$\quad\quad\quad B_{i,k}$  is the number of investor k initiated buy order over day $j$.

$\quad\quad\quad S_{i,k}$  is the number of investor k initiated sell order over day $j$.

(For retailer k = 1, for institutional investor k = 2 and for foreign investor k = 3).

$\quad\quad\quad\delta_i$  is a probability of information event that occurred.

$\alpha_i$     is a probability of occurring event is good news.

$\theta_i$     is the vector of parameters to be estimated. ($\alpha_i$, $\delta_i$, $\varepsilon_{i,k}$, $\mu_{i,k}$).

During the bad information event occurring day, the probability of having retailer initiated buy number is equal to B1, the retailer initiated sell number is equal to S1, the institutional initiated buy number is equal to B2, the institutional initiated sell number is equal to S2, the foreign initiated buy number is equal to B3 and the foreign initiated sell number is equal to S3, for firm $i$ is equal to:

$$\prod_{k=1}^{3}\left( e^{-\varepsilon_{i,k}} \frac{\left(\varepsilon_{i,k}\right)^{B_{i,j,k}}}{B_{i,j,k}!} e^{-(\mu_{i,k}+\varepsilon_{i,k})} \frac{\left(\mu_{i,k}+\varepsilon_{i,k}\right)^{S_{i,j,k}}}{S_{i,j,k}!} \right)$$

(Equation 14)

During the good information event occurring day, the probability of having retailer initiated buy number is equal to B1, the retailer initiated sell number is equal to S1, the institutional initiated buy number is equal to B2, the institutional initiated sell number is equal to S2, the foreign initiated buy number is equal to B3 and the foreign initiated sell number is equal to S3, for firm $i$ is equal to:

$$\prod_{k=1}^{3}\left( e^{-(\mu_{i,k}+\varepsilon_{i,k})} \frac{\left(\mu_{i,k}+\varepsilon_{i,k}\right)^{B_{i,j,k}}}{B_{i,j,k}!} e^{-\varepsilon_{i,k}} \frac{\left(\varepsilon_{i,k}\right)^{S_{i,j,k}}}{S_{i,j,k}!} \right)$$

(Equation 15)

During the no information event occurring day, the probability of having retailer initiated buy number is equal to B1, the retailer initiated sell number is equal to S1, the institutional initiated buy number is equal to B2, the institutional initiated sell number is equal to S2, the foreign initiated buy number is equal to B3 and the foreign initiated sell number is equal to S3, for firm $i$ is equal to:

$$\prod_{k=1}^{3}\left( e^{-\varepsilon_{i,k}} \frac{\left(\varepsilon_{i,k}\right)^{B_{i,j,k}}}{B_{i,j,k}!} e^{-\varepsilon_{i,k}} \frac{\left(\varepsilon_{i,k}\right)^{S_{i,j,k}}}{S_{i,j,k}!} \right)$$

(Equation 16)

If a probability of information event occurring is $\delta_i$ and a probability of occurring event is good news, is $\alpha_i$, the likelihood function is:

$$L_i\big[B_{i,j,k}, S_{i,j,k}/\theta_i\big]$$

$$= \big(\delta_i(1-\alpha_i)\big)\prod_{k=1}^{3}\left(e^{-\varepsilon_{i,k}}\frac{(\varepsilon_{i,k})^{B_{i,j,k}}}{B_{i,j,k}!}\,e^{-(\mu_{i,k}+\varepsilon_{i,k})}\frac{(\mu_{i,k}+\varepsilon_{i,k})^{S_{i,j,k}}}{S_{i,j,k}!}\right)$$

$$+\;(\delta_i\alpha_i)\prod_{k=1}^{3}\left(e^{-(\mu_{i,k}+\varepsilon_{i,k})}\frac{(\mu_{i,k}+\varepsilon_{i,k})^{B_{i,j,k}}}{B_{i,j,k}!}\,e^{-\varepsilon_{i,k}}\frac{(\varepsilon_{i,k})^{S_{i,j,k}}}{S_{i,j,k}!}\right)$$

$$+\;(1-\delta_i)\prod_{k=1}^{3}\left(e^{-\varepsilon_{i,k}}\frac{(\varepsilon_{i,k})^{B_{i,j,k}}}{B_{i,j,k}!}\,e^{-\varepsilon_{i,k}}\frac{(\varepsilon_{i,k})^{S_{i,j,k}}}{S_{i,j,k}!}\right)$$

(Equation 17)

Estimate these parameters θ*i* of firm *i* in each year by maximizing the joint likelihood over the *J* trading days in a calendar year. The formula is shown below:

$$L_i(M_i/\theta_i) = \prod_{j=1}^{J} L_i\big(B_{i,j,k}, S_{i,j,k}/\theta_i\big)$$

(Equation 18)

# APPENDIX B

**Questions for corporate governance index construction**

| Code | Questions | Scoring Rule | | Max. Score | Weight |
|------|-----------|--------------|---|-----------|--------|
| **A. Board Structure** | | | | **6.00** | **20%** |
| A1 | What is the size of the board of directors? | 1 if 5 <=a1<=12; | ;0 otherwise | 1.00 | |
| A2 | What is the size of executive board? | 1 if a2 <= 12 | ;0 otherwise | 1.00 | |
| A3 | How many directors are also managers? | 1 if a3/a1 < 1/3 | ;0 otherwise | 1.00 | |
| A4 | How many directors are dependent? | 1 if a4/a1 > 1/3 | ;0 otherwise | 1.00 | |
| A5 | Does the firm state the definition of independence in the disclosure report? | 1 if a5=1 | ;0 otherwise | 1.00 | |
| A6 | How many directors have attended director training programs by the Thai Institution of Directors Association? | 1 if a6/a1 >1/2 | ;0 otherwise | 1.00 | |
| **B. Conflict of Interest** | | | | **8.00** | **25%** |
| B1 | Is the chairman is the same person as CEO? | 1 if b1=0 | ;0 otherwise | | |
| B2 | Is the chairman independent? | 1 if b2=1 | ;0 otherwise | | |
| B3 | How many public companies dose the chairman currently serve as a director or a manager? | 1 if b3<=3 | ;0 otherwise | | |
| B4 | Does an audit committee exist? | 1/2 if b4=1 | ;0 otherwise | | |
| B5 | -    Chair by independent director? | 1/6 if b5=1 | ;0 otherwise | | |
| B6 | -    Role and responsibilities clearly stated? | 1/6 if b6=1 | ;0 otherwise | | |
| B7 | -    Performance or meeting attendance disclosure? | 1/6 if b7=1 | ;0 otherwise | | |
| B8 | Does a nominating committee exist? | 1/2 if b8=1 | ;0 otherwise | | |
| B9 | -    Chair by independent director? | 1/6 if b9=1 | ;0 otherwise | | |
| B10 | -    Role and responsibilities clearly stated? | 1/6 if b10=1 | ;0 otherwise | | |
| B11 | -    Performance or meeting attendance disclosure? | 1/6 if b11=1 | ;0 otherwise | | |
| B12 | Does a remuneration committee exist? | 1/2 if b12=1 | ;0 otherwise | | |
| B13 | -    Chair by independent director? | 1/6 if b13=1 | ;0 otherwise | | |
| B14 | -    Role and responsibilities clearly stated? | 1/6 if b14=1 | ;0 otherwise | | |
| B15 | -    Performance or meeting attendance disclosure? | 1/6 if b15=1 | ;0 otherwise | | |
| B16 | Does a corporate governance committee exist? | 1/2 if b16=1 | ;0 otherwise | | |
| B17 | -    Chair by independent director? | 1/6 if b17=1 | ;0 otherwise | | |
| B18 | -    Role and responsibilities clearly stated? | 1/6 if b18=1 | ;0 otherwise | | |
| B19 | -    Performance or meeting attendance disclosure? | 1/6 if b19=1 | ;0 otherwise | | |

| Code | Questions | Scoring Rule | | Max. Score | Weight |
|------|-----------|--------------|---|-----------|--------|
| **B. Conflict of Interest** | | | | **8.00** | **25%** |
| B20 | Does the firm has a policy that specifies a minimum number of independent directors? | 1/3 if b20=1 | ;0 otherwise | | |
| | Does the firm discuss the following internal-control issues in the disclosure report? | | | | |
| B21 | - Organization and control environment | 2/15 if b21=1 | ;0 otherwise | | |
| B22 | - Risk management | 2/15 if b22=1 | ;0 otherwise | | |
| B23 | - Management control activities | 2/15 if b23=1 | ;0 otherwise | | |
| B24 | - Information and communication | 2/15 if b24=1 | ;0 otherwise | | |
| B25 | - Monitoring and evaluation | 2/15 if b25=1 | ;0 otherwise | | |
| **C. Board Responsibilities** | | | | **13.00** | **20%** |
| C1 | Number of board meeting per year | 1 if c1>4 | ;0 otherwise | 1.00 | |
| C2 | Average director's meeting attendance | c2/c1 | ;0 otherwise | 1.00 | |
| C3 | Average independent directors meeting attendance | c3/c1 | ;0 otherwise | 1.00 | |
| C4 | Is there a board meeting solely for independent directors? | 1 if c4=1 | ;0 otherwise | 1.00 | |
| C5 | Number of audit committee meeting per year | 1 if c5=>4 | ;0 otherwise | 1.00 | |
| C6 | Average audit committee meeting attendance | c6/c5 | ;0 otherwise | 1.00 | |
| C7 | Is there at least one accounting expert on the audit committee? | 1 if c7=1 | ;0 otherwise | 1.00 | |
| C8 | How many public companies does the chairman of audit committee serve as a director or manager? | 1 if c8<=3 | ;0 otherwise | 1.00 | |
| C9 | Does the firm clearly distinguish the role and responsibilities of the board and management? | 1/3 if c9=1 | ;0 otherwise | 0.33 | |
| C10 | Does the firm disclose that directors evaluation system exists? | 1/3 if c10=1 | ;0 otherwise | 0.33 | |
| C11 | Does the firm have an option scheme which incentivizes management? | 1/3 if c11=1 | ;0 otherwise | 0.33 | |
| C12 | Has there been any legal dispute where the firm was claimed to be a fault during the past year? | 1 if c12=0 | ;0 otherwise | 1.00 | |
| C13 | Has there been any sanction to the board, management, or other insider for violations of Securities and/or Corporations laws in the last two years? | 3*(1-c13) | ;0 otherwise | 3.00 | |
| **D. Shareholder Rights** | | | | **7.00** | **10%** |
| D1 | Does the firm hold an annual general shareholder meeting? | 1 if d1=1 | ;0 otherwise | | |
| D2 | Does the firm employ one-share-one-vote rule? | 1 if d2=1 | ;0 otherwise | | |
| D3 | Is cumulative voting allowed in electing directors? | 1 if d3=1 | ;0 otherwise | | |
| Code | Questions | Scoring Rule | | Max. Score | Weight |
| **D. Shareholder Rights** | | | | **7.00** | **10%** |
| D4 | Is voting by mail allow? | 1 if d4=1 | ;0 otherwise | | |
| D5 | How many days in advance does the company send out a notice of general meetings to shareholders? | d5/14 | ;0 otherwise | | |

| | | | | | |
|---|---|---|---|---|---|
| D6 | Is proxy voting allowed? | 1 if d6=1 | ;0 otherwise | | |
| D7 | Does the firm disclosure a dividend policy? | 1/3 if d7=1 | ;0 otherwise | | |
| D8 | What is the minimum dividend (as a percentage of net profit) according to the dividend policy? | 1/3*d8/100 | ;0 otherwise | | |
| D9 | Does the firm provide an explanation/rationale for setting dividend at the specified level? | 1/3 if d9=1 | ;0 otherwise | | |
| **E. Disclosure and Transparency** | | | | **13.00** | **25%** |
| | Does the firm disclose the following information in the disclosure report? | | | | |
| E1 | - Board meeting attendance of individual directors | 1 if e1=1 | ;0 otherwise | 1.00 | |
| E2 | - Board compensation and/or benefits of individual directors | 1 if e2=1 | ;0 otherwise | 1.00 | |
| E3 | - Directors shareholding | 1 if e3=1 | ;0 otherwise | 1.00 | |
| E4 | - Management shareholding | 1 if e4=1 | ;0 otherwise | 1.00 | |
| E5 | - Related party transaction in detail | 1 if e5=1 | ;0 otherwise | 1.00 | |
| E6 | - Corporate group structure | 1 if e6=1 | ;0 otherwise | 1.00 | |
| E7 | - Grouping of major shareholding who belong to the same family/economics unit | 1 if e7=1 | ;0 otherwise | 1.00 | |
| E8 | Does investor relation unit exist? | 1 if e8=1 | ;0 otherwise | 1.00 | |
| E9 | Does the firm mention its investor relations activity carried out during the past year? | 1 if e9=1 | ;0 otherwise | 1.00 | |
| E10 | Does the firm's Annual Report include a section devoted to corporate governance principles and implementations? | 1 if e10=1 | ;0 otherwise | 1.00 | |
| E11 | How many times in the last two years has the firm been charged for failures to publish company reports within the specified periods? | 3-e23 | ;0 otherwise | 3.00 | |

# BIOGRAPHY

Mr. Chaiamorn Trakarnkoolapun was born on 12 April 1985, in Bangkok. At the secondary school, he graduated from Assumption School. After that, at the undergraduate level, he graduated from the Faculty of Engineering, Chulalongkorn University in January 2008 with a Bachelor of Civil Engineering degree. He joined the Master of Science in Finance program, Chulalongkorn University in June 2008.