จุฬาลงกรณ์มหาวิทยาลัย

ทุนวิจัย

กองทุนรัชดาภิเษกสมโภช

รายงานวิจัย

การซื้อขายบุคคลวงในของตลาดทุนไทยมีสารสนเทศหรือไม่?

(Does Insider Trading Provide Information in Thai Market?)

โดย

สันติ ถิรพัฒน์

สิงหาคม 2556

Acknowledgement

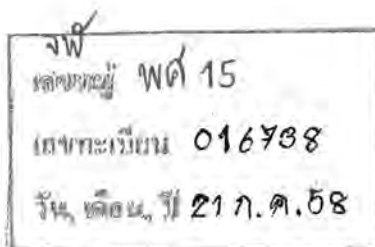**ชื่อโครงการวิจัย**: การซื้อขายบุคคลวงในของตลาดทุนไทยมีสารสนเทศหรือไม่?

ชื่อผู้วิจัย: รองศาตราจารย์ ดร.สันติ ถิรพัฒน์

เดือนและปีที่ทำวิจัยเสร็จ: สิงหาคม พ.ศ. 2556

บทคัดย่อ

เป็นที่ถกเถียงกันมากว่าการซื้อขายโดยบุคคลภายในที่เกี่ยวข้องกับบริษัทนั้นมาจาก เป็นการได้
ประโยชน์จากการรับรู้ข้อมูล หรือเป็นเพียงการซื้อขายเพื่อปรับสภาพคล่องของคนเหล่านั้น
งานวิจัยนี้ เป็นการศึกษาเบื้องต้นเกี่ยวกับข้อมูลข่าวสารที่เกิดขึ้นจากบุคคลภายใน โดยใช้ตัววัดที่
เรียกว่า PIN (Probability of Information-board Trading) โดยปรับเพิ่มตัววัดนี้ให้สะท้อนถึงระดับ
ความไม่เท่าเทียมของข่าวสารของนักลงทุนประเภทต่างๆ (นักลงทุนรายย่อย นักลงทุนสถาบัน และนัก
ลงทุนต่างประเทศ) จากข้อมูลการซื้อขายของบุคคลภายในแบบ 59-2 ของสำนักงานคณะกรรมการ
กำกับหลักทรัพย์และตลาดหลักทรัพย์ (กลต.) ระหว่างปี ค.ศ. 2002 ถึง ค.ศ. 2008 การวิเคราะห์
เบื้องต้นพบว่าค่า PIN ก่อนปรับของ Easley และคณะ (1996) ไม่มีการเปลี่ยนแปลงมากนักก่อนและ
หลังการซื้อขายของบุคคลภายใจ อย่างไรก็ตาม เมื่อใช้ PIN ที่ปรับให้สะท้อนประเภทของนักลงทุน
พบว่า PIN สำหรับนักลงทุนต่างชาติเพิ่ม (ลดลง) หลังจากการซื้อ (ขาย)ของบุคคลวงใน ซึ่ง
หมายความว่านักลงทุนต่างชาติมีข้อมูลข่าวสารเพิ่มขึ้น นอกจากนั้น การศึกษายังพบว่าการซื้อของนัก
ลงทุนภายในของกลุ่มหลักทรัพย์ที่มี PIN ต่ำมีผลการดำเนินการดีกว่าหุ้นที่มี PIN สูง ในอีก 6 เดือน
ข้างหน้า ซึ่งหลักฐานนี้ไม่สอดคล้องกับแนวคิดที่ว่าบุคคลภายใช้ประโยชน์จากการรู้ข้อมูลของบริษัทใน
การซื้อขาย เนื่องจากหุ้นที่มี PIN ต่ำเป็นหุ้นที่มีความไม่เท่าเทียมกันของข้อมูลข่าวสาร (Asymmetric
Information) ต่ำและเป็นหุ้นของบริษัทที่มีธรรมาภิบาลดี โดยการศึกษาของ Chung และคณะ
(2010)

ชื่อโครงการวิจัย: การซื้อขายบุคคลวงในของตลาดทุนไทยมีสารสนเทศหรือไม่?
ชื่อผู้วิจัย: รองศาตราจารย์ ดร.สันติ ถิรพัฒน์
เดือนและปีที่ทำวิจัยเสร็จ: สิงหาคม พ.ศ. 2556

บทคัดย่อ

เป็นที่ถกถียงกันมากว่าการซื้อขายโดยบุคคลภายในที่เกี่ยวข้องกับบริษัทนั้นมาจาก เป็นการได้ประโยชน์จากการรับรู้ข้อมูล หรือเป็นเพียงการซื้อขายเพื่อปรับสภาพคล่องของคนเหล่านั้น งานวิจัยนี้ เป็นการศึกษาเบื้องต้นเกี่ยวกับข้อมูลข่าวสารที่เกิดขึ้นจากบุคคลภายใน โดยใช้ตัววัดที่เรียกว่า PIN (Probability of Information-board Trading) โดยปรับเพิ่มตัววัดนี้ให้สะท้อนถึงระดับความไม่เท่าเทียมของข่าวสารของนักลงทุนประเภทต่างๆ (นักลงทุนรายย่อย นักลงทุนสถาบัน และนักลงทุนต่างประเทศ) จากข้อมูลการซื้อขายของบุคคลภายในแบบ 59-2 ของสำนักงานคณะกรรมการกำกับหลักทรัพย์และตลาดหลักทรัพย์ (กลต.) ระหว่างปี ค.ศ. 2002 ถึง ค.ศ. 2008 การวิเคราะห์เบื้องต้นพบว่าค่า PIN ก่อนปรับของ Easley และคณะ (1996) ไม่มีการเปลี่ยนแปลงมากนักก่อนและหลังการซื้อขายของบุคคลภายใจ อย่างไรก็ตาม เมื่อใช้ PIN ที่ปรับให้สะท้อนประเภทของนักลงทุนพบว่า PIN สำหรับนักลงทุนต่างชาติเพิ่ม (ลดลง) หลังจากการซื้อ (ขาย)ของบุคคลวงใน ซึ่งหมายความว่านักลงทุนต่างชาติมีข้อมูลข่าวสารเพิ่มขึ้น นอกจากนั้น การศึกษายังพบว่าการซื้อของนักลงทุนภายในของกลุ่มหลักทรัพย์ที่มี PIN ต่ำมีผลการดำเนินการดีกว่าหุ้นที่มี PIN สูง ในอีก 6 เดือนข้างหน้า ซึ่งหลักฐานนี้ไม่สอดคล้องกับแนวคิดที่ว่าบุคคลภายใช้ประโยชน์จากการรู้ข้อมูลของบริษัทในการซื้อขาย เนื่องจากหุ้นที่มี PIN ต่ำเป็นหุ้นที่มีความไม่เท่าเทียมกันของข้อมูลข่าวสาร (Asymmetric Information) ต่ำและเป็นหุ้นของบริษัทที่มีธรรมาภิบาลดี โดยการศึกษาของ Chung และคณะ (2010)

Project Title: Does Insider Trading Provide Information in Thai Market?

Name of the Investigators: Associate Professor Sunti Tirapat, Ph.D.

Year: August 2013

Abstract

There is much debate in the literatures whether insider trading is driven by opportunistic or liquidity trading. The study preliminary examines the information provided by insider trading in Thai capital market using the probability of information-based trading (PIN). It focuses on extending the traditional PIN model to examine the level of information asymmetry by various types of investors in the market (local retail, local institution, foreign, and broker investors). Using the data of insider trading from the 59-2 form provided by the Thai SEC during 2002 to 2008, the preliminary analysis finds that in general there is not much change in average PINs using Easley et al. (1996) estimation before and after insider trading, both for buy and sell transactions. However, using the extended PINs it is found that for the foreign investors PINs seem to increase (decrease) after buy (sell) transactions. This suggests that they are more informed after the insider buy transaction but become less informed after the sell transactions. In addition, it is documented that the portfolio of low PIN stocks that the insider buys outperform others over the next six months. This evidence is not consistent with the opportunistic insider trading since the low PIN firms are firms with less private information and as suggested by Chung et al. (2010) that these firms are firms with better governance structure.

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1. Introduction

Early evidence in the US market shows insider trading is informative because outsiders could achieve abnormal profit from observing insider trade information (see for example; Lorie and Niederhoffer, 1968; Jaffe, 1974; Seyhun, 1986, 1998; Rozeff and Zaman, 1988; Lin and Howe, 1990). In contrast, recent evidence is inconsistent with that of prior research. Lakonishok and Lee (2001) show limited market movement when insiders trade or report their trade to SEC. Jeng, Metrick and Zeckhauser (2003) also find insiders sales do not significant earn abnormal returns. Eckbo and Smith (1998) show evidence that abnormal insider returns are zero or negative in the Oslo Stock Exchange (OSE). Although the academic evidence of opportunistic trade is far from conclusive, prohibiting insider trading is a common practice in almost all stock exchanges around the world. Bhattacharya and Daouk (2002) document that at least all of the 22 developed countries and 80 percent of the 81 emerging markets have insider trading laws at the end of 1998. The existence of insider trading regulations around the world reflects unanimous view of regulators that insider trading should be restricted to protect outsiders and assure the level playing field.

As pointed out by Hu and Noe (1997), however, the regulation of insider trading remains one of the most controversial debates among economists and legal scholars. Proponents of insider trading such as Manne (1966), Carlton and Fischel (1983), and Leland (1992) basically argue that trading by insiders allows information to be rapidly incorporated in the prices of securities. As a result, by allowing insider trading can increase market efficiency. Although this is a sound argument, as to my knowledge, there is no study that directly investigate the degree of information that insider disseminate to the market especially in the emerging capital market where the investor protection is low such as Thailand. Although several recent studies such as Aboody et al., (2005) and Huddart and Ke (2007) examine the relation between information asymmetry and insider trading, their focuses are on the insider trading profits not the information provided by insider trading. This study adds a contribution to the insider trading debate by directly investigating the information disseminated by insider trading transactions. The Stock Exchange of Thailand (SET) provides us with an

interesting setting to investigate the insider trading. Thai authorities established insider trading law in 1984 and enforced it in 1993 (Bhattacharya and Daouk, 2002). The distinct features of Thai capital are: 1) family-control is a dominant ownership structure, and 2) corporate governance mechanism is relatively weak. This environment may prone to opportunistic using and trading based on private information. Hence, whether there is a benefit of insider trading is more interesting than that of in the developed capital markets.

The objective of this paper is to examine whether insider trading provide information to the Thai capital market. In particular I investigate the information asymmetry around the transactions using the traditional probability of information-based trading (PIN). Moreover, since there are three main types of investors in Thai market (local retail, local institution, and foreign investors), the information asymmetry by types of investors are also examined by extending the original PIN model. This allows us to further understand the impact of insider trades on these investors.

In this study, using the data of insider trading from the 59-2 form provided by the Thai SEC during 2002 to 2008, it documents that there is strikingly price run-up for twenty days before insider sell transaction dates while there is no such noticeable pattern for the insider buy transactions. The preliminary analysis finds that in general there is not much change in average PINs using Easley et al. (1996) estimation before and after insider trading, both for buy and sell transactions. However, using the extended PINs it is found that for the foreign investors PINs seem to increase (decrease) after buy (sell) transactions. This suggests that they are more informed after the insider buy transaction but become less informed after the sell transactions. It is also found that for the low PIN stocks, the price run-up is much higher than that of the high PIN stocks. The evidence seems to be inconsistent with the opportunistic insider trading argument. To support this argument, it should be documented that stocks with high level of information asymmetry increase due to inside information and insiders take advantage of the information by opportunistically selling at the peak. In addition, it is documented that the portfolio of low PIN stocks that the insider buys outperform others over the next six months. This evidence also is not consistent with the

opportunistic insider trading since the low PIN firms are firms with less private information and as suggested by Chung et al. (2010) that these firms are firms with better governance structure.

The remainders of the study are organized as follows. Section 2 briefly reviews the related studies. Section 3 discusses sample and data. It also provides descriptive statistics of insider trading data in Thailand. Section 4 examines market reactions and informativeness of insider trading. Section 5 examines insider trading and information asymmetry based on PINs and extended PINs. Section 6 concludes the main findings of the study.

2. A Brief Review of Related Studies

Most prior research in this area focuses on the association between insider trading and subsequent stock returns. For example, Lorie and Niederhoffer (1968), Jaffe (1974), Seyhun (1986), Rozeff and Zaman (1988), Noe (1999), and Jeng, Metrick, and Zeckhauser (2003) find that insiders earn abnormal returns. In addition, Meulbroek (1992) and Lakonishok and Lee (2001) find that the insiders' trades have significant predictive power with respect to future stock returns. Summers and Sweeney (1998) document that insider selling is a predictor of accounting fraud, which adversely affects stock returns. Cheng, Nagar, and Rajan (2007) also find that insider sales in a delayed disclosure such as private transactions between executives and firms are predictive of negative future returns as well as lower future earnings relative to analyst forecasts. These findings seem to suggest that insiders exploit a non-public informational advantage when trading their corporate stocks. To prevent these self dealing transactions many countries including Thailand have adopted insider trading laws. Bhatacharya and Daouk (2002) points out from their survey that 87 out of 103 countries have introduced insider trading rules of some form.

However, the need for insider trading regulation has been a standing debate among academicians in finance, economics and laws. The proponent of insider trading argue that the trades may allow private information to be quickly impounded into stock

prices, thereby leading to more informational efficient capital markets. Carlton and Fischel (1983) point out that increased price efficiency can benefit firms by reducing investor uncertainty. They also argue that price efficiency established by insider trading, as opposed to direct disclosure, may better protect confidential corporate information. Other benefit of insider trading as argued by Easterbrook (1985) is that insider trading can increase the managers' willingness to take on risk. This may be beneficial since firm-specific human capital bias managers to take less risk than it would be optimal for investors.

Using illegal informed trading, Meulbroek (1992), Cornell and Siri (1992) and Chakravarty and McConnell (1997) provide empirical evidence that insider trading leads to more rapid price discovery. These papers show that insider trading corrects prices significantly and in the right direction[1]. All the authors conclude that insider trading is significantly correlated with stock price run-ups implying that insider trades affect price discovery differently than non-insider (uninformed) trades[2].

More recent studies have examined the relation between information asymmetry and insider trading. These studies in general find a positive relation between insider-trading profits and information asymmetry. However, the results are somewhat mixed. Specifically, Frankel and Li (2004) find that increased financial statement informativeness and greater analyst following reduce the association between insider trades and subsequent stock returns. Aboody et al., (2005) investigate whether insiders earn greater profits when trading stocks with higher exposure to an asymmetric information risk factor. They use earnings quality, measured as the unsigned abnormal accruals, as a proxy for information asymmetry. In general they find evidence that insiders trading more profitably in firms with higher exposure to information asymmetry. Huddart and Ke (2007) use six measures of information asymmetry and

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[1] In particular, Meulbroek (1992) uses an indicator variable to identify the days in which insider trading occurred while Cornell and Siri (1992) compute the fraction of total daily volume attributable to insiders; and Chakravarty and McConnell (1997) use daily and hourly insider trading volume.

[2] In a related paper by Chakravarty and McConnell (1999), using the case study of Boesky's purchase of Carnation's stock, they show that the effects of insider trading and non-insider trading (in the same direction) are statistically indistinguishable.

investigate how they explain cross-sectional variation in insiders' trades[3]. They document that the relationship between abnormal returns and the six proxies for information asymmetry are statistically significant in most cases. However, the sign of proxies are quite mixed; for three out of six proxies the predicted sign of the association for purchases is inconsistent with the predicted association for sales transactions.

In a related issue, some studies investigate the impact of litigation risk on insider-trading behavior. For example, Beneish et al. (2005) find that insiders of firms with deteriorating performance use accruals to inflate earnings so as to push defaults to future periods when selling corporate stock but refrain from doing so when they trade closer to the event of the default. This suggests that insider alter trading behavior when litigation risk is high. The finding is consistent with that of Huddart and Ke (2007) who find that that insiders tend to trade on information in subsequent 10K and 10Q filings only during low litigation periods. In addition, Piotroski and Roulstone (2008) document that insider trading varies with both the magnitude and the direction of future earnings surprises. They argue that the evidence suggests that insiders consider litigation risk to be higher in the presence of material non-public information.

Overall these studies document the positive association between insider-trading profits and information asymmetry. However, to my knowledge there is no study that directly investigates whether insider trades provide information to the market and which types of investor become more informed after such trades.

3. Sample and Data

Under the Securities and Exchange Act of B.E. 2535 Section 59, managers must report their trading in securities of their own firm within 3 days after the transaction date. The insider trading information is collected from the 59-2 form provided by the Thai

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[3] These proxies include (1) institutional ownership, (2) analyst following, (3) book-to-market ratio, (4) the frequency with which the firm reports losses, (5) whether the firm reports research and development (R&D) expenditures, and (6) the median absolute abnormal return over past earnings announcements.

SEC. Form 59-2 reports all of each manager transactions in the past until the current year. The data contains position, report date which is a date insiders submit the form to SEC, filing date which is a date SEC receives the form (usually the same as report date), transaction date, security type, number of shares traded, average security price and method of acquisition and disposition. The identity of insider can be classified into officers, directors, chief officers, chief directors, CEOs and presidents, chairman of the board of directors, or large shareholders. The information of large shareholders trading can be obtained from the Form 246-1. The insider-trading activity is announced by the SEC one day after receiving the form. The buy and sell transactions of each type of investors (local retail, local institutions, foreign, and brokerage) used to estimate the PIN are extracted from the intraday database provided by the SET. All other firms' characteristic variables are from Datastream.

Although the insider trading law was implemented in 1993, the quality of the data in earlier years was poor and incomplete. For example, important information such as the insider transaction prices were missing, the transaction date and filing date are inconsistent. Although the study propose to use data during 2000 to 2008, after investigating the raw data to ensure a high quality and complete data, the sample finally used in this study covers the insider transactions during the period from January 2002 to December 2008. The study excludes records with less than 100 shares trade. Finally, only individual trades in common stocks are included in the sample. We exclude rights transfer and executive stock option exercise records from our analysis since these transactions may due to other strategic reasons than the information.

Table 1 reports the insider trading activities in terms of the number of trades, trading value and trade sizes of insider purchases and sales for each year from 2002 to 2008. As stated in Tirapat and Visaltanachoti (2012), the number and trade values of insider sells are generally higher than the number of insider buys. Also trade sizes are larger when insiders sell than when they purchase. From the table, there is no clear relation between stock market performance and insider trading. However, it seems that insider tend to sell when market rose and buy when market was down. For instance, when stock market rose 81% in 2003 there were 2,236 sell transactions (12.74 billion baht

worth of shares being sold) and only 1,211 buy transactions (5.19 billion baht worth of shares being bought). In contrast, when the market was down by 63% in 2008 there were only 864 sell transactions (2.74 billion baht worth of shares being sold) and 2,355 buy transactions (3.54 billion baht worth of shares being bought).

4. Insider trading in Thai market

Market reactions and informativeness of insider trading

As a background for further study I first document the stylized facts of insider trading in Thailand and investigate the profitability and the information of insider trading based on the standard procedure in insider trading literature such as Lakonishok and Lee (2001) and Jeng, Metrick, and Zeckhauser (2003). Specifically, a standard event study analysis surrounding periods of insider trading is shown in **Table 2.** The table shows average daily abnormal returns for − 20 and + 20 days around the insider transaction dates during the sample period for buy, sell, and overall transactions. The reported abnormal returns are adjusted by the market returns (SET index returns). It can be observed that in general the average returns of stocks before insider sell are positive and statistically significant while those of insider buy are not. Moreover, for the very short period before the insider transaction dates, the average returns of stocks that insiders bought are negative and positive. In particular, the t-1 returns are -0.11% and statistically significant while the t+1 returns are 0.073% and statistically significant. For the insider sell transactions, the abnormal returns are positive and statistically significant but after the sell transactions they are not statistically significant. **Figure 1** shows cumulative average abnormal returns during -20 and +20 days around insider transaction dates. It can be observed that the cumulative return patterns are strikingly different between insider buy and sell transactions. The insiders sold stocks that run up around 20 days before the transaction dates. After the insider transactions, the price of those stocks seemed to level off or increase marginally for both buy and sell transactions. The evidence overall seems to be consistent with the idea that insiders trade for liquidity.

Then I investigate whether insider trading is informative. This issue is examined by analyzing the performance of portfolio based on the net purchase ratio (NPR) as suggested by Lakonishok and Lee (2001). The ratio is calculated as the number of purchases minus the number of sales by the total number of insiders' transactions. If insider trading is informative, the returns of stocks after trading should be positively associated with the NPR.

Table 3 reports weekly abnormal returns adjusted by market returns of equally weighted portfolio of stocks traded by insiders. The high portfolio consists of top one-third NPR stocks while the low portfolio is the bottom one-third NPR stocks. The table does not provide us the clear pattern whether insider trading is informative. **Figure 2** shows cumulative weekly abnormal returns of these portfolios over the next six months (24 weeks). The low NPR portfolio seems to underperform the medium and the high NPR around 2 percents over six month period.

Insiders' opportunistic trades

To gain further understanding of insider trading in Thailand, I examine the performance of portfolio formed by opportunistic trading using the 'PricePattern' by Rozanov (2008). The study suggests that insider transactions that are likely to extract the benefits from non-public information can be identified by the so called PricePattern as follows:

$$
Pr icePattern_i = \ln \left(\frac{\prod_{t=0}^{K} (1 + AR_{it})}{\prod_{t=-J}^{-1} (1 + AR_{it})} \right) \tag{1}
$$

where AR_{it} is the market adjusted return on day t for firm i ($R_{it} - RMt$). The denominator is the market-adjusted gross return over J trading days preceding the insider trading transaction while the numerator is the market-adjusted gross return over K trading days following the transaction date. The higher the PricePattern value the more likely the transaction to be opportunistic trade for the purchase transactions,

and vice versa for the sell transactions[4]. Hence, if insider trading is opportunistic, it is expected that the

The portfolio performance formed by PricePattern (J=20, K=20) is presented in **Table 4**. The table reports weekly average abnormal returns adjusted by market returns of equally weighted portfolio of stocks traded by insiders. The high portfolio consists of top one-third PricePattern stocks while the low portfolio is the bottom one-third PricePattern stocks. Panel A of this table reports average abnormal returns for insider buy transactions while Panel B reports those of sell transactions. **Figure 3** shows cumulative weekly abnormal returns of these portfolios over the next six months (24 weeks). The results suggest that the portfolio of the most opportunistic buy does not seem to gain subsequently after the measurement (PricePattern) is formed. However the most opportunistic sell portfolio does losses around 5 percent after the measurement period.

5. Insider trading and information asymmetry

The focus of this study is to investigate the role of insider trading in disseminating information to the market. As suggested by Manne (1966) Carlton and Fischel (1983) and Harris (2003) insider trading can also contribute to the efficient pricing of securities by conveying private information to the markets. To investigate whether information-based insider trading benefits the market by conveying non-public information to the capital markets, we base our analysis on the probability of information-based trading (PIN), the methodology suggested by Easley, Kiefer, O'Hara and Paperman (1996).

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[4] Alternatively, insiders' opportunistic trades can be examined using Gunny et al. (2008)'s proxy for the degree of insider opportunism which they refer to as OIT (opportunistic insider trade). The idea is that if the trade is opportunistic trade, the market adjusted return should have the pattern of V shape for the purchase and the inverted V for the sell around the transaction date. They use the degree of the V and inverted V shape to reflect the degree of insider opportunism.

The PIN model

Easley et al. (1996)'s model is the sequential trade model where uninformed liquidity providers set the bid and ask quotes by observing the buy and sell order flows to compensate themselves for the possibility of trading against informed traders. The PIN can be estimated as:

$$PIN = \frac{\alpha\mu}{\alpha\mu + \varepsilon} \tag{2}$$

where are α is the probability that a private information event will occur on a given day; μ is the arrival rate of informed traders; ε is the arrival rate of uninformed traders.

These parameters can be estimated by applying the maximum likelihood technique on the following function:

$$
\begin{aligned}
L(\alpha,\mu,\varepsilon,\delta \mid B,S) = & (1-\alpha)e^{-\varepsilon}\frac{\varepsilon^B}{B!}e^{-\varepsilon}\frac{\varepsilon^S}{S!} \\
& + \alpha\delta e^{-(\mu+\varepsilon)}\frac{(\mu+\varepsilon)^B}{B!}e^{-\varepsilon}\frac{\varepsilon^S}{S!} \\
& + \alpha(1-\delta)e^{-\varepsilon}\frac{\varepsilon^B}{B!}e^{-(\mu+\varepsilon)}\frac{(\mu+\varepsilon)^S}{S!}
\end{aligned}
\tag{3}
$$

where B and S are the number of buys and sells for a given day and δ is the probability of positive private signal if a private information event occurs on a particular day.

To determine whether the insider trading provide information to the markets, I compare the PIN 90 days preceding and 90 days post the insider transactions dates. If the insider trades provide information to the market, it should be expected that the PIN should decrease (lower information asymmetry) after the insider trades.

Information asymmetry by investor types

There are number of studies document that different types of market participants are not equally accessible to the information, especially for local and foreign participants. For example, Choe, Kho and Stulz (2005) show that foreign money managers pay more than domestic ones when they buy and receive less when they sell for medium and large trades. There is also some evidence that domestic individual investors have an edge over foreign investors. Thurlin (2009) also presents the evidence that domestic investors dominate the price discovery process. Bae, Stulz, and Tan (2007) find that local analysts make more precise earnings forecast than foreign analysts. In addition, the local advantage is high in countries where earnings are smoothed more, less information is disclosed by firms, and firm idiosyncratic information explains a smaller fraction of stock returns. More importantly it is positively related to holdings by insiders.

Hence, it is interesting to examine the impact of insider trades on the level of information asymmetry by types of investors (local retails, local institutions, and foreigners). And this can be carried out due to the availability of intraday data provided by SET which recorded the buy and sell transactions by type of investors.

By extending the original PIN model to incorporate types of investor, I can investigate this issue. There are six types of investors (three types and each type is either an informed or uninformed investor) in the extended model. The likelihood function for firm i over trading day j of investor type k can be written as follows:

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

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

$$(1-\delta_i) \prod_{k=1}^3 \left(e^{-\varepsilon_{i,k}} \frac{(\varepsilon_{i,k})^{B_{i,j,k}}}{B_{i,j,k}!} e^{-\varepsilon_{i,k}} \frac{(\varepsilon_{i,k})^{S_{i,j,k}}}{S_{i,j,k}!}\right) \tag{4}$$

where $\varepsilon_{i,k}$ 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

         δ_i is a probability of information event is occur

         α_i is a probability of occurring event is good news

         θ_i is the vector of parameters to be estimated. (α_i, δ_i, $\varepsilon_{i,k}$, $\mu_{i,k}$)

The joint likelihood over the j trading days in a calendar year can be written as:

$$L_i(M_i/\theta_i) = \prod_{j=1}^{J} L_i\big(B_{i,j,k}, S_{i,j,k}/\theta_i\big) \tag{5}$$

The adjusted model allows us to compare the information asymmetry preceding and post the insider transactions for each type of investors.

Table 5 reports estimates of Probability of Inform-based Trading (PIN) before and after insider transaction dates based on Easley et al. (1996) as well as those that extended for types of investors. Panel A reports PINs for all investor types by buy, sell and overall insider transactions for 2002 to 2008. Panel B through D report the corresponding PINs for retail, intuitional, and foreign investors, respectively. **Figure 4** show the average PINs before and after insider trading. In general it can be seen that foreign investors are less informed than other type of local investors. The results show that for all investors types there is not much change in PINs before and after insider trading, both for buy and sell transactions. However, for the foreign investors PINs, it documents that they are more informed after the insider buy transaction but become less informed after the sell transactions

In general PIN reflects the level of information asymmetry of stocks traded in the market. Chung et al. (2010) show that stocks of firms with better governance structure exhibit narrower quoted and effective spreads, higher market quality index, smaller price impact of trades, and lower PIN. It is interesting to investigate stock price reactions of insider traded stocks for different degree of information asymmetry.

Table 6 presents average daily abnormal returns -20 and +20 days around the insider transaction dates of portfolios formed by PIN. Equally weighted portfolios are formed by high PIN (above median) and low PIN (below the median). **Figure 5** shows the corresponding cumulative abnormal returns adjusted by market returns during -20 and +20 days of insider buy and sell transaction dates. Consistent with results in **Figure 1**, the cumulative return patterns are strikingly different between insider buy and sell transactions. The insiders sold stocks that run up around 20 days before the transaction dates. After the insider transactions, the price of those stocks seemed to level off or increase marginally for both buy and sell transactions. However, the figure shows that for the low PIN stocks, the price run up is much higher than that of the high PIN stocks. The evidence seems to be in contrast with the opportunistic insider trading argument. To support this argument, it should be documented that stocks with high level of information asymmetry increase due to inside information and insiders take advantage of the information by opportunistically selling at the peak.

To further investigate this issue for longer horizon, I investigate the performance of equally weighted portfolio formed by high PIN (above median) and low PIN (below the median) for the next six months (24 weeks) in **Table 7**. The corresponding cumulative weekly abnormal returns adjusted by market returns of equally weighted portfolio are shown in **Figure 6**. It is found that the portfolio of low PIN stocks that the insider buy outperform others over the next six months. It suggests that insiders of firms with low information asymmetry (low PIN) have better returns in the future. This evidence also is not consistent with the opportunistic insider trading since the low PIN firms are firms with less private information and as suggested by Chung et al. (2010) that these firms are firms with better governance structure.

6. Conclusion

The study investigates the information provided by insider trading in Thai capital market using the probability of information-based trading (PIN). It focuses on extending the traditional PIN model to examine the level of information asymmetry by various types of investors in the market (local retail, local institution, foreign, and

broker investors). Using the data of insider trading from the 59-2 form provided by the Thai SEC during 2002 to 2008, it first document the stylized facts of insider trading in Thai market based on standard procedure in the literature such as Lakonishok and Lee (2001). It is documented that there is strikingly price run-up for twenty days before insider sell transaction dates while there is no such noticeable pattern for the insider buy transactions. Then the performance of portfolios formed using those suggested by previous studies such the net purchase ratio (NPR) and the price pattern (PricePattern) are investigated over the next six months. It documents that cumulative abnormal returns of a portfolio formed by low NPR seem to underperform others over this period. The evidence from a portfolio formed by using the PricePattern also find that for the opportunistic insider sell transactions (low PricePattern) underperforms others over the six month period.

To further investigate the information and insider trading, the study estimates PINs suggested by Easley et al. (1996) and extends it different types of investors (retail, institutional, and foreign investors). The preliminary analysis finds that in general there is not much change in average PINs using Easley et al. (1996) estimation before and after insider trading, both for buy and sell transactions. However, using the extended PINs it is found that for the foreign investors PINs seem to increase (decrease) after buy (sell) transactions. This suggests that they are more informed after the insider buy transaction but become less informed after the sell transactions. It is also found that for the low PIN stocks, the price run-up is much higher than that of the high PIN stocks. The evidence seems to be inconsistent with the opportunistic insider trading argument. To support this argument, it should be documented that stocks with high level of information asymmetry increase due to inside information and insiders take advantage of the information by opportunistically selling at the peak. In addition, it is documented that the portfolio of low PIN stocks that the insider buys outperform others over the next six months. This evidence also is not consistent with the opportunistic insider trading since the low PIN firms are firms with less private information and as suggested by Chung et al. (2010) that these firms are firms with better governance structure.

In conclusion, the findings of this study provide some insights to the controversial insider trading debate whether the trading is opportunistic or liquidity driven. It should be noted that his study is exploratory in nature. It aims to provide a basis (i.e. estimations of extended PINs for various types of investors) for further investigation of the insider trading in Thailand. The more robust analysis of information asymmetry and opportunistic insider trading should be left for future study.

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Table 1
Insider Trades in Thai Market during 2002 - 2008

Year	No. Of Insider Buys	No. Of Insider Sells	Insider Buy Values (Mil. THB)	Insider Sell Values (Mil. THB)	Market Return (SET Index)
2002	1,184	1,373	4,413	8,739	22%
2003	1,211	2,236	5,191	12,745	81%
2004	1,727	1,253	4,730	10,152	-3%
2005	1,912	1,746	4,785	17,086	14%
2006	430	869	522	6,329	-2%
2007	1,369	1,752	2,808	8,610	31%
2008	2,355	864	3,549	2,747	-63%
Total	10,188	10,093	25,998	66,408	

This Table shows insider trading activity on the Stock Exchange of Thailand from 2002 to 2008. The insider data is collected from the File 59-1 and 59-2 from the Securities and Exchange Commission. The table reports the number, trading values of insider purchases and sales on common stocks. The market return is the value weighed returns of stocks listed on the main board of the Stock Exchange of Thailand.

Table 2
Average Insider Buy and Sell Abnormal Returns

Day	Insider Buy		Insider Sell		Overall	
	Returns	t-statistics	Returns	t-statistics	Returns	t-statistics
t-20	0.090%	0.92	0.077%	2.68	0.084%	1.58
t-19	0.094%	0.74	0.076%	3.13	0.085%	1.27
t-18	-0.001%	-0.06	0.089%	3.69	0.041%	2.48
t-17	0.008%	0.33	0.085%	3.47	0.044%	2.63
t-16	0.127%	1.00	0.089%	3.55	0.109%	1.61
t-15	0.134%	1.00	0.145%	4.89	0.139%	1.94
t-14	0.016%	0.50	0.226%	6.72	0.115%	5.02
t-13	-0.040%	-1.52	0.143%	4.91	0.047%	2.40
t-12	-0.010%	-0.44	0.151%	5.96	0.067%	3.97
t-11	-0.042%	-1.92	0.156%	5.99	0.051%	3.02
t-10	0.015%	0.64	0.128%	4.99	0.069%	3.98
t-9	0.137%	1.09	0.157%	6.13	0.147%	2.17
t-8	0.115%	0.91	0.180%	5.97	0.146%	2.14
t-7	0.095%	0.74	0.279%	8.01	0.182%	2.63
t-6	0.001%	0.02	0.551%	3.04	0.261%	3.00
t-5	-0.011%	-0.45	0.347%	2.48	0.159%	2.35
t-4	-0.034%	-1.39	0.217%	8.20	0.085%	4.74
t-3	-0.106%	-4.24	0.346%	6.28	0.108%	3.69
t-2	0.142%	1.07	0.349%	10.51	0.240%	3.34
t-1	-0.111%	-2.09	0.730%	5.39	0.287%	4.10
t-0	-0.124%	-0.91	1.492%	5.71	0.641%	4.48
t+1	0.063%	2.14	0.146%	1.34	0.102%	1.90
t+2	0.073%	3.08	0.036%	1.30	0.056%	3.07
t+3	0.026%	1.11	-0.028%	-1.15	0.000%	0.01
t+4	0.031%	1.34	0.093%	0.87	0.060%	1.16
t+5	0.072%	2.97	0.049%	1.83	0.061%	3.40
t+6	0.178%	1.83	-0.025%	-0.82	0.082%	1.54
t+7	0.065%	2.13	0.011%	0.30	0.039%	1.69
t+8	0.018%	0.71	0.007%	0.23	0.013%	0.66
t+9	0.019%	0.85	-0.021%	-0.83	0.000%	0.00
t+10	0.013%	0.60	-0.058%	-2.41	-0.020%	-1.24
t+11	-0.026%	-1.19	0.035%	1.41	0.003%	0.17
t+12	0.107%	1.11	-0.014%	-0.53	0.050%	0.95
t+13	0.003%	0.11	0.021%	0.68	0.011%	0.57
t+14	0.017%	0.58	0.010%	0.31	0.014%	0.64
t+15	0.072%	2.80	-0.002%	-0.07	0.037%	1.90
t+16	0.064%	2.83	-0.028%	-1.20	0.020%	1.24
t+17	-0.001%	-0.06	-0.017%	-0.73	-0.009%	-0.54
t+18	-0.002%	-0.09	-0.018%	-0.77	-0.009%	-0.58
t+19	0.046%	1.97	0.030%	1.17	0.039%	2.22
t+20	0.078%	2.78	0.031%	1.07	0.056%	2.77

This table presents average daily abnormal returns for − 20 and + 20 days around the insider transaction dates during 2002 - 2008. It reports the abnormal returns of buy, sell, and overall insider transactions as well as their t-statistics. The abnormal returns are adjusted for the market (SET index) returns.

Figure 1
**Cumulative Abnormal Returns around Insider Trading**
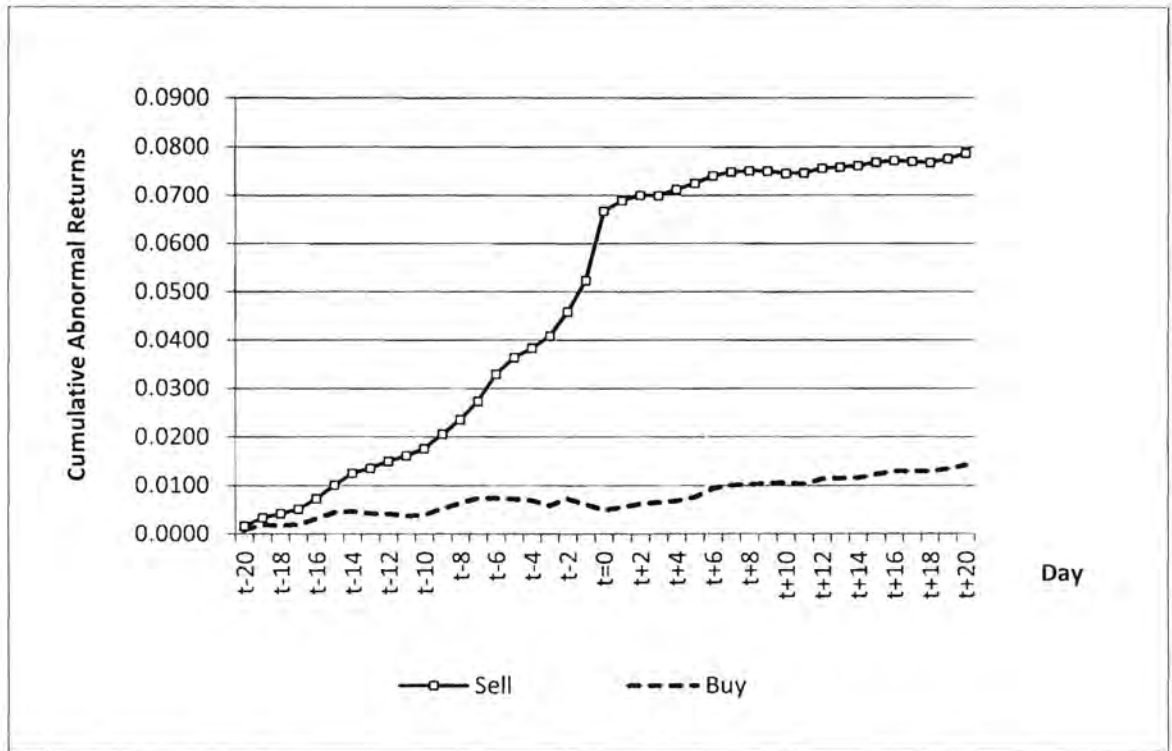
The figure illustrates cumulative abnormal returns adjusted by market returns during -20 and +20 days of insider transaction dates for sell, buy, and all insider transactions during 2002 – 2008.

Table 3
Portfolio Performance by Net Purchase Ratio

Weeks	High Net Purchase Ratio	Medium Net Purchase Ratio	Low Net Purchase Ratio
1	0.07%	0.22%	0.04%
2	0.88%	0.29%	0.19%
3	-0.03%	0.14%	0.01%
4	0.40%	0.35%	-0.01%
5	-1.17%	-0.09%	-0.91%
6	0.68%	0.65%	0.65%
7	0.96%	0.00%	0.32%
8	0.08%	-0.85%	-0.69%
9	-0.14%	-0.13%	-0.27%
10	-0.34%	1.40%	-0.20%
11	-0.24%	-0.43%	-0.47%
12	-0.21%	-0.26%	-0.35%
13	-0.50%	-0.65%	-0.71%
14	-1.02%	-0.19%	-0.22%
15	0.36%	0.24%	0.29%
16	0.64%	0.33%	0.26%
17	0.19%	-0.03%	0.00%
18	-0.18%	-0.22%	-0.11%
19	0.88%	0.32%	0.04%
20	-0.38%	-0.27%	-0.05%
21	-0.38%	-0.06%	-0.19%
22	-0.25%	-0.74%	-0.54%
23	0.93%	0.27%	0.53%
24	-0.07%	-0.23%	-0.33%

The table shows weekly abnormal returns adjusted by market returns of equally weighted portfolio formed by the Net Purchase Ratio (NPR) for the next six months (24 weeks). The NPR is the number of purchases minus the number of sales by the total number of insiders' transactions based on the prior six month transactions. The High NPR portfolio consists of the highest one third transactions by NPR while the Low NPR portfolio consists of the lowest one third of transactions.

Figure 2
Cumulative Abnormal Returns by NPR
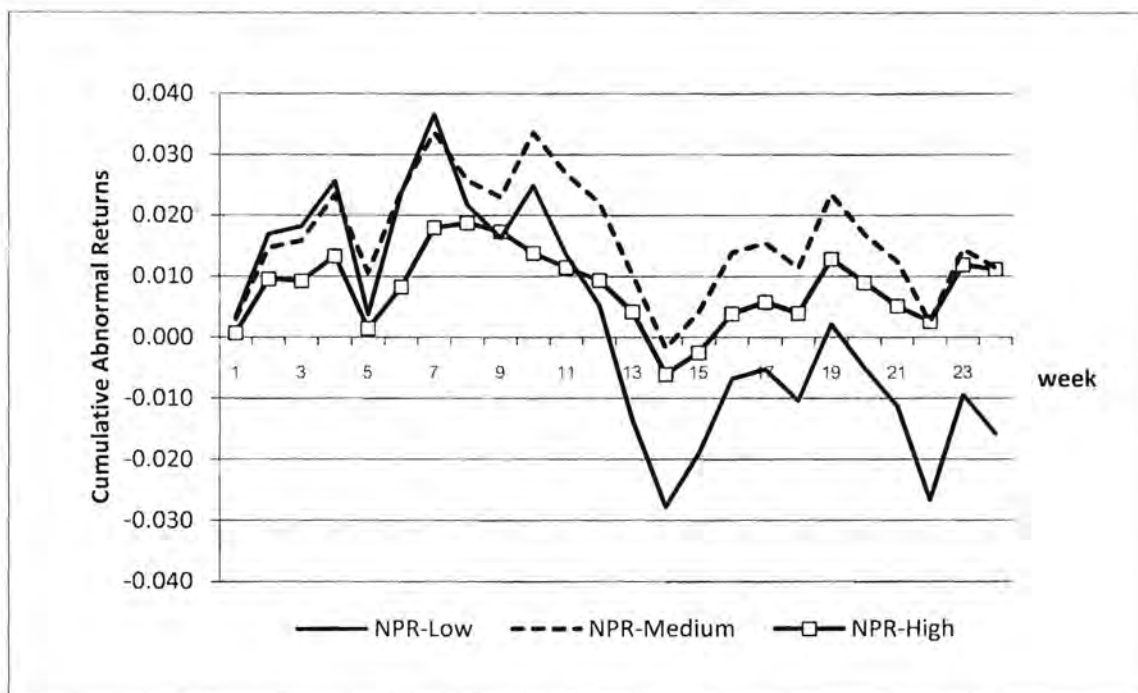
The figure illustrates cumulative weekly abnormal returns adjusted by market returns of equally weighted portfolio formed by the Net Purchase Ratio (NPR) for the next six months (24 weeks).

Table 4
Portfolio Performance by PricePattern

Panel A: Insider Buy Transactions

| Weeks	High PricePattern	Medium PricePattern	Low PricePattern
1	2.955%	0.253%	-1.751%
2	2.378%	-0.080%	-1.837%
3	2.191%	0.104%	-1.429%
4	0.475%	0.056%	0.047%
5	0.004%	0.114%	0.156%
6	0.009%	0.240%	0.224%
7	0.022%	0.117%	-0.030%
8	0.125%	0.103%	0.342%
9	0.093%	0.064%	0.090%
10	0.046%	-0.083%	-0.302%
11	0.323%	0.141%	0.078%
12	0.030%	-0.078%	0.215%
13	-0.078%	-0.033%	0.197%
14	-0.074%	0.250%	0.134%
15	0.347%	0.094%	1.222%
16	0.095%	0.120%	-0.079%
17	-0.259%	0.105%	0.167%
18	-0.037%	0.191%	0.123%
19	-0.028%	0.303%	0.068%
20	0.028%	-0.037%	0.010%
21	0.120%	0.010%	-0.134%
22	-0.017%	-0.215%	-0.220%
23	-0.018%	0.185%	0.132%
24	-0.115%	0.005%	-0.011%

Table 4 (continue)
Portfolio Performance by PricePattern
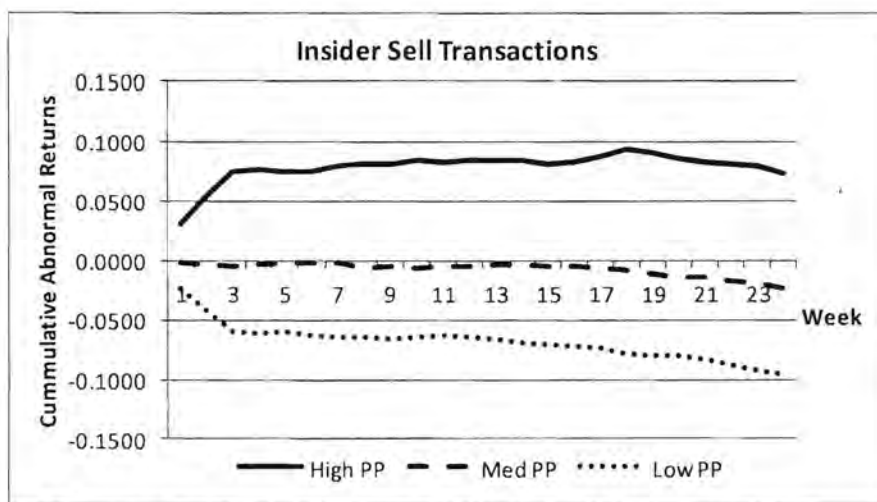
Panel B: Insider Sell Transactions

Weeks	High PricePattern	Medium PricePattern	Low PricePattern
1	3.078%	-0.107%	-2.439%
2	2.333%	-0.245%	-1.866%
3	1.858%	-0.120%	-1.855%
4	0.189%	0.083%	-0.036%
5	-0.067%	0.183%	0.009%
6	-0.083%	0.100%	-0.225%
7	0.440%	-0.136%	-0.157%
8	0.156%	-0.344%	-0.083%
9	-0.057%	0.016%	-0.131%
10	0.295%	-0.042%	0.092%
11	-0.060%	0.088%	0.271%
12	0.090%	0.097%	-0.128%
13	0.024%	0.121%	-0.236%
14	-0.043%	-0.073%	-0.362%
15	-0.180%	-0.127%	-0.148%
16	0.023%	0.071%	-0.237%
17	0.529%	-0.154%	-0.151%
18	0.480%	-0.198%	-0.440%
19	-0.287%	-0.298%	-0.126%
20	-0.371%	-0.328%	-0.112%
21	-0.293%	-0.100%	-0.359%
22	-0.074%	-0.189%	-0.472%
23	-0.264%	-0.250%	-0.499%
24	-0.478%	-0.486%	-0.310%

The table shows weekly abnormal returns adjusted by market returns of equally weighted portfolio formed by the PricePattern for the next six months (24 weeks). The price pattern is the log ratio of cumulative abnormal returns, where the denominator is the cumulative market-adjusted gross return over J trading days preceding the insider trading transaction while the numerator is the market-adjusted gross return over K trading days following the transaction date.

Figure 3
Cumulative Abnormal Returns by PricePattern
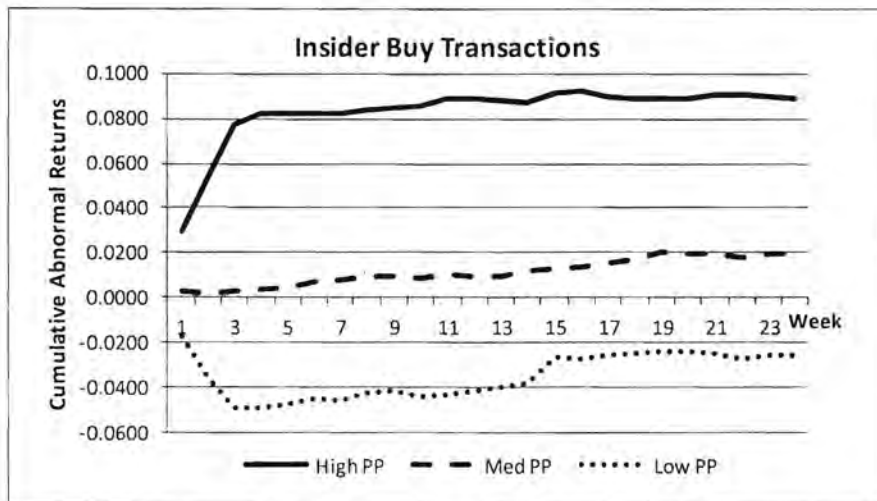
Figure 3a: Cumulative abnormal returns of insider buy transactions

Figure 3b: Cumulative abnormal returns of insider sell transactions

The figure shows cumulative weekly abnormal returns adjusted by market returns of equally weighted portfolio formed by the PricePattern for the next six months (24 weeks). Figure 3a and Figure 3b show cumulative weekly abnormal returns for buy and sell insider transactions, respectively.

Table 5
Probability of Inform-based Trading (PIN) before and after Insider Trading

Panel A: PIN of all investor types

Year	Purchase		Sell		Overall	
	Before	**After**	**Before**	**After**	**Before**	**After**
2002	0.3038	0.3033	0.3084	0.3053	0.3062	0.3044
2003	0.3247	0.3047	0.2759	0.2699	0.2935	0.2831
2004	0.3065	0.2923	0.3128	0.2904	0.3088	0.2916
2005	0.2649	0.2417	0.2844	0.2828	0.2738	0.2606
2006	0.2653	0.2705	0.2727	0.2767	0.2702	0.2747
2007	0.2416	0.2362	0.2644	0.2583	0.2538	0.2475
2008	0.2482	0.2827	0.2621	0.2451	0.2515	0.2739
Average	0.2793	0.2759	0.2830	0.2755	0.2797	0.2765

Panel B: PIN of retail investor trading transactions

Year	Purchase		Sell		Overall	
	Before	**After**	**Before**	**After**	**Before**	**After**
2002	0.5350	0.5354	0.2767	0.2770	0.3981	0.3972
2003	0.3902	0.3196	0.3338	0.3056	0.3547	0.3112
2004	-0.4914	-0.4456	0.4325	0.3231	-0.1454	-0.1630
2005	0.2962	0.2545	0.2751	0.2732	0.2864	0.2631
2006	0.2692	0.2801	0.2760	0.2755	0.2736	0.2771
2007	0.2596	0.2522	0.2721	0.2709	0.2657	0.2611
2008	0.2535	0.2866	0.2375	0.2375	0.2498	0.2759
Average	0.2160	0.2118	0.3005	0.2804	0.2404	0.2318

Panel C: PIN of institutional investor trading transactions

| Year	Purchase		Sell		Overall	
	Before	**After**	**Before**	**After**	**Before**	**After**
2002	0.2844	0.2641	0.3009	0.2401	0.2932	0.2513
2003	0.3219	0.3030	0.1907	0.1883	0.2394	0.2341
2004	0.1583	0.1644	0.1803	0.2113	0.1665	0.1817
2005	0.2046	0.2188	0.2088	0.2254	0.2066	0.2218
2006	0.2188	0.1689	0.3064	0.2561	0.2753	0.2265
2007	0.2332	0.2025	0.3059	0.2682	0.2686	0.2335
2008	0.2397	0.2418	0.2277	0.2509	0.2369	0.2438
Average	0.2373	0.2234	0.2458	0.2343	0.2409	0.2275

Table 5 (continue)
Probability of Inform-based Trading (PIN) before and after Insider Trading

Panel D: PIN of foreign investor trading transactions

Year	Purchase		Sell		Overall	
	Before	After	Before	After	Before	After
2002	0.1786	0.2224	0.2036	0.1677	0.1918	0.1932
2003	0.2277	0.1997	0.1568	0.1427	0.1831	0.1654
2004	0.0342	0.2017	0.1647	0.1512	0.0831	0.1831
2005	0.1619	0.1809	0.1906	0.1647	0.1752	0.1734
2006	0.1670	0.1718	0.1796	0.1928	0.1751	0.1857
2007	0.1975	0.1406	0.3290	0.1364	0.2617	0.1386
2008	0.1754	0.2515	0.2028	0.2297	0.1818	0.2468
Average	0.1632	0.1955	0.2039	0.1693	0.1788	0.1837

The table summarizes the Probability of Inform-based Trading (PIN) before and after insider trading transaction over 2002 - 2008. Panel A reports PIN estimated using all types of investors. Panel B through D reports PIN estimated by transactions by retail, institutional, and foreign investors, respectively.

Figure 4
Average PIN before and after Insider Trading
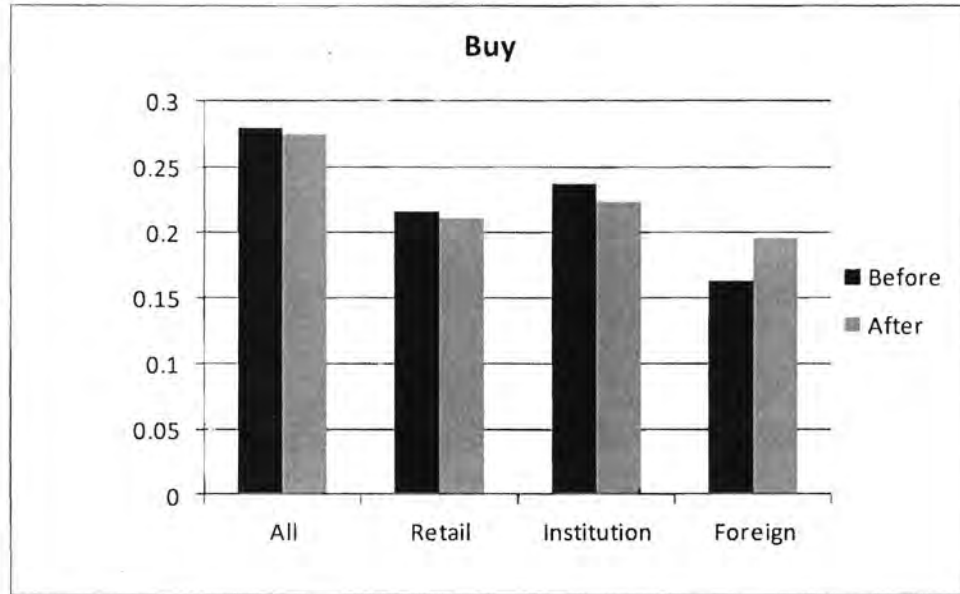
Figure 4a: PIN of insider buy transactions
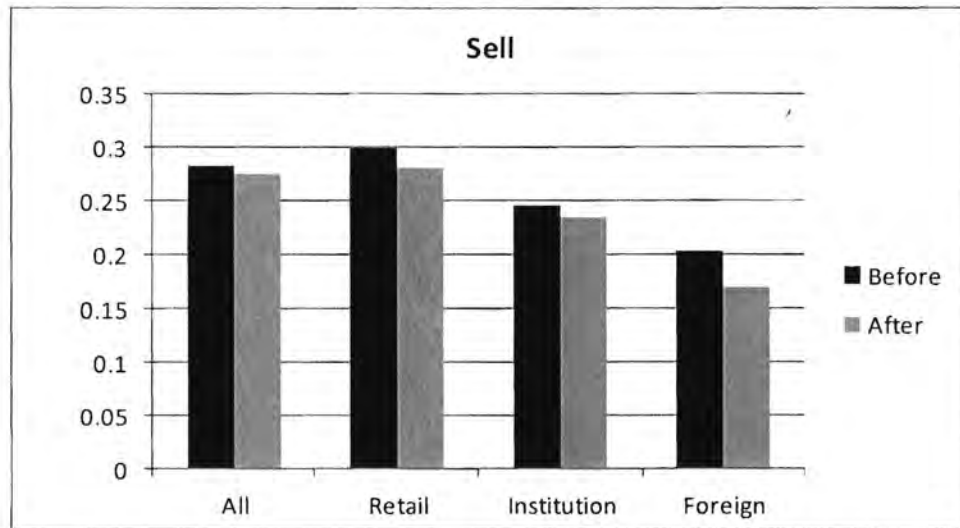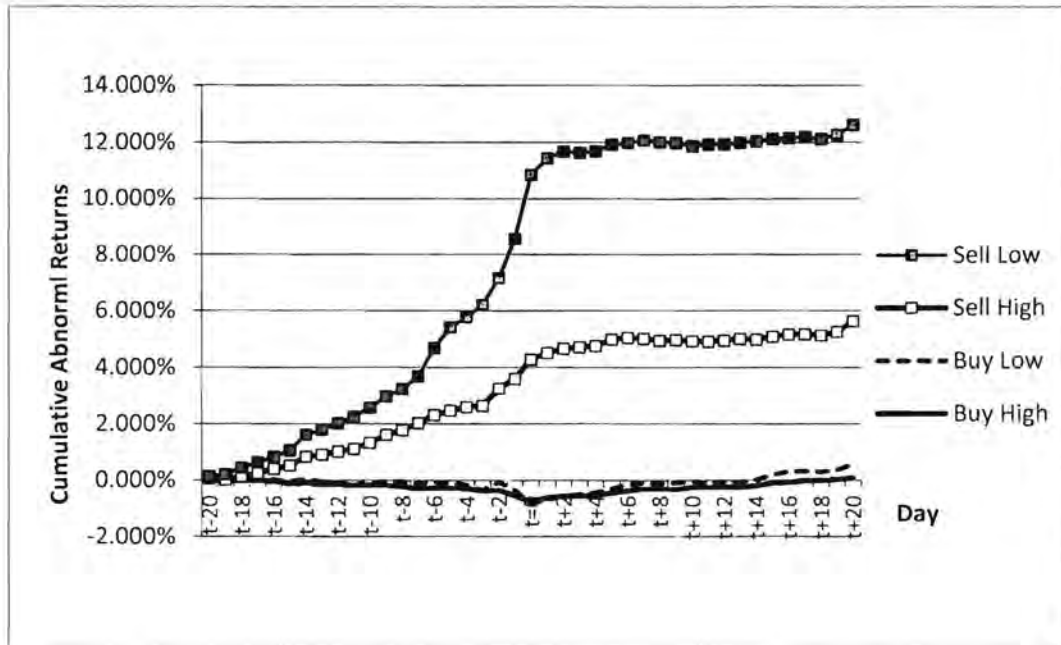

Figure 4b: PIN of insider sell transactions

The figure shows the average Probability of Inform-based Trading (PIN) before and after insider trading transactions over 2002 - 2008.

Table 6
Daily abnormal returns of portfolio formed by PIN around Insider Transaction Date

Day	Purchase Transactions		Sell Transactions	
	High PIN	Low PIN	High PIN	Low PIN
t-20	0.059%	-0.035%	0.038%	0.072%
t-19	-0.039%	-0.017%	0.002%	0.119%
t-18	-0.041%	0.050%	0.112%	0.118%
t-17	-0.006%	0.019%	0.105%	0.069%
t-16	-0.013%	0.032%	0.133%	0.049%
t-15	-0.088%	0.025%	0.182%	0.113%
t-14	0.037%	0.048%	0.233%	0.241%
t-13	-0.059%	-0.043%	0.169%	0.099%
t-12	0.004%	-0.051%	0.151%	0.124%
t-11	-0.048%	-0.015%	0.153%	0.132%
t-10	0.012%	0.053%	0.155%	0.102%
t-9	-0.019%	0.076%	0.216%	0.117%
t-8	-0.040%	0.024%	0.185%	0.091%
t-7	-0.069%	0.007%	0.303%	0.205%
t-6	0.025%	0.036%	0.224%	0.694%
t-5	-0.014%	-0.024%	0.191%	0.564%
t-4	-0.008%	-0.050%	0.179%	0.232%
t-3	-0.074%	-0.123%	0.230%	0.376%
t-2	0.009%	0.289%	0.308%	0.338%
t-1	-0.189%	-0.091%	0.605%	1.007%
t=0	-0.214%	-0.272%	1.126%	1.529%
t+1	0.148%	0.003%	0.074%	0.337%
t+2	0.060%	0.072%	0.020%	0.080%
t+3	0.000%	0.044%	0.005%	-0.086%
t+4	0.027%	0.024%	-0.002%	0.004%
t+5	0.081%	0.064%	0.082%	0.006%
t+6	0.085%	0.067%	-0.087%	0.006%
t+7	0.055%	0.006%	-0.091%	0.115%
t+8	-0.002%	-0.031%	-0.033%	-0.005%
t+9	-0.013%	0.057%	-0.022%	-0.045%
t+10	0.066%	-0.030%	-0.075%	-0.063%
t+11	-0.008%	-0.042%	0.032%	0.068%
t+12	0.018%	0.024%	-0.006%	-0.030%
t+13	-0.012%	0.004%	0.061%	-0.002%
t+14	0.060%	0.016%	-0.095%	0.074%
t+15	0.102%	0.069%	-0.064%	-0.023%
t+16	0.028%	0.092%	-0.042%	-0.039%
t+17	0.055%	-0.042%	0.003%	0.019%
t+18	0.008%	-0.028%	-0.020%	-0.024%
t+19	0.034%	0.030%	0.059%	0.020%
t+20	0.052%	0.162%	0.151%	-0.025%

This table presents average daily abnormal returns around (-20 through +20 days) the insider transaction dates of portfolio formed by PIN estimated before insider transaction dates. It reports abnormal returns adjusted by the market (SET index) returns of equally weighted portfolio formed by high PIN (above median) and low PIN (below the median) for insider buy and sell transactions.

Figure 5
Cumulative Abnormal Returns by PIN around Insider Transaction Date

The figure illustrates cumulative abnormal returns adjusted by market returns during -20 and +20 days of insider buy and sell transaction dates, according to PIN. Equally weighted portfolios are formed by high PIN (above median) and low PIN (below the median).

Table 7
Portfolio Performance by PIN

Weeks	Purchase Transactions		Sell Transactions	
	High PIN	Low PIN	High PIN	Low PIN
1	0.621%	0.296%	0.267%	0.104%
2	0.245%	0.070%	0.216%	-0.089%
3	0.238%	0.261%	-0.127%	0.141%
4	0.019%	0.236%	0.001%	0.290%
5	-0.181%	0.084%	-0.021%	0.256%
6	-0.011%	0.152%	-0.020%	-0.006%
7	0.027%	-0.046%	-0.032%	0.187%
8	0.037%	0.287%	-0.239%	0.139%
9	-0.025%	0.098%	0.071%	-0.140%
10	-0.270%	-0.005%	-0.154%	0.304%
11	0.116%	0.295%	0.047%	0.019%
12	-0.062%	0.043%	-0.390%	-0.176%
13	-0.052%	0.120%	-0.374%	-0.101%
14	0.015%	0.263%	-0.341%	-0.132%
15	1.103%	0.100%	-0.105%	0.037%
16	0.085%	0.107%	0.063%	0.022%
17	-0.009%	0.175%	-0.043%	-0.194%
18	0.115%	-0.035%	-0.346%	-0.273%
19	0.073%	0.263%	-0.086%	-0.296%
20	0.262%	-0.128%	-0.255%	-0.019%
21	0.156%	0.022%	-0.293%	-0.194%
22	-0.292%	-0.005%	-0.136%	-0.247%
23	0.124%	-0.010%	-0.384%	-0.226%
24	-0.160%	0.047%	-0.562%	-0.320%

The table shows weekly abnormal returns after insider transactions for the next six months (24 weeks). It reports abnormal returns adjusted by the market (SET index) returns of equally weighted portfolio formed by high PIN (above median) and low PIN (below the median) for insider buy and sell transactions.

Figure 6
Cumulative Abnormal Returns by PIN over the 6 months
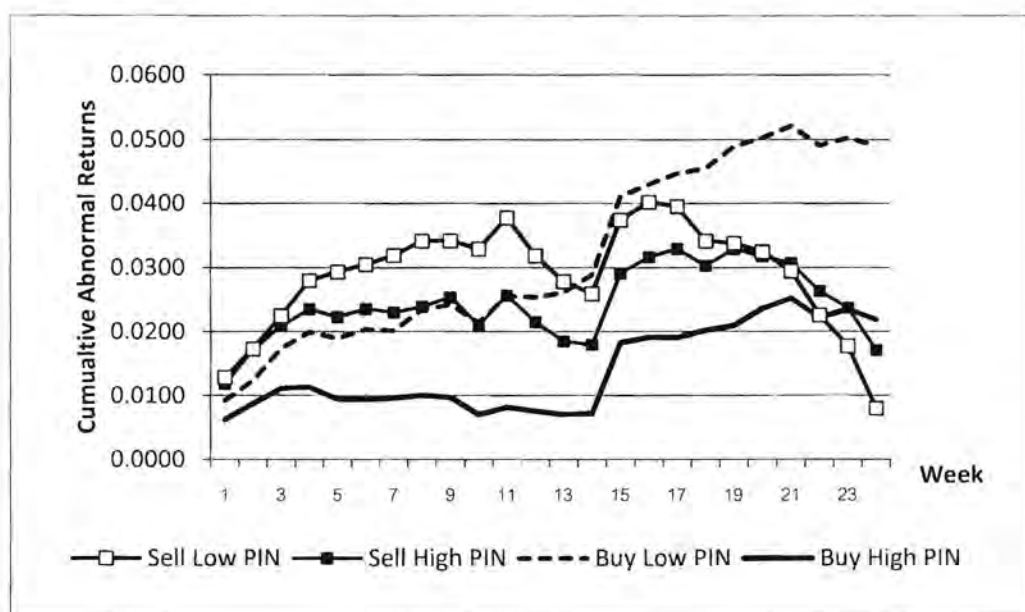
The figure shows cumulative weekly abnormal returns adjusted by market returns of equally weighted portfolio formed by the PIN for the next six months (24 weeks).